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Lower Yaak, O'Brien, Sheep

Final Environmental Impact Statement

Three Rivers Ranger District
Kootenai National Forest
Lincoln County, Montana

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Lower Yaak, O'Brien, Sheep (OLY) Project
Final Environmental Impact Statement
Lincoln County, Montana

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Abstract: This Final Environmental Impact Statement (FEIS) documents the detailed analysis of four alternatives, including the no action alternative, which were developed for the Lower Yaak, O'Brien, Sheep Project (OLY). Alternative 1 is the no action alternative. Alternative 2 is the modified proposed action; it includes timber harvest, prescribed burning, regeneration openings over 40 acres and treatments within old growth which do not remove any attributes of old growth. Alternative 3 is similar to Alternative 2 and is the agency's preferred alternative. Alternative 4 is also similar to Alternative 2, but timber harvest would not create regeneration openings over 40 acres.

A summary of the changes between the Draft Environmental Impact Statement (DEIS) and the FEIS are described after the Summary section and before Chapter 1.

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Summary

Introduction

The Lower Yaak, O'Brien, Sheep (OLY) Project was developed to:

- promote healthy, resilient stands of early-seral species including western larch, ponderosa pine and western white pine
- promote healthy stands of Douglas-fir in areas where root rot is not actively infecting trees
- maintain or improve water quality and native species habitat
- provide forage opportunities while maintaining wildlife security
- Contribute to fire's role on the landscape and promote fire behavior characteristics and fuel conditions that allow for safe and effective fire management within and outside the wildland urban interface (WUI)
- provide wood products to the local and regional economies

The project area encompasses approximately 67,500 acres; this includes approximately 3,802 acres of other private land, 9,433 acres of private timber land, 589 acres of Montana State land, 9,628 acres within two Inventoried Roadless Areas (IRAs), 2,614 acres within Management Area MA2 (eligible wild and scenic rivers), 7,781 acres within MA5a (backcountry), 1,783 acres within MA5c (backcountry – motorized winter; non-motorized summer), 186 acres within MA4 (Research Natural Area) and 41,312 acres within MA6 (general forest). Approximately 5,624 acres of old growth are within the project area. Also, about one half of the project area (34,911 acres) lies within the WUI. A portion (186 acres) of the 1,715-acre Huson Peak Research Natural Area (RNA) lies within the OLY project area. No management activities would occur in the RNA. Map M-22 found in the map section of this Environmental Impact Statement displays the MAs within the OLY project area.

Desired conditions for the project area include a mosaic of diverse, productive habitats which would be available to provide both cover and forage for wildlife species. The desired condition for vegetation within the WUI would provide for defensible space and firefighter safety in the vicinity of homes within the project area. Prescribed fire would return fire's role on the landscape and be used to promote the growth and development of large trees and snags as well as provide forage and snag habitat in a mosaic pattern with areas of cover.

An interdisciplinary team (IDT or team) conducted field reviews in 2013 to determine the existing condition and needs for National Forest System (NFS) lands in the OLY project area. Following this field review, the Three Rivers Ranger District of the Kootenai National Forest (KNF) developed a proposed action for the OLY project.

The Forest Service has prepared this Final Environmental Impact Statement (FEIS) in compliance with the National Environmental Policy Act (NEPA) and other relevant Federal and state laws and regulations. This FEIS discloses the direct, indirect and cumulative environmental impacts that could result from the proposed action and alternatives. The document is organized into three chapters with maps and appendices at the end:

Changes between the FEIS and DEIS: This section lists the changes incorporated into the FEIS in response to public comments and internal review.

Chapter 1 – Purpose and Need: This chapter characterizes the project area, describes the purpose and need for the project, the agency's proposal for achieving that purpose and need, and a description of the process used to develop this proposal. It also explains the scope of the analysis and the decisions to be made.

Chapter 2– Alternatives: This chapter details how the Forest Service informed the public of the proposal, how the team identified the issues that drove alternative development, and other alternatives that were considered but not analyzed in detail. It provides a detailed description of the agency's proposed action and presents alternatives for achieving the stated purpose and need. This section provides a summary table of how each alternative addresses the purpose and need and the key issues. It also includes design features developed for the action alternatives to help protect resources.

Chapter 3 – Affected Environment and Environmental Consequences: This chapter describes the affected environment and the environmental effects of implementing the proposed action and other alternatives. This analysis is organized by resource and contains required agency disclosures and literature cited.

Chapter 4 – Response to Comments: This chapter categorizes the comments received after the Draft Environmental Impact Statement was released, and the responses to those comments.

Appendices – The appendices provide the maps, best management practices, unit summary tables for each alternative, information about road work and prescribed burning activities, access management plan, monitoring plan, cooperators, and other supporting information for this FEIS.

Additional supporting information may be found in the project file located at the Three Rivers Ranger District Office in Troy, Montana. Key documents and communications with the public have been posted to the forest website www.fs.usda.gov/projects/kootenai/landmanagement/projects.

Changes between DEIS and FEIS

A summary list of substantive changes between the DEIS and Final Environmental Impact Statement (FEIS) are provided below. These include edits to discussion, additions to discussions, changes in values and insertions; additions/edits/deletions to Literature Cited; citations and reorganization of discussion. Minor citation corrections, formatting and spelling edits are not listed here.

Chapter 1 Changes:

- Inserted a description of two Management Areas (MAs), MA4 and MA5c. The description and acres of these two MAs was not included in the DEIS. No treatment would occur within these two MAs in the OLY project.
- FEIS p. 9: Removed the following sentence: "In, addition, these treatments would not remove any old growth attribute."

Chapter 2 Changes:

- Inserted a more thorough discussion of Project Development at the beginning of the Proposed Action section which describes the process used by the IDT to develop the Proposed Action. This included four new maps: Figure 8 (Areas in Need of Vegetation Management), Figure 9 (Areas in Need of Vegetation Management with RHCAs and Past Regeneration Harvest Excluded), Figure 10 (Harvest Units Identified Focusing on WUI, Root Disease, Off-site Ponderosa Pine and Existing Roads), and Figure 11 (OLY Project Area and Proposed Treatments).
- A discussion of "Rationale for Issue Development or Consideration" was added to Issue Identification. The discussion included five criteria used to determine lack of significance.
- The title to Table 2 was edited because it only displays data relevant to Alternative 2. The wording in the title referring to Alternative 3 was removed.
- The description of Key Issue 2, Protection of Historic Properties, was further developed. Wording was included to describe how Alternative 3 was developed, in part, to respond to the Confederated Salish and Kootenai Tribes' concerns for the protection of historic properties.
- Within the "Key Issues that Drove Alternative Development" section, two special considerations items (old growth and treatment acres within the Wildland Urban Interface) were inserted. These were not key issues but worthy of mention because they were brought up by the public as well as internally, and were analyzed in the OLY project.
- Within "Alternatives Considered but Eliminated from Detailed Analysis: Drop Proposed Harvest Units in Grizzly Bear Core Habitat", the discussion was rewritten to better clarify the Interdisciplinary Team's (IDT) rationale.
- A description of the change in ending season date from April 30 to March 31 for motorized over-snow vehicle access to reduce potential disturbance effects to emerging grizzly bears was inserted within the Timber Harvest section for each action alternative.
- In the Alternative 2 – Modified Proposed Action section, a bullet was added stating, "In Alternative 2, Modified Proposed Action, regeneration Harvest Units 18 and 20 were

further modified to reduce their combined opening size from 190 acres to approximately 100 acres."

- Within each section for the action alternatives, a description of management activities in WUI was added to their respective "Timber Harvest" section.
- Within the "Activities Common to Alternatives 2, 3, and 4" section, a Timber Suitability section was inserted prior to the Design Features section.
- A Table Note was added to Table 15 to clarify that NO regeneration harvest would occur within the 16 acres of old growth in Unit 75. These 16 acres would receive improvement cut only.
- Added a suitability description of Harvest Units 73 and 75 at the end of the Timber Suitability section and inserted Figure 18 and Figure 19.
- Within the "Funding Dependent Resource Improvement Work" section at the end of Chapter 2, a sub-bullet was added to describe that required restoration for units exceeding 15 percent Detrimental Soil Disturbance, after post-harvest monitoring, may be funded by other funding.

Chapter 2, Design Features:

- A bullet and sub-bullets were added for Aquatic Species
  - Culvert replacements, culvert removals, and/or other in-stream work in live streams that are known to contain or are connected to streams that are known to contain westslope cutthroat trout or bull trout would be permitted only during the specified timeframe listed below to protect spawning and incubation periods for westslope cutthroat trout and bull trout (which exist downstream and outside of the project area). These road activities may occur outside of this timeframe only if dry channel exists downstream of the project site.
    - Westslope cutthroat trout timeframe: After July 15
    - Bull trout timeframe: Before August 31
    - Both westslope cutthroat trout and Bull trout: Between July 15 and August 31

  Paving of FSR 4445 bridge approaches may occur outside of the above timeframe for bull trout if measures are taken to prevent sediment contribution to O'Brien Creek (e.g. placement of straw waddles) and if a Forest Service biologist inspects the operation if the work is to be done after August 31st.

- A bullet was added under the "Special Provisions for Public Access on Decommissioned and Stored Roadways" section to discuss the change in the motorized over-snow vehicle season.
- The following wording was added:
  - Winter logging over frozen ground and a cut-to-length system (log forwarding) is required in Harvest Units 33, 34, 35, 35A, 36, 37 (**west side of powerline only**).
  - Landing locations in these units **will be specified in advance of the award of the contract** (C6.4#, C6.42#).

- A row was inserted in Table 28 and Table 29 to show that Harvest Unit 33 would be winter logged.
- The symbol, (HP), was added to Unit 34 in Table 28 and Table 29 as a justification to winter harvest. HP is a designation for Historic Properties.
- Within the Soils section of Design Features, a description that soils restoration might be funded by KV or Stewardship funds was added.
- Within the Wildlife Grizzly Bear section of Design Features:
  - The Bullet, "No harvest or associated slashing, machine piling, ….", was edited to include: "Along open roads, routine road maintenance activities (e.g., blading, culvert cleaning, brushing, **and other activities of a similar nature**), loading/hauling of logs, and hand thinning of Fuels Units F7, F8, F18, F20, F22, F26, F29, F31, F32, F33, F34, F35, F36 may occur during this period. **Also, road maintenance activities may occur on gated roads during the spring bear use period but must be completed within administrative use levels.**"
  - A new bullet was added: "**Due to management activities on NFSRs 4433 and 4445 (along Lynx Creek) that will provide continued snowmobile access into predicted grizzly bear denning habitat, a forest order would prohibit over-snow motorized use of these roads in the spring after March 31 to reduce potential disturbance effects to grizzly bears during the spring emergence period.**"
  - A sub-bullet was added under the "Stimson Lumber Company has proposed …." Bullet: "**Proposed activities will not occur during the spring bear use period (4/1 – 6/15).**"
  - A sub-bullet was added under "To compensate for the loss of grizzly bear Core habitat:": "**Stimson would provide for the in-kind replacement of Core by placing barriers on five of its roads #4407A, #4407C, portion of #4407E, #9905, and #9909. All other roads located behind these barriers would also be barriered to motorized use and includes roads #14115, #14369, #9905A, #9905B, #9905C, and #9909B. These roads are located on Stimson property and are currently restricted (gated) to public motorized use.**"
  - A sub-bullet was added under "To compensate for the loss of grizzly bear Core habitat:": "**Newly created areas of Core will remain in place for a minimum of 10 years barring unforeseen circumstances.**"
  - A bullet point was added to discuss the rationale for reducing the closing date for motorized over snow vehicle access from April 30 to **March 31**.
  - The "Prior to road reconditioning" bullet was edited. "Reconditioning" was replaced with "construction/reconstruction". And the following was added to the end of the bullet: "**The newly created Core areas will remain in place for a minimum of 10 years barring unforeseen circumstances. Harvest of 13 units accessed via open county roads could occur prior to or concurrent with watershed and barrier installation work associated with the in-kind replacement of Core; allowed units include units 5, 6, 7, 15, 16, 23, 24, 25, 27, 42, 50, 55, and 55A**."
  - To the "Currently gated or barriered/impassable roads will remain . . ." bullet, the following was added: "**Purchaser shall install a Temporary Activity Barrier on roads where physical barriers are removed.**"

- Added a new bullet: “The newly created Core areas will remain in place for a minimum of 10 years barring unforeseen circumstances.”
- A sub-bullet, “Proposed activities will not occur during the spring bear use period (4/1 – 6/15)”, was added under the bullet starting with “Stimson Lumber Company has proposed . . .”
- A sub-bullet, “The newly created Core areas will remain in place for a minimum of 10 years barring unforeseen circumstances.”, was added under the bullet starting with “To compensate for the potential loss of grizzly bear Core habitat”
- Under the “To reduce potential cumulative effects to grizzly bear . . .” bullet, the two original DEIS sub-bullets were edited and two new sub-bullets about post-harvest fuels treatments and planting activities on Yaak Mountain were added:
  - Implementation of Stimson’s proposed road construction and harvest could not occur until OLY’s proposed harvest/machine piling of fuels, harvest associated road work, and watershed improvement activities have been completed on Yaak Mountain.
  - Similarly, Stimson’s proposed work could not occur until OLY’s harvest/machine piling of fuels and harvest associated roadwork activities have been completed on Kilbrennan Ridge.
  - OLY’s post-harvest fuels treatments and planting activities on Yaak Mountain and Kilbrennan Ridge would be planned to minimize road use in these areas. Specifically, if these activities occur within the same bear year as Stimson’s activities on Yaak Mountain, then road use on Kilbrennan Ridge and/or NFSR 4408 on Yaak Mountain would be managed to keep motorized use within administrative use levels.
  - OLY’s post-harvest fuels treatments and planting activities on Yaak Mountain will be coordinated with Stimson’s activities, if necessary, to minimize potential safety issues associated with the two activities occurring on the same road system.
- A bullet was added concerning watershed work on Yaak Mountain.
- The discussion within the bullet for watershed work on Pulpit Mountain/O’Brien Creek area and the bullet for watershed work in the Hummingbird Creek activity area were edited.
- The word “**potential**” was added to the last sentence in the bullet “There are six areas of proposed watershed improvement work ….”
- A sub-bullet was added: “**Watershed work on Yaak Mountain will occur at the same time as harvest or harvest related road work occurring on Yaak Mountain.**”
- Sub-bullets were edited to read:
  - Watershed work in the Pulpit Mountain/O’Brien Creek area would occur prior to most harvest or harvest associated road work as the Pulpit Mountain work would provide the majority of the in-kind replacement of Core habitat as described above (see Figure 20). Harvest of 13 units accessed via open county roads could occur prior to or concurrent with the watershed work in this area; allowed units include units 5, 6, 7, 15, 16, 23, 24, 25, 27, 42, 50, 55, and 55A. (see Figure 14)

- Watershed work in the Hummingbird Creek activity area would not occur until all harvest activities (including mechanical piling and roadwork) are completed within the Project Area, including Stimson's proposed activities, and could not occur within the same bear year (April 1 through November 30).

Unit Specific Design Features Tables

- Within Design Features Table 27, the fuels units which pertain to old growth was corrected. The correct list is: F02, F05, F13, F19, F25, F26, F29
- Within Design Features Table 28 and Table 29, post-harvest soil monitoring was added to Units 52B and 61 because these units used the reduced Detrimental Soil Disturbance assumption for secondary entry.
- Removed Soils, (S), as a reason for winter harvest for Unit 37 in Table 29.
- FEIS p. 106: Near the end of Chapter 2, "Table 30 Comparison of Alternatives by Measurement Indicator" was inserted.

Chapter 3 Changes:

- FEIS p. 123: In the Air Quality section, "Federal Law" heading was added to the Regulatory Framework Findings section, moved applicable discussion within the text under that heading and added to that discussion.
- FEIS p. 134: The **American Indian Consultation** section was added after Air Quality section in Chapter 3.
- FEIS p. 147: In the Aquatic Habitat and Species section, the discussion of white sturgeon was rewritten. Also, a discussion of PACFISH/INFISH Biological Opinion (PIBO) and a table displaying PIBO information was included.
- FEIS p. 165: Deleted words "331 and" from the following sentence, "Sediment release generated from paving bridge approaches on ~~331 and~~ NFSR 4445 would be short term and these BMP requirements would ultimately reduce sediment contributions to O'Brien Creek by up to 5 cubic yards per year."
- FEIS pp. 176 and 180: In the Cultural Resources section, the harvest and fuels treatment acreages were corrected to display 3,127 acres of timber harvest units and 1,716 acres of fuels treatment (848 acres of fuels units and 868 acres of ecosystem prescribed burns).
- FEIS p. 196: In the Fire and Fuels section, an Assumptions and Limitations section was added.
- FEIS p. 200: Fire and Fuels section, added the following: "As stated previously, mixed severity fires, including stand replacing crown fire are part of the desired condition to increase fire's role on the landscape in the OLY project area. It is recognized that some species, for example black-backed woodpecker (See the Black-backed Woodpecker section in Chapter 3), benefit from high severity fires. Severe wildland fires will continue to occur under certain environmental conditions, and therefore habitats for species dependent on high-intensity fire would continue."

- FEIS p. 203: The words “the lack of” were removed from the following sentence: “The vegetation within the OLY analysis area has been altered over time due to several factors, such as ~~the lack of~~ fire suppression and vegetation management.”
- FEIS p. 252: In Forest Vegetation, a discussion of regeneration openings over 40 acres was added for Alternative 3.
- FEIS p. 257: In Forest Vegetation, the acres of precommercial thinning was corrected from 715 to 650 acres. Also the wording that refers to “feathering” in design features was removed since that is not a design feature.
- FEIS p. 265: In Forest Vegetation, the discussion of compliance with FW-STD-TBR-02 was corrected. In the DEIS it was incorrectly stated the both Alternatives 2 and 3 had 32 regeneration harvest units which created or contributed to 22 regeneration openings over 40 acres. Alternative 3, in fact, has 30 regeneration harvest units which create or contribute to 20 regeneration openings greater than 40 acres.
- FEIS p. 266: in the Forest Vegetation, a discussion of compliance with FW-GDL-TBR-01 was included in the Regulatory Framework Findings section.
- FEIS p. 267: in the Forest Vegetation section, the Forest Plan FW-GDL-VEG-05 and the OLY compliance was added.
- FEIS pp. 298-307: Within Inventoried Roadless section, a discussion of the rationale used to determine the location of the Saddle Mountain Inventoried Roadless Area (IRA) was added. Additionally a discussion of unroaded areas contiguous to IRAs was added, and a column for Roadless Expanse was added to Table 85, Activity Units Analyzed for Their Proximity to the Saddle Mountain IRA.
- FEIS p. 318: in the Old Growth section, a Table Note was added to Table 89 to clarify that NO regeneration harvest would occur within the 16 acres of old growth in Unit 75. These 16 acres would receive improvement cut only.
- FEIS p. 333: in the PTES section, the term classic was removed in referring to old growth in one location. “The action alternatives propose that ~~classic~~ old growth, which provides potential habitat for moonworts within the wetter habitat types, be reserved.”
- FEIS p. 373: in the Scenic Resource section, Table 108 was added. It displays how each harvest unit met the Scenic Integrity Objective (SIO). A Google Earth image (Figure 34) was also added which displays the location of viewpoints relative to the OLY project area that were used in the scenic analysis.
- The Soils section was reorganized for clarity. Also, a further explanation of the Detrimental Soil Disturbance for Harvest Units 41B and 35B was provided and an explanation that these units would not occur in Alternative 3. A discussion was also clarified that in Alternative 3 all units would meet the Regional Soil Quality Standards as well as Forest Plan guidance.
- FEIS p. 382: In Soils, a citation (Page-Dumroese et al. 2009) was added to the text.
- FEIS p. 384: In Soils, a table note was added to Table 110 to reflect why season of harvest was not applicable. Also added a row to differentiate skyline with feller-buncher and skyline without feller-buncher logging system.

- FEIS p. 401: In Soils a column was added to Table 114 to describe predicted DSD after decompaction for those units which required soil decompaction. Also corrected the Table Note to replace Regional Soils Supplement (~~1999~~) with (2014).
- FEIS p. 409: In Soils, a table note was added to Table 115 to explain that some fuels units were not sampled for Detrimental Soil Disturbance because there would be no machinery used.
- FEIS p. 412: Added the words "desired conditions" to end of an incomplete sentence.
- FEIS p. 417: In Soils, Replaced the last sentence in a paragraph in the Temporary Road and Landings Section with new wording:
  - Original - Soil restoration would be required in units that exceed 15 percent soil disturbance. To meet Regional Standards, skid trails and landings would be ripped and/or re-contoured and covered with slash and CWD; FW-GDL-SOIL-02 and FW-GDL-VEG-03. Post-harvest and fuel abatement soil monitoring will determine if soil decompaction would be required. As a result, cumulative effects of prior management and the proposed harvest activity are not expected to exceed the threshold of 15 percent for detrimental soil disturbance in any activity area.
  - Replaced with - If restorative treatments are used in conjunction with adequate control of skidding equipment in activity areas that are being re-entered, the end result will be a net improvement in soil quality. Therefore, soils quality standards would be met. In areas where more than 15 percent detrimental soil conditions exist from prior activities, the cumulative detrimental effects from project implementation and rehabilitation should not exceed the conditions prior to the planned activity.
- FEIS p. 461: Values were edited within Table 123 "Alternatives 2/3/4 Sediment Reduction from Treated Stream Crossings, Road Storage, Decommissioning, and Stream Site Stabilization" in the Water Resource section. These changes were computation corrections and did not change the analysis or conclusions.
- FEIS p. 461: In Water Resources section, the word "continued" was added: "Three crossings were identified as high priority for treatment: two crossings at the end of NFSR 4433B where the culverts will be removed and crossings recontoured, and one crossing on NFSR 4433 where the culvert will be replaced with a larger capacity culvert in order to provide **continued** snowmobile access." This was also added in response to comment [09, 16], FEIS p. 822.
- FEIS p. 465: Table 125 "Ongoing and Foreseeable Actions in the OLY Project Area" in the Water Resource section: a citation was corrected ~~(USDA and USDI 2001)~~ (USDA 2005).
- **North American wolverine status change:**
  - After the DEIS was completed, the status of the North American wolverine changed from sensitive to proposed as of May 2016. As a result, the entire wolverine section was moved from the Sensitive Species section of the FEIS to the Threatened, Endangered, and Proposed Species section. The determination changed from "may impact individuals or their habitat, but will not likely contribute to a trend toward federal listing or cause a loss of viability to the population or species", to: **would not jeopardize the continued existence** of the proposed species.

- Language was changed on FEIS pp. 590, 591, 593, 595-598, 600-601 to address the change in status of North American wolverine from sensitive to proposed.
- North American wolverine was removed from Table 154, Sensitive Wildlife Species (FEIS p. 603), and was added to Table 126, Threatened, Endangered and Proposed Terrestrial Wildlife Species (FEIS p. 476).
- Added "Other Agencies and Individuals Consulted" heading at the end of the wolverine section and added a discussion of Kevin Aceituno.

◦ In the Wildlife Grizzly Bear section:
- Added discussion of Kevin Aceituno to the "Other Agencies and Individuals Consulted" section.
- Changed the date from November 21 to November **30**: "Administrative use within the CYE shall not exceed 60 vehicle round trips per active bear year (April 1 – November 30) per road (FW-STD-WL-02)."
- Added NFSR 4433 and "along Lynx Creek" to: "Also, to reduce potential disturbance effects to grizzly bears during spring emergence, a forest order would prohibit motorized over-snow use on **NFSR 4433** and NFSR 4445 **along Lynx Creek** between March 31 and November 30 to be consistent with the 2015 Forest Plan guideline FW-GDL-WL-01 (see Design Features, Chapter 2), following the implementation of proposed watershed and recreation improvement work that would maintain existing snowmobile access (see "Motorized Over-Snow Vehicles")."
- Added discussion of 13 identified units via open county roads "Storage and decommissioning work in the Pulpit Mountain/O'Brien Creek activity area must occur prior to **most** harvest or harvest associated road work in order to provide the required in-kind replacement of Core. **Harvest may only occur prior to or concurrent with the Pulpit Mountain/O'Brien Creek watershed work in 13 identified units (see Design Features, Chapter 2) that would be accessed via open county roads. Use of these open roads would not impact the habitat parameters of Core, OMRD, or TMRD and would not be expected to result in a noticeable increase in disturbance to grizzly bears compared to the existing and regular use of these roads.** Proposed activities taking place on Yaak Mountain **would** be implemented concurrent with **either** harvest **activities or** associated road work **occurring on Yaak Mountain**."

◦ In the Wildlife Canada Lynx section:
- Added discussion of Kevin Aceituno to the "Other Agencies and Individuals Consulted" section.

◦ In the Wildlife Canada Lynx Critical Habitat section:
- Added discussion of Keven Aceituno and Katrina Dixon to the "Other Agencies and Individuals Consulted" section
- Edited title Table 151 and replaced Vegetation Management with Harvest: "During Project and Future Effects[1] of **Harvest Activities** to Lynx Critical Habitat PCE Conditions within the China LAU"

◦ In the Wildlife Fisher section:
- The values in Table 170 "Acres of Proposed Vegetation Management . . ." were edited. The Total Treatment values were incorrectly displayed. They should

"Yearlong: 1,110 acres" for Alt 2; "Yearlong 1,096 acres" and "Winter: 62 acres" for Alt 3; and "Yearlong: 862 acres" and "Winter: 62 acres" for Alt 4.

- In the Wildlife Migratory Birds section:
  - The values in Table 190 were edited. Intermediate Harvest, should be "1,011 acres" in Alt 2 and "1,008 acres" in Alt 3. Regeneration Harvest should be "2,116 acres" in Alt 2 and "2,061 acres" in Alt 3.
  - The acres were edited in the third paragraph of the Harvest Section: "Alternative 2 proposes the most harvest within the OLY project area at approximately 3,127 acres including **2,116** acres of regeneration harvest."
- FEIS p. 491 edited the discussion of "probability of decline" both in the text and footnote [8] to read as follows:
  - "The 2015 Forest Plan incorporated the 2011 Access Amendment as a standard (FW-STD-WL-02) to be applied within the portion the KNF that falls within the CYE. FW-STD-WL-02 provides the habitat parameter standards by BMU for Core, OMRD, and TMRD as analyzed below and considers the best available science (Allen et al. 2011) for the CYE. The estimated grizzly bear population has increased since 1999 (20 bears) through the early 2000s (30 to 40 bears) to a current maximum estimate of 69 bears, although the actual number likely falls within the range between 37 and 69 bears (Kasworm et al. 2000, 2003, 2004, 2014). Similarly, an improvement in the calculated percent "probability of decline" (measured as a percent) has been observed since 2006, decreasing from 94 to 57 percent in 2012 (Kasworm et. al 2007, 2013) to 50 percent in 2013 (Kasworm et al. 2014)[8].
  - [8] The "probability of decline" reflects the probability that repeated calculations of the growth rate, using random combinations of values rather than the mean value from all years, would result in values of < 1 (i.e., a decreasing population). Therefore, although an improvement in the "probability of decline" does not directly indicate that the grizzly bear population is increasing, it means that the calculated growth rate is getting closer to 1.0 (i.e., a stable population). Even when the growth rate becomes just greater than 1.0 (i.e., an increasing population), there would still be some probability that the population is in decline due to portions of the bell curve still falling below 1.0. As of 2013, the growth rate reached 1.0 reflecting a stable population (Kasworm et al. 2014). A year later, the reported growth rate of 1.014 indicates an increasing population (Kasworm et al. 2015). This suggests that the KNF's wheeled motorized access management policy over the last decade has contributed to improving the grizzly population towards recovery goals within the CYE by improving BMU parameter levels with many now meeting or being better than the standards. Implementation of FW-STD-WL-02 would continue this trend.
- FEIS p. 551, added the following paragraph:
  - "Kosterman (2014) looked at the relationship between Canada lynx reproductive success and lynx habitat within occupied female lynx home ranges in Northwest Montana. The findings of this Master's research, provided in the 2014 thesis, provides new information to consider with regards to the management of lynx and lynx habitat. As such, Kosterman (2014) has been provided as opposing science to the current management direction provided by the NRLMD. However, a review of these findings (Marten 2016) present rationale and examples as to why "it is

premature to conclude that the current management direction provided in the NRLMD is inadequate." In particular, although there appears to be a relationship between habitat and lynx reproductive success, the relationship is "not well enough understood to determine if, or what, specific changes in management are warranted" (ibid). Also, "the parameters and metrics used to demonstrate this relationship do not cross-walk well to the metric standards provided in the NRLMD" (ibid)."

- FEIS p. 644, inserted the following:
  - "High severity fire is a natural disturbance process that has occurred historically within the project area. Certain wildlife species, such as the black-backed woodpecker discussed in this analysis, have developed a close association to the habitat conditions created from fire. Because of demonstrated benefits to ecosystem function and resilience and by providing high quality habitat to certain wildlife species, DellaSala and Hanson (2015) and Hutto (2008), for example, advocate the need to both acknowledge the role of moderate and high severity fire on the landscape as well as to allow for its continued occurrence on the landscape.
  - A purpose and need of this project is to reduce the potential for high severity fires in the WUI; however, the proposed activities are not intended nor expected to eliminate all fires from the project area, especially high severity fires. For example, although wildfire activity did not occur within the project area in 2015, ; however, an increase in fire activity occurred on the KNF as approximately 32,724 acres were burned this past year. This is 24,917 acres more than what was reported in the past 8 years combined. This includes the Tepee Fire which is within a couple of air miles from OLY's western boundary and that burned approximately 1,018 acres. This increase in fire activity is consistent with those expected in Bonn et al. 2007 and ERG 2012 and would benefit black-backed woodpeckers across the KNF. Also, 2015 Forest Plan direction encourages the use of wildland fire to help trend the vegetation towards desired conditions (FW-DC-FIRE-03). Under the right seasonal conditions, those natural wildland fires allowed to burn within more remote areas of the OLY project area (e.g., backcountry MAs or IRAs) would create mosaics of burned and general forest conditions that would also benefit black-backed woodpeckers by creating high quality foraging habitat."

- FEIS p. 796, edited the word "most" to many: A large, high severity wildfire would remove habitat for **many** species, although in the short-term it would favor those species that prefer open, early successional-stage habitats such as black-backed woodpeckers.

- FEIS p. 802, added the following paragraph to the "Burned Forest" section:
  - High severity fire is a natural disturbance process that has occurred historically within the project area. Certain wildlife species, such as the black-backed woodpecker, have developed a close association to the habitat conditions created from fire. Because of demonstrated benefits to ecosystem function and resilience and by providing high quality habitat to certain wildlife species, DellaSala and Hanson (2015) and Hutto (2008), for example, advocate the need to both acknowledge the role of moderate and high severity fire on the landscape as well as to allow for its continued occurrence on the landscape.
  - A purpose and need of this project is to reduce the potential for high severity fires in the WUI; however, the proposed activities are not intended nor expected to eliminate

all fires from the project area, especially high severity fires. For example, although wildfire activity did not occur within the project area in 2015, an increase in fire activity occurred on the KNF as approximately 32,724 acres were burned this past year. This is 24,917 acres more than what was reported in the past 8 years combined. This includes the Tepee Fire which is within a couple of air miles from OLY's western boundary that burned approximately 1,018 acres. This increase in fire activity is consistent with those expected in Bonn et al. 2007 and ERG 2012 and would benefit species associated with post-fire habitats, like black-backed woodpeckers, across the KNF. Also, 2015 Forest Plan direction encourages the use of wildland fire to help trend the vegetation towards desired conditions (FW-DC-FIRE-03). Under the right seasonal conditions, those natural wildland fires allowed to burn within more remote areas of the OLY project area (e.g., backcountry MAs or IRAs) would create mosaics of burned and unburned conditions that would also benefit a variety of migratory bird species.

Added Chapter 4: Response to Comments for the OLY DEIS

- FEIS pp. 815: Added a discussion of Kauffman 2004, McRae el al. 2001 and Hessburg and Agee 2003 in the Response to Comment [09, 05].
- FEIS p. 817: Added a discussion that due to natural causes the first surveyed reach of Kilbrennan Creek did not meet the Riparian Management Objective. Natural causes included the low gradient and that beaver dams and their resultant ponding had gone away due to flooding.
- FEIS p. 826: Addressed Sallabanks et al. 2001 in Response to Comment [09, 100 {B}].
- FEIS p. 921: Added discussion of snowshoe hare pellet observation to Response to Comment [09, 68 {B}].

Literature Cited Changes:

- In Aquatics Literature Cited, removed:
  - Johnson, Wayne J. (editor). 2004
  - Johnson, Wayne J. 1999
  - U.S. Department of the Interior Fish and Wildlife Service (USFWS). 1998. Interior Columbia Basin . . .
- In Aquatics Literature Cited, added:
  - Stagliano, D.M. 2015
  - U.S. Department of the Interior Fish and Wildlife Service (USFWS). 1998. Biological Opinion . . .
- In Aquatics Literature Cited, corrected: U.S. Department of Agriculture Forest Service ~~1999~~; to 2013 and corrected the title.
- In the Soils Literature Cited, added:
  - Bulmer, C., Archuleta, J. and Curran, M., 2007. Restoring and Enhancing Productivity of Degraded Tephra-Derived Soils.
  - Heninger, R., Scott, W., Dobkowski, A., Miller, R., Anderson, H. and Duke, S., 2002. Soil disturbance and 10-year growth response of coast Douglas-fir on nontilled

and tilled skid trails in the Oregon Cascades. Canadian Journal of Forest Research, 32(2), pp.233-246.

- In Water Resource Literature Cited, replace DEIS citation: ~~USDA Forest Service and USDI Bureau of Land Management, 2001. Off-highway vehicle record of decision for Montana, North Dakota and portions of South Dakota. Missoula, MT~~." with this citation: "USDA Forest Service. November 9, 2005. 36 CFR Parts 212, 251, 261, and 295. Travel Management; Designated Routes and Areas for Motor Vehicle Use, Final Rule. Federal Register Vol. 70, No. 216. 26 p."
- In the Wildlife section added:
  - DellaSala, D., and C. Hanson (Eds). 2015. The ecological importance of mixed-severity fires: nature's phoenix. Elsevier Inc., Waltham, MA. 450 pp.
  - Hutto, R. 2008. "The ecological importance of severe wildfires: some like it hot." Ecological Applications 18(8): 1827-1834.
  - Kasworm, W., T. Radandt, J. Teisberg, A. Welander, M. Proctor, and C. Servheen. 2015. Cabinet-Yaak Grizzly Bear Recovery Area 2014 research and monitoring progress report. Unpublished report, USDI Fish and Wildlife Service, Missoula, Montana 96 p.
  - Kosterman, M. 2014. Correlates of Canada lynx reproductive success in Northwestern Montana. Missoula: University of Montana; 79 p. Master's thesis.
  - Marten, L. [Letter to Michael Garrity]. 2016 April 20. Regarding applicability of new information provided in 2014 thesis by Megan Kosterman to Canada lynx management. 2 p.

Appendices Changes:

- Added "Passive Decommissioning" to Glossary.
- Appendix C Harvest Summary: Changed the season of year for in Units 43, 45A, 45B, 47, 49, 50, 52, 58 and 62 in Alternatives 2, 3, and 4 from tractor/winter to tractor. The season was incorrectly written in the appendices. Also the logging system in 45B was changed from Skyline to Tractor. It was incorrectly written in the appendices.
- Appendix E Access Management:
  - Edited discussion within Map Index numbers 21, 24 and 25 to say "Prior to most harvest activities; See Design Features for exceptions."
  - Added a row and associated discussion for a new map index number "25A" to depict the season ending date for motorized over-snow vehicle access on NFSR 4445 and the NFSR 4433 road system.
  - Added Map Index 25A to the Access Management Map in Appendix E.
- Added three zoomed-in subset maps for each alternative map Map M-6 (6.1, 6.2, and 6.3); Map M-7 (7.1, 7.2, and 7.3); Map M-8 (8.1, 8.2, and 8.3)
- Added map M-25 Recreation and Scenic River Segments.

Chapter 1 – Purpose and Need

Project Area Description

The OLY project area encompasses approximately 67,500 acres in the immediate vicinity of Troy, Montana. The legal description includes Townships 31, 32, 33, and 34 North; Ranges 32, 33, and 34 West; Lincoln County, Montana. Figure 1 displays the project area vicinity map.

The project area includes 9,628 acres located within two IRAs (Saddle Mountain IRA #168 and Flagstaff Mountain IRA #690), 2,614 acres within eligible wild and scenic rivers, 589 acres of State lands, 9,433 acres of private industrial forest land, and 3,811 acres of privately owned land. The privately owned lands and WUI are mainly located near Troy and along U.S. Highway 2.

A number of small lakes lie within the project area, some of which are located on private property and some that are located on National Forest System (NFS) lands. Kilbrennan and Alvord Lakes are popular areas for fishing, hiking, and camping. The Troy Shooting Range, developed over the last 10 years, is very popular, and offers a variety of shooting practice areas and shooting sports. The project area is important to people for other activities such as picking huckleberries, hunting, hiking, winter recreation, snowmobiling, mountain biking, firewood cutting, fishing, scenic driving, horseback riding, and camping.

The project area includes 34,911 acres (approximately 52 percent) within the WUI as well as areas that are somewhat higher in elevation and more remote. Both inside and outside the WUI some stands have increased fuel loadings and ladder fuels due to fire exclusion, fire suppression, and past management activities. These fuel conditions are susceptible to high intensity stand replacing wildfires.

Some of the lowest elevation, warm habitats found on the Three Rivers Ranger District are located within the project area. Both warm/dry and warm/moist biophysical settings are abundant, as well as some higher elevation subalpine fir/mixed conifer areas along the project area's eastern boundary (USDA-FS 2015). The Final Environmental Impact Statement (FEIS) for the 2015 Kootenai National Forest Land Management Plan defines biophysical setting as follows:

Biophysical Setting

> To characterize the existing, historical, and desired forest vegetation across the KNF, three Biophysical Settings were recognized: Warm/Dry; Warm/Moist; and Subalpine.
>
> • **Warm/Dry:** This biophysical setting includes the warmest and driest sites that support forest vegetation. These sites cover approximately 22 percent of KNF NFS lands within the project area and occur either at low elevations, at mid-elevations on southerly aspects, or on droughty soils. Vegetation response units 1 through 3 occur in this setting.
>
> • **Warm/Moist**: This biophysical setting includes moist sites that are relatively warm and these sites cover approximately 37 percent of the KNF NFS forested lands within the project area. This setting includes low-elevation upland sites with deeper soils on north and east aspects, extensive mid-elevation moist upland sites, and most low- and mid-elevation wet stream bottoms and riparian benches and toe-slopes. Vegetation response units 4 through 6 occur in this setting.
>
> • **Subalpine:** This biophysical setting occurs over approximately 41 percent of the KNF NFS forested lands within the project area and occupies the higher

elevations of the Forest. This setting ranges from the cool and moist, lower subalpine sites up to the cold and dry, high elevation sites that have more open forests and occur between forest and alpine tundra. The moist end of this setting is common on northwest to east-facing slopes and riparian and poorly drained subalpine sites. The cool to cold dry sites occur at higher elevations and typically have a short growing season. Vegetative response units 7 through 11 comprise this setting.

These biophysical settings are broad groupings of vegetative response units that have been aggregated by factors that regulate disturbance regimes and successional responses (such as habitat types, landform, and other topographic characteristics such as aspect); combined with climatic factors such as temperature and moisture gradients. The vegetative response units are equivalent to the land unit, or ecological land unit, as described in the National Hierarchical Framework of Ecological Units (Cleland et al. 1997).

Areas within each of the biophysical setting have similar patterns in potential natural communities, soils, hydrologic function, landform and topography, lithology, climate, and natural processes (e.g., nutrient and biomass cycling, succession, productivity, and fire regimes).

Map M-16 displays the biophysical settings for the OLY project area.

Existing Condition

Evidence of past management activities is present, dating back to the settlement of Troy in 1892. The project area shows evidence of efforts to establish ponderosa pine using seedlings likely originating in South Dakota or other off-site genetic source locations that are resulting in poor health in these stands. Many other stands had their high-market-value trees removed, including western larch, western redcedar, ponderosa pine, Douglas-fir and western white pine, leaving less-commercially-valued species such as grand fir. These past harvest activities have resulted in stands whose species composition is susceptible to root rot and other insects and diseases and now display poor forest health. Several species of root rot fungus are actively killing susceptible tree species, including grand fir, Douglas-fir and western hemlock within the project area. Root rot can thrive in stands that utilized partial harvest treatments which retained susceptible species. Therefore, 1,956 acres of stand treatments are proposed for regeneration harvest in this project area. Some photos of existing conditions are displayed in Figure 2, Figure 3, and Figure 4.

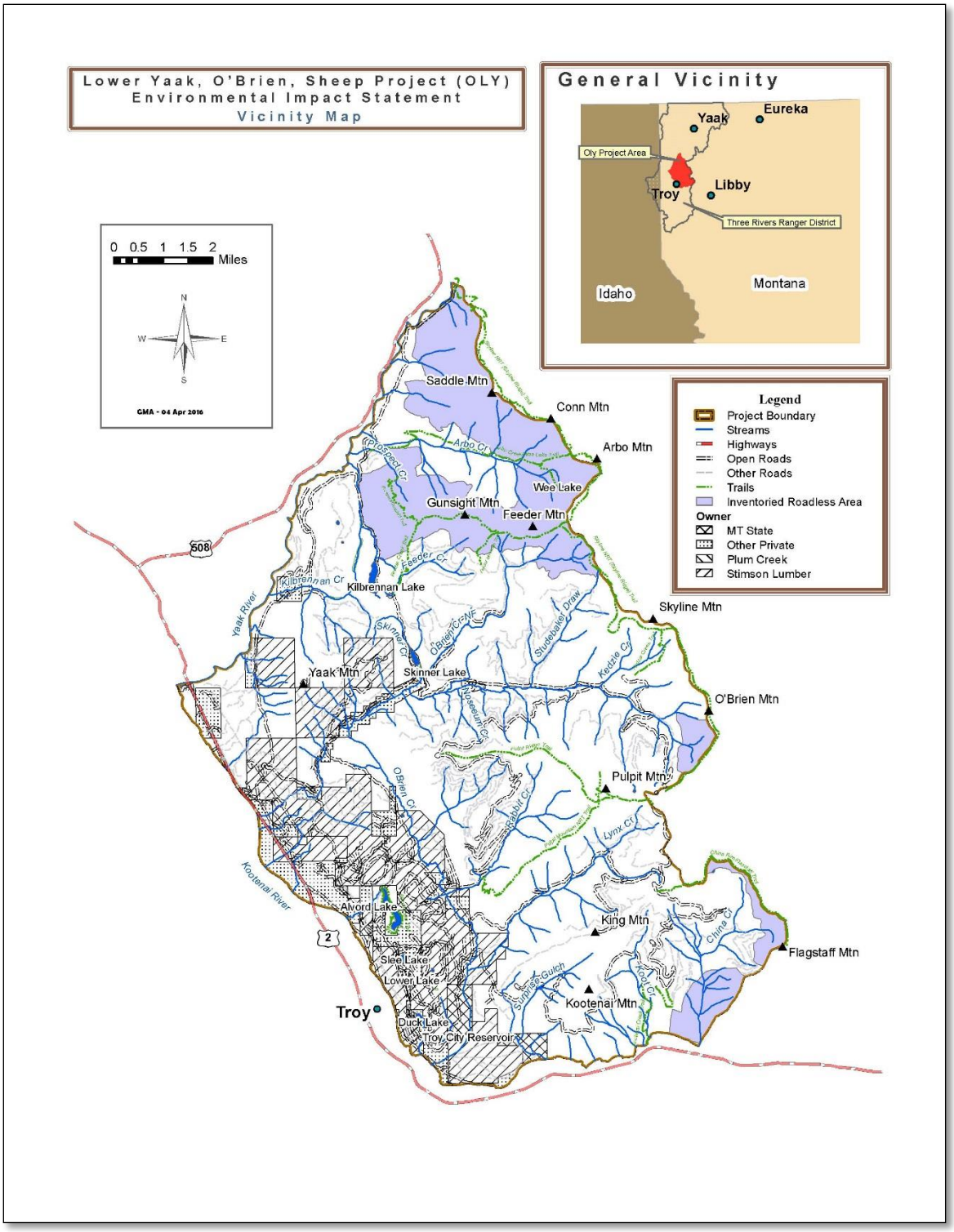


Figure 1**. OLY Project Area Vicinity Map**

Figure 2. Photo of Existing Conditions in Proposed Harvest Unit 61

There is a National Forest System Road (NFSR) network in the project area. Some of these roads were closed in the 1990s, in part, to meet habitat parameters for grizzly bear recovery, and have not been maintained since the time of the closure. Although most of these roads have revegetated, some are contributing sediment to streams as a result of blocked ditches, plugged or undersized culverts, and road fill failures. Considerable work has been done to improve drainage on open roads within the project area, but some of the closed roads still need road stabilization.

Figure 3. Photo of Existing Condition in Proposed Harvest Unit 20

Figure 4. Photo of Existing Condition in Proposed Fuels Unit F9

Desired Condition

The desired condition of the project area includes healthy stands of early-seral species including western larch, western white pine, and ponderosa pine as well as healthy stands of Douglas-fir in areas where root rot is not active. Vegetation would be resilient and adapted to fire, insects, and diseases. Fire would return to the landscape where feasible and appropriate to maintain fire adapted species, maintain patches of open forest conditions, and reduce accumulated fuel levels. Vegetation in the project area's wildland urban interface would provide a defensible space and firefighter safety in the vicinity of homes.

Healthy aquatic systems would provide clean water for human use as well as for wildlife and fisheries habitat. O'Brien Creek in particular, would provide high-quality habitat for bull trout and other native fish species. Sediment contribution to streams, rivers and wetlands from roads in the project area would be minimized.

A mosaic of diverse, productive habitats would be available to provide both cover and forage for wildlife species. Lower elevation, dry ponderosa pine/Douglas-fir forests would provide for wildlife that utilize these habitat types, which is relatively limited on the district. Prescribed fire would be used to promote the growth and development of large trees and snags as well as rejuvenate shrubs, and provide forage and snag habitat in a mosaic pattern with areas of cover. Figure 5 displays a photo of desired conditions in low elevation habitat types on the district.

Figure 5. Photo of Desired Conditions in Low Elevation Habitat Types

Humans would continue to have a presence in and around the project area and would expect to be able to enjoy and utilize products from the project area. Firewood gathering, camping, hunting, fishing, hiking, huckleberry picking, horseback riding, scenic driving, and snowmobiling are all activities that would continue to occur within the project area. Access for public and motorized travel would continue to facilitate these activities.

Across the landscape, the desired conditions would have a variety of patch sizes in quantities, shapes, and sizes that mimic historic fire events. These varied patch sizes, including both large and small openings, would provide a mosaic of wildlife forage and secure areas of cover. Over time, the forest age class distribution would move towards reference ranges and species composition to include a mix of seral and climax species that would be more resilient to climate change and other disturbances.

The browse and forage species in the understory of harvest units would increase. The huckleberry component would also increase and provide berry picking opportunities for humans as well as forage for wildlife, especially for black bear and grizzly bear. Natural openings would be maintained through the use of fire and would improve huckleberry production.

Drainages in the project area would provide habitat for aquatic species. Sediment sources would be addressed to improve existing conditions. Road stabilization and drainage work would be performed based on our assessment of watershed risk and the long-term transportation needs for the area.

Purpose and Need for Action

The 2015 Kootenai National Forest Land Management Plan (2015 Forest Plan) provides the overarching direction for management activities on the Kootenai National Forest. Forestwide management goals, as well as specific management area direction, represent the desired condition that management actions are designed to achieve. The proposed activities will be analyzed in the context of the 2015 Forest Plan.

Based on the field review of the OLY project area, the direction found in the 2015 Forest Plan, public input, and consideration of past projects, the team identified the following Purpose and Need to help move the landscape towards the desired condition:

- **Promote resilient vegetation conditions by managing towards the 2015 Forest Plan desired conditions for landscape-level vegetation patterns, structure, patch size, fuel loading, and species composition.**
    - Promote early seral tree species including western larch, ponderosa pine, and western white pine.
    - Maintain old growth character and improve resilience and resistance to insect, disease, and fire.
    - Contribute to fire’s role on the landscape.
- **Maintain or improve water quality and native aquatic species habitat.**
    - Implement Best Management Practices (BMPs) on Forest Service roads to be used for timber sale activities.
    - Implement BMPs on non-haul routes where conditions warrant and on roads important for public motorized access.
    - Implement stabilization and drainage work on roads currently stored or proposed for intermittent storage by removing culverts at risk for failure, recontouring failing stream crossings, constructing armored overflows, and water barring.

  - Decommission roads by recontouring stream crossings and unstable fills, water barring, ripping, and revegetating.
  - Rehabilitate road/stream crossings on currently decommissioned or closed roads by removing the road fill where actively eroded by streams.
- **Provide forage opportunities while maintaining wildlife security.**
  - Maintain or increase the forage component and seedling/sapling age class in the project area through timber harvest and prescribed fire.
  - Maintain areas of secure habitat through access management.
- **Provide wood products that are in demand by the American public, contribute to the local economy by generating jobs and income, and provide a safe and efficient transportation system.**
  - Provide vegetation management projects including commercial timber sales and other vegetation management projects.
  - Complete necessary construction, reconstruction, and maintenance of roads.
- **Treat hazardous fuels to reduce crown fire potential and stand replacing wildfire within the WUI and other areas while promoting fire behavior characteristics and fuel conditions that allow for safe and effective fire management.**
  - Implement fuels reduction treatments within the WUI, including timber harvest, slashing, grapple and hand piling and ecosystem burning.
  - Implement prescribed burning of fuels both in timber harvest and non-commercial treatment areas.

Proposed Action

The IDT developed a proposed action that includes timber harvest and associated fuels treatments, prescribed burning, access management, recreation improvements, and watershed work to address the purpose and need.

Chapter 2 provides greater detail about the proposed activities and alternatives developed to meet the purpose and need while addressing issues and concerns raised by the public and the team.

Harvest Acres:

Within the area identified as needing vegetation management, the team proposed 1,956 acres of regeneration harvest and 973 acres of intermediate harvest (see the Glossary and Chapter 2 for definitions of regeneration harvest and intermediate harvest). This would be accomplished through 2,089 acres of tractor harvest and 840 acres of skyline harvest.

Regeneration Harvest Units Over 40 Acres:

In the Proposed Action, forty units would create or contribute to 24 different openings over 40 acres. This helps to meet Forestwide Desired Conditions (FW-DC-VEG-05, FW-DC-VEG-11 and FW-DC-WL 19) and to emulate the natural range of variability for patch sizes on the Kootenai National Forest. The largest of these treatment units would be approximately 100 acres in size. FW-STD-TBR-02 of the 2015 Forest Plan states, “If individual harvest openings created by even-aged silvicultural practices are proposed that would exceed 40 acres, then NFMA requirements

regarding public notification and approval shall be followed. These requirements do not apply to the size of areas harvested because of catastrophes such as, but not limited to, wildfire, insect and disease attacks, or wind storms." This even-aged management action requires 60-day public review and Regional Forester approval (FSM 2471.1).

The Interdisciplinary Team decided that large, irregularly shaped openings adhere to several of the Forest Plan's desired conditions and could help provide:

- Better interior habitat in the long term for some wildlife species, including migratory birds, western toad, Townsend's big-eared bat, big game, and grizzly bear (FW-DC-WL-09, FW-DC-WL-14);
- A landscape-scale fuels management strategy with effective barriers to interrupt crown fire spread across the landscape;
- A range of patch sizes across the landscape that have a diversity of successional stages, densities, and compositions (FW-DC-VEG-05);
- A combination of forage and cover opportunities for wildlife (FW-DC-WL-19);
- More acres of western larch, ponderosa pine, and western white pine restoration (FW-DC-VEG-01); and
- Better economic feasibility by concentrating management.

Management in Old Growth:

Approximately 155 acres of harvest treatments and 376 acres of fuels treatments are proposed within old-growth stands or portions of those stands. The treatments would maintain old-growth character, improve resilience and resistance to insect, disease, and fire as part of the desired conditions of the 2015 Forest Plan. These treatments would occur within old growth stands in the drier habitat types in Douglas-fir, ponderosa pine dominated stands to contribute to their stand resistance and resiliency (FW-GDL-VEG-01). No regeneration harvest would be conducted within old growth. The treatments would not modify the characteristics to the extent that they would no longer meet the definition of old growth (FW-STD-VEG-01). Treatment in these areas would promote historic patch size and pattern, characteristic forest structure, historic fuel loadings, and historic species composition—thus meeting the purpose and need of the OLY project. Refer to the old growth narrative in Alternative 2 – Modified Proposed Action in Chapter 2 for a listing of proposed treatments within old growth. See also the old growth effects analysis section of Chapter 3. See Map M-18 for proposed harvest and fuels treatment locations within old growth.

Management in Inventoried Roadless Areas (IRA):

There are two Inventoried Roadless Areas (IRAs) within the OLY project area: Saddle Mountain IRA #168 and Flagstaff IRA#690.

Fuels Unit F1 (172 acres), is proposed within the Saddle Mountain IRA and Management Area 5a, Backcountry. This would be an ecosystem burn whose purpose would be to contribute to fire's natural role on the landscape (FW-DC-FIRE-03), maintain or enhance forest resilience (FW-OBJ-VEG-01 and FW-DC-FIRE-03), trend toward a range of patch sizes having a diversity of successional stages (FW-DC-VEG-05) and stimulate forage (FW-DC-WL-16, FW-DC-WL-19 and FW-OBJ-WL-03) and enhance habitat (FW-DC-WL-14). Fuels Unit F1 would be within a predicted huckleberry production area.

Management in Scenic and Recreational River Corridors:

Segments of the Yaak River and Kootenai River within the OLY project area are in MA2, Eligible Wild and Scenic Rivers.

Eligibility for wild, scenic, or recreational river designation is an evaluation of whether the river (or segment) is free flowing and possesses one or more outstandingly remarkable values (ORV) – a value which is unique, rare, or significant. An illustrative list of possible ORVs includes: scenery, recreation, geology, fish populations, habitat, wildlife, prehistory, history, botany/rare plants and plant communities, and natural areas. The ORVs for the eligible Yaak River segments are botany, history, recreation, and scenery; while the ORVs for the eligible Kootenai River segment are fisheries, recreation, wildlife and history.

The segment of the Yaak River from the northernmost project boundary south to the Yaak Falls is classified as eligible Recreational River; the segment from the Yaak Falls south to the Kootenai River is classified as eligible Scenic River (Figure 6 and map M-25). The segment of the Kootenai River within the project boundary is classified as eligible Recreational River (Figure 6). No eligible Wild River segments occur within the project boundary (See the Final Environmental Impact Statement for the Kootenai National Forest Land Management Plan (USDA-FS 2015a).

The vegetation existing conditions along portions of these river segments are consistent/moving towards the desired conditions of the 2015 Forest Plan. Elements not consistent with desired conditions include: fire exclusion, increased fuel loads and stand densities, prevalent root disease, mistletoe and insect damage, and species composition underrepresented by western larch, western white pine, and ponderosa pine. Harvest and fuels treatments within MA2 would help restore and maintain the scenic and recreational ORVs.

The 2015 Forest Plan states within its MA2 Guideline for Timber (MA2-GDL-TBR-02), “Timber harvest is allowed to maintain or restore the values for which the eligible scenic or recreational river was identified. Timber harvest is not scheduled and does not contribute towards the allowable sale quantity.” The purpose of the proposed timber harvest along these river segments would be to align the proposed harvest areas with desired stand health, densities, age classes, size classes, and species composition.

Approximately 328 acres of harvest units (295 acres of regeneration harvest and 33 acres of improvement harvest) would occur along the Yaak and Kootenai river segments within MA2. This is less than 13 percent of the total of MA2 in the project area, leaving natural ecological processes as the primary force within most of this MA. In addition, proposed treatments are designed to mimic ecological processes and move existing conditions to Forest Plan desired conditions.

Planned ignitions within fuels units are designed to mimic natural fire and would be used as a tool for ecosystem restoration (MA2-GDL-FIRE-02). About 270 acres of fuels units would occur within MA2 whose purpose would be to move those stands toward the desired condition where fire plays an increased role as a natural disturbance agent (MA2-DC-FIRE-01) and to maintain these segments’ scenic and recreational ORVs.

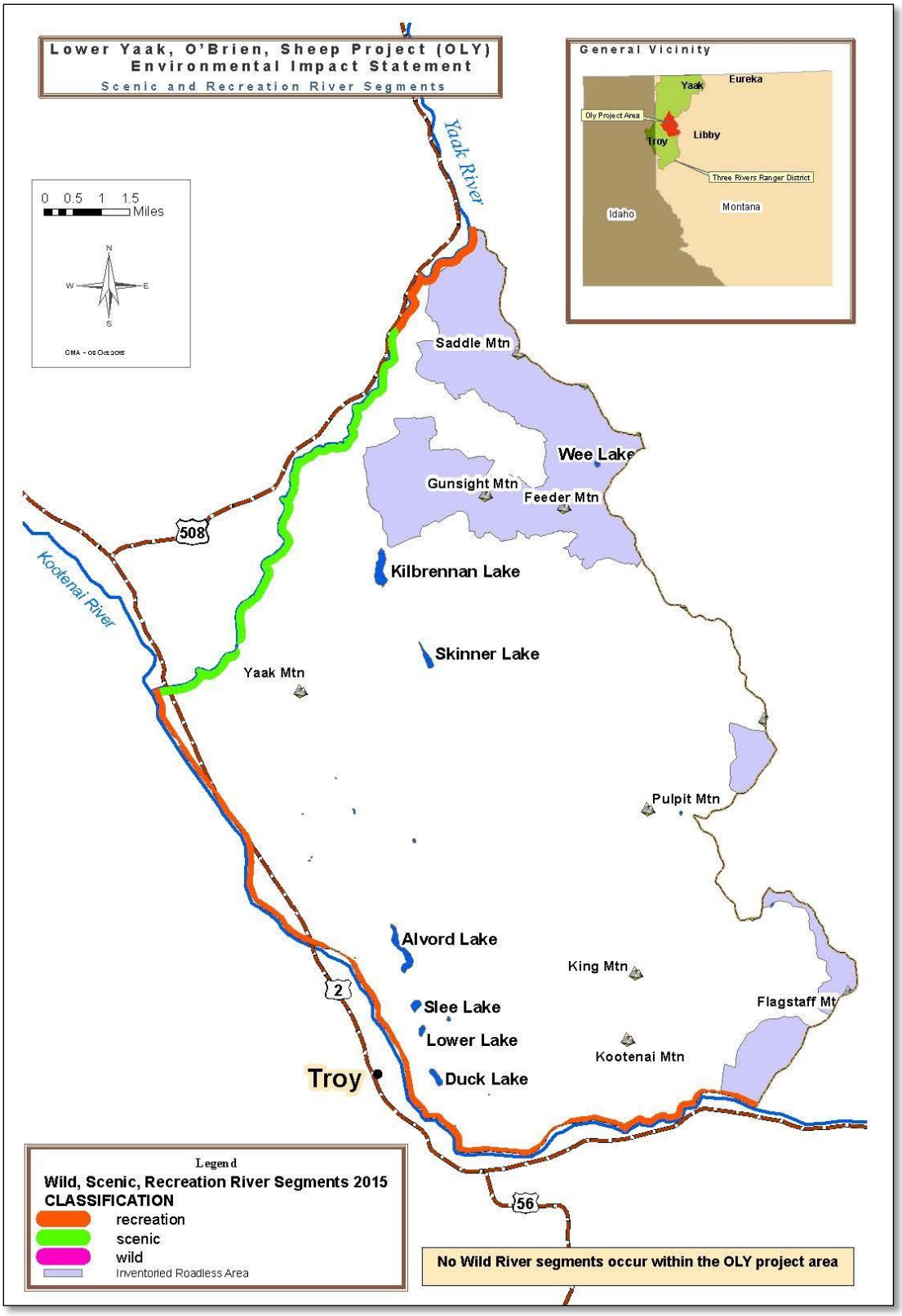


Figure 6. Scenic and Recreational River Segments within the OLY Project Area

Prescribed Fire:

The 2015 Forest Plan states that prescribed fire is a wildland fire originating from a planned ignition to meet specific objectives identified in a written, approved, prescribed fire plan for which NEPA requirements (where applicable) have been met prior to ignition (USDA-FS 2015). It also states that planned ignition is the intentional initiation of a wildland fire by hand-held, mechanical, or aerial device where the distance and timing between ignition lines or points and the sequence of igniting them is determined by environmental conditions (weather, fuel, topography), fire technique, and other factors which influence fire behavior and fire effects (USDA-FS 2015).

In an effort to meet the 2015 Forest Plan's desired condition (FW-DC-Fire-03) to return fire to the landscape, maintain or enhance forest resilience (FW-OBJ-VEG-01), and help promote wildlife foraging opportunities (FW-DC-WL-16, FW-DC-WL-19 and FW-OBJ-WL-03), approximately 1,508 acres of prescribed burning would be implemented. Of this, approximately 727 acres would occur in the wildland urban interface and approximately 660 acres within the Inventoried Roadless Areas.

Road Work:

- It was estimated that two segments of temporary road, totaling approximately 0.4 miles, would be constructed to access Units 8 and 52. These roads would be rehabilitated to pre-harvest conditions following activities. The segment accessing Unit 8 would be reconstruction of an existing road template and would not include any new construction. Two segments of road would be rerouted for resource protection (approximately 0.5 miles on NFSR 14321A, west of Kilbrennan Lake and 0.3 miles near the Troy Shooting Range).
- Best Management Practices and road maintenance work would be implemented on Forest Service haul roads. Approximately 45 miles of NFS haul road would be reconstructed to meet State BMPs for water quality.
- If funding is available, BMPs would be implemented on 10.8 miles of road that would not be used for the timber sale. The two road segments proposed for maintenance work (including widening existing turnouts or creating new turnouts) are the north end of NFSR 4429, known as the Pulpit Jeep Trail, and the portion of NFSR 4445 which is the main road up the Lynx Creek drainage.
- Approximately 10.7 miles of active road storage, 6.3 miles of passive road storage, 1.3 miles of active decommissioning and 7.0 miles of passive decommissioning would be done on NFS roads not currently open for public motorized travel (see Glossary for road definitions). Roads identified in the Travel Analysis as needed for long-term management of NFS lands would be put into intermittent stored service (storage). Roads identified as not needed for future management would be decommissioned. Both storage and decommissioning could have a range of treatments including simple barrier installation (passive treatment) where watershed impacts are not likely, pulling culverts (active treatment), or in some locations, full recontouring when risks to resources are high.
- Non-motorized access would be facilitated with improved tread on road segments identified by the public as important for use.

- Five stream crossing sites would be restored on previously decommissioned roads where additional stream stabilization is needed. Streams where this work is proposed include North Fork O'Brien, Rabbit Creek, and Prospect Creek.
- In order to allow for timber harvest and other land management activities within existing grizzly bear core habitat, a core area would be exchanged. Core habitat is an area of high quality habitat within a bear management unit (BMU) that contains no motorized travel routes or high use trails. New core habitat would have to remain in place for a minimum of 10 years. Note: Core replacement options were considered during scoping, but this alternative is being analyzed based on responses received from the public during scoping.

  The following roads would be opened for administrative access to facilitate management activities and would continue to be restricted to public access (please see the OLY Project area road work map (Map M-3) for locations):

  - NFSRs 14393/14393A/14321/176F road system between the Eastside Road and the Kilbrennan Lake Road;
  - NFSR 2394A off of Kilbrennan Lake Road;
  - Portion of NFSR 4447 in the Sears Flat area;
  - NFSR 14309/14309A near the Troy Shooting Range.

  The following roads would be closed to create replacement core areas (no motorized access):

  - NFSR 4433, North Fork Lynx Creek; NFSR 4425, Upper Rabbit Creek; and NFSR 2376, Feeder – O'Brien, which are all currently gated and restricted to public motorized use.

- Several roads are under consideration for short-term restriction on public motorized use through the installation of gates. These are roads currently open to public motorized travel, and would be restricted (gated) to offset an increase in open motorized route density (OMRD) during project activities. These roads would be reopened post-project, and include:
  - A portion of NFSR 2380, North Fork O'Brien Road;
  - NFSR 2391, Kedzie Creek Road.

- Construction of approximately 0.16 mile of new road construction on Yaak Mountain to provide Stimson Lumber Company reasonable access to their lands for land management purposes. This new road construction would access Stimson land in T32N R34W, Section 3. Please see the OLY project area road work map (Map M-3) for more specific location information.

Tribal and Other Agency Consultation:

The Forest Service is required by law and policy to conduct government-to-government consultation with Indian Tribes regarding any undertaking which could impact the ancestral territory or treaty rights of the Tribes. The District archaeologist has been in continual consultation with the Confederated Salish and Kootenai Tribes concerning proposed activities in the OLY project.

Concerning historic properties, the process of consultation with the State Historic Preservation Office (SHPO) must take place prior to making a decision on the project unless the results of the historic properties inventory fall within the scope of a memorandum of understanding between the Kootenai National Forest (KNF) and SHPO that streamlines consultation.

Section 7 of the Endangered Species Act requires interagency consultation before undertaking actions that could harm endangered species. Consultation with the US Fish and Wildlife Service (FWS) will be conducted concerning grizzly bear, Canada lynx, lynx critical habitat, bull trout, bull trout critical habitat, and potentially white sturgeon if necessary. The District wildlife and fisheries biologists have ongoing discussions about big game, non-game, and fisheries needs with the Montana Fish, Wildlife, and Parks (MTFWP) biologists for this region. The District fisheries biologist also had discussions with MTFWP concerning population studies of local and non-native fish species and had discussions with the Montana Natural Heritage Program (Helena, Montana) and MTFWP concerning non-fish aquatic species such as amphibians, mollusks, etc.

Proposed Recreation Improvements:

The Proposed Action would include the following recreation access improvements within the project area (see Map M-2):

- Upgrading a portion of the Alvord Lake trail to be accessible to all under Forest Service Accessibility Guidelines (FSTAG) standards, including construction of a paved trail to the Outdoor Classroom located on the northwest side of the lake;
- Replace the native material at the Kilbrennan Lake Campground boat ramp with a concrete design;
- Contour the tread on the Arbo Wee Lake Trail (196) on both sides of the stream crossing at the Prospect Creek to create a lessened grade and install water bars on that portion of the trail;
- Create a parking area which would utilize the landing in harvest unit 29, near the bottom of NFSR 4445, Lynx Creek, to facilitate existing snowmobile use on NFS lands;
- Improve drainage, brush out sides of road and construct turnouts on portions of NFSR 4429, Pulpit Jeep Road;
- Widen parking areas at trailheads for: #43 China Rim; #366 Pulpit Mountain National Recreation Trail; #709 Pulpit Ridge; and #706 Skyline Ridge.

Figure 7 below displays the proposed recreation improvements in the OLY project area.

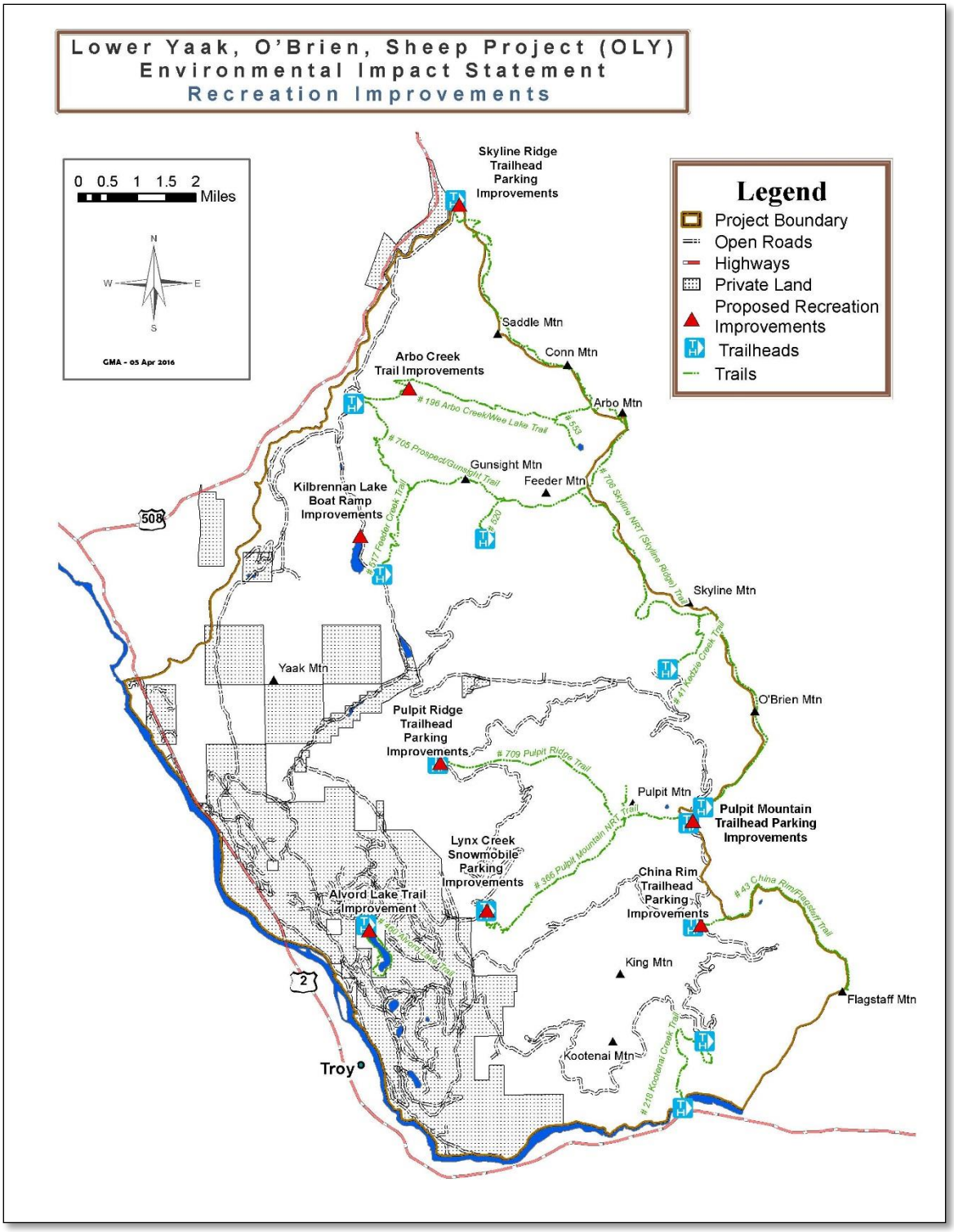


Figure 7. Proposed Recreation Improvements in the OLY Project Area

Project Scope

Section 40 CFR 1508.25 of the NEPA implementing regulations provides guidance in determining the proper scope of an Environmental Impact Statement.

Geographic Scope: The District has prepared this FEIS to document the analysis and disclose the environmental effects of a proposed project on National Forest System lands in the OLY project area.

Temporal Scope: The action alternatives would result in timber sales, post-harvest fuels treatments, planting, watershed improvement work, recreation work and prescribed burning activities. Timber sales would be planned for bid in the fall of 2016. Harvest is expected to be completed by 2021, with slash disposal and reforestation activities completed by 2024. Prescribed burning is anticipated to be accomplished within approximately 10 years after the Record of Decision (ROD) has been signed. BMP work on haul roads is designed to be accomplished prior to haul of timber products. Watershed improvement work could also begin after the ROD has been signed and would be subject to timing restrictions. See the design features in Chapter 2 for more detailed information about timing restrictions.

These dates are tentative, based upon anticipated budgets, workforce, weather, and other considerations. Actual dates and timing of implementation and accomplishment could vary.

Administrative Scope: Alternatives to the proposed action were developed. The No Action Alternative was also analyzed and reflects the current status, administrative activities and public use within the project area. The Proposed Action includes those activities necessary to fulfill the identified purpose and need, as well as all connected actions as described in Chapter 2. Connected actions include temporary road construction, road work on existing roads, slash treatment, and design features described in Chapter 2. Three types of effects are considered in the analysis: direct, indirect, and cumulative effects, pursuant to 40 CFR 1508.7 and 40 CFR 1508.8. The potential effects to resources are disclosed in Chapter 3.

Relationship to the Forest Plan

Direction for this project comes from the 2015 Kootenai National Forest Land Management Plan, which sets the forestwide direction (goals, desired conditions, objectives, standards, and guidelines) for managing the resources of the Forest (Forest Plan, Chapter 1). The 2015 Forest Plan embodies the provisions of the National Forest Management Act (NFMA), its implementing regulations, and other guiding documents. Where appropriate, this FEIS tiers to the 2015 Forest Plan Final Environmental Impact Statement and Record of Decision in compliance with 40 CFR 1502.20.

The 2015 Forest Plan groups NFS lands into seven major management categories called management areas (MAs). Within each category are different MA prescriptions, desired conditions, standards, and guidelines (2015 Forest Plan, Chapter 3). Three management areas occur within the OLY project area: MA6 (general forest), MA5a (back country) and MA2 (eligible wild and scenic rivers). Table 1 displays the proposed vegetation treatments for the three MAs within the project area under the proposed action.

Table 1. Proposed Vegetation Treatment Acres by Management Area under the Proposed Action

MA	Category	Description and Applicable Standards	Proposed Vegetation Treatment
2	Eligible Wild and Scenic Rivers	This MA applies to river segments that have been identified as eligible for inclusion as part of the Wild and Scenic Rivers System under the authority granted by the Wild and Scenic Rivers Act of 1968, as amended. MA2-GDL-TBR-02. Scenic/Recreational. Timber harvest is allowed to maintain or restore the values for which the eligible scenic or recreational river was identified. Timber harvest is not scheduled and does not contribute towards the allowable sale quantity.	**598 acres** (270 acres fuels treatment) (328 acres harvest treatment)
4	Research Natural Area	RNAs are established to provide for the study and protection of a full range of habitat types identified in the "Research Natural Areas of the Northern Region: Status and Needs Assessment" (1996). These areas form a long-term network of ecological reserves established as baseline areas for non-manipulative research, education, and the maintenance of biodiversity. Most of these areas protect late-seral or climax vegetation conditions. These RNAs generally contain undisturbed conditions that are valuable in monitoring the effects of climate change to ecosystems in a late-seral or climax condition. MA4-GDL-TBR-01. Timber harvest or cutting of trees may only occur as identified in the RNA Establishment Record or approved RNA management plan.	**No Management Activity**
5a	Backcountry (non-motorized year-round)	These areas provide semi-primitive non-motorized recreation year-round. MA5a,b,c-STD-TBR-01. Timber harvest is not scheduled and does not contribute towards the allowable sale quantity. MA5a,b,c-STD-TBR-02. If within an inventoried roadless area outside of Idaho, timber harvest activities shall follow direction found in the 2001 Roadless Rule (36 CFR 294.13).	**1,067 acres** (1,067 acres fuels treatment) (0 acres harvest)
5c	Backcounty (motorized winter; non-motorized summer)	These areas provide semi-primitive non-motorized recreation during the summer and allow winter motorized. MA5a,b,c-STD-TBR-01. Timber harvest is not scheduled and does not contribute towards the allowable sale quantity. MA5a,b,c-STD-TBR-02. If within an inventoried roadless area outside of Idaho, timber harvest activities shall follow direction found in the 2001 Roadless Rule (36 CFR 294.13).	**No Management Activity**

MA	Category	Description and Applicable Standards	Proposed Vegetation Treatment
6	General Forest	Most of this MA consists of relatively large areas with roads, trails, structures, and signs of forest management activities. This MA provides a variety of recreation opportunities, both motorized and non-motorized. This MA contains lands suitable for timber production, with timber harvest contributing to regulated timber harvest estimates. Some lands within this MA are not suitable for timber production, based on the timber suitability analysis. MA6-STD-TBR-01. On lands suitable for timber production, timber harvest is allowed for the purpose of timber growth and yield while maintaining productive capacity. Timber harvest is scheduled and contributes to the allowable sale quantity. MA6-STD-TBR-02. On lands not suitable for timber production, timber harvest is allowed to meet specific resource objectives other than timber growth and yield. Timber harvest is not scheduled and does not contribute towards the allowable sale quantity.	**4,317 acres** (1,506 acres fuels treatment) (2,811 acres harvest treatment)

While the forestwide desired conditions describe management direction for the entire Forest, individual places (geographic areas) across the Kootenai National Forest have their own distinct characteristics and conditions. The OLY project area falls within the Yaak, Bull, and Libby Geographic Areas (2015 Forest Plan, Chapter 4). Compliance with the 2015 Forest Plan is discussed in various sections of this FEIS, including resource-specific effects analyses in Chapter 3.

To be consistent with the goals and desired conditions of the 2015 Forest Plan, a project or activity must be designed to meet one or more of the following conditions:

- Maintain or make progress toward one or more of the desired conditions of the Plan without adversely affecting progress toward, or maintenance of other desired conditions; or
- Be neutral with regard to progress toward Plan desired conditions; or
- Maintain or make progress toward one or more of the desired conditions over the long term, even if the project or activity would adversely affect progress toward or maintenance of one or more desired conditions in the short term; or
- Maintain or make progress toward one or more of the desired conditions over the long term, even if the project or activity would adversely affect progress toward other desired conditions in a minor way over the long term.

The project documentation should identify which of these four criteria are being met and how they are being met.

Decision Framework

Given the purpose and need, the deciding official reviews the proposed action, the other alternatives, the environmental consequences, and public comments on the analysis in order to make the following decisions:

- Whether to implement vegetation management activities, including timber management (silvicultural prescriptions, logging methods, road work, slash treatment, reforestation), and prescribed burning activities. Whether to include design features to protect resources, and if so, the site-specific location of these activities and practices;
- Whether to implement fisheries work and watershed improvement projects, including road reroute, road decommissioning and road storage work, and, if so, to what extent;
- Whether to implement road improvements, maintenance, access changes, and if so, the specifics of each action;
- Whether to implement recreation improvement projects including trailhead improvements and other action items, and if so, the site specific locations and actions;
- What, if any, specific design criteria or mitigation measures are needed;
- What specific project monitoring requirements are needed to assure design features are implemented and effective, or to evaluate the success of project objectives?

Chapter 2 - Alternatives

Introduction

This chapter describes the issue and alternative development process, including how public comments helped formulate the alternatives, the issues identified, and the descriptions of alternatives. In this analysis, four alternatives are carried forward and analyzed in detail in Chapter 3 by resource. Table 21 and Table 22 display an alternative comparison of proposed activities, project objectives, and key issues, providing a clear comparison for the decision maker and the public (40 CFR 1502.14). Chapter 2 also includes project design features which would help protect resources under the alternatives studied in detail.

Proposed Action

Project Development

During field season of 2013-2014, district specialists conducted field reviews in the OLY area to evaluate the existing environmental conditions and compare them to the desired conditions, which are guided by the 2015 Kootenai National Forest Land Management Plan (hereafter referred to as the 2015 Forest Plan). Management needs and opportunities were identified that would move the project area towards the desired landscape conditions. Those feasible management needs determined to be important to implement within the next 10 years were included in the Proposed Action for OLY.

As the team began field reconnaissance of the project area in the field season of 2014, they identified areas in need of vegetation management to move forest stands towards a more resilient condition in the project area and that could allow fire to return on the landscape, shown on the map in Figure 8 below.

They focused their attention on the Kilbrennan Ridge, Sears Flats, Yaak Mountain/O'Brien Creek, and Kootenai Mountain/Lynx Creek areas in particular because of the Forest Plan desired conditions, existing forest stand conditions and the presence of existing roads that could be used for vegetation management. These areas were also considered because they are in the Wildland Urban Interface (WUI) and outside of Inventoried Roadless Areas (IRAs).

Within the areas identified as needing vegetation management, the team excluded past regeneration harvest units that are stocked and are providing hiding cover for wildlife (see Figure 9).

The team delineated riparian habitat conservation areas (RHCAs) with buffers ranging from 100-300 feet (as determined by INFISH guidelines in the Forest Plan), and in some cases much larger than 300 feet. The initial areas in need did not include many RHCAs or other water features, so ponds and wetlands were used to design corridors around and between them, where they existed (see Figure 9).

The team focused on the areas with the highest levels of root disease, as well as existing off-site ponderosa pine stands. In addition, the team designed a mosaic of intermediate and regeneration treatments where landscape conditions provided the opportunity. For example, the Kilbrennan ridge area was designed to provide wildlife movement through and within the area by excluding Douglas-fir stands with minimal evidence of or effects from root disease. Also, in Alternatives 3 and 4, an untreated area in the Sears Flats area was left between Units 33 and 34 to add to the mosaic and improve wildlife movement.

Large, irregularly shaped openings were designed where possible to provide the following characteristics or features:

- Fewer periods of disturbance to wildlife associated with management activities.
- Better interior and edge habitat for some wildlife species, including migratory birds, western toad, Townsend's big-eared bat, big game and grizzly bear.
- A landscape fuels management strategy with effective barriers to interrupt crown fire spread across the landscape.
- Historic patch sizes across the landscape.
- A combination of forage and cover opportunities for wildlife.
- More acres of western larch, ponderosa pine and western white pine restoration.
- Better economic feasibility by concentrating management.

The team then identified the existing roads on the landscape that would allow for activities to occur while continuing to meet the grizzly bear habitat parameters laid out in the 2015 Forest Plan. As a result, some additional treatments along the East Side Road were identified.

The team also identified opportunities to manage fuels in the Wildland Urban Interface bordering private land (see Figure 10). Some of these opportunity areas had no commercial timber value but treatment would be beneficial from a fuels reduction and wildfire standpoint. It was recognized that reducing existing ground and ladder fuels bordering private land could slow the progression of an advancing wildfire. Although hazardous fuels treatments can modify fire behavior, no treatment can completely eliminate the potential for a wildfire to burn in a given area. Therefore, it was noted that it is also very important to convey to landowners the need to address the fuels on their land and around their homes to help minimize the impacts from a wildfire.

The importance of fire beyond the initial areas identified was also discussed and the team recognized the positive effects of past fires in similar forest types and those that occurred within the project area in past years. Therefore, prescribed fire areas not related to timber harvest were added to the project. It was recognized that some areas did not have a need for commercial harvest; however, these areas provided effective opportunities for rejuvenating native forbs, grasses, and shrubs. This prescribed burning could help maintain and/or expand ridgeline openings where decadent plant species exist and trees such as subalpine fir have begun to encroach in desirable openings. These proposed unit boundaries were designed to benefit grizzly bear habitat and big game forage opportunities, while minimizing impacts to lynx, old growth, and streams.

The following figures display the progression of the development of the proposed action including harvest units, fuels units and prescribed ecosystem burns.

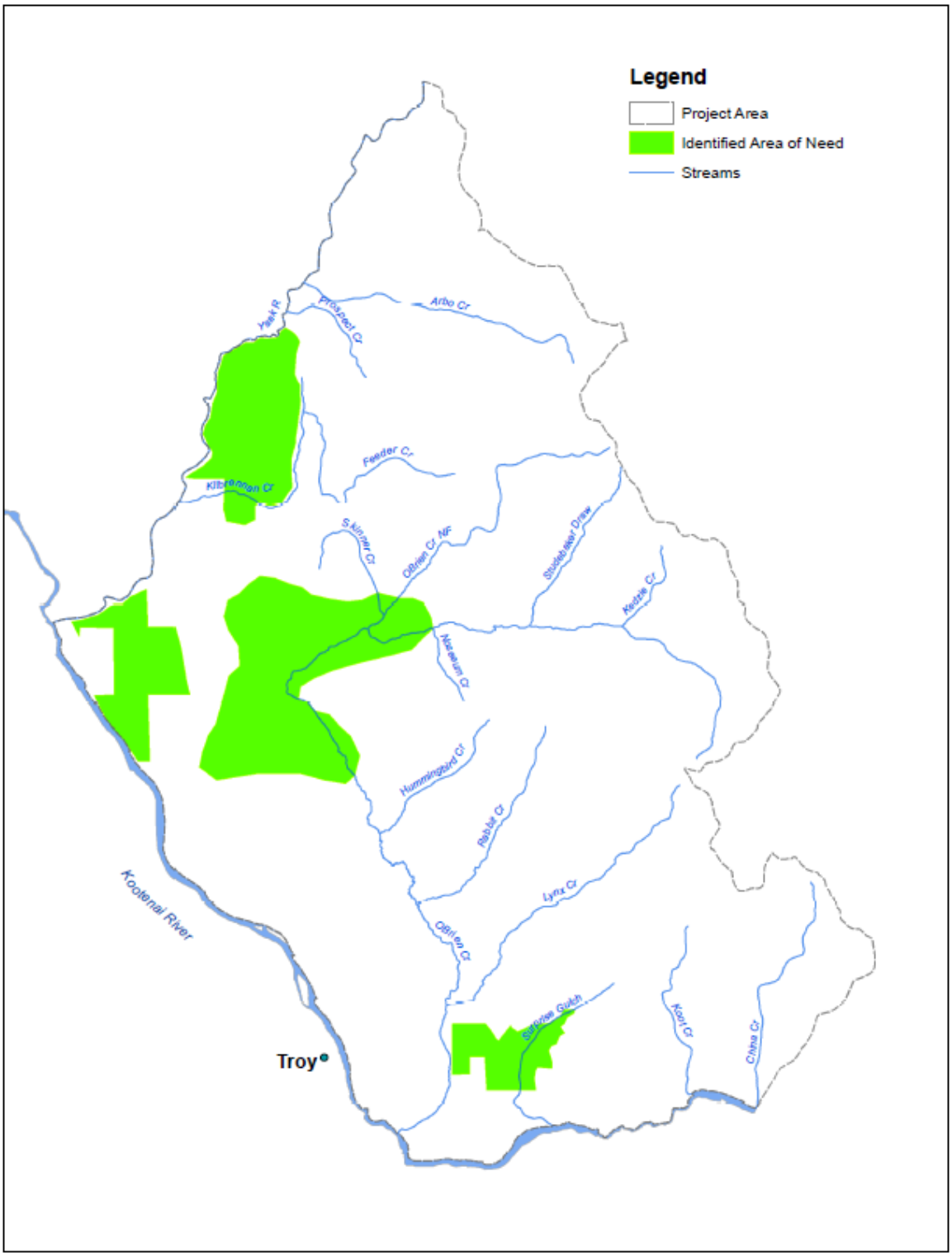


Figure 8. Areas in Need of Vegetation Management Identified within the OLY Project Area

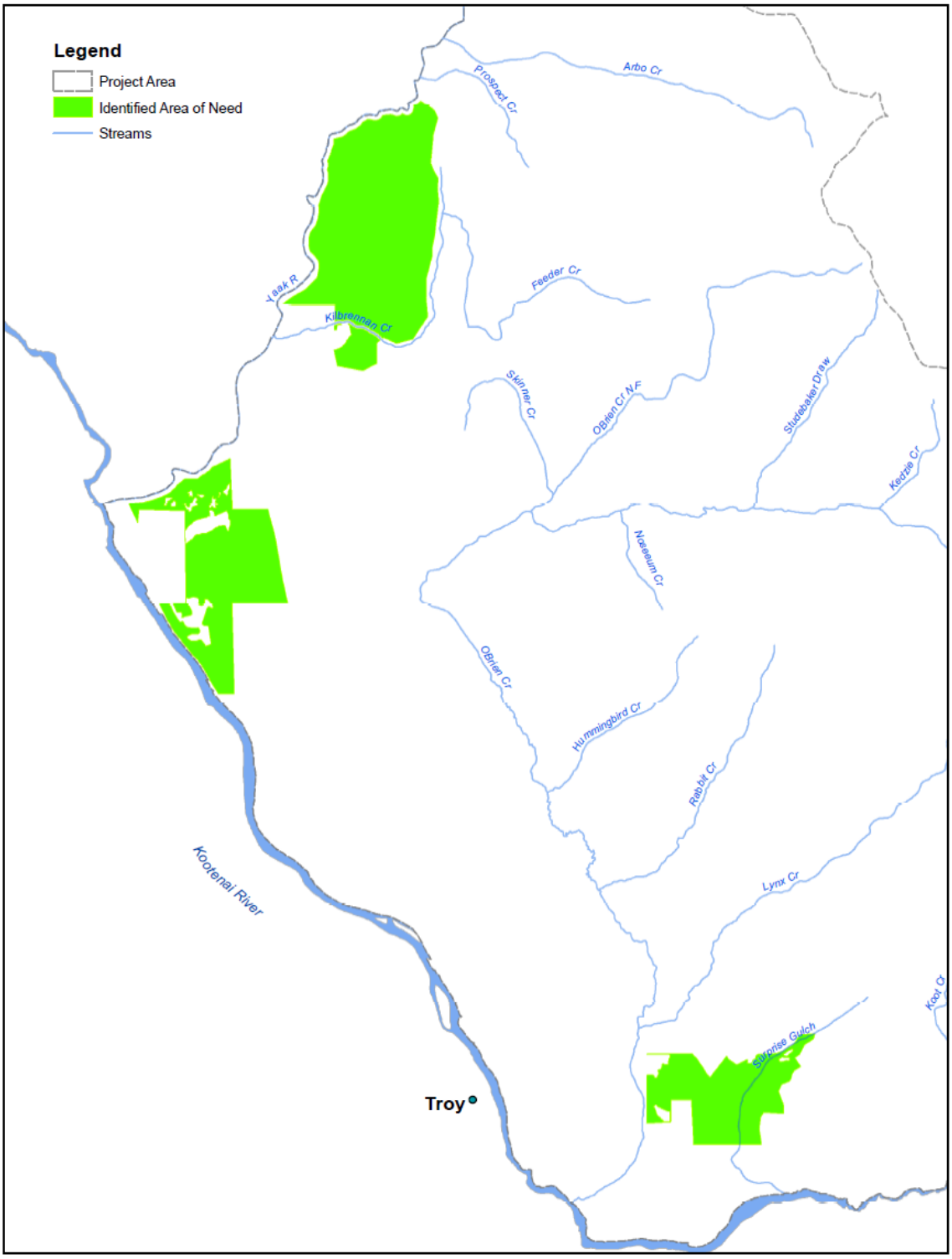


Figure 9. Areas in Need of Vegetation Management with RHCAs and Past Regeneration Harvest Excluded

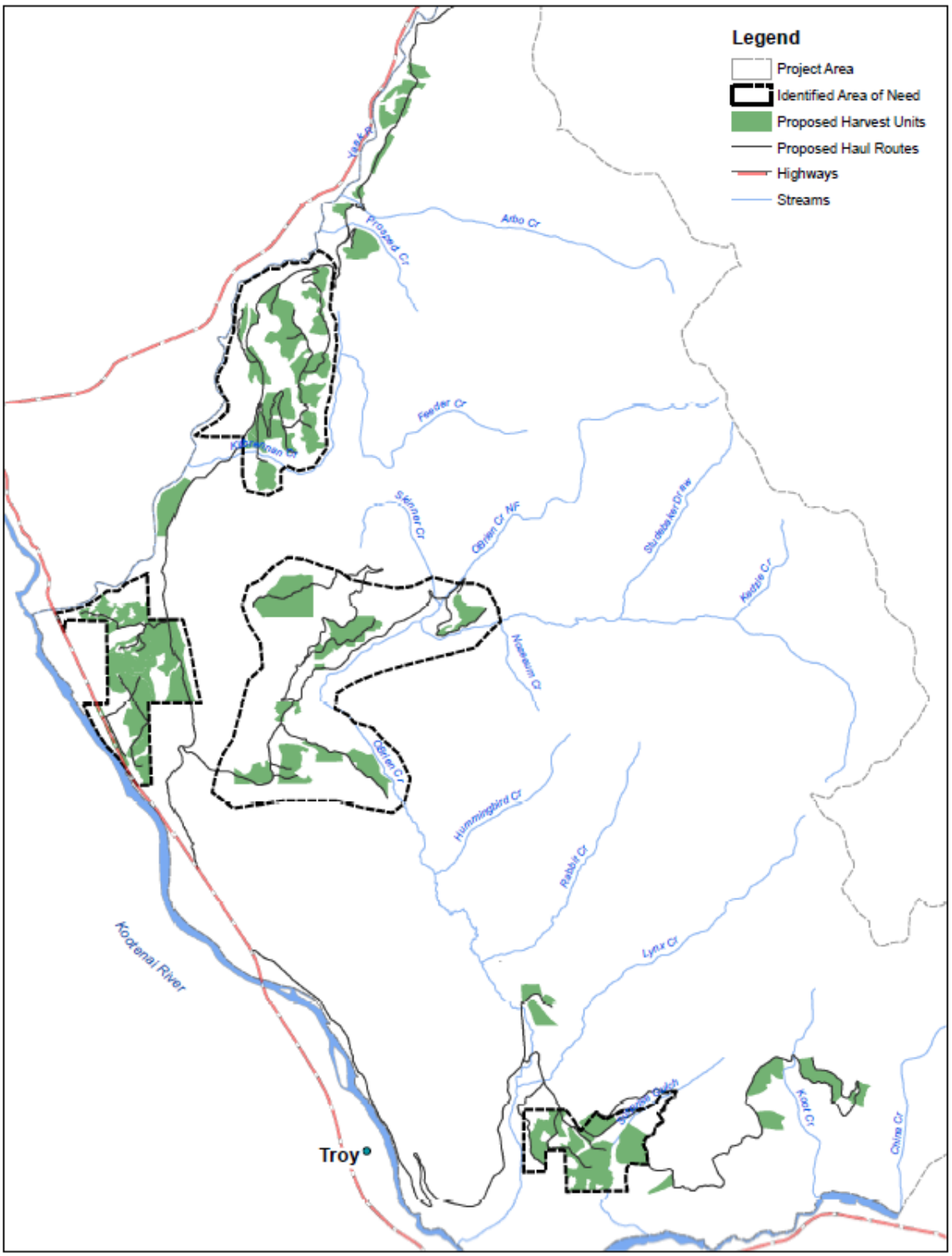


Figure 10. Harvest Units Identified Focusing on WUI, Root Disease, Off-site Ponderosa Pine and Existing Roads

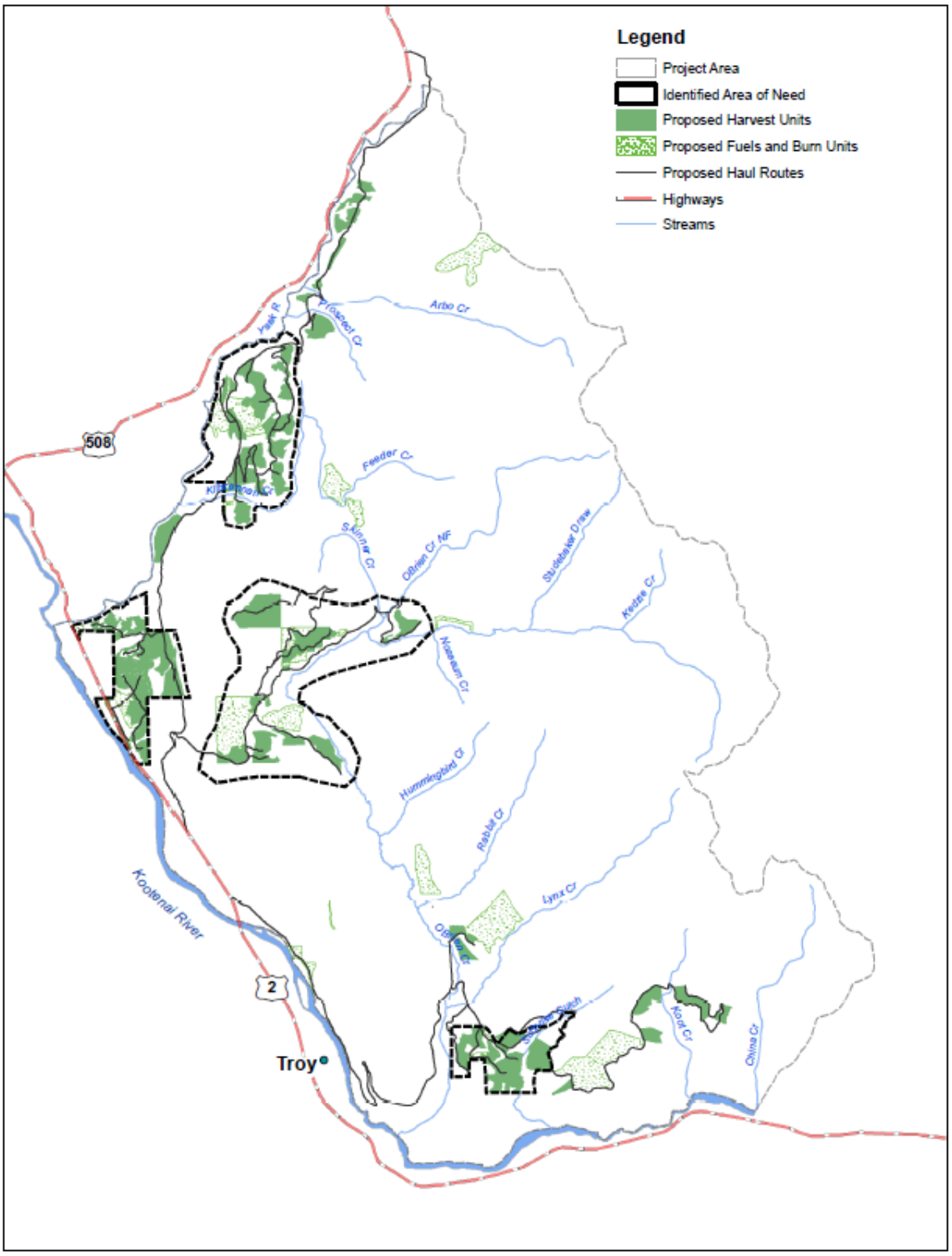


Figure 11. OLY Project Area and Proposed Treatments

Public Involvement and Collaboration

Involving the public has been a crucial element in project development. OLY public collaboration and involvement helped the District identify and modify its Proposed Action and alternatives.

This section summarizes public involvement and collaboration for the OLY project. More detailed information including mailings, legal notices, notes from meetings and field trips, and comments are located in the public involvement and collaboration section of the project file.

During the public involvement and collaboration effort for this project, ID team members met with and corresponded with representatives of the Kootenai Forest Stakeholders Coalition (KFSC). Some of their primary concerns are summarized below along with an explanation of how the ID team addressed their concerns.

- The Stakeholders stated their concerns for wildlife security with respect to regeneration harvest treatments adjacent to open roads. The ID team met with the KFSC to discuss habitat security needs for wildlife and created a design feature in response to concerns.
- The Stakeholders advocated use of their forest management guidelines (October 2014) to be used at the landscape scale. The ID team met with the KFSC to discuss our process of analyzing the project area at the landscape scale, considering which areas are ready for treatment (existing vs. desired conditions) and are feasible to treat. The ID team will be utilizing their guidelines for layout of unit 30.
- The stakeholders advocated the use of a single map to display existing conditions so that they would be better able to determine where the ID team has considered their forest management guidelines (October 2014). The ID team explained and displayed the many layers (e.g. grizzly bear core, lynx, elk security, old growth, forest plan management areas, etc.) used during the analysis process and the effectiveness of displaying on one map. The ID team made available to the KFSC the given map layers.

Specific Public Comments

Pre-Scoping

On March 7, 2014 a pre-scoping request for information letter was sent to gather general information about the OLY project area. Thirty-nine different parties responded. The pre-scoping comments can be found at the Three Rivers Ranger District and OLY project file. A summary of the comments received included:

- Concern about noxious weeds in the project area (with some site specific comments);
- Support for selective thinning, commercial thinning and pre-commercial thinning;
- Interest in seeing improved wildlife forage and habitat, including huckleberries;
- Concern about the condition of fisheries in O’Brien and Arbo Creeks;
- Support for fuels reduction activities in project area (with some site specific comments);
- Support for fuels reduction in the Wildland Urban Interface;
- Desire for access to firewood;

- Desire for increased access, though many were comfortable with the current road system and wanted to see maintenance occur;
- Concern about logging resulting in landslides with multiple references to the Yaak Mountain slide which occurred during 2007;
- Multiple comments supporting "restoration" logging on the landscape and encouragement for the team to look at resiliency across the landscape.

Scoping

Site-specific public comments on the OLY Proposed Action were requested on October 2, 2014 through a legal ad in the *Daily Inter Lake* and a display ad in the *Western News* on October 3, 2014. Based on requests from the public, the scoping period was extended until November 4, 2014, through a display ad in the Western News on October 24, 2014. A letter requesting comments was also mailed to interested individuals, groups, officials, and landowners in the vicinity of the project area. The scoping period formally began on October 6, 2014, when the notice of intent (NOI) was published in the Federal Register to inform the public that an Environmental Impact Statement would be prepared to analyze proposed activities in the OLY area. Comments from 25 different parties were received through letters, emails, phone calls, and requests to meet with the interdisciplinary team members. These comments varied from support, to concern, to suggestions for specific projects or areas. They helped the team refine the Proposed Action and develop alternatives. Individual Scoping comments can be found in the project file.

The issues identified from the scoping comments for the OLY project were:

- Concerns about access on NFSR 4429 O'Brien-Lynx Creek (jeep trail);
- Concern about the west slope cutthroat in O'Brien Creek;
- Opposition to any management activities within the project area;
- Concern about dead/down material within the project area creating a fire hazard;
- Concern about applying a landscape scale design feature that is in line with the Kootenai Stakeholder Vegetation Guidelines;
- Concern about road systems, construction, reconstruction, and decommissioning of roads in relation to resource affects and public access;
- Concerns in regard to impacts to IRAs within the project area;
- Concern whether ten percent old growth is enough for species viability. Note: this comment was made in 2014, and was relevant to the 1987 Forest Plan. The Forest now is under the 2015 Forest Plan. It no longer includes a minimum percentage standard for old growth. The 2015 Forest Plan includes the desired condition to increase the amount of old growth at the forestwide scale (FW-DC-VEG-03).
- Concern about using the WUI as an excuse to conduct harvest activities (logging);
    - Yet also received support to conduct fuels reduction and logging in the WUI;
- Concern about prescribed burning on air quality;
- Concern over Open Motorized Route Density and grizzly bear Core habitat;
- Concern about maintaining sensitive species on the landscape;

- Concern about safety and timing restrictions at the Troy Shooting Range;
- Concern about the spread of noxious weeds within the project area;
- Concern about impacts to aquatic resources;
- Concern for protection of historic properties;
- Concern about impacts of management activities on soils - Detrimental Soil Disturbance (DSD).

Public Presentations and Meetings with Collaborative Groups

The district ranger made several presentations to local community groups in the Troy community, encouraging members of the public to provide comments and contact the team if they wanted to learn more detailed information about the project. The team also organized meetings, open houses, and field trips to provide the public with information and provide opportunities to ask questions and provide comment. Team members also contacted tribal representatives and other Federal and State agencies to gather feedback on the proposed activities.

Public Open House

On the evening of November 4, 2014, the team held a public open house at the Three Rivers Ranger District. Attendees were provided information on the Proposed Action and maps of proposed activities were displayed. Twenty-one members of the public attended to ask questions about proposed activities in the project area. Attendees asked questions about the NEPA process, motorized access, and how they could stay informed about the proposal. Meeting attendees clearly expressed that they did not want NFSR 4429, locally known as the jeep trail, closed to motorized vehicles.

Field Trip

On September 30, 2014, the district hosted a public field trip to the project area. Two people attended the field trip. The participants and district staff visited Units 30 and 63, and discussed treatment options and design features.

Discussions with Kootenai Forest Stakeholders Coalition

The district ranger and interdisciplinary team (IDT) had five meetings with the Kootenai Forest Stakeholders Coalition (KFSC), a diverse local collaborative group, to discuss pre-project scoping, collaborate on project development and provide updates on the OLY project's progress. The Stakeholders participated in two field trips, one of which was held on August 5, 2014 and the other on October 27, 2014. The group met at the Troy Ranger Station to discuss proposed activities in the project area, and then proceeded with district staff to the field to review proposed harvest and burn units on the ground. A meeting about Stakeholder comments on the DEIS was held at the Troy Ranger Station on February 22, 2016.

Discussion with Tribes and Other Agencies

Throughout the project development process, the IDT has shared information about proposed activities with the Confederated Salish and Kootenai Tribes (CSKT) and the Kootenai Tribe of Idaho. The District Ranger, IDT leader, Forest Archaeologist, and Tribal Liaison met with the CSKT representatives on March 2, 2015 to discuss the Tribes' concerns about protection of historic properties in the project area. The Tribal Liaison and IDT leader attended the CSKT

Elder's meeting on November 12, 2014. The IDT leader presented the scoping package to the Elders, introduced the components of the project, and explained the project's current status. Ongoing communication with the Tribal Liaison keeps the Tribe informed on project status, provides feedback of the Tribe's input, and fosters collaboration.

Communication and consultation with Montana Fish, Wildlife, and Parks and the U.S. Fish and Wildlife Service has been ongoing throughout the project development. These discussions have influenced the design of proposed activities so that they can benefit habitat conditions through vegetation management and minimize potential impacts to wildlife during these activities.

Issue Identification

The IDT reviewed the pre-scoping and scoping comments received to help develop and modify the Proposed Action. The input received from the public through meetings, field trips, internal discussions, and field reconnaissance helped identify Key Issues. They also helped focus the environmental effects analysis presented in Chapter 3 and helped drive the development of alternatives to the Proposed Action. Some comments were determined to be beyond the scope of the project; others were addressed by adherence to law, regulation, and policy or Forest Plan standards and guidelines; some were addressed through adopting design criteria or mitigation; some were addressed through effects analysis; and some were addressed by the development of alternatives to the Proposed Action.

The comments received that were determined to be best addressed by developing alternatives to the Proposed Action are described below. The alternatives to the Proposed Action, including those dropped from detailed study, are described in this chapter. The issue disposition document, located in the public involvement and collaboration section of the project file, shows how the scoping comments were considered and categorized.

Rationale for Issue Development or Consideration

Key issues discussed below were addressed through the development and analysis of alternatives to the Proposed Action. Other concerns were not considered key issues because they were resolved through project design, analysis, or existing law, regulation, or policy, and therefore, were not used to develop alternatives analyzed in detail. Other issues also included effects of the Proposed Action and are analyzed in the applicable resource sections in Chapter 3 and can also be found in the project file. Criteria used to determine lack of significance include:

- Issue is beyond the scope of the project;
- Issue is already decided by law, regulation, Forest Plan, or other higher-level decision;
- Issue can be addressed through adopting design criteria or mitigation;
- Issue can be addressed through effects analysis;
- Issue can be addressed by developing alternatives to the proposed action.

Key Issues that Drove Alternative Development

External and internal comments revealed issues that drove the development of alternatives including:

Issue 1: Harvest units creating large openings, including openings over 40 acres.

The public expressed concern that large openings could affect wildlife habitat security in the project area. Alternative 4 was developed so that harvest units would not create openings over 40 acres.

FW-STD-TBR-02 of the 2015 Forest Plan states, "If individual harvest openings created by even-aged silvicultural practices are proposed that would exceed 40 acres, then NFMA requirements regarding public notification and approval shall be followed." This even-aged management action requires 60-day public review and Regional Forester approval (FSM 2471.1).

As stated in Chapter 1, proposing openings over 40 acres would help meet Forestwide Desired Conditions (FW-DC-VEG-05, FW-DC-VEG-11 and FW-DC-WL 19) and to emulate the natural range of variability for patch sizes on the Kootenai National Forest. The interdisciplinary team decided that large, irregularly shaped treatment areas could provide better interior habitat in the future for some wildlife species, including migratory birds, western toad, Townsend's big-eared bat, elk, and grizzly bear. Refer to Chapter 1 for other considered benefits of openings larger than 40 acres.

In Alternative 2, the Modified Proposed Action, 32 regeneration harvest units would either create or contribute to a total of 23 regeneration openings over 40 acres (see Table 2) and in Alternative 3, the preferred alternative, 30 regeneration harvest units would either create or contribute to a total of 22 regeneration openings over 40 acres.

Table 2. Proposed Regeneration Harvest Units that Create or Contribute to Openings over 40 Acres under Alternative 2

Harvest Unit Number (Unit size where adjacent to other regeneration harvest in acres)	Adjacent Harvest Unit (acres of total opening)	Acres of New Harvest Opening
14		70
18	**20**	100
25		65
31B		60
34 (56 Alt 2) (40 Alt 3)	**33** (30)	86 (Alt 2) 70 (Alt 3)
37 (73 Alt 2) (68 Alt 3)	**38A** (6)	79 (Alt 2) 74 (Alt 3)
39		52
40		109
42		85
43		48
45A (63)	**44** (20)	83
45 (33)	**47** (17)	50
45C (34)	**48** (23)	57
49 (6)	**52A** (38)	44

Harvest Unit Number (Unit size where adjacent to other regeneration harvest in acres)	Adjacent Harvest Unit (acres of total opening)	Acres of New Harvest Opening
51 (36)	**52D** (14)	50
52B (65)	**54** (24)	89
53		49
57		68
61		51
68		70
70		67
74		100
77		41

Issue 2: Protection of historic properties

The Confederated Salish and Kootenai Tribes (CSKT) expressed concerns for the protection of historic properties and special places in the OLY project area and especially the Sears Flat and Yaak River Campground areas, which were not addressed in the Proposed Action. In the Modified Proposed Action (Alternative 2), the District, proposed winter logging 5 units to protect known historic properties. However, the CSKT Tribal Preservation Council asked the District to exclude harvest from these 5 units. In response to these specific concerns, the District developed Alternative 3, and these harvest units were converted to fuels units. Additionally, Alternative 3 also proposes to exclude prescribe fire from more units (4 compared to 1) than the other action alternatives.

The team has had ongoing collaboration with CSKT and developed specific Design Features to protect historic properties. With Tribal input, ground disturbing activities, prescribed burning, and harvest activities in Alternative 3 would adhere to specific requirements. For example in some units, ground disturbance is prohibited, in others prescribed fire is excluded and in others winter logging designed to protect historic properties is required in units without known historic properties (See Design Features in Chapter 2). In addition, timber harvest was dropped in some units to address this issue.

Issue 3: Existing detrimental soil disturbance (DSD) approaching 15 percent or greater

Concern was expressed that harvest units with DSD approaching 15 percent or greater would not meet Northern Region soil guidance. This was not addressed in the Proposed Action, therefore Alternative 3 was created.

Forestwide Desired Condition FW-DC-SOIL-01 states, “Soil organic matter, physical conditions, and down woody debris maintain soil productivity and hydrologic function. Physical, biological, and chemical properties of soil are within the recommended levels by soil type as described in the KNF soil inventory. These soil properties enhance nutrient cycling; maintain the role of carbon storage, and support soil microbial and biochemical processes.”

The Forest Service Manual, FSM Northern Region (R1) Soil Supplement 2500-2014-1 states, "Design new activities that do not create detrimental soil conditions on more than 15 percent of an activity area. In areas where less than 15 percent detrimental soil conditions exist from prior activities, the cumulative detrimental effect of the current activity following project implementation and restoration must not exceed 15 percent. In areas where more than 15 percent detrimental soil conditions exist from prior activities, the cumulative detrimental effects from project implementation and restoration should not exceed the conditions prior to the planned activity and should move toward a net improvement in soil quality."

Existing and predicted DSD was determined for harvest units for each alternative for the OLY project. Alternative 3 was developed to address detrimental soil concerns. Harvest treatment types and season of year were developed to help follow the regional guidance for Alternative 3. Soil restoration would be required for units that exceed 15 percent DSD. Pre- and Post-harvest monitoring would be prescribed on units approaching or exceeding 15 percent DSD.

Special Consideration

Two items were given special consideration during the development of the OLY project: old growth and treatment acres within the Wildland Urban Interface. These were not Key Issues but did garner consideration because they were brought up both by the public and internally by the interdisciplinary team. Old growth and treatments within the Wildland Urban Interface were analyzed in the project.

Range of Alternatives

Section 102(2)(e) of the National Environmental Policy Act states that all Federal agencies shall "study, develop, and describe appropriate alternatives to recommend courses of action in any proposal which involves unresolved conflict concerning alternative uses of available resources."

An environmental impact statement (EIS) must "rigorously explore and objectively evaluate all reasonable alternatives" [40 CFR 1502.14(a)]. The courts have established that this direction does not mean that every conceivable alternative must be considered, but that selection and discussion of alternatives must permit a reasoned choice and foster informed decision making and informed public participation.

The range of alternatives may extend beyond the limits set by the Forest Plan goals and objectives under NEPA; however, the National Forest Management Act (NFMA) requires that the selected alternative fully comply with the Forest Plan unless the plan is amended in accordance with 36 CFR 219.10(f).

The range of alternatives presented in this chapter was determined by evaluating public and internal comments, environmental issues, and the purpose and need for the project. Other influences include 2015 Forest Plan goals, objectives, desired conditions, standards, and guidelines; Federal laws, regulations, and policies; and economic viability. Within these parameters the alternatives display a range of reasonable and feasible outputs, treatments, costs, management requirements, design features, and effects on resources.

In addition to the alternatives considered in detail, two other alternatives were examined during the analysis process. Although these alternatives contributed to the reasonable range, they were eliminated from further consideration for the reasons listed below.

Alternative Considered but Eliminated from Detailed Study

Drop Proposed Harvest Units in Grizzly Bear Core Habitat:

After reviewing public comment on the Proposed Action and considering potential environmental affects, the team considered an additional alternative based on a suggestion to drop proposed harvest units within grizzly bear Core habitat.

Management activities are allowed within areas currently contributing to grizzly bear Core habitat. To accomplish this, in-kind replacement of closed roads is required to compensate for roads opened for management purposes. This exchange would allow management activities in compliance with habitat parameter standards for BMU 10. Appendix B (Part I.B.3.) of the 2015 Forest Plan (pg. 148) states "Routine forest management may be proposed in a core area block after 10-years of core area benefit. However, BMUs must remain at or above the core standard. Therefore, potential losses to existing core must be compensated with in-kind replacement concurrently or prior to incurring the losses. Such in-kind replacement of core would be established within the affected BMU in accordance with the direction in Part I.B.1. For exceptions, see specialized circumstances outlined in Part I.D. concerning BMU's that exceed standards. Following management, core areas must subsequently be managed undisturbed for 10 years."

The team considered dropping proposed harvest units within grizzly bear Core habitat, but decided not to develop an alternative based on this proposal because of the management tools available (in-kind replacement) and decided that management activities including harvest and prescribed burning could benefit the area. While prescribed burning without harvest could contribute to achieving desired conditions described in the Forest Plan, much of the project area could not be feasibly or safely treated with fire without a previous timber harvest treatment due to the quantity of fuels present. These fuels, which include trees with viable timber products, would burn with too much intensity to control, and would leave a great deal of biomass post fire. While these conditions would contribute to the desired condition and be acceptable on some remote parts of the project area, they would not be desirable or acceptable on lands that may be accessed by existing roads, though they may be within core habitat.

Analysis in the effects section of this EIS shows that wildlife, vegetation, and other resources benefit from treating the landscape with timber harvest within these core areas. In addition to providing additional forage, these harvest treatments provide wood products to local mills and contribute to the regional economy. Conversely, not treating these areas would reduce the area that meets Forestwide Desired Conditions for vegetation and wildlife, and would substantially reduce the area that meets the purpose and need.

Without core exchange, the Kilbrennan Ridge area, which comprises nearly one-third of the OLY project area, would not be treated. Treating the Kilbrennan Ridge area would help move it towards the Forestwide Desired Vegetation Condition which describes less of the forest dominated by small and medium size classes (FW-DC-VEG-02). Harvest treatments and their fuels treatments would help:

- Promote the larger tree size class for snag replacement and potential cavity nesting (FW-DC-WL-12);

- Increase patch size and representation of seedling/sapling size class (FW-DC-VEG-05, FW-DC-VEG-02);
- Decrease stand density where existing conditions are not aligned with the desired condition (FW-DC-VEG-04);
- Maintain and foster forage and grass production (FW-DC-WL-16) as well as post-fire habitat (FW-DC-WL-14).

In addition, offsite ponderosa pine plantations exist in the Kilbrennan Ridge area. These stands were planted prior to awareness that seed source was important (1970s) and do not exhibit characteristics of healthy stands; they show adverse effects of root disease and insects and mature trees often appear stunted. Large trees in these stands range from 10-16 inches DBH. Similarly, other offsite ponderosa stands on the KNF show similar characteristics and have suffered from insects and diseases normally of little consequence in a healthy native stand (Lockman and Sturdevant 2011, Lockman and Gibson 2005). It is likely that if left untreated the root disease would continue to increase and proliferate.

Harvest within the Lynx Creek Drainage:

The team also considered some limited timber harvest within the Lynx Creek drainage. Any harvest treatments in Lynx Creek would haul down the NFSR 4445. This road is very steep and in some locations is located quite close to the stream making prevention of sediment delivery to the stream difficult. Sediment in Lynx Creek has a high potential to be delivered directly to bull trout spawning habitat in O'Brien Creek. In order to use the Lynx Creek road as a haul route, BMPs would have needed to be implemented to minimize sediment delivery. These BMPs would have included installation of additional drainage structures, replacement of undersized culverts, and other measures which would be costly to implement and difficult to maintain in an operational condition during haul.

Additionally, harvest upslope from the Lynx Creek NFSR 4445 would be impossible from the road itself due to steep terrain. Skyline logging systems would be necessary and would require new road construction above NFSR 4445. Any new road built in this area would require at least portions of full bench excavation, would be very expensive to build, and difficult to maintain. This situation also results in timber harvest in the drainage being economically infeasible.

Relocating NFSR 4445 further upslope and away from Lynx Creek was also considered, but would again be prohibitively expensive and would have potential impacts to Lynx Creek at least until the new construction stabilized.

As a result of the difficulty of implementing BMPs, and the limited area suitable and accessible for timber harvest in this steep drainage, and economic feasibility concerns, the team recommended no timber harvest in Lynx Creek at this time.

Alternatives Studied in Detail

In response to the issues identified by this project, the team developed two alternatives to the proposed action, along with the no action alternative, to be analyzed in detail. These alternatives are discussed below.

Alternative 1 – No Action

This alternative is a baseline for comparison of environmental consequences of the other alternatives to the existing condition (36 CFR 1502.14) and is a management option that could be selected by the deciding official. Under this alternative, management actions in the project area would be limited to the ongoing and reasonably foreseeable actions listed in the introduction to Chapter 3. The No Action alternative is based on the premise that ecosystems change, even in the absence of active management. It is essentially a "status quo" strategy that describes the effects of current activities and policies, such as recreation administration, road maintenance and fire suppression.

The no action alternative and the effects analysis are based on the following assumptions:

- Conifer encroachment would continue to negatively impact the availability and productivity of grass, forb, and shrub species within affected open forest habitat and natural openings, and reduce foraging opportunities for big game and other wildlife species.
- Natural regeneration of seral species such as ponderosa pine and western larch would be minimal.
- The risk of insect and disease activity would remain moderate to high and would be likely to increase.
- The potential for high severity wildland fire would remain the same or likely increase.
- Improperly installed or undersized culverts, where they exist, would continue to impede fish passage and have a higher likelihood for plugging and failing than properly-sized culverts.
- Sediment sources from roads would continue to impact water quality.

Alternative 2 – Modified Proposed Action

The Proposed Action was scoped with the public in September of 2014 and modified based on public comment and additional field review. Alternative 2, the Modified Proposed Action, was designed to address those public scoping comments, meet the purpose and need of the project, and improve feasibility. Due to field reconnaissance, some of the harvest and fuels unit boundaries and acres were changed to help protect resources and provide for feasible logging operations. The following changes were made and have been carried forward in the analysis as Alternative 2:

- A portion of Harvest Unit 66A was dropped from the Proposed Action because field surveys identified lynx multi-story habitat in this proposed unit.
- Harvest Units 66, 66A and 67 are not economically feasible and were therefore dropped from the alternatives.
- Harvest Unit 10 was dropped. It was proposed to include Unit 10 within Unit 9. However, it was dropped because of old growth within the area between the two units.
- Harvest Unit 61 has been split into two units, 61 and 61A, to protect the RHCA.
- Fuels Unit F23, a burn that was proposed on both NFS and Stimson Lumber Company lands, was dropped due to concerns raised by Stimson to protect regeneration on their lands in the proposed burn area.
- Field reconnaissance discovered that a portion of Harvest Unit 3B should be treated with an intermediate harvest. Therefore that portion will be incorporated into Unit 4 and would be an intermediate harvest.
- Harvest Units 2 and 4 were combined into Harvest Unit 4, because field reconnaissance found they should receive the same fuels treatment and they are adjacent to each other.
- A portion of Harvest Unit 4 has been dropped because field reconnaissance discovered it was too young and not in need of harvest.
- Field reconnaissance determined that Harvest Units 40 and 41 had the same treatments, so they were combined into one unit, Harvest Unit 40.
- Field reconnaissance determined that Harvest Units 37B and 39 had the same treatments, so they were combined into one unit, Harvest Unit 39.
- Based on field reconnaissance, the eastern portion of Harvest Unit 17 was combined into Harvest Unit 21 due to the inability to reach a portion of the unit across a steep RHCA with logging systems. The remainder of Harvest Unit 17 was changed into two fuels units, F26 and F29, to retain treatment of fuels.
- Both portions of Harvest Unit 21 were combined into one piece. It was originally split into a tractor harvest piece and skyline piece. However, it was decided the entire unit should be skyline and thus combined back into one unit.
- Field reconnaissance found that Harvest Unit 76 was very young and not in need of harvest. Therefore it was changed to Fuels Unit, F31, which would be thinned and burned.
- The fuels treatment for Harvest Unit 6 was changed to grapple pile due to predicted heavy residual fuels. The fuel treatment in Harvest Units 28 and 38 was changed to

grapple pile because each unit is an off-site ponderosa pine plantation which would likely deteriorate rapidly if exposed to an underburn. The fuels treatment for Units 46 and 50 were changed to grapple pile due to off-site western white pine plantation which also likely would not withstand an underburn treatment after harvest.

- Five acres in Harvest Unit 9 were dropped due to the presence of old growth.
- Four acres of Harvest Unit 8 were split out to form Harvest Unit 8A because of a different fuels treatment. Harvest Unit 8 would have an underburn and Harvest Unit 8A would be grapple piled and burned.
- Fuels Unit F24 was dropped from the Proposed Action after concerns were raised by the fire management specialist, hydrologist, and fisheries biologist regarding the feasibility of implementing this burn, and potential effects to China Creek, which is one of four water bodies on the Three Rivers Ranger District that contains a pure strain of redband trout. These specialists agreed that there is a risk of burning fuels within the RHCA as a result of down logs from the China Basin burn of 1994. A burn within this RHCA would likely have very negative effects to the redband trout.
- Fuels Unit F25 was added as a result of stakeholder input. This unit is a prescribed burn near Yaak Mountain.
- Harvest Unit 41A, an intermediate skyline logging system unit, was dropped due to safety concerns of running a skyline machine under a high-voltage power line. This unit was converted to Fuels Unit F30.
- Fuels Units F26, F27, F28, and F29 were added. These units are portions of the original Harvest Unit 21 that are not feasible to log due to either a lack of treatment need or an inability to apply logging systems due to steepness or the presence of RHCAs that cannot be crossed with conventional logging systems.
- In the Proposed Action, Harvest Unit 31A was combined with Harvest Unit 31B, because Unit 31A is a decadent lodgepole pine stand in need of regeneration harvest. The combined unit would be called Harvest Unit 31B and would create an over-40 acre opening.
- In Alternative 2, Modified Proposed Action, regeneration Harvest Units 18 and 20 were further modified to reduce their combined opening size from 190 acres to approximately 100 acres.

Timber Harvest

Alternative 2 proposes 2,090 acres of regeneration harvest, 652 acres of intermediate harvest, and 385 acres of a combination of intermediate and regeneration harvest designed to move the stands towards the desired vegetative condition (Table 3). This treatment would result in an improvement cut with seed tree or shelterwood openings. The total harvest activities could produce approximately 75,700 CCF (CCF = 100 cubic feet), or approximately 38.6 million board feet (MMBF) of timber with approximately 28.4 MMBF in saw timber and 10.2 MMBF in non-saw timber.

To allow harvest within areas of the OLY project area currently contributing to grizzly bear core habitat, changes to road access would be necessary to comply with habitat parameter standards for BMU 10 (see Map M-23). Also see Appendix E Access Management Plan and its table therein.

In Alternative 2, seventy-five harvest units totaling 2,744 acres are within the WUI (1,760 acres of regeneration harvest and 984 acres of intermediate harvest). Twenty-six fuels units totaling 1,008 acres are within the WUI.

This alternative also proposes 155 acres of intermediate harvest within old growth (Table 15). This intermediate harvest is designed to retain old growth characteristics.

Thirty-two units either create or contribute to openings over 40 acres in Alternative 2 (See Table 2 above).

> Regional policy (Regional Supplement FSM 2400 Timber Management, Chapter 2470 Silvicultural Practices, FSM 2471.1) directs the size of harvest openings created by even-aged silvicultural practices would normally be 40 acres or less. Creation of larger openings requires 60-day public review and Regional Forester approval. The public was notified of the potential for these openings during the scoping period in September, 2014 (see Proposed Action section of the project file).
>
> Alternative 2 would require approval from the Regional Forester to create openings exceeding 40 acres in size. This alternative is being studied in detail to show that there is support from multiple district resources including vegetation, wildlife, watershed, soils and fuels for creating openings over 40 acres to help achieve desired ecological conditions.

Table 3. Proposed Harvest Activities for Alternative 2

Proposed Harvest Related Activities	Acres
Regeneration Harvest[1]	2,116
Intermediate Harvest[2]	626
Intermediate/Regeneration Harvest[3]	385
Total Harvest	**3,127**
	Volume
Total Harvest MMBF	**38.6 MMBF**
Total Harvest CCF	**75,700 CCF**
Type of Fuels Treatment following Harvest	**Acres**
Grapple pile[4]	1,152
Underburn[5]	1,974
Total	**3,126**

[1] Regeneration Harvest: Silvicultural prescriptions include Seed Tree Cut, Shelterwood Cut, or Clearcut with Reserves.

[2] Intermediate Harvest: Silvicultural prescription is an Improvement Cut.

[3] Intermediate/Regeneration Harvest: This is a combination of intermediate harvest and regeneration harvest. The regeneration patches are generally less than 5 acres in size. The silvicultural prescription results in an Improvement Cut with Seed Tree or Shelterwood Openings.

[4] Grapple pile: Excavator machine piled slash.

[5] Underburn: The controlled application of prescribed fire to reduce surface fuels while protecting the overstory component.

MMBF = Million Board Feet
CCF = 100 Cubic Feet

Silvicultural Prescriptions

The following treatments and their descriptions apply to all alternatives where applicable.

Regeneration Stand Treatments

Regeneration is used as a treatment method to replace a stand when intermediate harvest is not feasible due to the existing species composition and condition of the stand. In this project regeneration is proposed in stands where healthy seral species like western larch and western white pine are a minor component and other species like grand fir, western hemlock and western redcedar are in poor condition with small crowns, stem and root diseases, and in stands that are currently occupied by off-site[1] ponderosa pine and Douglas-fir infected with root rot. Large western larch, ponderosa pine, western white pine and Douglas-fir trees would be left with additional tree species in some places to provide diverse structure. The intent is to create a stand condition somewhat similar to what would occur, post-wildfire, with the larger fire tolerant trees remaining and the smaller and non-fire tolerant trees being killed. A representative photo of a regeneration harvest is shown in Figure 12.

These units would provide open grown conditions similar to a stand replacing fire and reforestation would focus on establishment of western larch, western white pine, ponderosa pine and Douglas-fir in the stand with western redcedar, lodgepole pine, Engelmann spruce, grand fir and western hemlock and some seral species naturally regenerating and present as a component of the species mix. Snags and snag replacement trees would be left at 6 to 12 trees per acre with western larch and western redcedar being the desired species for snags and any species with active cavity nests that are stable enough to withstand harvest activities. Leave trees would be left in groups of 4 to 12 trees as well as scattered individuals to mimic natural conditions and to leave the best trees no matter what spacing. There are generally three types of regeneration harvest: seed tree cut, shelterwood cut and clearcut with reserves. These various types of regeneration harvest are detailed below and vary by number of leave trees per acre.

[1] Off-site ponderosa pine was planted in various locations in the project area. These stands, as a whole are not healthy, probably because the off-site planting stock is not adapted to local growing conditions.

Figure 12. Regeneration Harvest

Seed Tree Cut

These units have 10 to 25 quality trees per acre that would remain after harvest in an uneven arrangement of individuals, small groups, and clumps. Seed from these leave trees would naturally regenerate most of these units along with supplemental planting of species such as western larch and rust resistant western white pine. Units that are excavator piled would likely be planted to assure adequate desirable stocking.

Shelterwood Cut

These units have 15 to 35 quality trees per acre that would remain after harvest in an uneven arrangement of individuals, small groups and clumps. Seed from these leave trees would naturally regenerate the unit along with supplemental planting of species such as western larch and rust resistant western white pine. Units that are excavator piled would likely be planted to assure adequate, desirable stocking. This type of harvest is used when additional leave trees are needed to protect the site and to protect scenic values.

Clearcut with Reserves

These units have 5 to 20 trees per acre that would remain after harvest in an uneven arrangement of individuals, small groups, and clumps. These stands are in such poor condition that few quality trees and very few of the desirable species are available. These units would be planted to assure adequate, desirable stocking with western larch and rust resistant western white pine.

Intermediate Stand Treatment

The Forest Service Manual (FSM) defines Intermediate Treatment as: “A collective term for any treatment or tending designed to enhance growth, quality, vigor, and composition of the stand

after establishment or regeneration and prior to final harvest (FSM Amendment No. 2400-2014-1). The FSM also defines an improvement cut as "… an intermediate treatment made in a stand, pole-sized or larger, primarily to improve composition and quality by removing less desirable trees of any species (FSM Amendment No. 2400-2014-1)."

Improvement Cut

An improvement cut (thinning) is used to improve the composition and quality of forest stands by reducing the density of the trees and promoting more open stand structure. Enough healthy desirable species are present to allow for thinning which would increase vigor and growth in the leave trees that would remain to occupy the site for many more years. A representative improvement cut is displayed in Figure 13.

Figure 13. Stand Improvement Harvest

Intermediate/Regeneration Harvest

For some units, the best silvicultural practice is a combination of intermediate harvest and regeneration harvest. An intermediate/regeneration harvest results in an improvement cut (see description above) with seed tree or shelterwood openings. The size of the regeneration openings is not limited to 5 acres or less, but is dependent upon the appropriate size needed to treat pockets of insects and disease within the unit. All openings greater than 5 acres will be tracked and held to the same NFMA standards for reforestation as all regeneration harvest units.

Harvest Unit Summary for Alternative 2

The following table displays the management area (MA), proposed treatment, logging system and season (for units that must be winter harvest) and fuels treatment method for each proposed unit in Alternative 2 (Table 4).

Table 4. Harvest Unit Summary for Alternative 2

Harvest Unit #	MA	Acres	Proposed Treatment	Logging System/Season	Fuels Treatment
1	6	54	Improvement Cut with Seed Tree or Shelterwood Openings	Tractor	Slash, grapple pile
3A	6	12	Clearcut with Reserves	Tractor	Slash, grapple pile
3B	6	13	Seed tree with Reserves	Tractor	Slash, grapple pile
4	6	176	Improvement Cut	Tractor	Slash, underburn
5	6	8	Seed tree with Reserves	Tractor	Slash, grapple pile
6	6	42	Improvement Cut with Seed Tree or Shelterwood Openings	Tractor	Slash, grapple pile
7	6	8	Seed tree with Reserves	Tractor	Slash, grapple pile
8	6	66	Improvement Cut	Tractor	Slash, underburn
8A	6	4	Improvement Cut	Tractor	Slash, grapple pile
9	6	16	Seed tree with Reserves	Tractor	Slash, grapple pile
11	6	11	Seed tree with Reserves	Tractor	Slash, underburn
12	6	25	Seed tree with Reserves	Tractor	Slash, grapple pile
14	6	70	Clearcut with Reserves	Tractor/Winter	Slash, underburn
15	6	27	Seed tree with Reserves	Tractor	Slash, underburn
16	6	6	Improvement Cut	Tractor	Slash, underburn
18	6	81	Clearcut with Reserves	Tractor	Slash, underburn
20	6	109	Seed tree with Reserves	Skyline	Slash, underburn
21	6	129	Improvement Cut	Skyline	Slash, underburn
23	6	24	Improvement Cut with Seed Tree or Shelterwood Openings	Tractor	Slash, grapple pile
24	6	25	Improvement Cut	Skyline	Slash, underburn
25	6	65	Clearcut with Reserve	Tractor	Slash, grapple pile
27	6	11	Improvement Cut	Skyline	Slash, underburn
28	6	80	Improvement Cut	Tractor	Slash, grapple pile
29	6	25	Seed tree with Reserves	Tractor	Slash, grapple pile
30	6	37	Shelterwood with Reserves	Tractor	Slash, grapple pile
31B	6	60	Clearcut with Reserves	Tractor	Slash, grapple pile
32	2, 6	34	Improvement Cut	Tractor	Slash, underburn
33	2, 6	30	Clearcut with Reserves	Tractor/Winter	Slash, underburn
34	6	56	Seed tree with Reserves	Tractor/Winter	Slash, underburn
35	2	12	Seed tree with Reserves	Tractor/Winter	Slash, grapple pile
35A	2	2	Clearcut with Reserves	Tractor/Winter	Slash, grapple pile
35B	2	3	Improvement Cut	Tractor/Winter	Slash, grapple pile
36	2	4	Seed tree with Reserves	Tractor/Winter	Slash, grapple pile

Harvest Unit #	MA	Acres	Proposed Treatment	Logging System/Season	Fuels Treatment
37	6	73	Seed tree with Reserves	Tractor/Winter	Slash, underburn
37A	6	34	Improvement Cut	Skyline	Slash, underburn
38	6	71	Improvement Cut with Seed Tree or Shelterwood Openings	Tractor	Slash, grapple pile
38A	6	6	Clearcut with Reserves	Tractor	Slash, underburn
39	6	52	Seed tree with Reserves	Tractor	Slash, grapple pile
40	2, 6	109	Seed tree with Reserves	Tractor	Slash, grapple pile
41B	2, 6	15	Seed tree with Reserves	Tractor/Winter	Slash, grapple pile
42	2, 6	85	Seed tree with Reserves	Skyline	Slash, underburn
43	6	48	Seed tree with Reserves	Tractor	Slash, grapple pile
44	6	20	Seed tree with Reserves	Tractor	Slash, grapple pile
45	6	33	Clearcut with Reserves	Tractor	Slash, underburn
45A	6	63	Seed tree with Reserves	Tractor	Slash, underburn
45B	6	26	Improvement Cut	Tractor	Slash, underburn
45C	6	35	Seed tree with Reserves	Tractor/Winter	Slash, grapple pile
46	6	16	Improvement Cut	Tractor/Winter	Slash, grapple pile
47	6	17	Clearcut with Reserves	Tractor	Slash, underburn
48	6	23	Clearcut with Reserves	Tractor/Winter	Slash, underburn
49	6	6	Clearcut with Reserves	Tractor	Slash, underburn
50	6	21	Improvement Cut	Tractor	Slash, grapple pile
51	6	36	Clearcut with Reserves	Tractor/Winter	Slash, underburn
52	6	56	Improvement Cut with Seed Tree or Shelterwood Openings	Tractor	Slash, underburn
52A	6	39	Clearcut with Reserves	Tractor	Slash, grapple pile
52B	2, 6	65	Seed tree with Reserves	Tractor/Winter	Slash, underburn
52C	6	31	Improvement Cut with Seed Tree or Shelterwood Openings	Tractor/Winter	Slash, underburn
52D	6	14	Clearcut with Reserves	Tractor/Winter	Slash, grapple pile
53	6	49	Clearcut with Reserves	Tractor	Slash, underburn
54	6	24	Clearcut with Reserves	Tractor	Slash, grapple pile
55	6	31	Improvement Cut with Seed Tree or Shelterwood Openings	Tractor	Slash, underburn
55A	2, 6	10	Improvement Cut	Tractor	Slash, underburn
55B	2, 6	18	Shelterwood with Reserves	Tractor	Slash, underburn
56	2, 6	29	Seed tree with Reserves	Tractor	Slash, grapple pile
57	6	68	Seed tree with Reserves	Tractor/Winter	Slash, underburn
58	2	15	Seed tree with Reserves	Tractor	Slash, grapple pile

Harvest Unit #	MA	Acres	Proposed Treatment	Logging System/Season	Fuels Treatment
59	2	11	Seed tree with Reserves	Tractor	Slash, grapple pile
60	2, 6	24	Seed tree with Reserves	Tractor/Winter	Slash, grapple pile
61	2, 6	51	Clearcut with Reserves	Tractor/Winter	Slash, grapple pile
61A	2, 6	34	Clearcut with Reserves	Tractor	Slash, grapple pile
62	2, 6	24	Seed tree with Reserves	Tractor	Slash, grapple pile
63	6	10	Improvement Cut	Tractor/Winter	Slash, grapple pile
68	6	70	Shelterwood with Reserves	Skyline	Slash, underburn
69	6	27	Seed tree with Reserves	Skyline	Slash, underburn
70	6	67	Seed tree with Reserves	Skyline	Slash, underburn
71	6	39	Seed tree with Reserves	Skyline	Slash, underburn
73	6	18	Seed tree with Reserves	Skyline	Slash, underburn
74	6	100	Seed tree with Reserves	Skyline	Slash, underburn
75	6	50	Improvement Cut with Seed Tree or Shelterwood Openings	Skyline	Slash, underburn
77	6	41	Clearcut with Reserves	Tractor	Slash, underburn
Total Acres		**3,126**			

Harvest Related Road Work

In most cases the harvest units would be accessed from existing specified NFSRs, Lincoln County roads and Stimson Lumber Company roads totaling approximately 71 miles of designated haul roads.

Road Reconstruction and Reconditioning:

- Road reconstruction and reconditioning activities would be implemented on the NFSR haul roads (approximately 45 miles). This work would include implementation of BMPs to reduce road-related sediment and work to provide for safe timber transport. Road reconstruction and reconditioning work may include, but is not limited to, the replacement and installation of drain dips and culverts, constructing or cleaning catch basins and ditches, blading, dust abatement, buttressing cut slopes and fill slopes and resurfacing.

Temporary Road Construction:

- One segment of temporary road totaling approximately 0.2 miles would be constructed to access Harvest Unit 52. This road would be returned to the existing condition following activities.

New Construction:

- Approximately 0.4 miles of new construction (to become part of NFSR 14321) would occur. In addition, 0.5 miles of NFSR 14321, from milepost 1.1 to milepost 1.6, would be passively decommissioned. These actions would create a reroute to avoid a wetland (Figure 14).

- Approximately 0.3 miles of new construction from the end of NFSR 14309B would occur to allow a reroute around the Troy Shooting Range. (Figure 15). Approximately 0.2 miles of undetermined NFSR 14309A was originally planned for use to access this area. However, this portion would be passively decommissioned, because the road is located in a swale that receives occasional stream flow.

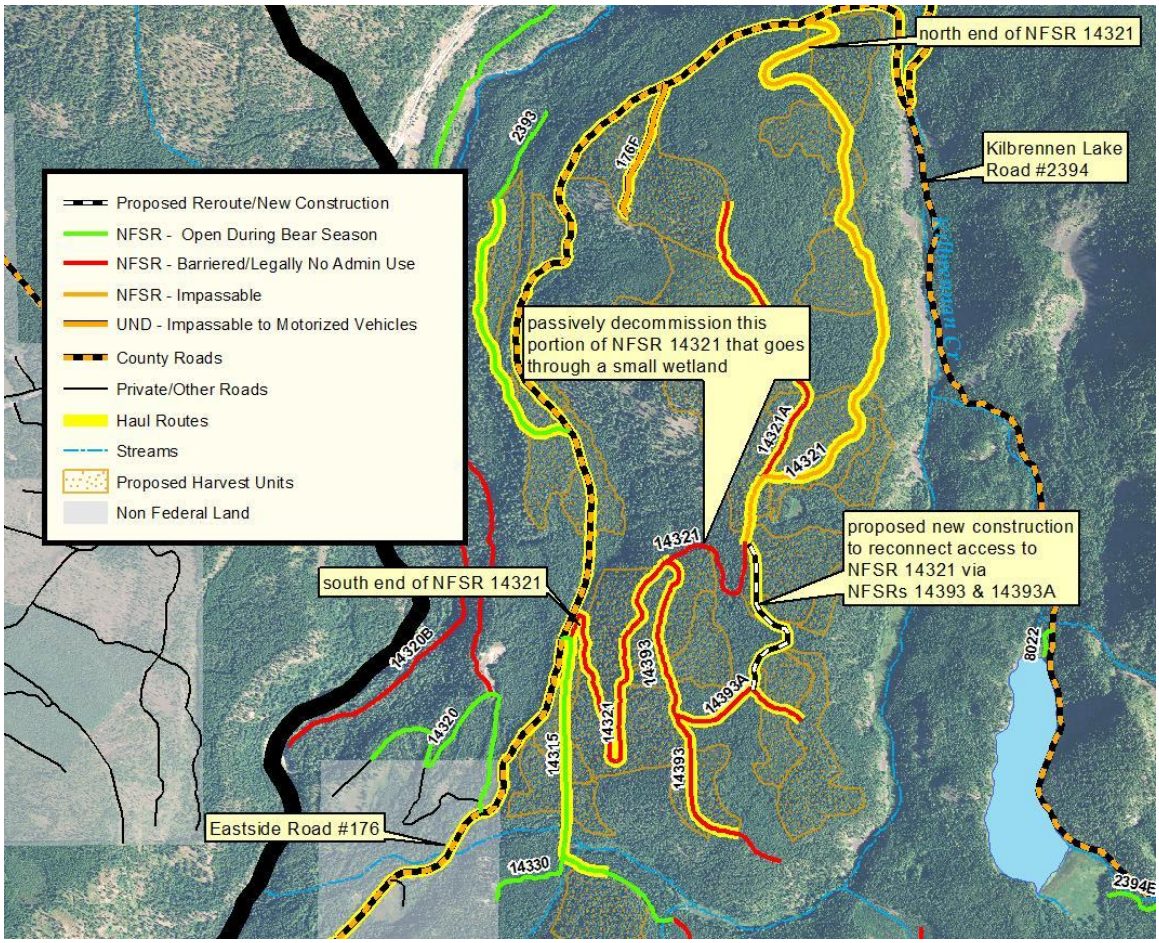


Figure 14. NFSR 14321 and 14321A Proposed Road Work

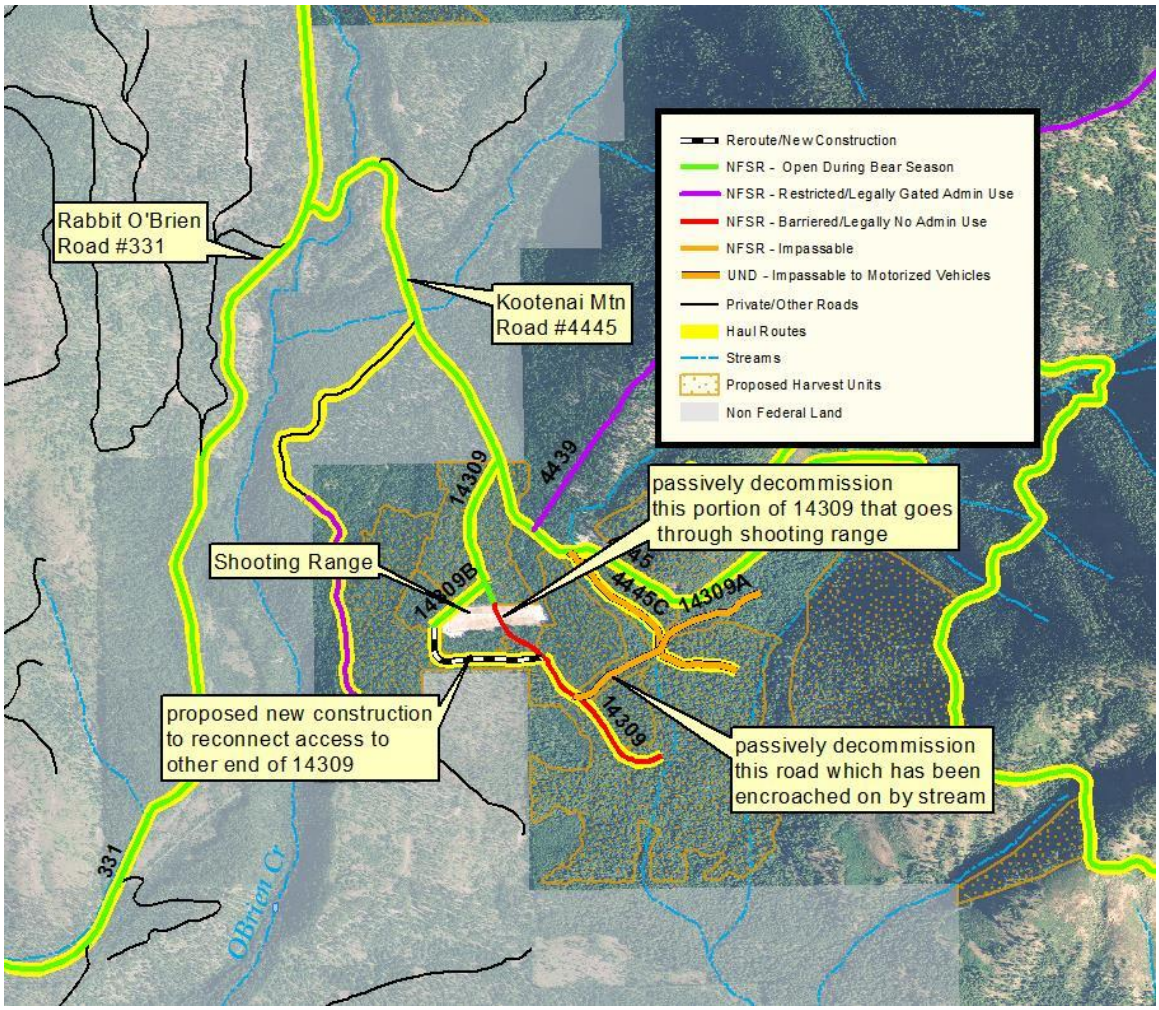


Figure 15. NFSR 14309, 14309A and 14309B Proposed Road Work

Harvest Related Fuels Treatment/Site Preparation Activities

The following fuels treatments in the OLY project area are prescribed to reduce natural and activity related fuels, prepare sites for reforestation, and stimulate browse and forage species, including huckleberries.

Yard Tops and Excavator Pile (approximately 37 percent of total harvest fuels treatment):

The tops of trees, comprising most of the foliage and branches, are removed from the site and unused portions are deposited in landing piles, where they are burned. To facilitate additional fuel reduction while protecting remaining trees, woody debris would be gathered and piled mechanically using an excavator. The piles would be ignited in the late fall during periods of optimum smoke dispersal. The piles would be placed at least 25 feet away from the unit boundaries, leave trees or leave islands to protect them from possible heat damage. In narrow work areas, piles would be located as far from leave trees/islands as possible

Yard Tops and Underburn (approximately 63 percent of total harvest fuels treatment):

The tops of trees, comprising most of the foliage and branches, are removed from the site and unused portions are deposited in landing piles, where they are burned. The foliage and branches are fuels which are most likely to ignite should a source of ignition occur in the unit. These fuels add substantially to fire intensity and resistance to control of a wildfire. After yarding tops, some harvest units would be underburned to reduce concentrations of remaining slash, resulting in application of a mosaic of low intensity fire which would stimulate browse and forage species, including huckleberries, and prepare the site for natural regeneration and/or planting.

Slash and grapple pile or hand pile

- Slash is vegetative debris resulting from natural causes and management activities such as road construction, logging, pruning, thinning, or brush cutting. It includes logs, chunks of wood, bark, branches, and broken understory trees or brush.
- Grapple piling is accomplished by an excavator with bucket and thumb to pile slash.
- Hand piling is when slash is piled by hand.

Reforestation

Within the 2,090 acres proposed as regeneration harvest in Alternative 2, planting would supplement the anticipated natural regeneration, and help establish tree species such as western larch, ponderosa pine and western white pine. Western white pine and western larch are under-represented within the warm/moist biophysical setting, while ponderosa pine and western larch are under-represented within the warm/dry biophysical setting. Contributing factors to this under-representation include: fire exclusion, inadequate seed source, disease, and past harvest activities. Planted conifer seedlings would enhance species diversity, assure timely reforestation, and contribute toward long-term desired habitat conditions. Reforestation of harvest areas would be designed to achieve a mix of native tree species appropriate to the specific site. Western white pine seedlings to be planted would be from breeding stock that has been specially cultivated for resistance to white pine blister rust. (Refer to Chapter 1 and the Glossary for a description of biophysical settings)

NFSR 2380 and 2380A Road Work

Approximately 0.3-miles of NFSR 2380 would be decommissioned and revegetated from the junction of NFSR 752 and NFSR 2380 to the junction of NFSR 2380 and 2380A (Figure 16). Concurrent with this work 0.7 miles of NFSR 2380A would be reconstructed so as to provide continued access to the to N.F. O'Brien area.

The purpose of this work would be to reduce sediment delivery to N.F. O'Brien and restore the riparian area while still providing public access to the same area. The work is dependent on funding availability. This work is proposed in Alternatives 2 and 3, but not in Alternative 4.

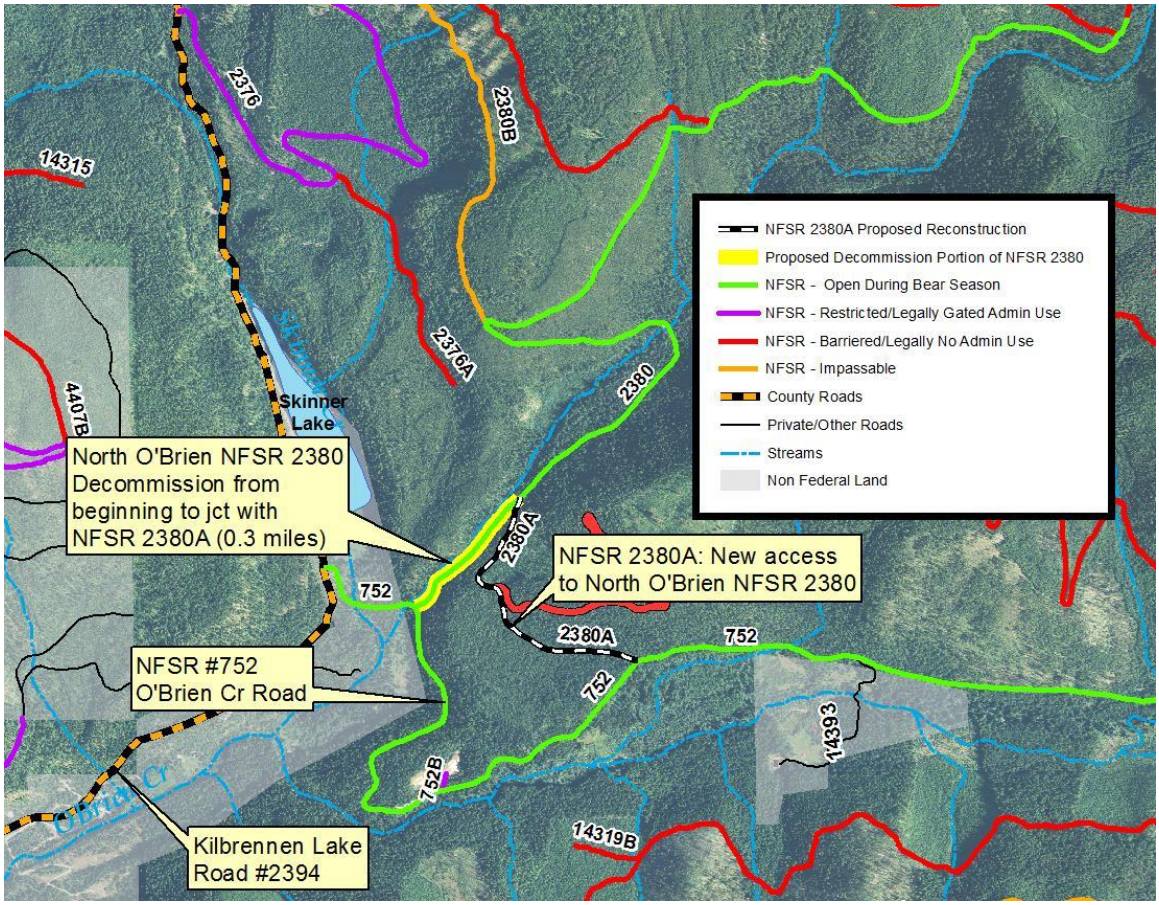


Figure 16. NFSR 2380 and 2380A Proposed Roadwork

Non-Harvest Related Fuels Treatment Activities

Non-harvest fuels treatment is proposed on approximately 1,716 acres, including approximately 376 acres within old growth. Fuels treatments would include about 1690 acres of prescribed fire, 12 acres of mechanical piling and prescribed fire and about 14 acres of mechanical grinding (Table 5). About 1,009 acres of fuels treatment occur within the WUI and 172 acres occur within the IRAs. Most units would be ignited by hand in the spring or fall. There would be no ignition within the RHCAs, but fire would be allowed to back into the RHCA. The lower elevation burns are intended to be mixed severity type burns with the objectives to maintain the ecological processes in fire-adapted stands with the benefit of improving big game winter range forage and spring grizzly bear foraging habitat. Anticipated crown cover density reduction as a result of these

burns is displayed in the Fuels Treatment Summary Table (Appendix D). This reduction in canopy cover would include a range of mortality from areas of scattered tree mortality to larger areas with greater levels of tree mortality.

Prescribed burning helps reduce fuels, contribute to natural processes and promote wildlife forage, including huckleberry production, where the plant is found. The objectives are to maintain the ecological processes in fire-adapted stands help improve big game winter range forage and spring grizzly bear foraging habitat.

Mechanical fuel treatment, such as grinding, is prescribed when fuels reduction is necessary but prescribed fire is not advised due to safety or resource concerns.

Non-Harvest Fuels Treatment Types:

- Ecosystem Burn: Utilizes prescribed fire as a management tool to achieve vegetation desired conditions in non-harvest areas. It is the controlled application of fire to the landscape under specific environmental conditions to emulate a mixed fire severity.
- Underburn: A prescribed fire technique that consumes surface fuels while leaving the overstory intact.
- Grind: Mechanical grinding of slash by a machine into smaller material and left on site or removed.
- Slash: Naturally occurring vegetative debris or non-harvest related fuels augmentation debris.
- Hand Pile: Piling of slash by hand.
- Grapple Pile: Piling of slash by an excavator with a bucket and thumb.

Table 5. Proposed Non-Harvest Fuels Treatment for Alternative 2

Proposed Fuels Treatment	Acres
Ecosystem Burn	868
Underburn	737
Slash and Grind	14
Slash and Grapple Pile	12
Slash and Underburn; Slash and Hand Pile	85
Total	**1,716**

Non-Harvest Fuels Treatment Implementation:

Prescribed burning would be implemented incrementally over an approximately ten year timeframe. One to three prescribed burn units would be ignited in a given year. Locations and entry would be staggered. The intent is to minimize displacement and disturbance to wildlife and to allow a few seasons of growth and recovery to occur prior to igniting adjacent units. The result is that if ignition occurred in one portion of the project area, the district would plan to wait 2 to 3 years before igniting in that area again in order to avoid vegetation change on too large an area at once.

Ignition would be with both helicopter and hand crews in either the spring or fall. Helicopter operations would be limited to two days each spring and two days each fall to minimize disturbance to wildlife.

To increase the probability of accomplishing prescribed objectives for ecosystem burns and underburns, fuels augmentation (slashing) may occur to provide pockets of fuels that would help fire carry into portions of the rest of the unit. Fuels augmentation would consist of hand felling trees approximately six inches diameter at breast height (DBH) or less and leaving the trees on site to dry and provide fuel. The trees would be selected according to the amount of fine fuels they could provide to the prescribed burn unit and would occur one or two years prior to ignition.

To treat hazardous fuels and reduce crown fire potential and stand replacing wildfire within the WUI, fuels reduction treatments would occur such as fuels augmentation, grapple and hand piling and underburning.

Ignition within the Riparian Habitat Conservation Areas would be avoided, but fire is expected to back into some of the areas naturally. All prescribed burning activities and fuels augmentation (slashing) would be dependent on available funding, fuel conditions, weather, and smoke dispersal at the time of implementation. This document presents analysis for the maximum amount of prescribed burning and fuels augmentation that could occur within the project area; however, it is possible that available funding and environmental conditions could warrant that only a portion of prescribed burn activities occur within a 10-year time frame. Table 6 displays proposed fuels treatments in non-harvest fuels units applicable to each alternative. However, Fuels Unit F30 is only included in Alternatives 2 and 4; Fuels Unit F32 is only included in Alternatives 3 and 4; and F33, F34, F35 and F36 are only included in Alternative 3. See Table 21 for a list of proposed activities by alternative.

Table 6. Proposed Non-harvest Fuels Units* and Treatments within the OLY Project Area

Fuels Unit # (Applicable Alt)	MA	Ignition Acres	Current Condition	Objective	Fuels Treatment
F1 (all alternatives)	5a	172	Higher elevation site. Forage and berry production reduced due to tree canopy closure, encroachment, lack of fire, and/or browse pressure.	A	Ecosystem Burn
F2 (all alternatives)	2, 6	76	Lower elevation site with drier habitat and associated species (e.g., ponderosa pine). Forage and berry production reduced due to tree canopy closure, encroachment, lack of fire, and/or browse pressure.	B	Underburn
F3 (all alternatives)	2, 6	83	Lower elevation site with drier habitat and associated species (e.g., ponderosa pine). Forage and berry production reduced due to tree canopy closure, encroachment, lack of fire, and/or browse pressure.	B	Ecosystem Burn
F4 (all alternatives)	6	17	Lower elevation site with drier habitat and associated species (e.g., ponderosa pine). Forage and berry production reduced due to tree canopy closure, encroachment, lack of fire, and/or browse pressure.	B	Underburn
F5 (all alternatives)	6	88	Lower elevation site with drier habitat and associated species (e.g., ponderosa pine). Forage and berry production reduced due to tree canopy closure, encroachment, lack of fire, and/or browse pressure.	B	Underburn
F6 (all alternatives)	6	43	Lower elevation site with drier habitat and associated species (e.g., ponderosa pine). Forage and berry production reduced due to tree canopy closure, encroachment, lack of fire, and/or browse pressure.	A	Ecosystem Burn
F7 (all alternatives)	6	9	Lower elevation site associated with private property. Existing fuel loads and ladder fuels contribute to increased fire risk and hamper potential fire-fighting efforts.	D	Slash and Underburn or Slash and Hand Pile
F8 (all alternatives)	6	23	Lower elevation site associated with private property. Existing fuel loads and ladder fuels contribute to increased fire risk and hamper potential fire-fighting efforts.	D	Slash and Underburn or Slash and Hand Pile
F9 (all alternatives)	6	18	Lower elevation site with drier habitat and associated species (e.g., ponderosa pine). Forage and berry production reduced due to tree canopy closure, encroachment, lack of fire, and/or browse pressure.	C	Slash and Underburn
F10 (all alternatives)	6	23	Lower elevation site with drier habitat and associated species (e.g., ponderosa pine). Forage and berry production reduced due to tree canopy closure, encroachment, lack of fire, and/or browse pressure.	C	Slash and Underburn

Fuels Unit # (Applicable Alt)	MA	Ignition Acres	Current Condition	Objective	Fuels Treatment
F11 (all alternatives)	2, 6	49	Lower elevation site with drier habitat and associated species (e.g., ponderosa pine). Forage and berry production reduced due to tree canopy closure, encroachment, lack of fire, and/or browse pressure.	B	Underburn
F12 (all alternatives)	6	107	Lower elevation site with drier habitat and associated species (e.g., ponderosa pine). Forage and berry production reduced due to tree canopy closure, encroachment, lack of fire, and/or browse pressure.	B	Underburn
F13 (all alternatives)	6	231	Lower elevation site with drier habitat and associated species (e.g., ponderosa pine). Forage and berry production reduced due to tree canopy closure, encroachment, lack of fire, and/or browse pressure.	A	Ecosystem Burn
F15 (all alternatives)	6	5	Lower elevation site associated with private property. Existing fuel loads and ladder fuels contribute to increased fire risk and hamper potential fire-fighting efforts.	D	Slash and Underburn or Slash and Hand Pile
F16 (all alternatives)	2	14	Lower elevation site associated with private property. Existing fuel loads have been reduced through past treatment.	D	Underburn
F17 (all alternatives)	2, 6	12	Lower elevation site associated with private property. Existing fuel loads have been reduced through past treatment.	D	Underburn
F18 (all alternatives)	2	14	Lower elevation site associated with private property. Existing fuel loads and ladder fuels contribute to increased fire risk and hamper potential fire-fighting efforts.	D	Slash and Grind
F19 (all alternatives)	6	339	Higher elevation site. Forage and berry production reduced due to tree canopy closure, encroachment, lack of fire, and/or browse pressure.	A	Ecosystem Burn
F20 (all alternatives)	6	4	Lower elevation site associated with private property. Existing fuel loads and ladder fuels contribute to increased fire risk and hamper potential fire-fighting efforts.	D	Slash and Underburn or Slash and Hand Pile
F22 (all alternatives)	6	8	Lower elevation site associated with private property. Existing fuel loads and ladder fuels contribute to increased fire risk and hamper potential fire-fighting efforts.	D	Slash and Grapple Pile
F25 (all alternatives)	6	242	Lower elevation site with drier habitat and associated species (e.g., ponderosa pine). Forage and berry production reduced due to tree canopy closure, encroachment, lack of fire, and/or browse pressure.	A	Underburn

Fuels Unit # (Applicable Alt)	MA	Ignition Acres	Current Condition	Objective	Fuels Treatment
F26 (all alternatives)	6	4	Lower elevation site associated with private property. Existing fuel loads and ladder fuels contribute to increased fire risk and hamper potential fire-fighting efforts.	D	Slash and Grapple Pile
F27 (all alternatives)	6	11	Lower elevation site with drier habitat and associated species (e.g., ponderosa pine). Forage and berry production reduced due to tree canopy closure, encroachment, lack of fire, and/or browse pressure.	B	Underburn
F28 (all alternatives)	6	21	Lower elevation site with drier habitat and associated species (e.g., ponderosa pine). Forage and berry production reduced due to tree canopy closure, encroachment, lack of fire, and/or browse pressure.	B	Underburn
F29 (all alternatives)	6	3	Lower elevation site associated with private property. Existing fuel loads and ladder fuels contribute to increased fire risk and hamper potential fire-fighting efforts.	D	Slash and Underburn or Slash and Hand Pile
F31 (all alternatives)	6	96	Lower elevation site associated with private property. Existing fuel loads and ladder fuels contribute to increased fire risk and hamper potential fire-fighting efforts.	D	Underburn
F30 (Alts 2 and 4 only)	2	4	Lower elevation site associated with private property. Existing fuel loads and ladder fuels contribute to increased fire risk and hamper potential fire-fighting efforts.	D	Underburn
F32 (Alts 3 and 4 only)	2, 6	15	Lower elevation site associated with private property. Existing fuel loads and ladder fuels contribute to increased fire risk and hamper potential fire-fighting efforts.	D	Hand Slash and Grind
F33 (Alternative 3 only)	2	10	Lower elevation site associated with private property. Existing fuel loads and ladder fuels contribute to increased fire risk and hamper potential fire-fighting efforts.	D	Slash and Grind
F34 (Alternative 3 only)	2	2	Lower elevation site associated with private property. Existing fuel loads and ladder fuels contribute to increased fire risk and hamper potential fire-fighting efforts.	D	Slash and Grind
F35 (Alternative 3 only)	2	3	Lower elevation site associated with private property. Existing fuel loads and ladder fuels contribute to increased fire risk and hamper potential fire-fighting efforts.	D	Slash and Grind

Fuels Unit # (Applicable Alt)	MA	Ignition Acres	Current Condition	Objective	Fuels Treatment
F36 (Alternative 3 only)	2	2	Lower elevation site associated with private property. Existing fuel loads and ladder fuels contribute to increased fire risk and hamper potential fire-fighting efforts.	D	Slash and Grind
Total Acres In Alt 2		**1,716**			
Total Acres in Alt 3		**1,744**			
Total Acres in Alt 4		**1,730**			

*** Note:** All fuels units for the OLY project are displayed. However, F30 is only within Alternatives 2 and 4; F32 is only within Alternatives 3 and 4; and F33, F34, F35 and F36 are only in Alternative 3.

Objective A: Reintroduce fire on the landscape, maintain existing open conditions, and stimulate forage/browse reproduction for big game and other wildlife species. There is potential for improved huckleberry production in the higher elevation locations, where present, that could benefit grizzly bear recovery efforts.

Objective B: Reintroduce fire on the landscape, thin encroaching confers with fuel augmentation (slashing) where needed, promote ponderosa pine restoration and prove future suitability for flammulated owl use. Promote growing conditions that maintain or encourage the development of old growth characteristics, improve browse and forage availability in big game winter ranges and spring foraging habitat for grizzly bear.

Objective C: Stimulate fire's role on the landscape by thinning encroaching conifers. Promote restoration of ponderosa pine which includes the maintenance/development of old growth characteristics through improved growing conditions. Maintain existing browse and forage by reducing competition and overstory cover, improve suitability for flammulated owl use.

Objective D: Reducing and/or maintaining low fuel conditions in the wildland urban interface. Increasing defensible space around private property and improving accessibility for emergency responders and public in the event of a wildfire.

Treatments within Old Growth

Harvest and fuels treatments are proposed within old growth and recruitment potential old growth. All action alternatives would propose 155 acres of harvest treatment and 376 acres of fuels treatment within old growth (Alternatives 3 and 4 would propose the same units and acreages).

Proposed treatments will not remove any old growth attributes. These proposed harvest treatments are designed to preserve all of the old growth attributes while treating excess fuel accumulations. The purpose of fuels treatment within old growth is to maintain the fire return cycle within these stands and promote the characteristics of old growth.

Harvest treatments are proposed in Units 21, 63 and 75 which contain old growth and within Unit 37A which contains recruitment potential old growth. Fuels treatments are proposed in Fuels Units F13, F19, F25, F26, and F29 which contain old growth and in Fuels Units F02 and F05 which contain recruitment potential old growth (Table 15 and Table 16 in Activities Common to the Action Alternatives).

Please refer to the Old Growth section of Chapter 3 for a complete description of activities proposed in old growth and associated effects.

Treatments within Scenic River and Recreational River Corridor

Fuels units totaling 107 acres and 327 acres of harvest units are proposed within MA2 under Alternative 2.

Treatments with Inventoried Roadless

A 172-acre fuels unit is proposed within the Saddle Mountain IRA under Alternative 2.

Alternative 3

Alternative 3 is the Forest Service's preferred alternative. This alternative was designed to meet the purpose and need for the project while responding to public comment and the key issues presented earlier in Chapter 2. It addresses heritage and soil concerns through design features or by dropping highly sensitive areas where design features were not feasible. In this alternative, some harvest units were converted to fuels units to allow for treatment options while helping to protect historic properties. The following changes were made to address resource concerns, improve feasibility and carried forward in the analysis as Alternative 3.

- Harvest Units 35, 35A, 35B, 36, and 41B would be converted to Fuels Units F33, F34, F35, F36 and F32 respectively to retain some fuels reduction activities and help protect historic properties.
- The fuels treatment for Fuels Unit F32 was changed from hand piling/burning to hand slash and grinding due to historic properties.
- Fuels Unit F30 was dropped due to potential concerns associated with ground disturbance necessary for fire line construction.

Timber Harvest

Alternative 3 proposes 2,061 acres of regeneration harvest, 623 acres of intermediate harvest and 385 acres of intermediate/regeneration harvest to move the stands towards the desired vegetative condition. This includes 155 acres of harvest treatment and 376 acres of fuels treatment within old growth. These treatments would not remove any old growth attributes.

To allow harvest within areas of the OLY project area currently contributing to grizzly bear core habitat, changes to road access would be necessary to comply with habitat parameter standards for BMU 10 (see Map M-23). Also see Appendix E Access Management Plan and its table therein.

In Alternative 3, seventy harvest units totaling 2,687 acres are within the WUI (1,706 acres of regeneration harvest and 981 acres of intermediate harvest). Thirty fuels units totaling 1,035 acres are within the WUI.

Thirty units either create or contribute to openings over 40 acres in Alternative 3 (See Table 2).

> Regional policy (Regional Supplement FSM 2400 Timber Management, Chapter 2470 Silvicultural Practices, FSM 2471.1) directs the size of harvest openings created by even-aged silvicultural practices would normally be 40 acres or less. Creation of larger openings requires 60-day public review and Regional Forester approval. The public was notified of the potential for these openings during the scoping period in September, 2014 (see Proposed Action section of the project file).
>
> Alternatives 3 would require approval from the Regional Forester to create openings exceeding 40 acres in size. These alternative is being studied in detail to show that there is support from multiple district resources including vegetation, wildlife, watershed, soils and fuels for creating openings over 40 acres to help achieve desired ecological conditions.

It is estimated that harvest activities could produce 36.9 million board feet (MMBF) of timber with approximately 27.8 MMBF in saw timber and 9.1 MMBF in non-sawtimber. The total harvest volume is 72,400 CCF. Table 7 below displays the timber harvest activities and related fuels treatment activities proposed for Alternative 3.

Table 7. Proposed Harvest Activities for Alternative 3

Type of Harvest	Acres
Regeneration Harvest[1]	2,061
Intermediate Harvest[2]	623
Intermediate/Regeneration Harvest[3]	385
Total Harvest	**3,069**
	Volume
Total Harvest MMBF	**36.9 MMBF**
Total Harvest CCF	**72,400 CCF**
Type of Fuels Treatment Following Harvest	**Acres**
Slash, grapple pile[4]	1,133
Slash, underburn[5]	1,936
Total	**3,069**

[1] Regeneration Harvest: Silvicultural prescriptions can be Seed Tree Cut, Shelterwood Cut, or Clearcut with Reserves.

[2] Intermediate Harvest: Silvicultural prescription is an Improvement Cut.

[3] Intermediate/Regeneration Harvest: This is a combination of intermediate harvest and regeneration harvest. The size of regeneration patches is generally 5 acres or less. The silvicultural prescription results in an Improvement Cut with Seed Tree or Shelterwood Openings.

[4] Grapple pile: Excavator machine piled slash.

[5] Underburn: The controlled application of prescribed fire to reduce surface fuels while protecting the overstory component.

MMBF = Million Board Feet

CCF = 100 Cubic Feet

Harvest Methods

Alternative 3 includes the same silvicultural prescriptions as Alternative 2, and would harvest 3,069 acres.

Table 8 displays each proposed harvest unit in Alternative 3 (see Appendix C, Harvest Treatment Summary for more information).

Table 8. Harvest Unit Summary for Alternative 3

Harvest Unit #	MA	Acres	Proposed Treatment	Logging System/Season	Fuels Treatment
1	6	54	Improvement Cut with Seed Tree or Shelterwood Openings	Tractor	Slash, grapple pile
3A	6	12	Clearcut with Reserves	Tractor	Slash, grapple pile

Harvest Unit #	MA	Acres	Proposed Treatment	Logging System/Season	Fuels Treatment
3B	6	13	Seed tree with Reserves	Tractor	Slash, grapple pile
4	6	176	Improvement Cut	Tractor	Slash, underburn
5	6	8	Seed tree with Reserves	Tractor	Slash, grapple pile
6	6	42	Improvement Cut with Seed Tree or Shelterwood Openings	Tractor	Slash, grapple pile
7	6	8	Seed tree with Reserves	Tractor	Slash, grapple pile
8	6	66	Improvement Cut	Tractor	Slash, underburn
8A	6	4	Improvement Cut	Tractor	Slash, grapple pile
9	6	16	Seed tree with Reserves	Tractor	Slash, grapple pile
11	6	11	Seed tree with Reserves	Tractor	Slash, underburn
12	6	25	Seed tree with Reserves	Tractor	Slash, grapple pile
14	6	70	Clearcut with Reserves	Tractor/Winter	Slash, underburn
15	6	27	Seed tree with Reserves	Tractor	Slash, underburn
16	6	6	Improvement Cut	Tractor	Slash, underburn
18	6	81	Clearcut with Reserves	Tractor	Slash, underburn
20	6	109	Seed tree with Reserves	Skyline	Slash, underburn
21	6	129	Improvement Cut	Skyline	Slash, underburn
23	6	24	Improvement Cut with Seed Tree or Shelterwood Openings	Tractor	Slash, grapple pile
24	6	25	Improvement Cut	Skyline	Slash, underburn
25	6	65	Clearcut with Reserve	Tractor	Slash, grapple pile
27	6	11	Improvement Cut	Skyline	Slash, underburn
28	6	80	Improvement Cut	Tractor	Slash, grapple pile
29	6	25	Seed tree with Reserves	Tractor	Slash, grapple pile
30	6	37	Shelterwood with Reserves	Tractor	Slash, grapple pile
31B	6	60	Clearcut with Reserves	Tractor	Slash, grapple pile
32	2, 6	34	Improvement Cut	Tractor	Slash, underburn
33	2, 6	30	Clearcut with Reserves	Tractor/Winter	Slash, underburn
34	6	40	Seed tree with Reserves	Tractor/Winter	Slash, underburn

Harvest Unit #	MA	Acres	Proposed Treatment	Logging System/Season	Fuels Treatment
37	6	68	Seed tree with Reserves	Tractor/Winter	Slash, underburn
37A	6	34	Improvement Cut	Skyline	Slash, underburn
38	6	71	Improvement Cut with Seed Tree or Shelterwood Openings	Tractor	Slash, grapple pile
38A	6	6	Clearcut with Reserves	Tractor	Slash, underburn
39	6	52	Seed tree with Reserves	Tractor	Slash, grapple pile
40	2, 6	109	Seed tree with Reserves	Tractor	Slash, grapple pile
42	2, 6	85	Seed tree with Reserves	Skyline	Slash, underburn
43	6	48	Seed tree with Reserves	Tractor	Slash, grapple pile
44	6	20	Seed tree with Reserves	Tractor	Slash, grapple pile
45	6	33	Clearcut with Reserves	Tractor	Slash, underburn
45A	6	63	Seed tree with Reserves	Tractor	Slash, underburn
45B	6	26	Improvement Cut	Tractor	Slash, underburn
45C	6	35	Seed tree with Reserves	Tractor/Winter	Slash, grapple pile
46	6	16	Improvement Cut	Tractor/Winter	Slash, grapple pile
47	6	17	Clearcut with Reserves	Tractor	Slash, grapple pile
48	6	23	Clearcut with Reserves	Tractor/Winter	Slash, underburn
49	6	6	Clearcut with Reserves	Tractor	Slash, underburn
50	6	21	Improvement Cut	Tractor	Slash, grapple pile
51	6	36	Clearcut with Reserves	Tractor/Winter	Slash, underburn
52	6	56	Improvement Cut with Seed Tree or Shelterwood Openings	Tractor	Slash, underburn
52A	6	39	Clearcut with Reserves	Tractor	Slash, grapple pile
52B	2, 6	65	Seed tree with Reserves	Tractor/Winter	Slash, underburn
52C	6	31	Improvement Cut with Seed Tree or Shelterwood Openings	Tractor/Winter	Slash, underburn
52D	6	14	Clearcut with Reserves	Tractor/Winter	Slash, grapple pile
53	6	49	Clearcut with Reserves	Tractor	Slash, underburn
54	6	24	Clearcut with Reserves	Tractor	Slash, grapple pile

Harvest Unit #	MA	Acres	Proposed Treatment	Logging System/Season	Fuels Treatment
55	6	31	Improvement Cut with Seed Tree or Shelterwood Openings	Tractor	Slash, underburn
55A	2, 6	10	Improvement Cut	Tractor	Slash, underburn
55B	2, 6	18	Shelterwood with Reserves	Tractor	Slash, underburn
56	2, 6	29	Seed tree with Reserves	Tractor	Slash, grapple pile
57	6	68	Seed tree with Reserves	Tractor/Winter	Slash, underburn
58	2	15	Seed tree with Reserves	Tractor	Slash, grapple pile
59	2	11	Seed tree with Reserves	Tractor	Slash, grapple pile
60	2, 6	24	Seed tree with Reserves	Tractor/Winter	Slash, grapple pile
61	2, 6	51	Clearcut with Reserves	Tractor/Winter	Slash, grapple pile
61A	2, 6	34	Clearcut with Reserves	Tractor	Slash, grapple pile
62	2, 6	24	Seed tree with Reserves	Tractor	Slash, grapple pile
63	6	10	Improvement Cut	Tractor/Winter	Slash, grapple pile
68	6	70	Shelterwood with Reserves	Skyline	Slash, underburn
69	6	27	Seed tree with Reserves	Skyline	Slash, underburn
70	6	67	Seed tree with Reserves	Skyline	Slash, underburn
71	6	39	Seed tree with Reserves	Skyline	Slash, underburn
73	6	18	Seed tree with Reserves	Skyline	Slash, underburn
74	6	100	Seed tree with Reserves	Skyline	Slash, underburn
75	6	50	Improvement Cut with Seed Tree or Shelterwood Openings	Skyline	Slash, underburn
77	6	41	Clearcut with Reserves	Tractor	Slash, underburn
Total Acres		**3,069**			

Harvest Related Road Work

Alternative 3 includes the same harvest related road work as Alternative 2, except for 0.3 miles needed to access Harvest Units 35 and 41B which are not included in Alternative 3 (see Map M-5). Harvest units would be accessed from existing NFSRs, Lincoln County roads, and Stimson

Lumber Company roads with approximately 71 miles of designated haul roads. Approximately 45 miles of road reconstruction would occur on NFSRs within Alternative 3.

Proposed harvest under Alternative 3 would require the same road access changes described for Alternative 2 in order to remain in compliance with habitat parameter standards for BMU 10 as decided by the 2011 Access Amendment.

Fuels Treatment Associated with Timber Harvest

Alternative 3 would both yard tops with excavator piling and yard tops with underburning as fuels treatment methods. These techniques are described in greater detail in Alternative 2.

Reforestation

Regeneration harvest is proposed for 2,061 acres in Alternative 3. Planting would supplement the anticipated natural regeneration, and move toward the desired condition of increasing the presence of ponderosa pine, western larch and western white pine. Western larch and western white pine are under-represented within the warm/moist biophysical setting; while western larch and ponderosa pine are under-represented within the warm/dray biophysical setting. Contributing factors to this under-representation include: fire exclusion, inadequate seed source, disease, and past harvest activities. Planted conifer seedlings would enhance species diversity, assure timely reforestation, and contribute toward long-term desired habitat conditions. Reforestation of harvest areas would be designed to achieve a mix of native tree species appropriate to the specific site. Western white pine seedlings to be planted would be from breeding stock that has been specially cultivated for resistance to white pine blister rust. (Refer to Chapter 1 and the Glossary for a description of biophysical settings).

NFSR 2380 and 2380A Road Work

As described in Alternative 2 NFSR 2380A will be reconstructed for public use concurrently with the decommissioning 0.3 miles of NFSR 2380. This work would be implemented, if funded, after the timber sale activities in the area are completed.

Non-Harvest Fuels Treatments

The Kootenai NF Forest Plan provides guidance for the importance and increased role of wildland fire on the landscape. Desired Condition FW-DC-FIRE-03 states, “The use of wildland fire (both planned and natural, unplanned ignitions), increases in many areas across the Forest. Fire plays an increased role in helping to trend the vegetation towards the desired conditions while serving other important ecosystem functions. However, when necessary to protect life, property, and key resources many wildfires are still suppressed.”

Proposed non-harvest fuels treatments include approximately 1,744 acres of prescribed burning. Of these acres, 1,037 acres occur within the WUI and 172 acres occur within the Saddle Mountain IRA. Most units would be ignited by hand in the spring or fall, see Table 9 below. There would be no ignition within the RHCAs, but fire would be allowed to back into these areas. The lower elevation burns are intended to be mixed severity type burns with objectives to maintain the ecological processes in fire-adapted stands with the benefit of improving big game winter range forage and spring grizzly bear foraging habitat. Anticipated crown cover density reduction as a result of these burns is displayed in the Fuels Treatment Summary Table (Appendix D). This reduction in canopy cover would include a range of mortality from areas of scattered tree mortality to larger areas with greater levels of mortality.

Alternative 3 includes the same fuels augmentation and fuels treatment methods as Alternative 2, and treats 1,744 acres compared to 1,716 acres in Alternative 2.

Table 9. Proposed Non-Harvest Fuels Treatment for Alternative 3

Proposed Fuels Treatment	Acres
Ecosystem Burn	868
Underburn	748
Slash and Grind	31
Slash and Grapple Pile	12
Slash and Underburn, Slash and Hand Pile	85
Total	**1,744**

All prescribed burning activities and fuels augmentation would be dependent on available funding, fuel conditions, weather, and smoke dispersal at the time of implementation. While this document has analyzed for the maximum amount of burning and fuels augmentation that could occur within the project area, it is possible that the funding and conditions could be such that only a portion of prescribed burn activities would occur within a 10-year time frame.

A summary of each proposed fuels unit for Alternative 3 is displayed in Table 6 above. Fuels Unit F32 is only applicable to Alternative 3 and 4; while Fuels Units F33, F34, F35 and F36 are only applicable to Alternative 3. Table 10 below displays those fuels units within Alternative 3 which are not within the other alternatives. See Table 21 for a list of proposed activities by alternatives.

Table 10. Proposed Non-harvest Fuels Units and Treatments in Alternative 3 not found the Other Action Alternatives

Fuels Unit #	MA	Treatment Acres	Current Condition	Objective	Fuels Treatment
F32 (old 41B) (Alts 3 & 4)	2, 6	15	Lower elevation site associated with private property. Existing fuel loads and ladder fuels contribute to increased fire risk and hamper potential fire-fighting efforts.	Objective D	Hand Slash and grind
F33 (old 35) (Alt 3 only)	2	10	Lower elevation site associated with private property. Existing fuel loads and ladder fuels contribute to increased fire risk and hamper potential fire-fighting efforts.	Objective D	Slash and Grind
F34 (old 35A) (Alt 3 only)	2	2	Lower elevation site associated with private property. Existing fuel loads and ladder fuels contribute to increased fire risk and hamper potential fire-fighting efforts.	Objective D	Slash and Grind
F35 (old 35B) (Alt 3 only)	2	3	Lower elevation site associated with private property. Existing fuel loads and ladder fuels contribute to increased fire risk and hamper potential fire-fighting efforts.	Objective D	Slash and Grind

Fuels Unit #	MA	Treatment Acres	Current Condition	Objective	Fuels Treatment
F36 (old 36) (Alt 3 only)	2	2	Lower elevation site associated with private property. Existing fuel loads and ladder fuels contribute to increased fire risk and hamper potential fire-fighting efforts.	Objective D	Slash and Grind
Total Acres		**32**			

Treatment within Scenic and Recreational River. Corridor

Alternative 3 proposes 133 acres of fuels units and 293 acres of harvest units within MA2.

Treatment within Inventoried Roadless

Alternative 3 proposes a 172-acre fuels unit in the Saddle Mountain IRA.

Alternative 4

Alternative 4 was designed to address the publicly raised issue of creating large openings (defined as openings over 40 acres for the purposes of this project) through regeneration harvest. Alternative 4 responds to this issue by modifying the design of harvest units so that no regeneration harvest opening, or opening created by a combination of units, exceeds 40 acres. For Alternative 4, Harvest Units 31A and 31B would not be combined into a 60-acre regeneration harvest as proposed in Alternatives 2 and 3. The harvest units in Alternative 4 are located within the boundaries of the harvest units in Alternative 2.

Timber Harvest

Alternative 4 proposes 1,569 acres of regeneration harvest, 652 acres of intermediate harvest, and 385 acres of intermediate/regeneration harvest designed to move the stands towards the desired vegetative condition. It also proposes 155 acres of harvest treatment and 376 acres of fuels treatment within old growth. These treatments would not remove any old growth attributes.

To allow harvest within areas of the OLY project area currently contributing to grizzly bear core habitat, changes to road access would be necessary to comply with habitat parameter standards for BMU 10 (see Map M-23). Also see Appendix E Access Management Plan and its table therein.

In Alternative 4, seventy harvest units totaling 2,337 acres are within the WUI (1,304 acres of regeneration harvest and 1,033 acres of intermediate harvest). Thirty fuels units totaling 1,023 acres are within the WUI.

It is estimated that harvest activities could produce 30.5 million board feet (MMBF) of timber with approximately 22.5 MMBF in saw timber and 8.0 MMBF in non-sawtimber.

Table 11 displays the timber harvest activities and related fuels treatment activities that are proposed for Alternative 4.

Table 11. Proposed Harvest Activities for Alternative 4

Type of Harvest	Acres
Regeneration Harvest[1]	1,569
Intermediate Harvest[2]	652
Intermediate / Regeneration Harvest[3]	385
Total Harvest	**2,606**
	Volume
Total Harvest (MMBF)	**30.5 MMBF**
Total Harvest (CCF)	**59,850 CCF**
Type of Fuels Treatment Following Harvest	**Acres**
Slash, grapple pile[4]	1010
Slash, underburn[5]	1,596
Total	**2,606**

[1] Regeneration Harvest: Silvicultural prescriptions can be Seed Tree Cut, Shelterwood Cut, or Clearcut with Reserves.

[2] Intermediate Harvest: Silvicultural prescription is an Improvement Cut.

[3] Intermediate/Regeneration Harvest: This is a combination of intermediate harvest and regeneration harvest. In general the regeneration patch size is 5 acres or less. The silvicultural prescription results in an Improvement Cut with Seed Tree or Shelterwood Openings.

[4] Grapple pile: Excavator machine piled slash.

[5] Underburn: The controlled application of prescribed fire to reduce surface fuels while protecting the overstory component.

MMBF = Million Board Feet

CCF = 100 Cubic Feet

Harvest Methods

Table 12 displays the MA, silvicultural prescription, logging method, and fuels treatment methods for each proposed harvest unit in Alternative 4 (see Appendix C, Harvest Treatment Summary for more information).

Table 12. Harvest Unit Summary for Alternative 4

Harvest Unit #	MA	Acres	Proposed Treatment	Logging System/Season	Fuels Treatment
1	6	54	Improvement Cut with Seed Tree or Shelterwood Openings	Tractor	Slash, grapple pile
3A	6	12	Clearcut with Reserves	Tractor	Slash, grapple pile
3B	6	13	Seed tree with Reserves	Tractor	Slash, grapple pile
4	6	176	Improvement Cut	Tractor	Slash, underburn
5	6	8	Seed tree with Reserves	Tractor	Slash, grapple pile
6	6	42	Improvement Cut with Seed Tree or Shelterwood Openings	Tractor	Slash, grapple pile
7	6	8	Seed tree with Reserves	Tractor	Slash, grapple pile
8	6	66	Improvement Cut	Tractor	Slash, underburn
8A	6	4	Improvement Cut	Tractor	Slash, grapple pile
9	6	16	Seed tree with Reserves	Tractor	Slash, grapple pile
11	6	11	Seed tree with Reserves	Tractor	Slash, underburn
12	6	25	Seed tree with Reserves	Tractor	Slash, grapple pile
14	6	24	Clearcut with Reserves	Tractor/Winter	Slash, underburn
14A	6	23	Clearcut with Reserves	Tractor/Winter	Slash, underburn
15	6	27	Seed tree with Reserves	Tractor	Slash, underburn
16	6	6	Improvement Cut	Tractor	Slash, underburn
18	6	40	Clearcut with Reserves	Tractor	Slash, underburn
20	6	37	Seed tree with Reserves	Skyline	Slash, underburn
21	6	129	Improvement Cut	Skyline	Slash, underburn

Harvest Unit #	MA	Acres	Proposed Treatment	Logging System/Season	Fuels Treatment
23	6	24	Improvement Cut with Seed Tree or Shelterwood Openings	Tractor	Slash, grapple pile
24	6	25	Improvement Cut	Skyline	Slash, underburn
25	6	10	Clearcut with Reserve	Tractor	Slash, grapple pile
25A	6	20	Clearcut with Reserves	Tractor	Slash, grapple pile
25B	6	11	Clearcut with Reserves	Tractor	Slash, grapple pile
27	6	11	Improvement Cut	Skyline	Slash, underburn
28	6	80	Improvement Cut	Tractor	Slash, grapple pile
29	6	25	Seed tree with Reserves	Tractor	Slash, grapple pile
30	6	37	Shelterwood with Reserves	Tractor	Slash, grapple pile
31A	6	26	Improvement Cut with Seed Tree or Shelterwood Openings	Tractor	Slash, grapple pile
31B	6	33	Clearcut with Reserves	Tractor	Slash, grapple pile
32	2, 6	34	Improvement Cut	Tractor	Slash, underburn
33	2, 6	30	Clearcut with Reserves	Tractor/Winter	Slash, underburn
34	6	40	Seed tree with Reserves	Tractor/Winter	Slash, underburn
35	2	10	Seed tree with Reserves	Tractor/Winter	Slash, grapple pile
35A	2	2	Clearcut with Reserves	Tractor/Winter	Slash, grapple pile
35B	2	3	Improvement Cut	Tractor/Winter	Slash, grapple pile
36	2	4	Seed tree with Reserves	Tractor/Winter	Slash, grapple pile
37	6	40	Seed tree with Reserves	Tractor/Winter	Slash, underburn
37A	6	34	Improvement Cut	Skyline	Slash, underburn
37C	6	9	Seed tree with Reserves	Tractor	Slash, underburn
38	6	71	Improvement Cut with Seed Tree or Shelterwood Openings	Tractor	Slash, grapple pile
39	6	41	Seed tree with Reserves	Tractor	Slash, grapple pile
40	2, 6	41	Seed tree with Reserves	Tractor	Slash, grapple pile
40A	2, 6	40	Seed tree with Reserves	Tractor	Slash, grapple pile
42	2, 6	35	Seed tree with Reserves	Skyline	Slash, underburn
42A	2, 6	28	Seed tree with Reserves	Skyline	Slash, underburn
43	6	40	Seed tree with Reserves	Tractor	Slash, grapple pile
44	6	20	Seed tree with Reserves	Tractor	Slash, grapple pile
45	6	18	Clearcut with Reserves	Tractor	Slash, underburn
45A	6	40	Seed tree with Reserves	Tractor	Slash, underburn

Harvest Unit #	MA	Acres	Proposed Treatment	Logging System/Season	Fuels Treatment
45B	6	26	Improvement Cut	Tractor	Slash, underburn
45C	6	8	Seed tree with Reserves	Tractor/Winter	Slash, grapple pile
46	6	16	Improvement Cut	Tractor/Winter	Slash, grapple pile
47	6	17	Clearcut with Reserves	Tractor	Slash, underburn
48	6	23	Clearcut with Reserves	Tractor/Winter	Slash, underburn
50	6	21	Improvement Cut	Tractor	Slash, grapple pile
51	6	36	Clearcut with Reserves	Tractor/Winter	Slash, underburn
52	6	56	Improvement Cut with Seed Tree or Shelterwood Openings	Tractor	Slash, underburn
52A	6	39	Clearcut with Reserves	Tractor	Slash, grapple pile
52B	2, 6	26	Seed tree with Reserves	Tractor/Winter	Slash, underburn
52C	6	31	Improvement Cut with Seed Tree or Shelterwood Openings	Tractor/Winter	Slash, underburn
52E	6	16	Seed Tree with Reserves	Tractor/Winter	Slash, underburn
53	6	25	Clearcut with Reserves	Tractor	Slash, underburn
53A	6	17	Clearcut with Reserves	Tractor	Slash, underburn
54	6	24	Clearcut with Reserves	Tractor	Slash, grapple pile
55	6	31	Improvement Cut with Seed Tree or Shelterwood Openings	Tractor	Slash, underburn
55A	2, 6	10	Improvement Cut	Tractor	Slash, underburn
55B	2, 6	18	Shelterwood with Reserves	Tractor	Slash, underburn
56	2, 6	29	Seed tree with Reserves	Tractor	Slash, grapple pile
57	6	30	Seed tree with Reserves	Tractor/Winter	Slash, underburn
57A	6	18	Seed tree with Reserves	Tractor/Winter	Slash, underburn
58	2	15	Seed tree with Reserves	Tractor	Slash, grapple pile
59	2	11	Seed tree with Reserves	Tractor	Slash, grapple pile
60	2, 6	24	Seed tree with Reserves	Tractor/Winter	Slash, grapple pile
61	2, 6	25	Clearcut with Reserves	Tractor/Winter	Slash, grapple pile
61A	2, 6	34	Clearcut with Reserves	Tractor	Slash, grapple pile
61B	2, 6	15	Clearcut with Reserves	Tractor/Winter	Slash, grapple pile
62	2, 6	24	Seed tree with Reserves	Tractor	Slash, grapple pile
63	6	10	Improvement Cut	Tractor/Winter	slash, grapple pile
68	6	27	Shelterwood with Reserves	Skyline	Slash, underburn
68A	6	25	Shelterwood with Reserves	Skyline	Slash, underburn

Harvest Unit #	MA	Acres	Proposed Treatment	Logging System/Season	Fuels Treatment
69	6	27	Seed tree with Reserves	Skyline	Slash, underburn
70	6	25	Seed tree with Reserves	Skyline	Slash, underburn
70A	6	23	Seed tree with Reserves	Skyline	Slash, underburn
71	6	39	Seed tree with Reserves	Skyline	Slash, underburn
73	6	18	Seed tree with Reserves	Skyline	Slash, underburn
74	6	32	Seed tree with Reserves	Skyline	Slash, underburn
74A	6	40	Seed tree with Reserves	Skyline	Slash, underburn
75	6	50	Improvement Cut with Seed Tree or Shelterwood Openings	Skyline	Slash, underburn
77	6	25	Clearcut with Reserves	Tractor	Slash, underburn
	Total Acres	**2,606**			

Harvest Related Road Work

Alternative 4 includes the same harvest related road work as Alternative 2. Harvest units would be accessed from existing NFSRs, Lincoln County roads, and Stimson Lumber Company roads with approximately 71 miles of designated haul roads. Approximately 45 miles of road reconstruction would occur on NFS roads.

Proposed harvest under Alternative 4 would require the same road access changes described for Alternative 2 in order to remain in compliance with habitat parameter standards for BMU 10 as decided by the 2011 Access Amendment.

Fuels Treatment/Site Preparation Activities

Alternative 4 would both yard tops with excavator piling and yard tops with underburning as fuels treatment methods. These techniques are described in greater detail in Alternative 2.

Reforestation

Alternative 4 would propose 1,569 acres of regeneration harvest. Planting would supplement the anticipated natural regeneration, and move toward the desired condition of increasing the presence of ponderosa pine, western larch and western white pine. Western larch and western white pine are under-represented within the warm/moist biophysical setting; while western larch and ponderosa pine are under-represented within the warm/dray biophysical setting. Contributing factors to this under-representation include: fire exclusion, inadequate seed source, disease, and past harvest activities. Planted conifer seedlings would enhance species diversity, assure timely reforestation, and contribute toward long-term desired habitat conditions. Reforestation of harvest areas would be designed to achieve a mix of native tree species appropriate to the specific site. Western white pine seedlings to be planted would be from breeding stock that has been specially cultivated for resistance to white pine blister rust. (Refer to Chapter 1 and the Glossary for a description of biophysical settings.)

NFSR 2380 and 2380A Road Work

The first 0.3 miles of NFSR 2380 in North Fork O'Brien would **not** be decommissioned. Consequently, NFSR 2380A would not need to be reconstructed for alternative access.

Non-Harvest Fuels Treatments

Proposed activities include approximately 1,731 acres of prescribed burning. Of these acres, 1,024 occur within the WUI and 172 occur within the IRAs. Most units would be ignited by hand in the spring or fall.

Table 13 below displays the non-harvest fuels treatment for Alternative 4. There would be no ignition within the RHCAs, but fire would be allowed to back into these areas. The lower elevation burns are intended to be mixed severity burns with objectives to maintain the ecological processes in fire-adapted stands with the benefit of improving big game winter range forage and spring grizzly bear foraging habitat. Anticipated crown cover density reduction as a result of these burns is displayed in the Fuels Treatment Summary Table (Appendix D). This reduction in canopy cover density would include a range of mortality from areas of scattered tree mortality to larger areas with greater levels of mortality.

Table 13. Proposed Non-Harvest Fuels Treatment for Alternative 4

Proposed Fuels Treatment	Acres
Ecosystem Burn	868
Underburn	752
Slash and Grind	14
Slash and Grapple Pile	12
Slash and Underburn, Slash and Hand Pile	85
Total Acres	**1,731**

All prescribed burning activities and fuels augmentation would be dependent on available funding, fuel conditions, weather, and smoke dispersal at the time of implementation. While this document has analyzed for the maximum amount of burning and fuels augmentation that could occur within the project area, it is possible that the funding and conditions could be such that only a portion of prescribed burn activities could occur within a 10 year time frame.

A summary of each proposed fuels unit for Alternative 4 is displayed in Table 6 above. Fuels Unit F30 is only applicable to Alternatives 2 and 4; while Fuels Unit F32 is only applicable to Alternatives 3 and 4. Table 14 shows a summary of non-harvest fuel treatment for F30 and F32. See Table 21 for a list of proposed activities by alternatives.

Table 14. Proposed Non-Harvest Fuels Treatment for F30 and F32 in Alternative 4

Fuels Unit # (Alternatives)	MA	Treatment Acres	Current Condition	Objective	Fuels Treatment
F30 (Alts 2 and 4)	2	4	Lower elevation site associated with private property. Existing fuel loads and ladder fuels contribute to increased fire risk and hamper potential fire-fighting efforts.	Objective D	Underburn

Fuels Unit # (Alternatives)	MA	Treatment Acres	Current Condition	Objective	Fuels Treatment
F32 (Alts 3 and 4)	2, 6	15	Lower elevation site associated with private property. Existing fuel loads and ladder fuels contribute to increased fire risk and hamper potential fire-fighting efforts.	Objective D	Hand Slash and grind
Total		**19**			

Activities Common to Alternatives 2, 3, and 4

Harvest and Non-harvest Treatments within Old Growth

Each action alternative proposes 155 acres of harvest treatment and 376 acres of prescribed fire fuels treatment within old growth and recruitment potential old growth (Table 15 and Table 16).

The treatments will not remove any old growth attributes. The proposed harvest treatments in old growth and recruitment potential old growth are designed to preserve old growth attributes while treating excess fuel accumulations. For example, no seed tree or shelterwood openings would occur within the 16 acres of old growth within Unit 75. These 16 acres would only receive an improvement cut treatment. The purpose of prescribed fire fuels treatment within old growth is to maintain the fire return cycle within these stands and promote the characteristics of old growth. Refer to the Old Growth section of Chapter 3 for a complete description.

Table 15. Harvest Treatments in Old Growth and Recruitment Potential Old Growth in the Action Alternatives

Harvest Unit #	Unit Acres	Acres of OG or RPOG within Unit	Proposed Harvest Treatment	Fuels Treatment
Harvest Treatments in Old Growth				
21	129	129	Improvement Cut	Slash, Underburn
63	10	10	Improvement Cut	Slash, Grapple Pile
75	50	16	Improvement Cut with Seed Tree or Shelterwood Openings **	Slash, Underburn
Total Acres	**189**	**155**		
Harvest Treatments within Recruitment Potential Old Growth				
37A	34	34	Improvement Cut	Slash, Underburn
Total Acres	**34**	**34**		

OG = Old Growth

RPOG = Recruitment Potential Old Growth

** The 16 acres of old growth within Unit 75 would only have an improvement cut. No seed tree or shelterwood openings would occur within these 16 acres.

Table 16. Fuels Treatments in Old Growth and Recruitment Potential Old Growth in the Action Alternatives

Fuels Unit #	Unit Acres	Acres of OG or RPOG within Unit	Proposed Fuels Treatment
Fuels Treatments in Old Growth			
F13	230	230	Ecosystem Burn
F19	339	33	Slash, Underburn
F25	242	106	Underburn
F26	4	4	Slash, Grapple Pile
F29	3	3	Slash, Hand Pile

Fuels Unit #	Unit Acres	Acres of OG or RPOG within Unit	Proposed Fuels Treatment
Total Acres	**818**	**376**	
Fuels Treatments in Recruitment Potential Old Growth			
F02	76	76	Ecosystem Burn
F05	88	88	Ecosystem Burn
Total Acres	**164**	**164**	

OG = Old Growth

RPOG = Recruitment Potential Old Growth

Recreation Improvements

The following recreation activities are proposed for each action alternative within the project area (see Map M-2).

- Upgrading a portion of the Alvord Lake trail to be accessible to all under Forest Service Accessibility Guidelines (FSTAG) standards, including construction of a paved trail to the Outdoor Classroom located on the northwest side of the lake;
- Upgrading the Kilbrennan Lake Campground boat ramp by replacing the native material with concrete;
- Improvements to a portion of the tread and one stream crossing on the Arbo Wee Lake Trail (Trail196) for recreation and watershed improvement. The trail would be rebuilt to a better grade with waterbars to prevent sediment delivery;
- Creating a parking area utilizing the landing in Harvest Unit 29, near the bottom of NFSR 4445, Lynx Creek, to facilitate existing snowmobile use;
- Improvements to portions of NFSR 4429, Pulpit Jeep Road, which would include implementation of improved drainage, brushing and construction of turnouts;
- Parking area improvements, including widening, at the following: #43 China Rim; #366 Pulpit Mountain National Recreation Trail; #709 Pulpit Ridge; and #706 Skyline Ridge.

The proposed recreation improvements are displayed in Chapter 1(Figure 7).

In-Kind Replacement of Core to Conduct Harvest Activities in BMU 10

A Core area is an area of secure habitat within a bear management unit (BMU) that contains no motorized travel routes or high use non-motorized trails during the non-denning season and is more than 0.3 miles (500 meters) from a drivable road. Core areas do not include any gated roads but may contain roads that are impassible due to vegetation or constructed barriers. Core areas strive to contain the full range of seasonal habitats that are available in the BMU.

The 2015 Forest Plan allows forest management to be proposed in a grizzly bear core habitat area if the area has been in core for at least ten years and the existing condition in the affected bear management unit (BMU) meets or exceeds required habitat parameters. Prior to such activities an equal or greater area of core must be established elsewhere in the BMU as in-kind replacement.

Appendix B (Part I.B.3.) of the 2015 Forest Plan (pg. 148) states, "Routine forest management may be proposed in a core area block after 10-years of core area benefit. However, BMUs must remain at or above the core standard. Therefore, potential losses to existing core must be compensated with in-kind replacement concurrently or prior to incurring the losses. Such in-kind replacement of core would be established within the affected BMU in accordance with the direction in Part I.B.1. For exceptions, see specialized circumstances outlined in Part I.D. concerning BMU's that exceed standards. Following entry for management activities, core areas must subsequently be managed undisturbed for 10 years."

To allow harvest within areas of the OLY project area currently contributing to grizzly bear core habitat, changes to road access would be necessary to comply with habitat parameter standards for BMU 10 (see Map M-23). Also see Appendix E Access Management Plan and its table therein.

When considering the miles of barriered roads being opened for administrative use (currently contributing to grizzly bear core) against the miles of gated roads to be barriered and placed into core, a straight comparison of linear miles is not applicable to the evaluation of providing an in-kind replacement of core and associated road densities. The calculation of core, OMRD, and TMRD involves the shape of the roads, their proximity to other roads, their current status, any changes to their status, and the status of the other roads (i.e., open, gated, or barriered to motorized use) within and immediately adjacent to the affected BMU.

Watershed Work Needed Prior to Timber Harvest

Watershed work in the Pulpit Mountain/O'Brien Creek area would occur prior to harvest or harvest associated road work as the Pulpit Mountain work would provide the majority of the in-kind replacement of Core habitat as described above.

Roads Opened to Allow Access for Management Purposes:

The following roads are currently barriered and contribute to core habitat. They would be opened to allow motorized access for management purposes, but would continue to be restricted to motorized public access:

- NFSRs 14393, 14393A, 14321, 176F;
- the temporary road off 14321A (the road system between the Eastside Road and the Kilbrennan Lake Road);
- NFSR 2365 into unit 57;
- NFSR 2394A and 2394I off Kilbrennan Lake Road;
- a portion of NFSR 4447 in the Sears Flat area;
- NFSR 14309 and NFSR 4445C near the Troy Shooting Range.

Roads Stored or Barriered to Compensate for Core Lost:

To allow access on the NFSRs listed in the previous paragraph, the following 5.4 miles of currently restricted NFSRs are proposed for road storage to compensate for the potential loss of core habitat. They will change status from gated to barriered.

- 2376 Feeder O'Brien (1.5 miles)

- 4425 Upper Rabbit Creek (1.7 miles)
- 4433 North Fork Lynx Creek (2.2 miles)

In addition, three other roads identified for passive decommissioning (NFSRs: 2394B, 2394D, 2394J), would contribute to the in-kind replacement of Core acres.

Stimson Lumber Company's Proposal for Road Work on Yaak Mountain

The Stimson Lumber Company has requested access to their lands on the northeast side of Yaak Mountain. A proposed road (0.16 miles) would be constructed on National Forest System land to allow the Company reasonable access to its lands (Figure 17). This road would not be needed to implement any proposed harvest work on NFS lands. Its location on NFS lands would result in a direct effect to Core acres within the BMU. Therefore, it is included within the direct effects analysis provided in this FEIS and is proposed under all action alternatives.

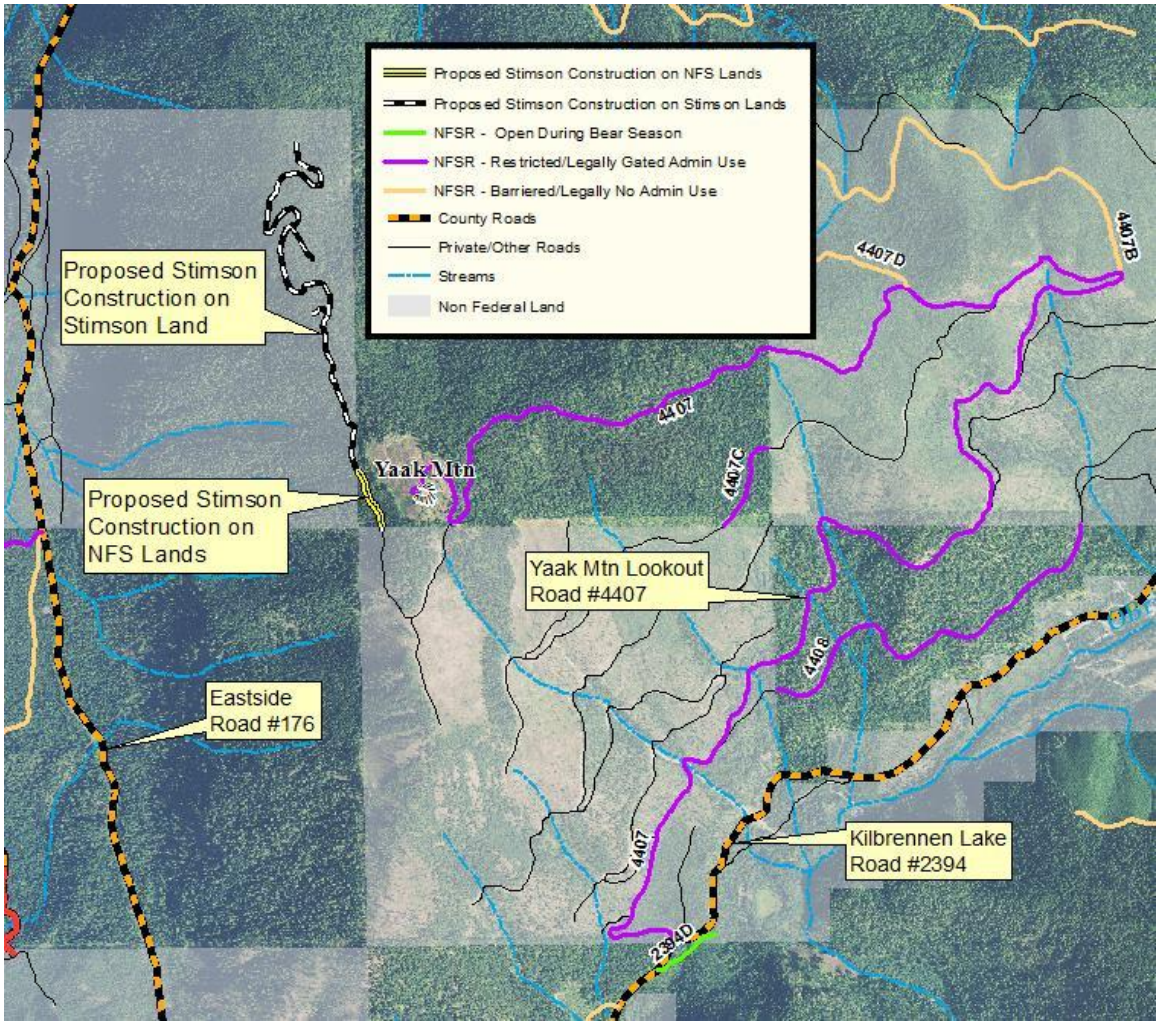


Figure 17. Proposed New Construction on NFS Lands Allowing Stimson Lumber Company Access to their Lands.

The mileage of the proposed Stimson road work is the same for each action alternative as shown in Table 22.

Road Work and Road System Changes Common to All Action Alternatives

An analysis of the transportation network within the project area was conducted by the District to inform the immediate travel management decisions included in OLY in accordance with Forest Service policy (FSM 7710.3) and can be found in the project file (see Lower Yaak-O'Brien-Sheep Travel Analysis Report).

As a result of this analysis a number of road-related actions were carried forward to the OLY NEPA and are described here. These actions include active and passive road storage, active and passive road decommissioning, and administrative changes to the National Forest Road System in the project area.

Active road storage, road decommissioning, and stream site rehabilitation work is proposed in three different activity areas that include four different Core blocks: Pulpit Mountain/O'Brien Creek, Yaak Mountain and Hummingbird Creek See Map M-23). The work in the Pulpit Mountain/O'Brien activity area would occur prior to the timber sale. The work in the Yaak Mountain activity area would occur concurrent with the timber sale. The work in the Hummingbird Creek activity area would occur after the timber sale, as funding becomes available. See the Grizzly Bear section of the Design Features below. In addition, road reconstruction on NFSRs 4429 and 4445 to address drainage issues is proposed. There is no timing restriction for this reconstruction work.

Intermittent Stored Service (Road Storage)

Approximately 11.1 miles of existing roads that are currently restricted to public motorized travel are proposed to be actively treated and placed in intermittent stored service status (storage). These roads were identified in the travel analysis process as needed for future management but currently have moderate to high risk for sediment delivery to streams. The 2015 Forest Plan requires that all road features, particularly stream crossings on roads closed by barriers for at least 5 years, are hydrologically stable (posing minimal risk of watershed impacts) and capable of passing at least a 100-year flood event with minimal erosion. Culverts left on closed roads should be capable of passing a 100-year event.

Stabilization work would include, but is not limited to, removing undersized culverts or providing armored overflows, recontouring unstable sections of road, water barring, scarifying the road surface, and seeding. The storage work to provide the in-kind replacement of core as described above is required prior to the initiation of timber harvest activities. The remaining storage work is expected to occur as funding becomes available. Approximately 7.0 miles of road were reviewed and determined to be of low risk for sediment delivery. These roads would be passively stored with no work required to stabilize them. Roads proposed for active and passive storage work are shown in Table 17.

Table 17. Proposed Road Storage Work in the OLY Project Area

NFSR Road #	Road Name	Length of Road Segment	Active or Passive* Road Work	Proposed Actions to Protect and Improve Watershed Conditions*
2376	Feeder O'Brien	1.5	Passive	
4407B	Yaak Mountain Lookout B	1.8	Active	Construct armored cross drain where stream is eroding road
4407B	Yaak Mountain Lookout B	0.4	Passive	
4425	Upper Rabbit Creek	1.7	Passive	
4428	4428 (Hummingbird)	0.8	Active	Construct waterbars on the road
4428B	4428B (Hummingbird)	3.3	Active	Remove failed or plugged drainage structures and recontour or armor road/stream crossing sites
4433	North Fork Lynx	1.2	Active	Replace undersized stream culvert with larger culvert; clean ditches and culverts; install waterbars to provide controlled drainage if culverts and ditches plug during period of closure
4433	North Fork Lynx	1.0	Passive	
4433A	North Fork Lynx A	0.8	Active	Clean ditches and culverts; waterbar road; constuct cross drain
4433A	North Fork Lynx A	1.1	Passive	
4433B	North Fork Lynx B	1.2	Active	Clean ditches and culverts; install waterbars to provide controlled drainage; remove two culverts near end of road and reconstruct stream channels
4650	4650 (Studebaker Draw)	0.1	Active	
4650	4650 (Studebakrer Draw)	0.6	Passive	Remove remains of old log structure from old stream crossing and stabilize road approaches
14306	Hummingbird Creek	1.5	Active	Clean ditches and culverts; install waterbars to provide controlled drainage
14349	Gun Barrel	0.4	Active	Remove two undersized stream culverts and construct stable stream crossings; waterbar road
14349	Gun Barrel	0.7	Passive	
Total Miles Active Road Storage		**11.1**		
Total Miles Passive Storage		**7.0**		

NFSR Road #	Road Name	Length of Road Segment	Active or Passive* Road Work	Proposed Actions to Protect and Improve Watershed Conditions*
Total Miles of Road Storage		**18.1**		
Total Miles of Required Road Work for Harvest Activities				

*No watershed improvement work is needed on roads noted for passive storage.

Decommissioning Roads

Roads proposed to be decommissioned were identified through the travel analysis process as being not needed for long term resource management. Decommissioning is the act of removing a road from the road system. The 2015 Forest Plan requires that roads being decommissioned are left in a hydrologically stable condition (posing minimal risk of watershed impacts). If on-the-ground work is needed, it is called active decommissioning. If no on-the-ground activities are necessary to put a road into a hydrologically stable condition then the action taken is called passive decommissioning. Approximately 1.6 miles of road are proposed to be actively decommissioned under Alternatives 2 and 3, and 1.3 miles under Alternative 4. Approximately 8.1 miles of road is planned to be passively decommissioned.

The roads identified for active decommissioning currently have a moderate to high sediment delivery risk. The active decommissioning work could include, but is not limited to, removing culverts, restoring natural stream channels, recontouring unstable fillslopes, waterbarring, ripping, placing slash and duff on the treated road surface, and seeding. The purpose is to reduce long-term sediment delivery, reduce the risk of mass failures, reestablish natural stream courses, improve infiltration and accelerate revegetation with native species. The roads identified for passive decommissioning have a low risk of future sediment delivery. All roads proposed for decommissioning, except NFSR 2380, are currently brushed in and inaccessible to both public and administrative motorized access. Table 18 displays the roads proposed for active and passive decommissioning.

Table 18. National Forest System Roads Proposed for Decommissioning

NFSR Road #	Road Name	Length of Road Segment (miles)	Active or Passive* Road Work	Proposed Actions to Protect and Improve Watershed Conditions*
331G	Rabbit O'Brien G	1.6	Passive	
2380**	North O'Brien	0.3 (milepost 0.0 to 0.3)	Active	Recontour and revegetate road segment located adjacent to stream
2394B	Kilbrennan Lake B	0.3	Passive	
2394D	Kilbrennan Lake D	0.2	Passive	
2394J	Kilbrennan Lake J	0.3	Passive	
4439H	King Mountain H	0.5	Passive	
4445B	Kootenai Mountain B	0.6	Passive	

NFSR Road #	Road Name	Length of Road Segment (miles)	Active or Passive* Road Work	Proposed Actions to Protect and Improve Watershed Conditions*
4445K	Kootenai Mountain K	0.5	Passive	
4650A	4650A	0.3	Passive	
14306	Hummingbird Creek	1.3	Active	Recontour road template and provide cross drainage to minimize risk of mass failures
14309	Troy Shooting Range	0.2 (milepost 0.4 to 0.6)	Passive	
14319B	Zebra B	0.2	Passive	
14321	14321	0.5 (milepost 1.1 to 1.6)	Passive	
14344C	Lower China C	0.2	Passive	
14359	South Snowbrush	1.3	Passive	
14360	14360	0.2	Passive	
14360A	14360A	0.1	Passive	
14739	14739	1.1	Passive	
Total Miles Active Decommissioning		**1.6**		
Total Miles Passive Decommissioning		**8.1**		
Total Miles Decommissioning		**9.7**		

* No watershed improvement work needed for roads noted for passive decommissioning.

** Proposed in Alternatives 2 and 3; not in Alternative 4

Undetermined Roads to be Decommissioned

The Kootenai National Forest Roads Database contains some segments of road that are identified as undetermined. These segments are road prisms that exist on the landscape from previous management activities or illegally created by users. They are not currently part of the National Forest System Roads. Approximately 3.3 miles of undetermined roads would be administratively reclassified as decommissioned (Table 19).

The team determined through the travel analysis process that these roads are not needed for long-term forest management. Site visits were made to road segments with potential resource concerns and it was determined that three roads need active work to prevent water quality impacts. The other roads are currently stable with no sediment or resource concerns and are grown in with vegetation. No ground-disturbing actions would occur on those roads, so physical conditions would be unchanged. Access to the public would not change because these roads are not open or drivable.

Table 19. Undetermined Roads to be Decommissioned

Undetermined Roads Not Needed for Future Management (Access to the public will not change. These are not open, drivable roads)			
Road #	**Length of Road Segment (miles)**	**Active or Passive* Road Work**	**Proposed Actions to Protect and Improve Watershed Conditions***
4420A	0.2	Active	Remove buried log structure and reconstruct stream channel
4429F	0.1	Passive	
4429F	0.1	Active	Remove culvert and reconstruct stream channel
4429G	0.2	Passive	
4444B	0.9	Passive	
8075A	0.1	Passive	
14306B	0.6	Active	Remove culvert and reconstruct steam channel; recontour road segment on steep side slopes
14309A	0.5	Passive	
14740	0.6	Passive	
Total Miles Active Undetermined Road Decommissioning:	**0.9**		
Total Miles Passive Undetermined Road Decommissioning:	**2.4**		
Total Miles Undetermined Road Decommissioning	**3.3**		

* No watershed improvement work needed for roads noted for passive decommissioning.

Undetermined Roads to be added to the National Forest System

Approximately 4.6 miles of undetermined road segments are proposed to be added to the National Forest System (see Table 20). These road segments are within the OLY project area and are roads that, through the travel analysis process, the team determined would be needed for current or future land management activities. Access to the public would not change. Those roads which are impassable and not proposed to be used for immediate project activities would remain in their current impassable condition. Those roads used for currently proposed project activities would be gated during implementation of harvest activities and would either remain gated or barriered after those activities are complete. Gated roads would be available for administrative use.

Table 20. Undetermined Roads to be added to the National Forest System

Road Number	Length of Road Segment
176F	0.4
2394I	0.3

Road Number	Length of Road Segment
4444C	0.5
4445C	0.5
4447	0.3
1203G	0.2
4458F	0.5
4651G	1.0
14294	0.9
Total Miles of Road to be added to NFS	**4.6**

Road Reconstruction Not Related to Harvest Activities

Approximately 4.5 miles of NFSR 4429 (Pulpit Jeep Trail) and 6.3 miles of NFSR 4445 (Lynx Creek access) are proposed for reconstruction and reconditioning with an emphasis on improving the driving surface, replacing deteriorating drainage structures and reducing sediment delivery (Map M-3).

Stream Site Rehabilitation

Four stream rehabilitation sites in O'Brien watershed are proposed under all action alternatives and work on these sites would occur before the timber sale begins. These sites are located on previously decommissioned roads where the old road/stream crossings are still eroding. Removal of additional fill material is needed to fully stabilize the sites.

Comparison of Alternatives Studied in Detail

This section displays a tabular comparison of the alternatives considered in detail. This information, along with a detailed discussion of the Environmental Consequences presented in Chapter 3, provides the basis for comparing alternatives.

Comparison of Proposed Activities

The following table (Table 21) compares harvest activities, harvest related fuels treatments, non-harvest fuels treatments, treatments within old growth, and the number of units creating or contributing to over 40 acre openings by alternative.

Table 21. Comparison of Proposed Activities by Alternative

Proposed Activities	Alt. 1 Acres	Alt. 2 Acres	Alt. 3 Acres	Alt. 4 Acres
Harvest Activities				
Regeneration Harvest	0	2,116	2,061	1,569
Intermediate Harvest	0	626	623	652
Intermediate/Regeneration Harvest*	0	385	385	385
Total Harvest (acres)	**0**	**3,127**	**3,069**	**2,606**

Proposed Activities	Alt. 1 Acres	Alt. 2 Acres	Alt. 3 Acres	Alt. 4 Acres
Total Harvest Volume (MMBF)	**0**	**38.6**	**36.9**	**30.5**
Harvest Related Fuels Treatment				
Slash, Grapple Pile	0	1,152	1,133	1,010
Underburn	0	1,974	1,936	1,596
Total Fuels Treatment with Timber Harvest		**3,126**	**3,069**	**2,606**
Non-harvest Related Fuels Treatments				
Ecosystem Burn	0	868	868	868
Underburn	0	737	748	752
Slash and Grind	0	14	31	14
Grapple Pile	0	12	12	12
Slash and Underburn or Slash and Hand Pile (burn piles)	0	85	85	85
Total Non-harvest Fuels Treatment	**0**	**1,716**	**1,744**	**1,731**
Total Harvest and Non-harvest Prescribed Burning	**0**	**4,828**	**4,782**	**4,323**
Treatments within Old Growth				
Harvest and Fuels Treatment within Old Growth	0	155 acres harvest / 376 acres fuels	155 acres harvest / 376 acres fuels	155 acres harvest / 376 acres fuels
Regeneration Openings over 40 Acres				
Units Creating or Contributing to Openings Over 40 Acres	0	32 units	30 units	0

* Intermediate/Regeneration Harvest: This is a combination of intermediate harvest and regeneration harvest. The size of regeneration patches is generally 5 acres or less. The silvicultural prescription results in an Improvement Cut with Seed Tree or Shelterwood Openings.

Comparison of Road Work by Alternative

Table 22 shows a comparison of road work by alternative.

Table 22. Comparison of Road Work by Alternative

	Alt. 1 No Action	Alt. 2 (miles)	Alt. 3 (miles)	Alt. 4 (miles)
Harvest Related Road Work				
Temporary Road Construction	0	0.2	0.2	0.2
Permanent Road Construction for Timber Access	0	0.7	0.7	0.7
Road Reconstruction and Reconditioning on NFSRs	0	45.0	44.7	45.0

	Alt. 1 No Action	Alt. 2 (miles)	Alt. 3 (miles)	Alt. 4 (miles)
Road Storage (active and Passive) for Core Offset	0	5.3	5.3	5.3
Other Road Work				
Road Storage (active and passive) not for Core	0	12.8	12.8	12.8
Permanent Road Construction allowing Stimson Lumber Company access to their land	0	0.16	0.16	0.16
NFSRs 4429 and 4445 Reconstruction not required for timber harvest	0	10.8	10.8	10.8
NFSR 2380A Reconstruction[A]	0	0.7	0.7	0.0
Undetermined Road Decommissioning (active and passive)	0	3.3	3.3	3.3
NFSR 2380 Decommissioning[B] (active)	0	0.3	0.3	0.0
Other NFSR Decommissioning besides NFSR 2380 (active and passive)	0	9.4	9.4	9.4
Totals				
Total Road Storage[C]	0	18.1	18.1	18.1
Total NFSR Decommissioning[D]	0	9.7	9.7	9.4

[A] NFSR 2380A reconstruction is a connected action with the decommissioning of NFSR 2380 in Alternatives 2 and 3.

[B] NFSR 2380 will not be decommissioned in Alternative 4. Decommissioning in Alternatives 2 and 3 is a connected action with the reconstruction of NFSR 2380A.

[C] Total Road Storage includes road storage for Core offset (5.3 miles) and road storage not for Core (12.8 miles).

[D] Total Decommissioning = NFSR 2380 (0.3 miles) added other NFSR decommissioning (9.4 miles).

Comparison of Purpose and Need by Alternative

The following table (Table 23) compares the purpose and need objectives by alternative.

Table 23. Comparison of Purpose and Need Objectives by Alternative

Purpose and Need Objective	Alt 1	Alt 2	Alt 3	Alt 4
Promote resilient vegetation conditions by managing towards the 2015 Forest Plan desired conditions for landscape-level vegetation patterns, structure, patch size, fuel loading, and species composition.				
Promote early seral tree species including western larch, ponderosa pine, and western white pine (acres)	0	4,842	4,813	4,337
Contribute to fire's role on the landscape (acres)	0	1,579	1,575	1,579
Maintain or improve water quality and native aquatic species habitat.				
BMP work on haul roads (miles)	0	45	45	45

Purpose and Need Objective	Alt 1	Alt 2	Alt 3	Alt 4
BMP work on non-haul routes important to public motorized access, where needed (miles)	0	10.8	10.8	10.8
Intermittent Stored Service (miles)	0	18.1	18.1	18.1
Decommissioning (miles)	0	9.7	9.7	9.7
Stream Crossings Restored: 4 sites on previously decommissioned roads; 3 sites on roads to be decommissioned by this project.	0	7 crossings	7 crossings	7 crossings
Provide forage opportunities while maintaining wildlife security.				
Maintain or increase the wildlife forage component and seedling/sapling age class (acres)	0	4,842	4,813	4,337
Maintain areas of secure habitat through access management (Yes/No).	Yes	Yes	Yes	Yes
Provide wood products that are in demand by the American public, contribute to the local economy by generating jobs and income, and provide a safe and efficient transportation system.				
Timber volume (MMBF)	0	38.6	36.9	30.5
Complete necessary construction, reconstruction, and maintenance of roads (Yes/No)	No	Yes	Yes	Yes
Treat hazardous fuels to reduce crown fire potential and stand replacing wildfire within the WUI and other areas while promoting fire behavior characteristics and fuel conditions that allow for safe and effective fire management.				
Fuels reduction wihout burning (acres)	0	14	31	14
Fuels reduction in the WUI	0	657	684	671
Prescribed burning treatments (acres)	0	4,828	4,782	4,323

Timber Suitability

National Forest System lands fall within the three timber suitability categories:

- Suitable for Timber Production
- Other than Suitable for Timber Production – Harvest Allowed
- Other than Suitable for Timber Production – Harvest Not Allowed

Lands suitable for timber production are located entirely within MA 6 (General Forest). However not all lands within MA 6 are suitable for timber production. Some lands in MA 6 allow timber harvest to meet other resource objectives (other than suitable for timber production – harvest allowed) while some lands in MA 6 do not allow timber harvest (other than suitable for timber production – harvest not allowed). Those lands within MA6 which are suitable for timber production allow timber harvest for the purpose of timber growth and yield while maintaining productive capacity (MA6-STD-TBR-01). Timber harvest is scheduled and contributes to the allowable sale quantity. The allowable sale quantity is the quantity of timber that may be sold from the area of suitable land covered by the Forest Plan for a time period specified by the Plan. This quantity is usually expressed on an annual basis as "the average annual allowable sale quantity" (see OLY FEIS Glossary).

Lands other than suitable for timber production include lands where timber harvest is allowed as well as lands where timber harvest is not allowed. Where timber harvest is allowed within lands other than suitable for timber production, harvest may be allowed to meet other resource objectives other than timber growth and yield. This harvest is not part of scheduled timber production and would not contribute to allowable sale quantity (see MA6-STD-TBR-02). Timber harvest in these lands may occur for such purposes as salvage, fuels management, insect and disease mitigation, protection or enhancement of biodiversity or wildlife habitat, or to perform research or administrative studies, or recreation and scenic-resource management consistent with other management direction. Harvest may be allowed in MAs (3, 5a, 5b, 5c, 7 and parts of 2 (scenic and recreational river segments)).

Timber harvest within MA4 (Research Natural Areas (RNA)) may only occur as identified in the RNA Establishment Record or approved RNA management plan (see MA4-GDL-TBR-01).

Harvest is not allowed within:

- Wilderness, Recommended Wilderness and Wilderness Study Areas (MAs 1a, 1b, 1c),
- Wild River segments (part of MA2).

Page 519 of the Forest Plan FEIS states:

> "Timber suitability is also affected by MA allocations. Lands in MA6 are suitable for timber production. All other MAs preclude timber production as an objective. Timber harvest may be allowed in other MAs (3, 5a, 5b, 5c, 7, and part of 2), but only to meet other resource objectives. These acres are not suitable for timber production."

Page 16 of the Forest Plan FEIS Appendices, Appendix B states:

> "The National Forest Management Act (NFMA) directs forests to identify lands which are not suited for timber production. The act states at sec. 6, (k) "the Secretary shall identify lands within the management area which are not suited for timber production, considering physical, economic, and other pertinent

> factors to the extent feasible, as determined by the Secretary, and shall assure that, except for salvage sales or sales necessitated to protect other multiple-use values, no timber harvesting shall occur on such lands for a period of 10 years."

The Kootenai NF used a geographic information system (GIS) to assess suitable timberlands (see page 16 of Forest Plan FEIS Appendices, Appendix B). Use of GIS resulted in consistent identification of each step in determining suitability. The OLY interdisciplinary team utilized the Forest's timber suitability GIS layer to determine the timber production suitability parameters in the OLY project area.

Table 24 below shows that 2,067 acres, 2,062 acres, and 1,703 acres of harvest, respectively in Alternatives 2, 3, and 4, are within lands suitable for timber production. The table also shows that 875 acres, 826 acres, and 744 acres of harvest, respectively in Alternatives 2, 3 and 4, are within lands other than suitable for timber production but harvest is allowed.

There would be no timber harvest within areas where harvest is not allowed for the OLY project. Harvest is not allowed in certain MAs as previously mentioned; not allowed for administrative reasons, and not allowed within areas identified with a high water table, or areas prone to mass failure or areas that cannot be adequately restocked (such as harsh, rocky, or dry sites). For each action alternative about 90 acres of non-forested lands, including areas such as roads, powerlines, and gravel pits, show up in GIS as being within "Harvest Not Allowed".

Table 24. Summary of OLY Harvest (acres) by Timber Suitability for each Action Alternative

Alt	Suitable for Timber Production (acres)	Other than Suitable for Timer Production: Harvest Allowed (acres)	Other than Suitable for Timber Production: Harvest Not Allowed (acres)
2	2,067	875	About 90 acres*
3	2,062	826	About 90 acres*
4	1,703	744	About 90 acres*

* This is due to GIS mapping listing areas such as roads, powerlines and gravel pits as being "Harvest not Allowed."

Harvest Unit 73 Boundary and Harvest Unit 75

NFMA allows for field verification of timber suitability designations. NFMA (at 16 USC 1604) specifies that lands not suitable for timber production shall be reviewed periodically and added to the suitable timber base at such time as those lands can become suitable for production:

"The Secretary shall review his decision to classify these lands as not suited for timber production at least every 10 years and shall return these lands to timber production whenever he determines that conditions have changed so that they have become suitable for timber production."

Unit 73

Upon field verification, the boundary of Harvest Unit 73 was altered to avoid an area where timber harvest is not allowed (see Figure 18). The actual harvest unit will stay within the northern part of the unit which is the area identified as suitable. The topography of the unit naturally cuts the unit, planned for skyline operations, at the suitability break. No harvest will occur on the unsuitable ground due to operational feasibility. The previous (unsuitable – harvest not allowed) portion of Unit 73 will be retained for possible prescribed burning without harvest.

Unit 75

Upon field verification, the area of land within Harvest Unit 75, designated as “Harvest Not Allowed” in GIS mapping was found to be the same as the surrounding suitable stand. There is a small rocky outcrop area of roughly ¼ - ½ acre that is unsuitable, otherwise there are no noticeable differences indicating vegetation response concerns. The unit is planned for an intermediate harvest type, thus regeneration is not an objective of the treatment. The area to the north of the unit, identified as unsuitable is a large rocky outcrop area and is appropriately labeled given the ground conditions. The area within unit 75 is recommended to be allowed for harvest (see Figure 19).

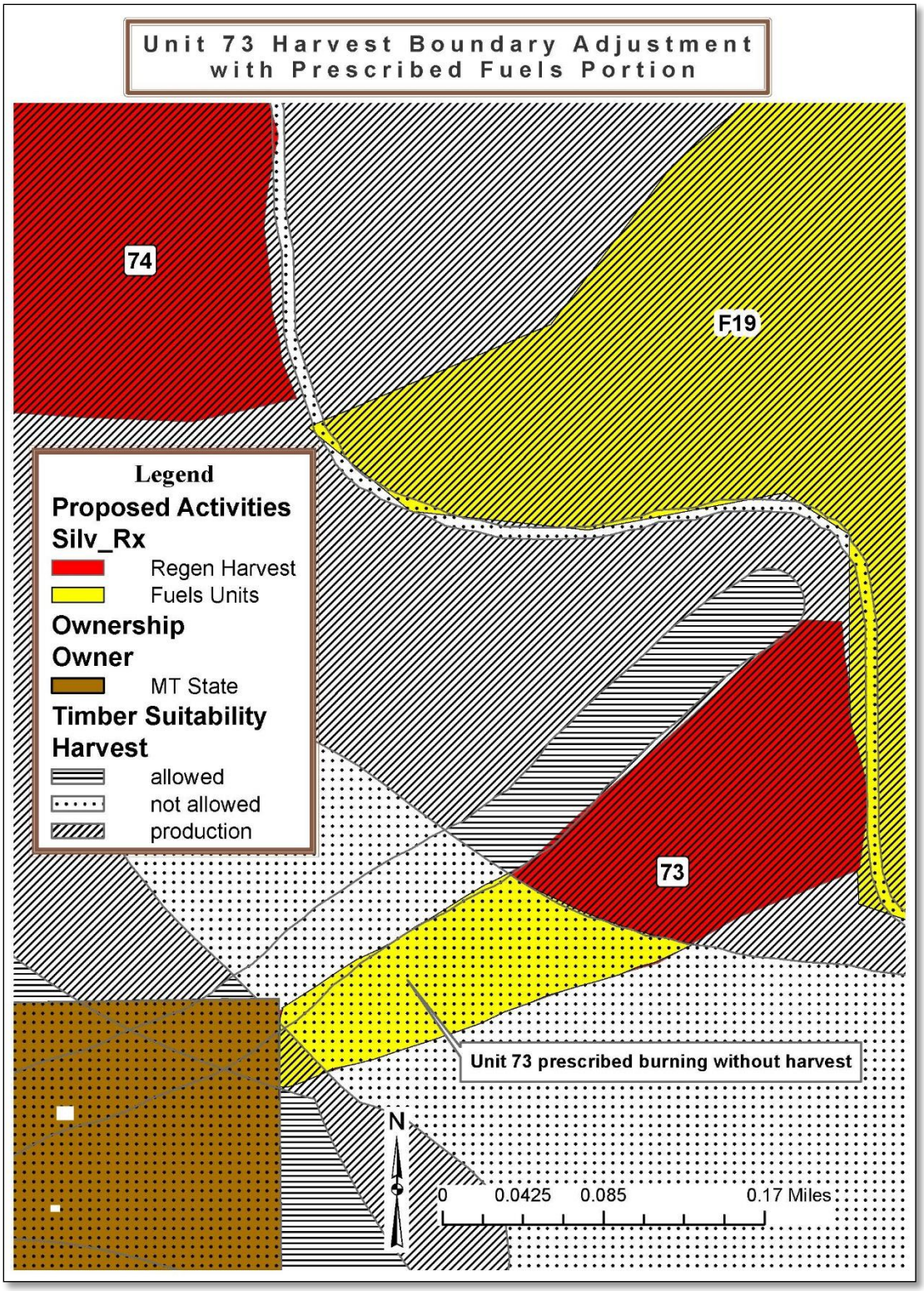


Figure 18. Harvest Unit 73 Adjusted Harvest Boundary and Prescribed Burn Portion

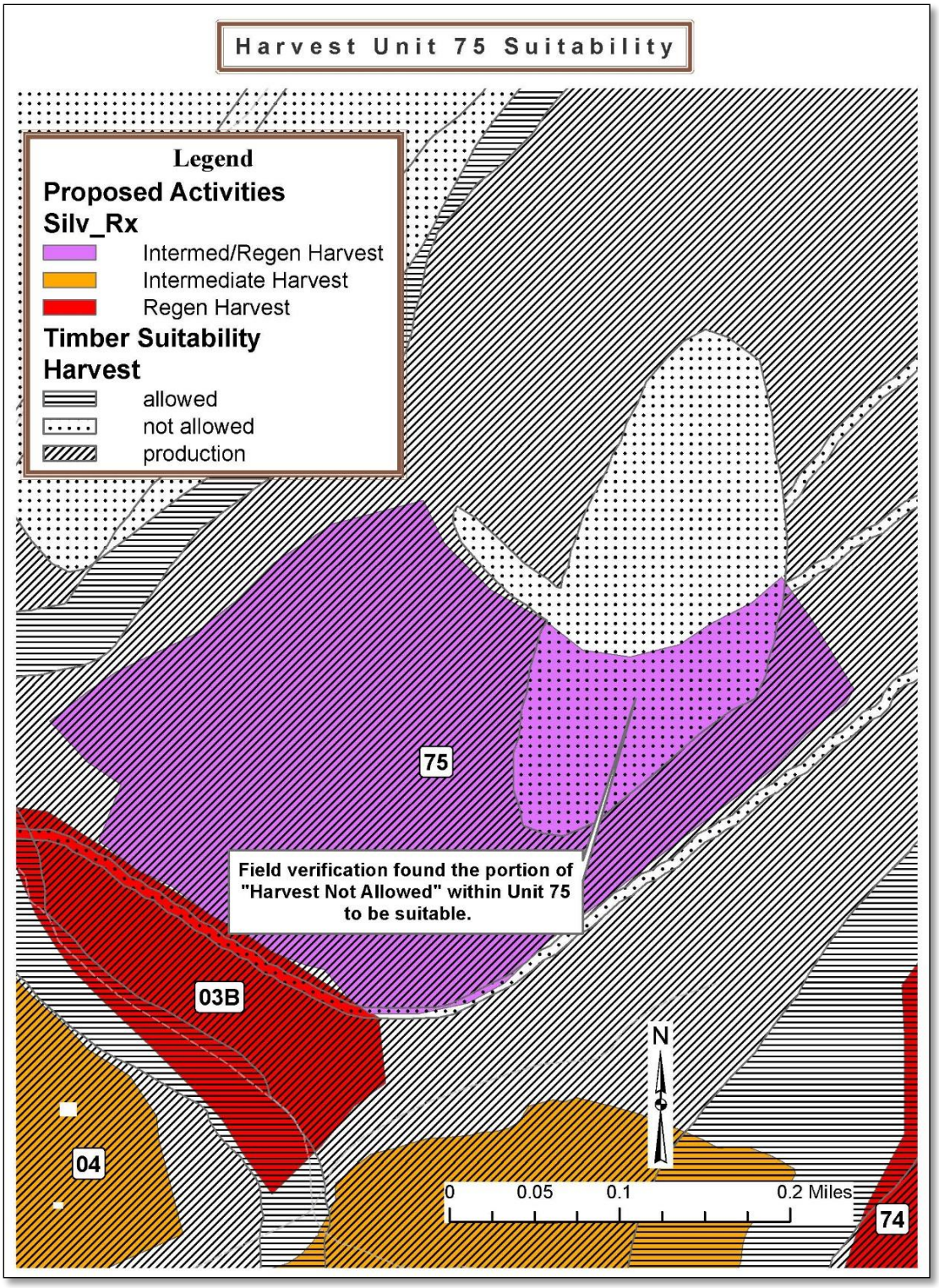


Figure 19. Harvest Unit 75 Suitability

Design Features

To avoid or minimize potential adverse impacts to resources from this project, the following design features will be incorporated into the selected alternative for the OLY Project. Contract provisions are shown in parentheses where applicable.

Aquatic Species and Habitat

- Culvert replacements, culvert removals, and/or other in-stream work in live streams that are known to contain or are connected to streams that are known to contain westslope cutthroat trout or bull trout would be permitted only during the specified timeframe listed below to protect spawning and incubation periods for westslope cutthroat trout and bull trout (which exist downstream and outside of the project area). These road activities may occur outside of this timeframe only if dry channel exists downstream of the project site.
    - Westslope cutthroat trout timeframe: After July 15
    - Bull trout timeframe: Before August 31
    - Both westslope cutthroat trout and Bull trout: Between July 15 and August 31

Paving of FSR 4445 bridge approaches may occur outside of the above timeframe for bull trout if measures are taken to prevent sediment contribution to O'Brien Creek (e.g. placement of straw waddles) and if a Forest Service biologist inspects the operation if the work is to be done after August 31st.

Coarse Woody Debris (CWD) Retention Recommendations for Soils and Wildlife

- CWD to be left on site shall follow the guidelines below except within 200 feet from private property.
- The largest diameter material is desired. Any material larger than 3 inches in diameter at the small end is considered CWD.

Table 25 shows the preferred tons per acre of CWD for the Warm/Dry and Warm/Moist biophysical setting.

Table 25. Coarse Woody Debris Retention by Biophysical Setting by Unit

Biophysical Setting	Tons per Acre	Unit(s)*
Warm/Dry	Drier Sites: 5 - 12	27, 37A, 68, 68A, 73, 75
	Moister Sites: 10 - 20	1, 3A, **4**, 6, **8**, 8A, 11, 14, 14A, 15, 21, 28, **32**, **35B**, **38**, **38A**, 42, 45, 45A, **45B**, 45C, **46**, 47, **48**, **49**, 50, **51**, **52**, 52A, 52B, **52C**, **52D**, 52E, 53, 53A, 54, 55, 55A, 55B, 69, 74, 74A, **77**
Warm/Moist	Drier Sites: 12 - 33	3B, 5, 7, 9, **12**, 16, 18, 20, 23, 24, 29, 30, 33, 34, **35**, **35A**, **36**, 37, 37C, **39**, 40, 40A, 41B, 44, 60, **63**, 70, 70A, 71
	Moister Sites: 17-33	25, 25A, 25B, **31A**, **31B**, **43**, **56**, 57, 57A, **58**, 59, 61, 61A, 61B, 62

*Units in **BOLD** are known to be deficient in CWD

Fire/Air Quality

- Burn plans will be prepared prior to the use of prescribed fire. These plans will determine the limits of weather conditions and fuel moistures to control fire intensity and meet air quality standards.
- All burning operations will be scheduled in accordance with the Memorandum of Understanding for air quality protection between the State of Montana Air Quality Bureau and the Forest Service, which allows burning only when adequate smoke dispersal will occur.
- Prior to conducting prescribed burns, the Three Rivers District will conduct the following activities to notify the local public of burning activities. These include but are not limited to: posting news releases in local newspapers, displaying maps and burn information in district newsletter(s), providing information at the local Forest Service office, and prepare a list of contacts for each prescribed burn to be notified by phone, site visit, or mail.

Historic Properties

- During any ground disturbing activities, if an inadvertent discovery occurs of historic properties, project work in the area shall stop and the District Archaeologist and Tribal Liaison will be notified immediately. If human remains are uncovered, all activities in the area will be immediately suspended and the District Archaeologist, Tribal Liaison and local law enforcement will be notified. Project work in the area of the inadvertent discovery can resume once the discovery has been assessed by KNF Heritage Personnel and appropriate resource protection measures have been implemented.
- Known and identified intact portions of eligible or unevaluated historic properties will be flagged and avoided during project implementation.
- In culturally sensitive areas with previous surficial[2] disturbance (Units 23, 24, 25, 27, 28, 32, 38A, 39, 40), with known and identified historic properties or potentially intact subsurface cultural deposits, activities must be conducted over dry or frozen ground. See specifics below.
- New temporary road construction and reconstruction of existing roads beyond standard maintenance (e.g. expanding the road prism, adding pull-outs, or adding new culverts, etc.) will be assessed by the District Archaeologist prior to implementation.
- Landings placed outside harvest units will be assessed by the District Archaeologist prior to any ground disturbing activities.
- Any areas subject to ground disturbance in association with expansion of trails or parking areas for recreational use will be assessed by the District Archaeologist prior to implementation.
- Filter cloth and fill (gravel or pit run) will be placed on the segment of NFSR 4447 through historic property, as identified by the District Archaeologist, and on NFSR 4458G from the powerline to the intersection with NFSR 14476.

[2] Surficial: Of or related to the earth's surface.

- Avoid slash piling on historic properties, specifically in Units 44 and 37 (in Alternative 2), and Fuels Unit F31 (all alternatives).
- In Fuels Unit F30 hand fire line construction is limited to predetermined locations to protect historic properties. Fire line construction must be monitored at all times by the Tribal Liaison and may be halted if any cultural materials are found. These requirements are only applicable to Alternatives 2 and 4.
- The Tribal Liaison and/or KNF Heritage Personnel must be present for pre- and post-burn monitoring for Fuels Units F11, F16, F17, F30-F36, and Harvest Units 24, 27, 33, 34, 35, 35A, 36, and 38A.
- Winter logging over frozen ground and a cut-to-length system (log forwarding) is required in Harvest Units 33, 34, 35, 35A, 36, 37 (west side of powerline only), and 41B. Winter logging in these units will require a cut-to-length system operating on at least 1 inch of frozen soil. During harvest operations, the harvester shall place tops and limbs evenly in the skid trail as it proceeds. Landing locations in these units will be specified in advance of the award of the contract (C6.4#, C6.42#).
- Reuse existing skid trails, roads, and landings to the greatest extent feasible.

Invasive Plant Species

Measures will be taken to reduce the risk of noxious weed introduction and spread. Weed spraying in the project area will be conducted in accordance with the April 2007 KNF Invasive Plant Management Record of Decision.

- The District will pre-spray weeds in portions of Harvest Unit 14, where concentrations of noxious weeds occur. Harvest operations will occur on 4 inches of frozen soil OR 1 inch of frozen soil and cut-to-length (log forwarding). During harvest operations, the harvester shall place tops and limbs evenly in the skid trail as it proceeds. (C6.4#, C6.42#)
- Prior to and after harvest operations, roads open to public use or gated for administrative use that provides access for boom truck or UTV will be treated by either the District weeds crew or the purchaser.
- Timber sale contracts will include Contract Provision C6.351# Washing Equipment, that requires all off-road vehicles associated with harvest operations to be cleaned and inspected prior to entering the sale area. These actions will also be applied to equipment used in fuels reduction activities.
- To help minimize the transport of noxious weeds via machinery, reconditioning of existing roads needed for timber hauling will be held to the minimum necessary to protect and maintain the road surface and drainage structures, and provide for public safety.
- Soil disturbing activities on NFSR 4425, Rabbit Creek, will be minimized. Soil disturbance on this road is likely to stimulate a long-suppressed population of rush skeletonweed and should be avoided to the extent possible. Walk in access must be maintained for monitoring and control of this new invader weed species.
- Knapweed will be targeted in Fuels Unit F11 with the release of biocontrol methods.

Old Growth

Tree removal and fuels reduction is proposed in old growth in Harvest Units 21, 63 and 75. Silvicultural prescriptions and unit layout notes identify site specific measures necessary to guide the implementation and contract administration efforts. Fuels reduction in old growth is also proposed for Fuels Units F13, F19, F25, F26 and F29. All treatments will maintain or improve old growth characteristics as defined by Green et.al. (1992).

Proposed Threatened, Endangered, and Sensitive Plants Species (PTES)

- PTES surveys have been completed. Therefore, to provide for inadvertent discovery, protection measures needed for endangered, threatened, proposed and sensitive plants will be included in the contract to provide for the protection of sensitive plants found during implementation and harvest activities (B6.24).

Recreation and Public Safety

- Temporary restrictions to over-snow motorized use and other public use of NFSR 4445 and NFSR 752 will be put in place during winter harvest activities for public safety. These roads will be open to the public for snowmobile use and other recreation activities on the weekends and during periods of inactivity.
- Temporary closures and/or travel restrictions will occur in the following locations prior to road work, harvest activities and burning: Yaak Mountain Lookout, Kilbrennan Campground\boat access, Alvord Lake Day-Use Site, Sears Flat Cross-Country Ski Area, and Troy Shooting Range. Public notification will occur prior to the above mentioned work. Safety signage will be placed in accordance with the proper Contract Provision.
- When logging Harvest Unit 42, the Eastside Road will be temporarily closed because of harvest activities. Notification to public and private land owners will occur.

Riparian Habitat Conservation Areas (RHCAs)

- Perennial and intermittent streams, springs, ponds, wetlands and landslide prone areas in the timber harvest units are identified and protected by establishing RHCAs around these features. No activities will occur in RHCAs that will retard attainment of riparian management objectives or adversely affect inland native fish.
- RHCAs will be established around any new water features and landslide prone areas that are found within harvest units during implementation (B2.37).

Snag Retention

- The Forestwide Desired Condition (FW-DC-VEG-07) and Guidelines (FW-GDL-VEG-04 and FW-GDL-VEG-05) provide guidance for snag retention. However, at times snags would need to be felled for safety concerns. All snags felled for safety reasons would be left on site (C2.303#) and would be cut as high as possible, to retain some value for wildlife use (foraging opportunities or habitat), where it is safe and reasonable to do so.

Soils

- Use equipment with a bucket and thumb for mechanized slash piling and mechanized fire line construction.
- Existing skid trails and other disturbed areas will be reused during harvest operations and machine piling as much as feasible in order to minimize new soil disturbance. (B6.4)
- Units required to be logged during the winter to minimize soil impacts shall have 4 inches of frozen soil OR 1 inch of frozen soil utilizing a cut-to-length system (log forwarding). During harvest operations, the harvester shall place tops and limbs evenly on the skid road as it proceeds. (C6.4#, C6.42#)
- Excavated skid trails and temporary roads constructed or used for the project will be recontoured after use. Slash and duff will be placed on the recontoured slopes (C6.632)
- Skid trails would be placed a minimum of 75 to 100 feet apart in order to reduce soil disturbance.
- Temporary roads or compacted landing areas will be decompacted or recontoured following harvest activities.
- All disturbed areas except firelines will be seeded.
- Final unit boundaries for Unit 20 will exclude potentially unstable slopes identified by field verification.
- In Unit 63 no landing is allowed due to existing detrimental soil disturbance (DSD) over 15 percent. Landing is anticipated to be located in Unit 29.
- Post-harvest soil restoration will be implemented in Units 51 and 63 in order to reduce soil disturbance values to 15 percent or less in a 3-year timeframe.
- Units determined by post-harvest monitoring to exceed 15 percent DSD will require restoration work to reduce soil disturbance to 15 percent or less. Restoration efforts will vary by unit, but are anticipated to include decompacting soil, recontouring excavated trails and/or spreading adjacent top soil, duff and slash over disturbed areas. Decompaction of soils (regardless of equipment or method) will not mix the soil horizons. Funding to accomplish such activities might be accomplished through KV funding or through retained receipts from previous stewardship contracting.

Special Provisions for Public Access on Decommissioned and Stored Roadways

- Stored service work on NFSR 4433 up to the junction with NFSR 4433B, and NFSR 4433B up to milepost 1.0 will be designed to allow for existing snowmobile access. The culvert at milepost 2.1 on NFSR 4433 will be replaced with a 48-inch squash corrugated metal pipe culvert.
- Historically, portions of NFSRs 4433 and 4433B have been used by snowmobilers as a route to access the open terrain found within the identified over-snow use area on and around Pulpit Mountain. Snowmobile use is currently allowed through April 30 which extends into the early part of the spring emergence period. To reduce potential disturbance effects to grizzly bears during this period, especially sows with cubs of the

year, a forest order would prohibit motorized over-snow use of this road after March 31 to be consistent with the 2015 Forest Plan guideline FW-GDL-WL-01.

Tree Retention along Roadways

- When existing ground conditions and operational feasibility provide the opportunity in Harvest Units 03B, 23, 25, 56, 61 and 61A:
  - Retain small diameter residual trees (hardwoods or conifers) and/or brushy vegetation within view of roadways to "break up and soften" the view of harvest and fuel treatment activities;
  - Generally locate landings off of roads and within harvest units to reduce their visual impact;
  - Avoid ignition along roads where possible and design ignition patterns to minimize mortality of small diameter trees and brush along roads (identified on site specific burn plans).

Vegetation

- If winter logging occurs in Harvest Units 1, 4, 28, 33, 38, 46, 50, or 77, accumulated post-harvest ponderosa pine and lodgepole pine slash will be monitored to determine the potential for *Ipps* beetle overwintering habitat and need for *Ipps* trapping. If the slash is determined to be a potential threat to remaining or neighboring pine trees, *Ipps* beetle traps will be implemented by the Forest Service.

Water Quality

- Harvest, burning, and road work activities have been designed to meet the Federal Clean Water Act and Montana State water quality regulations primarily through the implementation of best management practices (BMPs). See OLY FEIS - Appendix B for a description of the Kootenai National Forest (KNF) BMP program and a table listing BMPs applicable to the proposed timber sale(s) authorized by this analysis.
- Table 26 shows the site specific BMPs on NFS roads designed to maintain and help protect water resource values.
- NFSRs 4433, 4433A and 4433B (Lynx Creek) will be treated to minimize erosion and help restore natural hydrologic function before being barriered to non-winter motorized access (see Appendix E Access Management Plan for additional information).
- Road work that disturbs stream channel banks, such as culvert removal or replacement, will require a Montana Stream Protection Act 124 Permit from Montana Fish Wildlife and Parks.

Table 26. Timber Sale Related Road BMP

NFSR Number	Stream Location (Milepost)	Stream	Road /Stream Crossing BMP Work
4445	0.17	O'Brien Creek	Pave approaches to bridge.
4445	0.06	Lynx Creek	Pave road over top of culvert or install surface cross drains on both sides of crossing.

NFSR Number	Stream Location (Milepost)	Stream	Road /Stream Crossing BMP Work
4445	2.26	Surprise Gulch	Construct berm along outside shoulder to divert road surface water past stream crossing.
4445	2.28	Surprise Gulch	Install ditch relief culvert upgrade of stream crossing.
4445	4.08	Surprise Gulch	Install surface cross drains on both sides of crossing.
4445	9.00	Koot Creek	Install surface cross drain upgrade of crossing.
752	0.24	North Fork O'Brien	Install ditch relief culvert and surface cross drain upgrade of stream crossing at NFSR 2380/752 junction.
196	0.01	Kilbrennan, Arbo. Seventeenmile, Yaak Tributaries	Road is not under Forest Service jurisdiction so BMP work is not required.

Wildlife: General

- Protection measures needed for endangered, threatened, proposed, and sensitive animals will be included in the contract to provide for the protection of these animals found during implementation (B6.24).
- Provide protection for active den or nest sites discovered during project implementation, through timing restrictions, distance buffers around the site, etc. Coordination with Montana Fish, Wildlife and Parks biologists would occur if needed.
- To protect nesting bald eagles and common loons at Kilbrennan Lake and common loons at Alvord Lake, recreation improvements and thinning activities would be restricted during the early spring to mid-summer period (March 1st to July 15th) with the exception of potential spring burning in Fuels Unit F5.
- To protect nesting bald eagles and common loons at Kilbrennan Lake, ignition of Fuels Unit F5 would be by hand rather than helicopter if implemented during the spring period.
- To protect nesting common loons on Kilbrennan Lake, boating use would be monitored following installation of the boat ramp on Kilbrennan Lake. If an increase in use is detected such that it impacts nesting use and success, the district biologist would coordinate with Montana Fish, Wildlife and Parks biologists to identify appropriate measures to mitigate this disturbance.
- Design features may be applied to Harvest Units 31A and/or 31B to protect a goshawk nest. Design features may include timing restrictions, adjusting the unit boundaries and/or prescriptions, or dropping units if necessary.
- No dust abatement chemicals or herbicides would be applied within an exclusion area (known Coeur d'Alene salamander habitat) found between milepost 12.8 and 13.0 on the East Side Road. Refinement of the exclusion area will be identified on the ground and documented by the District Biologist.

Wildlife: Grizzly Bear

- No harvest or associated slashing, machine piling, machine fire line construction, road construction or reconstruction, road storage, road decommissioning, or watershed improvement work will occur during the spring bear use period (4/1 – 6/15). (C6.316#) Along open roads, routine road maintenance activities (e.g., blading, culvert cleaning, brushing, and other activities of a similar nature), loading/hauling of logs, and hand thinning of Fuels Units F7, F8, F18, F20, F22, F26, F29, F31, F32, F33, F34, F35, F36 may occur during this period. Also, road maintenance activities may occur on gated roads during the spring bear use period but must be completed within administrative use levels.
- Access management activities as displayed in Appendix E, the Access Management Plan, will be implemented to ensure that changes to grizzly bear habitat parameters are consistent with FW-STD-WL-02 design elements. (C5.12#, C5.41#).
- Currently gated or barriered/impassable roads will remain restricted to public motorized use when project activities occur during the bear year (4/1-11/30). Purchaser shall install a Temporary Activity Barrier on roads where physical barriers are removed. (C5.41#).
- The use of helicopters to ignite prescribed burns will not last more than 2 days per burn season (spring and fall) and not exceed a total of 4 days of helicopter use per bear year.
- Due to management activities on NFSRs 4433 and 4445 (along Lynx Creek) that will provide continued snowmobile access into predicted grizzly bear denning habitat, a forest order would prohibit over-snow motorized use of these roads in the spring after March 31 to reduce potential disturbance effects to grizzly bears during the spring emergence period.
- Prior to road construction/reconstruction and/or harvest use of currently barriered roads on Kilbrennan Ridge (NFSRs 14393, 14393A, 14321, 176F, and temporary road), Sears Flats (portion of NFSR 4447), near the Troy Shooting Range (NFSRs 14309 and 4445C), near Arbo Creek (NFSR 2365), and off of Kilbrennan Lake Road (NFSRs 2394A and 2394I) that would reduce existing Core habitat, NFSRs #2376 (Feeder-O'Brien), #4425 (Upper Rabbit Creek), and #4433 (North Fork Lynx) would be barriered to non-winter motorized use to provide in-kind replacement of Core habitat. The newly created Core areas will remain in place for a minimum of 10 years barring unforeseen circumstances. Harvest of 13 units accessed via open county roads could occur prior to or concurrent with watershed and barrier installation work associated with the in-kind replacement of Core; allowed units include units 5, 6, 7, 15, 16, 23, 24, 25, 27, 42, 50, 55, and 55A.
- Stimson Lumber Company has proposed road construction and harvest associated road use on Yaak Mountain.
    - Proposed activities will not occur during the spring bear use period (4/1 – 6/15).
    - To compensate for the loss of grizzly bear Core habitat:
        - Stimson would provide for the in-kind replacement of Core by placing barriers on five of its roads #4407A, #4407C, portion of #4407E, #9905, and #9909. All other roads located behind these barriers would also be barriered to motorized use and includes roads #14115, #14369, #9905A, #9905B, #9905C, and #9909B. These roads are located on Stimson property and are currently restricted (gated) to public motorized use.
        - The in-kind replacement of Core would occur prior to the initiation of the proposed Stimson road construction on Yaak Mountain.

        - Newly created areas of Core will remain in place for a minimum of 10 years barring unforeseen circumstances.
    - To reduce potential cumulative effects to grizzly bear open motorized route density (OMRD):
        - Implementation of Stimson's proposed road construction and harvest could not occur until OLY's proposed harvest/machine piling of fuels, harvest associated road work, and watershed improvement activities have been completed on Yaak Mountain.
        - Similarly, Stimson's proposed work could not occur until OLY's harvest/machine piling of fuels and harvest associated roadwork activities have been completed on Kilbrennan Ridge.
        - OLY's post-harvest fuels treatments and planting activities on Yaak Mountain and Kilbrennan Ridge would be planned to minimize road use in these areas. Specifically, if these activities occur within the same bear year as Stimson's activities on Yaak Mountain, then road use on Kilbrennan Ridge and/or NFSR 4408 on Yaak Mountain would be managed to keep motorized use within administrative use levels.
    - OLY's post-harvest fuels treatments and planting activities on Yaak Mountain will be coordinated with Stimson's activities, if necessary, to minimize potential safety issues associated with the two activities occurring on the same road system.
- Following completion of harvest on Harvest Unit 55B and the prescribed fire on Fuels Unit F2, NFSR 2393 would be barriered near the junction with NFSR 176 (East Side Road) to contribute to the improvement of grizzly bear habitat parameters within the bear management unit (BMU).
- There are six areas of proposed watershed improvement work (i.e., road storage, road decommissioning, and site restoration work) in the project area, grouped into five different activity areas: Pulpit Mountain/O'Brien Creek, Yaak Mountain, Hummingbird Creek, NFSR 2380 reroute, and Prospect Creek (please refer to Bear Management Unit Map M-19 displaying Watershed Improvement work). To minimize potential grizzly bear displacement:
    - Work within each watershed activity area would be completed within a single bear year.
    - Work within the Pulpit Mountain/O'Brien Creek, Yaak Mountain, and Hummingbird Creek activity areas would be completed in separate bear years from the other (e.g., no overlap of watershed work within a given bear year for these areas).
    - Watershed work on Yaak Mountain will occur at the same time as harvest or harvest related road work occurring on Yaak Mountain.
    - Watershed work will be planned so as not to conflict with timber harvest activities.
        - Watershed work in the Pulpit Mountain/O'Brien Creek area would occur prior to most harvest or harvest associated road work as the Pulpit Mountain work would provide the majority of the in-kind replacement of Core habitat as described above (see Figure 20). Harvest of 13 units accessed via open county roads could occur prior to or concurrent with the watershed work in this area; allowed units include units 5, 6, 7, 15, 16, 23, 24, 25, 27, 42, 50, 55, and 55A (See Figure 14).

        - Watershed work in the Hummingbird Creek activity area would not occur until all harvest activities (including mechanical piling and roadwork) are completed within the Project Area, including Stimson's proposed activities, and could not occur within the same bear year (April 1 through November 30).
    - The Prospect Creek and NFSR 2380 reroute watershed improvement work may occur within the same bear year as harvest or other watershed activities.

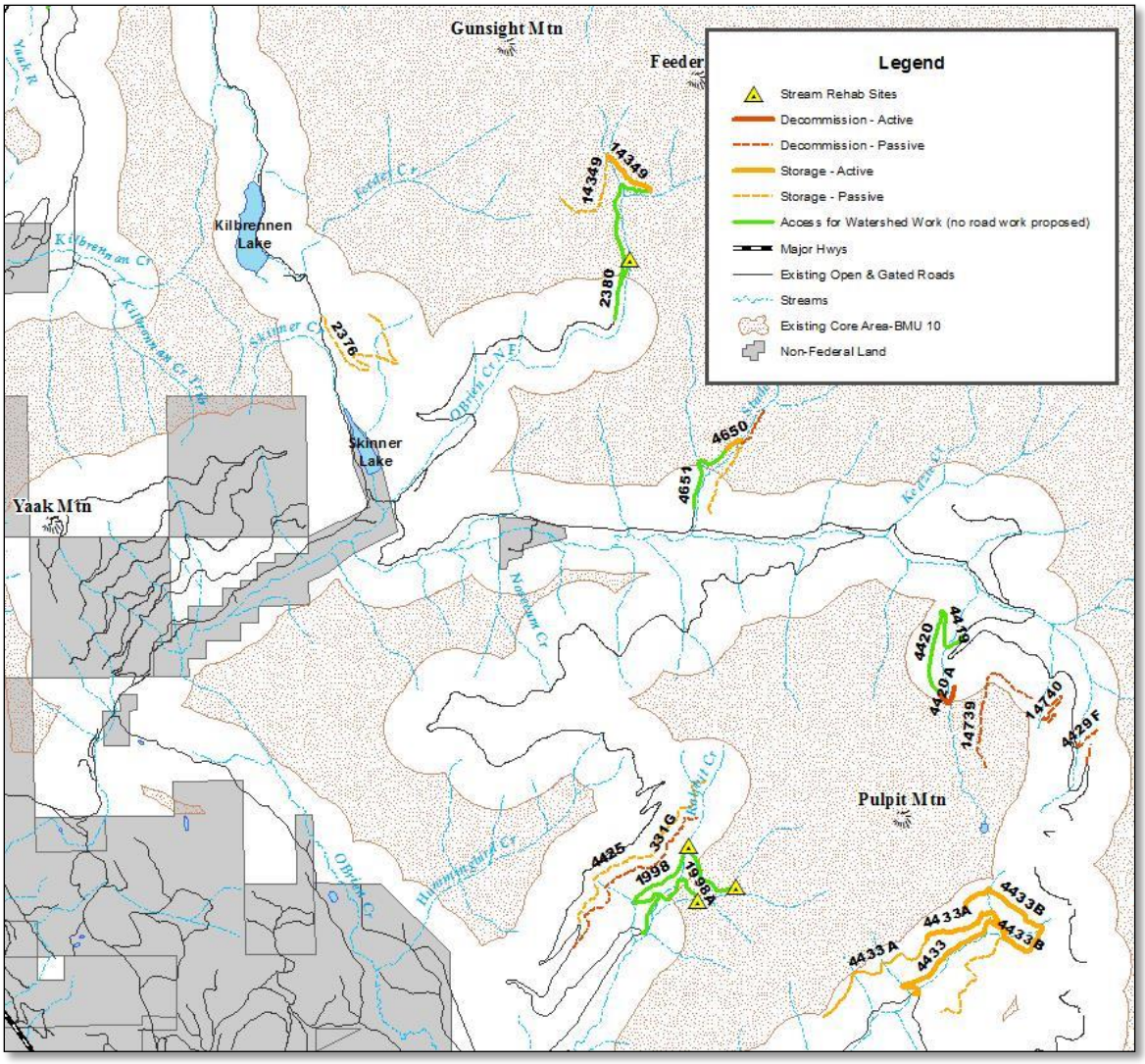


Figure 20. Proposed Watershed Improvement Work in the Pulpit Mountain/O'Brien Creek Area that Would Occur Prior to Harvest or Harvest Associated Road Work.

Unit-Specific Design Feature Tables

The following tables show specific design features for the OLY project. Table 27 displays unit specific design features. Table 28 displays the soils, cultural, wildlife and fuels design features for Alternatives 2 and 3. Table 29 displays design features for Alternative 4.

Table 27. Unit Specific Design Features to Maintain and Protect Resource Values

Unit	Description
F02, F05, F13, F19, F25, F26, F29	Any microsites that may experience detrimental effects from prescribed fire will be identified and excluded during the layout of this project. Snags within these old growth or recruitment potential old growth maintenance burn units would be protected through ignition and timing of the burn.
F02, F05, F06, F07, F08, F15, F18	Ignition will not occur within the RHCAs but fire **is** allowed to back through these areas.
Fuels Unit F27, Harvest Unit 21	Ignition will not occur within the RHCAs and fire is **not** allowed to back through these areas.
F09, F10	Slashing in these units will occur only after Fuels Unit F27 and Harvest Unit 21 have been burned to prevent the potential for fire to spread onto adjacent Stimson Lumber Company land. Slash created within Fuels Units F09 and F10 will be lopped and scattered to prevent adverse fuel accumulations.
F16, F17	Wet line, existing roads, and natural barriers will be used to control fire spread in these units to protect known historic properties.
Harvest Units 24, 27, 34, 37, 37A, 38A, Fuels Units F11, F16, F17, F25, F30, F31, F33, F34, F35, F36	During prescribed burn mop up operations no digging should occur within these units. The burns will be monitored after ignition and any stumps, large woody debris or other burning material of concern will be extinguished using water.
F18 (F33, F34, F35, F36 in Alternative 3)	To minimize potential detrimental effects to historic properties, all slash that is felled will be transported by hand to the road where slash will be ground by a wood chipper. The wood chipper will remain on the road or road right of way and shoot/scatter chips back into the unit while avoiding chip pile accumulations. Right of ways will only be used if it is determined to be safe by the contract administrator. If it is determined there is a commercial market for wood chips, chips will be removed by the purchaser.

Table 28. Soil, Cultural, Wildlife and Fuels Design Features for Alternatives 2 and 3

Unit Number	Required Winter Harvest[1] for Soils (S) or Weeds (W) or Historic Properties (HP)	Post-Harvest Soil Monitoring Required	Post-Harvest Soil Restoration Required Based on Existing DSD > 15%	Post-Harvest Soil Restoration Planned Based on Anticipated DSD >15%	Special Requirements to Protect Historic Properties[2]
Harvest Units					
4		X			
6		X			
7		X			

Unit Number	Required Winter Harvest[1] for Soils (S) or Weeds (W) or Historic Properties (HP)	Post-Harvest Soil Monitoring Required	Post-Harvest Soil Restoration Required Based on Existing DSD > 15%	Post-Harvest Soil Restoration Planned Based on Anticipated DSD >15%	Special Requirements to Protect Historic Properties[2]
8		X			
8A		X			
14	X (W)				
15		X			
23		X			
24, 27					X
28		X		X	
31B		X			
33	X (HP)				
34	X (S) (HP)	X			X
35*	X (HP)				X
35A*	X (HP)				X
35B*	X (S)	X	DSD > 15%, however, no ground disturbing activities allowed due to historic property concerns	Not Allowed	X
36*	X (HP)	X			X
37	X (HP)				X
37A					X
38		X		Not allowed	X
38A		X		Not allowed	X
41B*	X (S, HP)	X		Not allowed	X
43		X			
45A		X			
45B		X		X	
45C	X (S)	X			
46	X (S)	X			
47		X			
48	X (S)	X		X	

Unit Number	Required Winter Harvest[1] for Soils (S) or Weeds (W) or Historic Properties (HP)	Post-Harvest Soil Monitoring Required	Post-Harvest Soil Restoration Required Based on Existing DSD > 15%	Post-Harvest Soil Restoration Planned Based on Anticipated DSD >15%	Special Requirements to Protect Historic Properties[2]
49		**X**			
50		**X**			
51	**X(S)**	**X**	**X**		
52		**X**			
52B	**X(S)**	**X**			
52C	**X (S)**	**X**			
52D	**X (S)**	**X**			
57	**X (S)**	**X**			
58		**X**			
60	**X (S)**	**X**			
61	**X (S)**	**X**			
61A		**X**			
62		**X**			
63	**X (S)**	**X**	**X**		
77		**X**		**X**	
Fuels Units					
F11, F16, F17, F25, F30, F31, F32, F33, F34, F35, F36					**X**

[1] Units are required to have 4 inches of frozen ground or OR 1 inch of frozen soil utilizing a cut-to-length system (log forwarding). During harvest operations, the harvester shall place tops and limbs evenly on the skid trail as it proceeds. (C6.4#, C6.42#). See Soils Design Features

[2] Special requirements include pre and post burn treatment monitoring by a Tribal Liaison or heritage personnel. No ground disturbing activities and no ignition within historic properties but backing fire is acceptable. See Historic Properties design features above.

* These Units are not included in Alternative 3

DSD = Detrimental Soil Disturbance

Table 29. Soil, Cultural, Wildlife and Fuels Design Features for Alternative 4

Unit Number	Required Winter Harvest[1] for Soils (S) or Weeds (W) or Historic Properties (HP)	Post-Harvest Soil Monitoring Required	Post-Harvest Soil Restoration Required Based on Existing DSD > 15%	Post-Harvest Soil Restoration Planned Based on Anticipated DSD >15%	Special Requirements to protect Historic Properties[2]
Harvest Units					
4		X			
6		X			
7		X			
8		X			
8A		X			
14	X (W)				
14A	X (W)				
15		X			
23		X			
24, 27					X
28		X		X	
31A		X			
31B		X			
33	X (HP)				
34	X (S)	X			X
35	X (S, HP)				
35A	X (S, HP)				
35B	X (S)	X	DSD > 15%, however, no ground disturbing activities allowed due to historic property concerns	Not Allowed	X
36	X (S, HP)	X			
37	X (HP)				X
37A					X
38		X		Not allowed	
43		X			
45A		X			

Unit Number	Required Winter Harvest[1] for Soils (S) or Weeds (W) or Historic Properties (HP)	Post-Harvest Soil Monitoring Required	Post-Harvest Soil Restoration Required Based on Existing DSD > 15%	Post-Harvest Soil Restoration Planned Based on Anticipated DSD >15%	Special Requirements to protect Historic Properties[2]
45B		**X**		**X**	
45C	**X (S)**	**X**			
46	**X (S)**	**X**			
47		**X**			
48	**X (S)**	**X**		**X**	
50		**X**			
51	**X (S)**	**X**	**X**		
52		**X**			
52B	**X (S)**				
52C	**X (S)**	**X**			
57	**X (S)**				
58		**X**			
60	**X (S)**				
61	**X (S)**	**X**			
61A		**X**			
62		**X**			
63	**X (S)**	**X**	**X**		
77		**X**		**X**	
Fuels Units					
F17, F25, F30, F31, F32, F33, F34, F35, F36					X

[1] Units required to have 4 inches of frozen ground OR 1 inch of frozen soil utilizing a cut-to-length system (log forwarding). During harvest operations, the harvester shall place tops and limbs evenly on the skid trail as it proceeds. (C6.4#, C6.42#). See Soils Design Features.

[2] Special requirements include pre and post burn treatment monitoring by a Tribal Liaison and heritage personnel. No ground disturbing activities and no ignition within historic properties. However, backing fire is acceptable. See Historic Properties Design Features above.

DSD = detrimental soil disturbance

Comparison of Alternatives by Measurement Indicators

Table 30 compares alternatives by measurement indicators for key issues (see Chapter 1) and for two special concerns noted during scoping.

Table 30. Comparison of Alternatives by Issue Indicator

Key Issues	Alt. 1 (No Action)	Alt. 2 (Modified Proposed Action)	Alt. 3	Alt 4
Issue 1: Regeneration harvest units creating large openings, including openings over 40 acres				
Measurement Indicator: Number of regeneration harvest openings greater than 40 acres.	0	23	22	0
Issue 2: Protection of historic properties				
Measurement Indicator 1: Number of harvest units in areas with known historic properties.	0	5[1]	0	4
Measurement Indicator 2: Number of units requiring winter logging to protect known historic properties.	0	5[1]	0	4
Measurement Indicator 3: Number of harvest units prohibiting ground disturbance during prescribed fire and mop up operations.	0	6	6	5
Measurement Indicator 4: Number of fuels units prohibiting ground disturbance during prescribed fire and mop up operations.	0	11	11	9
Measurement Indicator 5: Number of units prohibiting prescribed fire to protect historic properties. Slash is transported by hand to the road where slash will be ground by a wood chipper.	0	1	4	1
Measurement Indicator 6: Number of fuels units requiring wet line, existing roads or natural fuel breaks to protect historic properties	0	0	2	0
Issue 3: Existing detrimental soil disturbance (DSD) approaching 15 percent.				
Measurement Indicator 1: Number of units requiring winter logging.	0	14	12	16
Measurement Indicator 2: Number of post-harvest units, exceeding 15 percent DSD, which require soil restoration.	0	3[2]	0*	3[2]
Measurement Indicator 3: Number of units requiring post-harvest monitoring for units approaching or exceeding 15 percent DSD.	0	35	30	30
Special Consideration: Management activities within old growth				

Key Issues	Alt. 1 (No Action)	Alt. 2 (Modified Proposed Action)	Alt. 3	Alt 4
Measurement Indicator 1: Acres of harvest units within old growth designed to retain old growth characteristics	0	155	155	155
Acres of harvest units within old growth that would not retain old growth characteristics	0	0	0	0
Measurement Indicator 2: Acres of fuels units within old growth designed to retain old growth characteristics	0	376	376	376
Acres of fuels units within old growth that would not retain old growth characteristics	0			
Special Consideration: Fuels Reduction in the Wildland Urban Interface				
Measurement Indicator: Acres of fuels reduction within the WUI	0	3,752	3, 722	3,312

[1] Under the Modified Proposed Action (Alternative 2), the District proposed winter logging to protect historic properties known to occur in 5 units. However, the Confederated Salish and Kootenai Tribal Preservation Council asked the District to drop certain units that are on known historic properties of concern to the tribes. In Alternative 3, these 5 units would not be harvested and were converted to fuels units, in response to the tribal request.

[2] Three units would exceed 15 percent Detrimental Soil Disturbance. However in Alternatives 2 and 4, two of these units would not receive soil restoration due to historic property concerns. These units are converted to fuels reduction without equipment use in Alternative 3.

* Units that exceed 15 percent DSD are converted to fuels units in Alternative 3.

Funding Dependent Resource Improvement Work

The following activities are not required project design features or mitigation for project activities. These activities have been designed to improve existing resource conditions. Implementation of these activities is dependent upon available funding. One source of funding could be Knutsen Vanderberg (KV) funds in association with the timber sale, or other sources of funding. Activities will not be implemented until sufficient funding is available.

- Inter-plant rust resistant western white pine;
- Post-harvest surveys of old growth;
- Girdle mistletoe infected western larch in the project area being planted with western larch;
- Monitor effects to soil resources from KV-funded activities;
    - Units found to exceed 15 percent Detrimental Soil Disturbance from post-harvest monitoring would receive soil restoration which might be funded by KV or another funding source like retained receipts.
- After landing piles have been burned, landing sites will be restored by decompaction and spreading of duff and slash. Weeds will be treated and sites will be seeded with native vegetation;

- Landing rehabilitation including decompaction, seeding and spreading duff and slash;
- Additional spraying of noxious weeds in areas where their concentrations occur;
- Monitor slash treatments funded by KV;
- Transport non-saw material outside of closed gates to areas the public can access and/or set up free firewood gathering areas. (In cases where winter logging is required or road closures would interfere with reselling any non-saw left on the landing, mandatory removal of non-saw would be required.)
- Road signs, mile markers and gate signs installed or replaced;
- North Fork O'Brien route relocation including NFSR 2380 decommissioning and associated riparian restoration, and NFSR 2380A reconstruction;
- Road storage, decommissioning and stream site rehabilitation in the OLY project area as identified in Table 17, Table 18, and Table 19. Any work not required to be completed before the timber sale will be considered part of this list;
- Road BMP work on NFSR 4429 and 4445 including surfacing, ditch cleaning, culvert replacement and surface cross drainage;
- Signing of recreation areas and amenities on or near Yaak Mountain, Kilbrennan Lake, and Alvord Lake.
- Enhance vistas or highlight "character trees" by thinning or pruning (FSH 2409.19 Chapter 10).

Chapter 3 – Affected Environment and Environmental Consequences

Introduction

Chapter 3 describes the environment (including its human elements) in and around the project area and discusses the environmental consequences that may result from implementation of each alternative. It provides the scientific and analytic basis for the comparison of alternatives presented in Chapter 2. Maps and appendices referred to in the analyses presented in chapter 3 are located at the end of this document.

The Council on Environmental Quality (CEQ) Regulations recognizes three types of effects:

Direct effects are caused by an action and occur at the same time and place.

Indirect effects are caused by an action but occur later in time or farther removed in distance.

Cumulative effects result from the incremental impact of an action when added to other past, present, and reasonably foreseeable future actions, regardless of what agency or person undertakes the actions (40 CFR 1508.7 and .8).As past actions are already included in the affected environment, the cumulative effects analysis builds upon this existing condition assessment by considering the incremental addition of direct and indirect effects of the proposed action as well as ongoing and reasonably foreseeable actions.

Past, Ongoing and Reasonably Foreseeable Actions

Analysis of cumulative effects presented in this chapter considered past, ongoing, proposed and reasonably foreseeable activities on NFS lands and adjacent lands that could affect the issues pertinent to this analysis. Adjacent lands within the OLY project area include: Montana Department of State Lands, Plum Creek Timber Company, Stimson Lumber Company, and other private ownership.

Land Ownership: Total acres of the project area by landowner are displayed in Table 31 below.

Table 31. Land Ownership by Total Acres and Percent within the OLY Project Area

Land Owner	Total Acres	Percent of Total
USDA Forest Service	53,666	80%
Montana Department of State Lands	589	<1%
Plum Creek Timber Company	4	<1%
Stimson Lumber Company	9,429	14%
Other Private	3,811	6%
Total Acres	67,499	

Past Actions

The environmental analysis required under National Environmental Policy Act is forward-looking in that it focuses on the potential impacts of the proposed action. Past and present activities and natural events have contributed to creating the existing condition and trends across the Kootenai National Forest. In order to understand the contribution of past actions to the cumulative effects

of the proposed action and alternatives, this analysis relies to a large extent on an examination of the current environmental conditions in order to highlight the impacts of past actions. This method is useful because existing conditions reflect the aggregate impact of all prior human actions and natural events that have affected the environment and might contribute to cumulative effects. Additionally, some of these activities, as well as reasonably foreseeable activities, may continue to produce environmental effects that overlap in time and space with issues or resources relevant to the proposal.

The cumulative effects analysis in this DEIS is consistent with regulations within the Code of Federal Regulations (CFR) at 36 CFR 220.4(f) (July 24, 2008) in accordance with CEQ Memorandum, *Guidance on the Consideration of Past Actions in Cumulative Effects Analysis*, which state, in part:

> "The analysis of cumulative effects begins with consideration of direct and indirect effects…agencies look for present effects of past actions that are, in the judgment of the agency, relevant and useful because they have significant cause-and-effect relationship with the direct and indirect effects of the proposal for agency action and its alternatives. CEQ regulations do not require the consideration of the individual effects of all past actions to determine the present effects of past actions. Once the agency has identified those present effects of past actions that warrant consideration, the agency assesses the extent that the effects of the proposal for agency action or its alternatives will add to, modify, or mitigate those effects. The final analysis documents an agency assessment of the cumulative effects of the actions considered (including past, present, and reasonably foreseeable future actions) on the affected environment. With respect to past actions, during the scoping process and subsequent preparation of the analysis, the agency must determine what information regarding past actions is useful and relevant to the required analysis of cumulative effects. Cataloging past actions and specific information about the direct and indirect effects of their design and implementation could in some contexts be useful to predict the cumulative effects of the proposal. The CEQ regulations however, do not require agencies to catalogue or exhaustively list and analyze all individual past actions. Simply because information about past actions may be available or obtained with reasonable effort does not mean that it is relevant and necessary to inform decision making. (40 CFR 1508.7)"

This section lists known past activities on NFS and adjacent lands as identified by resource specialists, documentation, other agencies, etc. There are marked differences between past and current land management practices and policies. The evolution that has occurred in land management practices is the result of science, our ongoing monitoring results, and changing public values.

During the scoping process and subsequent analysis of this project, the Forest Service determined that the following past activities, decisions, information, and environmental documents are applicable to all or portions of the National Forest System lands included in the analysis area for this DEIS, and considered them during the cumulative effects analyses discussed in this chapter.

Timber Harvest

Table 32 below displays harvest history in the project area by landowner, harvest type, and decade. Please see the Forest Vegetation section of Chapter 3 for more discussion of harvest types. Table 33 shows the past timber sales that have occurred in the project area.

Table 32. Harvest History[1] by Decade by Land Owner within the OLY Project Area

Land Owner	Decade	Intermediate Harvest (Acres)[2]	Liberation Harvest[3] (Acres)	Regeneration Harvest (Acres)	Total Acres
USFS	1930-1949	Harvest occurred during these decades, however acreages are not available			
	1950-1959	0	480	724	1,204
	1960-1969	415	291	3,872	4,578
	1970-1979	739	1,964	3,483	6,186
	1980-1989	3,903	535	3,415	7,853
	1990-1999	178	0	14,713	14,891
	2000-2009	509	0	522	1,031
	2010-2019	0	0	0	0
Montana Department of State Lands	1950-1959	0	0	0	0
	1960-1969	0	0	0	0
	1970-1979	0	0	17	17
	1980-1989	0	0	88	88
	1990-1999	0	0	42	42
	2000-2009	0	0	0	0
	2010-2019	0	0	0	0
Private	1950-1959	0	0	0	0
	1960-1969	0	0	35	35
	1970-1979	0	0	200	200
	1980-1989	0	148	1,890	2,038
	1990-1999	0	54	433	487
	2000-2009	0	63	48	111
	2010-2019	0	0	0	0
Stimson Lumber Company	1950-1959	0	0	0	0
	1960-1969	0	39	0	39
	1970-1979	0	0	140	140
	1980-1989	0	165	3,306	3,471
	1990-1999	0	1,509	1,322	2,831
	2000-2009	0	897	992	1,889

Land Owner	Decade	Intermediate Harvest (Acres)[2]	Liberation Harvest[3] (Acres)	Regeneration Harvest (Acres)	Total Acres
	2010-2019[4]	0	0	0	0
Total Acres		**5,744**	**6,145**	**35,242**	**47,131**

[1] Harvest History data is not complete, especially prior to 1970.

[2] The acres of intermediate harvest included entire stands even if only a portion of the stand was treated.

[3] Liberation Harvest: An intermediate harvest treatment made in a stand with an established understory not past the sapling stage, in order to free the favored trees from competition of older, overtopping trees.

[4] Data for the decade includes only activities completed to date. Future activities are included in the reasonably foreseeable actions section below.

Table 33. Past Timber Sales on National Forest System Lands within the OLY Project Area

Timber Sale Name	Year Sold	Total Acres
Surprise Gulch	1962	50
Kedzie Ridge	1974	644
King China	1979	502
Yaak-Kilbrennan	1980	263
Prospect Creek	1981	355
Studebaker Pulp	1981	110
Arbo Creek Blowdown	1982	27
Cold Bear	1982	41
Lower Arbo	1982	9
Lower Yaak Wildlife	1982	5
Lynx Plant 1st Xmas	1982	35
North Fork O'Brien Cedar Salvage	1982	19
Pulpit Mountain Blowdown	1982	45
Rabbit Creek OSR	1982	46
Rabbit Run	1982	22
Sears Wildlife Posts	1982	4
Studebaker Forks Cedar	1982	121
Surprise Gulch	1982	108
Broken Koot	1983	99
East Side Salvage	1983	493
Feeder Creek	1983	335
Lower Kedzie	1983	12
Lynx Creek (Original)	1983	97
Noseeum Longline	1983	103
O'Brien Mountain	1983	41

Timber Sale Name	Year Sold	Total Acres
Pickle City Cedar	1983	111
Pulpit Basin Xmas Tree	1983	110
Sears Ridge Xmas Tree	1983	185
Springer Sale	1983	20
Studebaker Burn Salvage	1983	45
Studebaker Fir Xmas	1983	75
Three Moose Cedar	1983	93
Arbo Firewood Salvage	1984	211
Far East Sanitation	1984	386
Handshake Cedar	1984	21
Horse Show	1984	15
Laramie Creek Salvage	1984	57
Lower Pulpit Cedar 2	1984	81
Lower Pulpit III	1984	27
Moose Up Cedar	1984	91
Pulpit Ridge Prep	1984	105
Upper O'Brien	1984	362
Lean To	1985	14
Lower Sears Flat LP	1985	92
Lynx Creek II	1985	292
Oberhoffers Sanitation	1985	148
Highway Two	1986	2
North O'Brien	1986	492
Noseeum	1986	446
O'Brien Cleanup	1986	99
Kilbrennan Scraps	1987	165
Lynx Plant 2nd Xmas	1987	35
Noseeum Sanitation II	1987	103
No Way Under	1987	49
Yaak-Back	1987	145
Kootchikoo Bugs	1988	128
Match Salvage	1988	66
China Sheep	1989	447
Flying Fur	1989	74
King Ranch	1989	166
Arbo Fire Salvage	1993	376

Timber Sale Name	Year Sold	Total Acres
East Windy	1993	77
Skunk Cabbage	1993	96
View Two Re-Ad	1995	92
China Basin Salvage	1997	514
King Pin Salvage SSTS	1997	5
Pew Fire Salvage	1997	15
Pulpit Fire Salvage	1997	486
Skinner Salvage	1997	37
Studebaker Fire Salvage	1997	728
Review SSTS	1998	30
Feeder Mountain – 26	2000	23
Kedzie Creek – 30	2000	222
Noseeum Creek – 32	2000	26
Pulpit Mountain – 37	2000	167
Cross Roads	2004	104
Short Curtain Salvage	2005	401
Crossed Out	2007	6
Shoot Out	2007	9
Yaak Mountain Lookout	2007	18
Artillery Pine	2012	43
Timber Sales in the data base with no name	1950-2002	23,769
	Total Acres	**35,786**

Wildfires and Fire Suppression

Records document that known wildfires have affected about 24,000 acres in the OLY project area since 1889. Larger wildland fire events in 1910, 1926, 1991, 1994, and 2000 contributed about 19,780 acres. The first recorded wildland fire events within the project area occurred in 1889. The 1910 Fire burned about 6,761 acres in the Gunsight and Seventeenmile drainages. From 1911-1925 wildland fires burned approximately 2,250 acres. During the time period from 1927 to 1990 about 780 acres were affected by wildfire. In 1991, an October wind event contributed to a wildfire burning 3,272 acres in the Arbo Mountain area. The project area experienced 51 fire starts in 1994 prior to an intense August lightning storm. That year about 7200 acres burned in the Arbo, China Basin, Pulpit, Studebaker and Gunsight areas.

About 100 recorded lightning-caused fires have occurred in the project area from 1986-2014. These lightning fires indicate the interrelationship between the vegetation and fire. A series of fires in 1910 burned about 3 million acres in Washington, Idaho and Montana. The 1910 fires were the impetus for a national policy of wildland fire suppression, and in 1935 the Forest Service established a policy to suppress fires by 10 a.m. on the day following the initial fire

detection report (http://www.foresthistory.org/ASPNET/Policy/Fire/FamousFires/1910Fires.aspx accessed 2015).

The policy-driven suppression of wildland fire has contributed to a vegetative pattern in the forest different from conditions that were present prior to fire suppression. Fuels that would have been consumed by numerous non-lethal or mixed-lethal fires have accumulated and remained on site. Fire exclusion has also allowed trees with low fire resistance to become more prevalent on sites where they would have had lower representation than tree species adapted to fire over the millennia.

It can be assumed that had the smaller, naturally occurring, fires in the project area not been suppressed, fire would have played a more active role in the ecological process across the landscape.

Road BMP, Stored Service, and Decommissioning Work

The Forest Service began intensive timber harvesting in the analysis area in the 1960s.With harvest activities, came the construction of the NFS road network in the project area. The roads constructed for the transportation of timber products in the 1960s were not always designed to serve long term management needs. In the 1990s the emphasis on road work transitioned from construction of new roads to reconstructing, storing, and decommissioning existing roads. The emphasis of this work was to lessen the degree of hydrologic impact by roads on area streams with particular emphasis on decreasing sediment delivery.

District records indicate that since 1993 approximately 27 road-related projects have been implemented including 68 miles of road reconstruction, 5 miles of road construction followed by decommissioning, 18 miles of road storage work and 39 miles of road decommissioning. Eight major culverts have been replaced including two that now provide fish passage.

District records indicate that since 1993 Best Management Practices (BMP) have occurred on roads open to the public within the analysis area. As part of this work, stream crossings were replaced to improve water quality and habitat for aquatic organisms. Other types of BMP work included the replacement and installation of drain dips, constructing or cleaning catch basins and ditches, blading, dust abatement, buttressing cut slopes and fill slopes and resurfacing roads.

Road Management

Measures implemented beginning in the 1990s for protection of the threatened grizzly bear have decreased the amount of road available for motorized public travel and management activities, while increasing security for grizzly bears as well as other wildlife species. The creation of grizzly bear core security areas has resulted in roughly half of the NFS lands on the district being unavailable to motorized travel during the active bear year.

Private Land Development

Approximately 20 percent of the OLY project area is privately owned, with 6 percent owned by private landowners and 14 percent owned by corporations (mostly Stimson Lumber Company). Developments such as commercial timber harvest, home building, subdivisions, land clearing, construction, well drilling, conversion of timbered land to pastures, and farming have occurred and are expected to continue (see Ongoing and Reasonably Foreseeable Actions).

In 2012, the Stimson Lumber Company converted 28,000 acres in the Kootenai River Valley near Troy into a conservation easement. The land cannot be sold privately for subdivisions and will remain a working forest with permanent public access. It includes lands along the Cabinet Mountains, the Yaak River, and Kootenai River, and includes parcels from the south end of Bull Lake to north of Troy, Montana. About one-third (9,429 acres) of this conservation easement is within the OLY project area.

Ongoing and Reasonably Foreseeable Actions

Ongoing actions are those actions initiated in the past which continue to take place. Reasonably foreseeable actions include those management activities that are proposed or imminent, as well as those from other agencies or persons. These activities may occur regardless of which alternative is selected for implementation.

Ongoing and reasonably foreseeable actions within and/or adjacent to the project area which were determined to be appropriate for consideration in the analysis of environmental effects are shown in Table 34.

Table 34. Ongoing and Reasonably Foreseeable Actions within or Adjacent to the OLY Project Area

Action Category	Description
Ongoing and Reasonably Foreseeable Actions within the OLY Project Area	
Activities on Private Lands	Within the project area, continued development of private land is expected. Development is expected to include commercial timber harvest, land clearing, home construction, septic field installation, water well drilling, and livestock grazing.
Communications	Radio repeaters installed on King Mountain will be maintained.
Fire Suppression	Fire suppression efforts could include construction of firelines, safety zones, and helispots.
Minerals	Ongoing Placer Mining Claims (10), Commercial Mineral Permits, and suction dredging operations in Snipetown and Why Not, Free Use rock picking on 2 sites.
Public Actions on National Forest System Lands	Recreation activities such as sightseeing, hiking, cross country skiing, camping, snowmobiling, hunting, and fishing, are ongoing and expected to increase over the next 10 years. Firewood cutting is predicted to continue to occur along open roads. Three permitted hunting outfitters will be allowed to continue seasonal operations within the project area.
Recreation Activities	Ongoing trail maintenance will occur on NFS lands. Yaak Mountain Lookout will continue to be maintained as a rental facility. Kilbrennan Lake Campground, Alvord Lake Campground, Yaak River Campground, and dispersed camping areas will be utilized and maintained.
Road Activities	Routine road maintenance (road blading, culvert cleaning and BMP work) is likely to occur as needed on those NFS roads that are open or gated within the project area. The roads most likely to receive maintenance are those open to public vehicle traffic.
Special Uses	Ongoing maintenance and use of the Troy Shooting Range facility.

Action Category	Description
Timber Stand Improvement (Precommercial Thinning)	Approximately 224 acres of precommercial thinning is scheduled to occur in the project area in stands below 4,000 feet in elevation, and approximately 426 acres of daylight thinning of western whitepine is schedule to occur within the project area. These actions are covered in previous NEPA documentation with signed decisions.
ForestwideYoung Growth Vegetation Management	The KNF has scoped for public input concerning young growth vegetation management across approximately 400,000 acres of previously managed stands, originating after 1969, across the forest. Within the OLY project area, approximately 11,500 acres met the initial stand age and resource protection screens, indicating they may be candidates for commercial or pre-commercial thinning in the next 10 to 15 years under the Forestwide Young Growth Project.
Vegetation Management: National Forest System lands	Apporximately 44 acres of post and pole sales (See Project Record for details) **Skin and Poles (Unit 1):** Sale is approximately 20 acres and located on the NF O'Brien Road (NFSR 2380) in T32N R33W sections 5 and 6 and T33N R33W section 34. **Fishing Poles (Unit 2)**: Small unit, about 4 acres, in section 33 of T33N R33W. It adjoins the Kilbrennan Lake Road (NFSR 2394. **East Pole (Units 3 & 4)**: These two units are located in T33N R33W sections 17, 18, 19 and 30. They lie on both sides of East Side road (NFSR 176). Unit 3 is approximately 10 acres and Unit 4 is about 10 acres.
Vegetation Management: Private Timber	Potential timber harvest on Stimson Lumber Company lands, during 2016-2024, on approximately 910 acres (5 percent regeneration, 60 percent overstory removal, and 35 percent partial harvest or commercial thin). These potential harvest areas are all located within the OLY project boundary, within about 6 miles north and east of Troy, Montana. See Figure 21 below which displays the general locations of these areas. **Year** **2016** – 92 acres T32N R34W section 25 T31N R33W section 05 **2017** – 202 acres T32N R34W section 03 T32N R34W section 23 T32N R34W section 25 **2019** – 257 acres T32N R34W section 3 T32N R34W section 24 **2021** – 91 acres T32N R34W section 15 T32N R34W section 22 T32N R33W section 19 T32N R33W section 30) **2022** – 61 acres T32N R34W section 27 **2024** – 207 acres T32N R34W section 15 T32N R34W section 25

Action Category	Description
Weed Control	Ground-based spraying to control weeds is ongoing within the project area under the Kootenai National Forest Invasive Plant Management EIS (April 2007 Record of Decision).
Ongoing and Reasonably Foreseeable Actions Adjacent to the OLY Project Area	
Bonneville Power Association (BPA) Powerline Construction and Maintenance	BPA work on the Kootenai River Trail. Vegetative clearing by hand along the powerline corridors and access roads 2 to 3 times in the next 10 years. Access road washout repairs for one month of work. Powerline maintenance and removal of hazard trees.
Prescribed Burning	Rocky Pine Fuels (Decision Notice 2008) has underburning and pile burning left to accomplish.
Recreation Activities	Seasonal and year-round activities include snowmobiling, Kootenai Falls and Swinging Bridge, National Forest System trail use and dispersed camping areas.
ForestwideYoung Growth Vegetation Management	The KNF has scoped for public input concerning young growth vegetation management forestwide across approximately 400,000 acres of previously managed stands, originating after 1969, across the forest. Within the OLY project area, approximately 11,500 acres met the initial stand age and resource protection screens, indicating they may be candidates for commercial or pre-commercial thinning in the next 10 to 15 years under the Forestwide Young Growth Project.

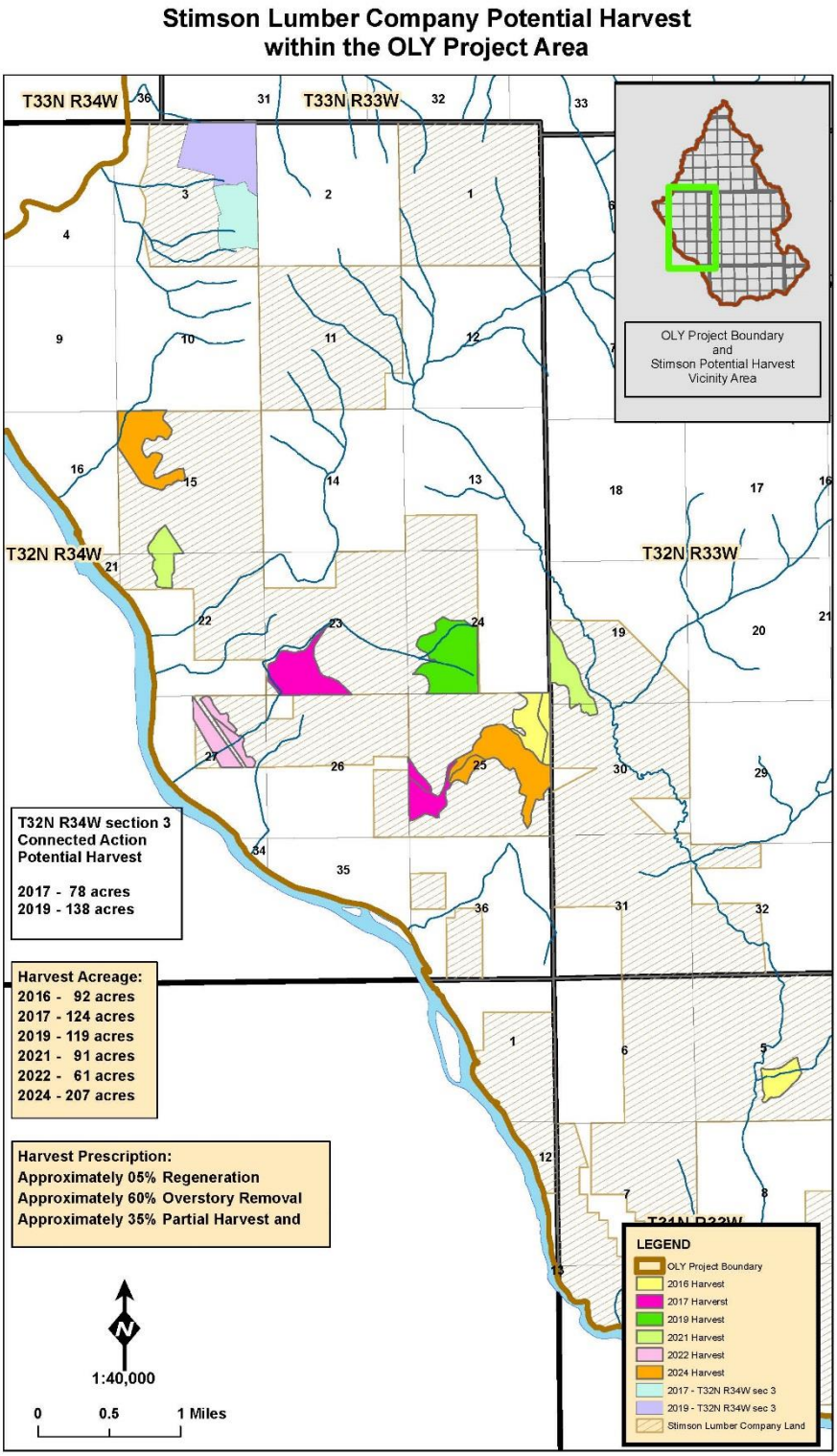


Figure 21. Potential Harvest Areas on Stimson Lumber Company Lands within the OLY Project Area

Forestwide Young Growth Project

The KNF has scoped for public input concerning young growth vegetation management forestwide across approximately 400,000 acres of previously managed stands, originating after 1969. This broad-scale, adaptive management project would authorize site-specific treatments based on minimum stand characteristic criteria and environmental thresholds to meet 2015 Forest Plan direction and avoid adverse impacts to threatened and endangered species and to sensitive areas. Within the OLY project area, approximately 11,500 acres met the initial stand age and resource protection screens, indicating they may be candidates for commercial or pre-commercial thinning in the next 10 to 15 years under the Forestwide Young Growth project.

During the development of the OLY proposed action, all opportunities that appeared to be candidates for treatment were considered and included either in the proposed action or in project alternatives. This would preclude any Young Growth Project treatments in the OLY vicinity in the near term. However, should OLY project area stands reach the Young Growth Project stand criteria age and structure in the next 5 to 15 years, the Young Growth Project design criteria would include consideration of OLY project activities as the environmental baseline when determining whether the site-specific treatment were within the required resource protection thresholds. At the time a site-specific treatment is proposed in the OLY project area under the Young Growth decision, the potential cumulative effects of that project with the OLY project activities will be described, analyzed, and considered. Activities with adverse cumulative effects will not proceed.

Because there are no site-specific treatments proposed in the OLY project area, the Forestwide Young Growth project will not be further addressed within the individual resource area cumulative effects sections.

2015 Fire Season

The 2015 fire season was very active on the Three Rivers Ranger District and the Kootenai National Forest. Through mid-October, 157 wildland fires totaling 31,551 acres received suppression efforts within the boundary of the forest; most of the fires were on NFS lands but some also occurred on private and State lands. The district experienced 36 fires from early April through mid-October totaling about 3,760 acres. None of the suppression activities occurred within the OLY project area. The Tepee Mountain Fire, which burned approximately 1,018 acres, was within one air mile of the OLY project area boundary, and 2 small fires, each only 0.1 acre, occurred along the railroad tracks by the Kootenai River Falls near the southeast corner of the project boundary. It is likely that during 2015, a higher level of air traffic, including fixed wing aircraft and helicopters, passed over the project area at low to mid elevation. These effects were short lived and are not expected to have caused any lasting effects to resources in the OLY project area.

2015 Forest Plan Numbering (Naming Conventions)

The 2015 Forest Plan, referred to throughout this DEIS, uses specific acronyms and naming conventions to describe its various elements.

Elements of the Forest Plan:

Goals: Concise statements that describe an overall desired condition the Forest will strive to achieve. It is normally expressed in broad, general terms and is timeless in that it has no specific date by which it is to be accomplished. Goal statements form the principal basis from which

objectives are developed (36 CFR 219.3). Goals will only be found in the section of the Plan labeled "Goals."

Desired Conditions: These are the social, economic, and ecological attributes that will be used to guide management of the land and resources of the Plan area. Desired conditions are not commitments or final decisions approving projects and activities. The desired condition for some resources may currently exist, or for other resources may only be achievable over a long time period. The Forest may need to make adjustments in the desired conditions if monitoring results indicate they are not achievable in the long term. Budget levels are an important factor in moving towards the desired conditions. Budgets are also directed by program area, with limited flexibility in moving funds between programs. Desired conditions will only be found in the section of the Plan labeled "Desired Conditions."

Objectives: A concise, time-specific statement of measurable planned results that respond to pre-established goals. An objective forms the basis for further planning to define the precise steps to be taken and the resources to be used in achieving identified goals (36 CFR 219.3). The ability to achieve objectives is based on several factors, including annual budgets. Objectives were developed using current budget levels. Objectives that are defined as occurring "over the life of the Plan" are referring to the first 15 years of Plan implementation. Objectives will only be found in the section of the Plan labeled "Objectives."

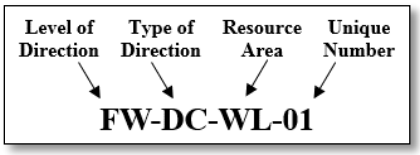
Standards: Limitation or requirement that is applied to project and activity decision making to help achieve goals and objectives. Standards can be developed for forestwide application or for specific areas and may be applied to all management activities or selected activities. Standards will only be found in the section of the Plan labeled "Standards."

Guidelines: Operational practice and procedure that is applied to project and activity decision making to achieve goals, desired conditions, and objectives. Guidelines can be developed for forestwide application or for specific areas and may be applied to all management activities or selected activities. Guidelines will only be found in the section of the Plan labeled "Guidelines."

Numbering used in 2015 Forest Plan:

Goals, desired conditions, objectives, standards, and guidelines are numbered for ease in referencing within the 2015 Forest Plan. This same numbering (naming convention) is used throughout the OLY DEIS.

The numbering begins with the level of direction, then the type of direction, then the resource area, and finally a unique number (in numerical order).



Level of Direction Naming Convention:

Level of Direction Code		Description
FW	=	Forestwide
MA	=	Management Area
GA	=	Geographic Area

Type of Direction Naming Convention:

Type of Direction Code		Description
GOAL	=	Goal
DC	=	Desired Condition
OBJ	=	Objective
STD	=	Standard
GDL	=	Guideline

Resource Area Naming Convention:

Resource Area Code		Description
AI	=	American Indian Rights and Interests
AQ	=	Air Quality
AQH	=	Aquatic Habitat
AQS	=	Aquatic Species
AR	=	Access and Recreation
CCI	=	Cooperation and Community Involvement
CR	=	Cultural Resources
FIRE	=	Fire
GRZ	=	Grazing
IRA	=	Inventoried Roadless Area
LND	=	Lands and Special Uses
MIN	=	Minerals
RIP	=	Riparian
SES	=	Social and Economic Systems
SFP	=	Special Forest and Botanical Products
SOIL	=	Soils
TBR	=	Timber
VEG	=	Vegetation
WL	=	Wildlife
WTR	=	Watershed

Air Quality

Introduction

This analysis discloses the potential effects to air quality from Alternative 1, the No Action Alternative, and Alternative 2, 3 and 4 to provide the decision maker with a means of comparing proposed alternatives. The analysis of all alternatives includes the effects of smoke from wildland fires, smoke from prescribed fire, and fugitive dust.

Smoke produced from the prescribed burning of slash generated during timber harvest and natural fuels can have an adverse effect on air quality. Depending on market conditions for biomass it may be possible to utilize sub-merchantable material, which could reduce the amount of fuel remaining after timber harvest, thereby reducing the amount of smoke produced.

Air quality is also affected by fugitive dust produced by vehicular traffic, especially on native surface roads. The silt content of the road surface layer, the distance traveled, weight and speed of the vehicle as well as weather conditions, influence the amount of dust produced.

This analysis includes the direct effects, indirect effects, and cumulative effects.

Regulatory Framework

Federal Law

Under the 1977 Clean Air Act amendments (42 U.S.C. 7401 et seq), areas of the country were designated as belonging to Class I, II, or III Airsheds for Prevention of Significant Deterioration purposes. Class I areas are all international parks, national parks greater than 6,000 acres, and national wilderness areas greater than 5,000 acres which were created prior to August 7, 1977. Class 1 areas provide the most protection to pristine lands by severely limiting the amount of additional, human-induced air pollution, which can be added to these areas. Class II areas are currently all other areas of the country that are not Class I. To date, there are no Class III areas. Glacier National Park and the Cabinet Mountain Wilderness, Class I Areas, and impact zones were considered in the development of this project.

The 1977 amendments to the Clean Air Act contained provisions for the Prevention of Significant Deterioration (PSD) Program to prevent the growth of stationary industrial sources from causing a significant deterioration of air quality in areas that meet present air quality standards of National Ambient Air Quality Standards (NAAQSs) and placement of limits on the "increment" of clean air that can be used by industrial projects. The PSD Program is administered by the State air regulatory agencies with oversight authority retained by EPA.

The Clean Air Act authorizes states with approved PSD Programs to exclude particulate matter emissions caused by temporary activities from consuming increment. EPA expects the states, on an individual basis, to decide the extent to which prescribed fires (and the resulting emission increases) should be considered temporary sources of air pollution when determining increment consumption in specific areas.

The majority of the legal entities in Montana (including the Forest Service), which create particulates as a result of their burning activities, formed the Montana/Idaho State Airshed Group. Through a Memorandum of Understanding with the Montana Air Quality Bureau, this group has established a smoke monitoring system that provides daily air quality predictions and air quality

restrictions to its members. The Montana Air Quality Bureau issues an annual burn permit to the Forest Service. Issuance of this permit is based on participation and compliance with burning restrictions set by the Montana/ Idaho State Airshed Group.

Prescribed burning within the analysis area will comply with the current Federal and state management plans. Prescribed burning is reported to the Airshed Coordinator on a daily basis. If the monitoring unit forecasts ventilation problems, prescribed burning is either restricted by elevation or curtailed until good ventilation exists.

Combustion products of wildfires and prescribed burning smoke include carbon dioxide, water vapor, carbon monoxide, particulate matter, hydrocarbons, nitrogen oxides, and trace minerals. Federal and State ambient air quality standards have been established for particulate matter (PM), which is the pollutant of most concern from smoke. Specifically, PM less than or equal to 10 micrometers in aerodynamic diameter (PM-10) is the size which can penetrate the inner recesses of the lungs, causing health problems. It is also the size that most severely impacts local and regional visibility.

If a community does not meet or "attain" the National Ambient Air Quality Standards, it is designated as a non-attainment area and must demonstrate to the public and the Environmental Protection Agency how it will meet standards in the future. This demonstration is done through the State Implementation Plan.

National Air Quality Standards

In July 1997, the EPA issued revised national air quality standards for ozone and particulate matter in the 2.5 micron class (PM-2.5). The EPA proposed the following implementation plan for the new standards, which took effect on January 17, 2007:

- Nationwide fine particulate monitors in place.
- States and EPA collect data from nationwide network.
- States submit to EPA their State Implementation Plans (SIPs) describing how they will meet and enforce the new standards.
- States implement their Plan to assure they attain the standards.

Current Federal and State Ozone and Particulate Standards

PM10:

- The concentration of PM10 must not exceed 150 micrograms per cubic meter over a 24-hour period.

PM2.5:

- The concentration of PM2.5 must not exceed 35 micrograms per cubic meter over a 24-hour period; or
- The annual arithmetic average must not exceed 12 micrograms per cubic meter. This is the primary standard for human health protection. There is also a secondary standard of 15 micrograms per cubic meter for public welfare including decreased visibility.

2015 Forest Plan

Desired Condition

FW-DC-AQ-01. The Forest meets applicable Federal, state, or tribal air quality standards. Prescribed burning is planned to meet those standards, including areas classified as Class 1 airsheds (i.e., Cabinet Mountains Wilderness) and nonattainment areas (i.e., presently Libby, Montana).

Guidelines

FW-GDL-AQ-01. The Forest should cooperate with Federal, state, tribal, and local air quality agencies as appropriate in meeting applicable air quality requirements.

Required Monitoring

Monitoring

The Forest Service is a member of the Montana/Idaho Airshed Group, which monitors air quality on a daily basis during burning season. The Monitoring Unit is activated when prescribed fire activity begins in the spring and continues until the end of November when the open burn season closes. The amount of burning allowed for any given day is based on this monitoring as well as forecast weather conditions. Air quality monitoring is performed daily at several locations within the area covered by this group. The amount of burning allowed within each airshed is tied directly to the daily monitoring of ambient air quality. The process of monitoring and forecasting has been effective at achieving the Airshed Group's objectives, which are listed in the Montana/Idaho Smoke Management Agreement.

One objective is to minimize or prevent accumulation of smoke during the fall prescribed burning season when burning is necessary for conducting accepted forest management practices such as hazard reduction, site preparation and wildlife habitat improvement. This is done by prohibiting or restricting burning at times and places where stagnant weather conditions result in poor smoke dispersion, and by conducting prescribed burns when ventilation and air quality conditions are good. The development of alternative methods is encouraged when such methods are practical.

A second objective is to develop a smoke management plan for reporting and coordinating burning operations on all forest and rangelands within Montana and Idaho. Guidelines in the plan will be based upon technical information currently available on smoke dispersion and on State and Federal air quality regulations.

The third objective is to improve the smoke management program through regular review and evaluation. One or two general meetings of members are held annually to exchange ideas, review operations and offer suggestions for improving the program.

In addition, each burn plan (required for every Forest Service burn) includes the provision for a test fire. The purpose of this test fire is to allow the burn boss to determine if burn objectives would be met as well as determining if smoke dispersal would be adequate.

Methodology

The basis of the effects analysis will be a comparison of Particulate Matter 2.5 and Particulate Matter 10 quantities produced from the proposed burning activities for each alternative.

Assumptions and Limitations

Assumptions are based on the proposed number of acres for each type of burning, which produce different amounts of particulate matter.

Affected Environment

Particulate matter is of concern for human health during a wildland fire (prescribed or wildfire). PM10 and PM2.5 refer to two different size classes of particulate matter that include both extremely small particles and liquid droplets found in the air. PM10 refers to particulate matter 10 microns in diameter and smaller, whereas PM2.5 refers to particulate matter 2.5 microns in diameter and smaller. According to the Clean Air Act of 1970, the EPA is required to set National Ambient Air Quality Standards (NAAQS) for specific pollutants. The standard for PM10 over a 24 hour period is less than 150 $\mu g/m^3$ (micrograms per cubic meter) and is not to be exceeded more than once per year on average of over 3 years. The standard for PM2.5 is less than 35 micrograms per cubic meter over a 24 hour period and must be less than the 98th percentile averaged out over 3 years.

Spatial and Temporal Context for Effects Analysis

The spatial boundaries for analyzing the effects to air resources will be based on airsheds. The state of Montana is divided into ten airsheds according to the Montana State Air Quality Bureau. The OLY project area lies within Airshed 1, which encompasses all of Lincoln Country and the northwestern tip of Sanders County.

The temporal boundaries are variable due to the intermittent nature of prescribed burning. Different types of prescribed burning can only be accomplished at specific times of the year when a specialized set of criteria are met. These criteria can occur over a range of days, weeks, and years.

Short term effects include the possibility of local hazy conditions, reduced visibility, and a decrease in air quality depending on wind direction and transport wind characteristics.

These effects are acceptable because of consultation with the Idaho/Montana Air Resource Group, which regulates what days and what units are allowed to contribute smoke into the airshed on a daily basis.

Existing Condition

Existing conditions are unpredictable and highly variable day-by-day based on atmospheric conditions and up-wind contributors. Smoke and dust from the west is the predominant influence on air quality in Airshed 1. Prescribed burning of logging residue by private and other government entities adds smoke into the air. Wildfires burning in the localized area, Canada, and from areas as far west as the coastal range of Oregon and Washington also contribute to air quality degradation. Dust, originating from tilled farmland during dry windy weather, as well as agricultural field burning, can add to local haze and reduce air quality.

Studies conducted by the Montana Health and Environmental Sciences Department demonstrate that prescribed burning of logging slash, when burned in compliance with State regulations, is not a major contributor to reduced air quality in the Libby area (Carlin 2008). Source apportionment studies taken in Libby (approximately 20 miles to the east of the project area), a non-attainment area, have shown that localized slash burning contributes less than three percent of the total

PM10, with road dust and wood stove smoke (prior to clean burning regulations) being major contributors (Ward et al 2006; Carlin 2008). PM10 readings taken in Libby since 1988 have shown a trend toward improvement in air quality from September through November when most fall prescribed burning occurs. The highest reading taken from monitors in Kalispell (approximately 85 miles to the east), another non-attainment area was 8.8 percent. Potential impacts of smoke due to prescribed burning are minimized through successful airshed coordination.

Historical Conditions (Reference Conditions)

Quantitative air quality data is not available for the period prior to settlement of the analysis area late in the 19th century. However, it is known that fire played a major role in the development of vegetative patterns throughout western Montana. For a thirty-year period, the area including the Kootenai, Flathead, Idaho Panhandle and Lolo National Forests averaged approximately 480 lightning caused fires per year (Barrows, Sandberg, and Hart, 1977).

The annual amount of smoke generated from forest fires has generally decreased since the early 1900s. Prior to the advent of effective fire suppression generally burned unchecked from the time of ignition until weather changes stopped their spread. Smoke production varied as environmental factors changed. Smoke could have been produced for just a few hours or for as long as several months. During severe fire seasons, especially when stagnant high pressure systems persisted, regional air quality was probably poor. The acreage burned by wildfires within the project area decreased as effective fire suppression evolved resulting in improved air quality. During the last half of the 20th century, natural fuels resulting from decades of fire suppression have reached a level where larger, more intense fires are possible.

Desired Condition

Goals of the Montana/Idaho Airshed Group Smoke Management Program include to:

- Provide for the use of prescribed burning for purposes such as fire hazard reduction, forest and rangeland regeneration, and wildlife habitat improvement.
- Prevent adverse smoke impacts from prescribed fire in Montana and Idaho in order to protect public health and meet state and Federal ambient air quality standards and visibility guidelines.
- Evaluate the Smoke Management Program annually and revise as necessary in order to better meet smoke management program goals.

Resource Indicator or Measure

Indicators used for measuring effects to the environment will be the amount of particulate matter produced post treatment for the project area.

- Particulate matter 2.5 micrograms per cubic meter produced. Measured in total tons produced.
- Particulate matter 10 micrograms per cubic meter produced. Measured in total tons produced.

Environmental Consequences

Direct and indirect effects on the air quality are described below for activities proposed in Chapter 2. Cumulative effects were considered for all past, present, and reasonably foreseeable activities listed and described at the beginning of Chapter 3.

Prescribed burning is a land management treatment to accomplish natural resource management objectives. Prescribed fires are conducted within limits of a burn plan that describe the conditions under which the burn can be implemented to accomplish resource objectives. Prescribed fire is a cost-effective and ecologically sound tool for forest management. Its use reduces the potential for high intensity wildfires and thus has the potential to maintain long-term air quality. Prescribed burning removes logging residues and fuel accumulations, helps to controls insect and disease, improves wildlife habitat and forage production, increases water yield, and maintains natural succession of plant communities. The major air pollutant concern is the smoke produced by prescribed fire (CH2M Hill 1995), which is short term in nature.

Fugitive road dust is a result of motorized vehicle use when road surfaces are dry. When a motorized vehicle travels on an unpaved road, the force of the wheels moving across the road surface, causes pulverization of surface material. Dust is lofted by the rolling wheels as well as by the turbulence caused by the vehicle itself. This air turbulence can persist for a period of time after the vehicle passes.

The quantity of dust emissions from a given segment of unpaved road varies linearly with the volume of traffic. Variables that influence the amount of dust produced include the average vehicle speed, the average vehicle weight, the average number of wheels per vehicle, the road surface texture, the fraction of road surface material which is classified as silt (particles less than 75 microns in diameter), and the moisture content of the road surface.

The moisture content of the road surface has the greatest influence on the amount of fugitive road dust produced. Within the OLY project area, unpaved roads are generally closed during the winter months from snow accumulation. July, August and September are generally dry, so most dust production would occur during this period. Precipitation during these months is usually limited, so it would only reduce dust production for short periods.

In addition to winter logging, measures that may be used to reduce fugitive road dust emissions within the OLY project area may include; the application of magnesium chloride which increases the moisture retention of road surfaces, specifically; watering during high use periods or during road maintenance operations; and speed restrictions in sensitive areas. While some or all of these measures would likely be used, it is not possible, at this time, to quantify the actual measures that would be taken.

Measures Taken to Reduce Prescribed Burning Emissions

The amount of smoke emissions resulting from prescribed burning of both natural fuels and logging slash would be reduced by methods such as: burning in optimum weather conditions, burning with optimum fuel conditions, suitable ignition techniques, post burn mop-up, fuel loading reduction, and impact avoidance.

Alternative 1 – No Action

The potential for a high-intensity wildfire occurring in the project area is greatest with the No Action Alternative. This would have greater potential impacts on air quality than the action alternatives.

The direct effects of a wildfire from implementing the no-action alternative is that fire occurrence, intensity, size, duration would be greater than what would be produced from implementation of the action alternatives because wildfires are largely unmanageable in terms of the timing and duration of the event. Smoke from wildfires is unmanageable and would likely produce greater quantities of particulates, last longer in duration, and likely impact a larger area than planned ignitions from prescribed fire. These impacts were demonstrated from fires occurring in the Northern Rockies during 1988, 1994, 2000, 2001, and 2003 and 2012. Ward et al. (1976) estimated that smoke emissions caused by wildfires are approximately three times greater than that produced by prescribed burning. In the absence of wildfires, there would be no cumulative effects to air quality caused by the No Action alternative since no new management activities would be implemented. However, cumulative effects from fugitive road dust (the result of motorized vehicle use when road surfaces are dry), as well as prescribed burning from other sources such as agriculture, Stimson Lumber Company, and private land owners could occur under the No-Action Alternative.

Alternatives 2, 3, and 4

Direct and Indirect Effects

Prescribed fire activities associated with Alternatives 2, 3, and 4 include pile burning, understory burning and ecosystem burning. Direct effects include reduced visibility and increased level of small diameter particulates, specifically PM10 and PM2.5, of concern for human health reasons. Due to the close proximity to Troy, Libby and the Cabinet Mountains Wilderness it is possible that there will be smoke impacts to these locations from prescribed burning. Impacts will be mitigated by coordinating with the Idaho and Montana Air Quality Group and the Lincoln County Air Quality Coordinator. Burns will only occur on days when dispersion forecasts will be favorable.

The estimated amount of smoke emissions produced by prescribed burning associated with the action alternative is portrayed in Table 35. The quantity of emissions is directly correlated with the number of acres treated by prescribed fire. Upon completion of the full suite of prescribed burning, Alternative 2 proposes to treat 4,787 acres producing approximately 6.3 million tons of particulate matter. Alternative 3 will treat 4,764 acres producing about 6.1 million tons of particulate matter, while Alternative 4 could produce 5.5 million tons of particulate matter resulting from the prescribed burning of 4,424 acres.

Table 35. Particulate Emissions by Burn Type

	No Action Alternative			Alternative 2			Alternative 3			Alternative 4		
Treatment Type	Acres	PM2.5	PM10	Acres	PM2.5	PM10	Acres	PM2.5	PM10	Acres	PM2.5	PM10
Underburn in Harvest Units PM10 = 1084 lbs/ac PM2.5 = 919 lbs/ac	**0**	0	0	**1974**	1814106	2139816	**1936**	1779184	2098624	**1596**	1466724	1730064
Underburn in Non-Harvest Units PM10 = 463 lbs/ac PM2.5 = 393 lbs/ac	**0**	0	0	**1575**	618975	729225	**1575**	618975	729225	**1575**	618975	729225
Hand and Grapple Pile Burning PM10 = 453 lbs/ac PM2.5 = 393 lbs/ac	**0**	0	0	**1208**	474744	547224	**1223**	480639	554019	**1223**	480639	554019
Maintenance Burning PM10 = 247 lbs/ac PM2.5 = 209 lbs/ac	**0**	0	0	**30**	6270	7410	**30**	6270	7410	**30**	6270	7410

lbs/ac = pounds per acre

The smoke emitted by prescribed burning is managed through season and timing of implementation when air quality and dispersion forecast are favorable. Fire intensities, fuel moisture levels, and utilization of the flaming phase of combustion would all be monitored and used to reduce particulate production and airshed impact. By burning under favorable conditions, particulate amounts would be drastically reduced compared to amounts generated by a wildfire of the same acreage. PM2.5 and PM10 levels would rapidly disperse as they are carried by local and general winds. Limiting the number of acres ignited on a given day will reduce the amount of particulate released at a time thus giving the particulate an opportunity to disperse before introducing more emissions into the airshed.

Smoke produced as a result of implementation would be limited to the local and downwind airshed air quality degradation. PM10 and PM2.5 particulates have an effect of increased visual haze. Levels rapidly disperse from the source as they are mixed out and carried by local and general transport winds. Short periods of smoke concentration may occur in the local area during night and early morning inversions following the day of ignition. Diurnal heating and mixing will disperse smoke as the inversions break during the early morning hours and mixing continues throughout the afternoon hours. Residual smoke production from large logs, stumps and piles can be expected for several days. These impacts will have their greatest effect on landowners immediately adjacent to the burn area; therefore, close coordination will occur with local homeowners prior to any burning.

Effects Analysis of Potential Impacts to Class I Airsheds

Certain wilderness areas and National Parks established before August of 1977 were designated as Class 1 Airshed areas. Class 1 designation allows only very small increments of new pollution above already existing air pollution levels. The Clean Air Act amendments of 1977 included a program for prevention of significant deterioration of air quality, generally referred to as the Prevention of Significant Deterioration program. This program is to prevent areas currently having clean air from becoming more polluted. The only Class I areas within 100 miles of the project include: Glacier National Park, located 90 miles almost directly east and the Cabinet Mountains Wilderness, which is near the project area but located on the south side of the Kootenai River.

Cumulative Effects

Spatial and Temporal Context for Effects Analysis

The spatial boundaries for analyzing the cumulative effects to air quality consist are all of Airshed 1 because smoke travels far and wide and future activities planned by the district are reasonably foreseeable, whereas burning activities associated with other landowners and Forests would be far too speculative. The temporal boundary of the cumulative effects analysis is 10 years because that is a reasonably foreseeable timeframe for future prescribed fire activities that may be coincident with the proposed activities in time and/ or space.

Past, Present, and Reasonably Foreseeable Activities Relevant to Cumulative Effects Analysis

Past, ongoing, and reasonably foreseeable activities relevant to air quality are those that produce smoke, dust, or other pollutants in excess of established standards. The smoke produced as a result of the implementation of the proposed action, would result in an incremental decrease in air quality as PM10 and PM2.5 particles from this source combine with other particles produced both

by the implementation of other aspects of this project, specifically fugitive road dust, as well as other local and regional sources located upwind. Prescribed burning of logging slash, on other Federal, state or private lands, would also contribute particulates, as would agricultural burning and fugitive dust from tilled ground. Particulates from industrial and automotive sources also contribute to regional particulate loading. Other vehicle traffic, agricultural and industrial sources within the analysis area would also contribute to the cumulative particulate loading.

The cumulative effect on Class 1 Airsheds from the implementation of the action alternatives and other present and reasonably foreseeable future actions is not known at this time. The production of air pollutants associated with the implementation of this project would vary over time and would not be continuous. Therefore impacts would be episodic in nature and the potential of occurrence would end when the implementation of this project is completed.

Anticipating cumulative effects is too speculative for this analysis. It is not possible to predict the amount of particulates contributed by these other sources. Cumulative effects to air quality would be nominal, speculative, and temporary in nature.

Vegetation Management (Prescribed Burning)

The cumulative effects on air quality by smoke produced from implementation of prescribed burning under the action alternatives could result in an incremental decrease in air quality if unmanaged. Particulates from this source would combine with other particulates from local and regional sources located upwind. Smoke produced by alternative implementation would be managed through the Montana/Idaho State Airshed Group to stay within the EPA Standards mitigating negative cumulative effects.

Wildland Fire and Fire Suppression

Under the no-action and action alternatives, the cumulative effects of wildfire smoke on air quality includes all pollution sources contributing particulates to the air mass in addition to the smoke produced by wildfires within the analysis area. The largest impacts occur when wildfires are burning upwind of the analysis area and within the analysis area concurrently. The cumulative effect of these particulate sources could result in extended periods of poor air quality.

Fugitive Dust

Fugitive dust results from motorized vehicle use on dry road surfaces, soil cultivation, earth moving, and off-road vehicles. Techniques that may be used to reduce fugitive road dust emissions include: the application of magnesium chloride to increase the moisture retention of road surfaces, watering during high use periods or during road maintenance operations, and speed restrictions in sensitive areas.

Private Land Development

Smoke associated with burning on private land is expected to occur. Conditions resulting from private land burning would be taken into account when determining whether to implement proposed burns.

Stimson Lumber Company Prescribed Burning

Smoke associated with burning on Company land is expected to occur. Conditions resulting from Stimson Lumber Company land burning would be taken into account when determining whether to implement proposed burns.

Regulatory Framework Findings

2015 Forest Plan

The 2015 Forest Plan provides desired conditions, objectives, standards, and guidelines for the OLY project. The following are applicable to the actions in this project:

Desired Condition:

FW-DC-AQ-01. The Forest meets applicable Federal, state, or tribal air quality standards. Prescribed burning is planned to meet those standards, including areas classified as Class 1 airsheds (i.e., Cabinet Mountains Wilderness) and nonattainment areas (i.e., presently Libby Montana).

Forestwide Guideline:

FW-GDL-AQ-01. The Forest should cooperate with Federal, state, tribal, and local air quality agencies as appropriate in meeting applicable air quality requirements.

Response to the Desired Condition and Guideline:

The Montana/Idaho State Airshed Group regulates smoke management for air quality. The Kootenai National Forest coordinates and schedules burning activities to maintain air quality. Prescribed burn plans describing how and under what conditions the burning would take place are prepared for all burning activities. All activities under the proposed action would be consistent with the 2015 Forest Plan.

Federal Law

By conducting prescribed burn timing during optimal burn conditions; burning within prescription fuel moisture parameters and burning within appropriate air quality ventilation; and by participating in the Montana/Idaho State Airshed Group, complying with the Memorandum of Understanding with the Montana Air Quality Bureau and meeting the requirements of the State Implementation Plan and the Smoke Management Plan, the proposed activities would comply with the 2015 Forest Plan and the 1977 Clean Air Act, including particulate matter standards.

American Indian Consultation

Introduction

Federal laws, regulations and treaties direct the forest to consult with federally-recognized tribes who may have concerns about federal actions that may affect religious practice, traditional cultural uses, and cultural resource sites and remains associated with American Indian ancestors. The analysis area lies within the aboriginal territory of the Kootenai Tribe. The Confederated Salish and Kootenai Tribes (CSKT) and the Kootenai Tribe of Idaho are the federally-recognized tribes representing the modern members of the Kootenai Tribe. The specific laws, regulations and treaties are further described under regulatory framework below.

Regulatory Framework

The Forest Service has a government-to-government responsibility to all federally-recognized Tribes. In addition, American Indian Tribes are afforded consideration under the National Historic Preservation Act (Section 2), NEPA, the Native American Graves Protection and Repatriation Act (NAGPRA), and the American Indian Religious Freedom Act (AIRFA) among other Executive orders and policy. Federal guidelines direct Federal agencies to consult with modern American Indian tribal representatives and traditionalists who may have concerns regarding Federal actions that may affect religious practices, and other traditional cultural uses, as well as cultural resource sites and remains associated with American Indian heritage. Any Tribe whose aboriginal territory falls within a project area is afforded the opportunity to voice concerns for issues governed by NHPA, NAGPRA, or AIRFA.

American Indian Religious Freedom Act (AIRFA) protects the “inherent right of the freedom to believe, express, and exercise their traditional religions” (P.L. 95-442, 92 Stat. 1065; 7 U.S.C. 2269). The forest has identified the Confederated Salish and Kootenai Tribes and Kootenai Tribe of Idaho as having general concerns about the management of the project area. These concerns include, but are not limited to, access to sites, use and possession of sacred objects, and the freedom to practice sacred worship ceremonies.

The project area is located within lands encompassed by the **Hellgate Treaty of 1855**. The Hellgate Treaty was signed between the United States and the Flathead, Upper Pend d’Oreilles, and the Kootenai Tribes, and the Federal government has consultation responsibilities to insure that the Tribes’ reserved rights are protected. The treaty-reserved rights include the "right of taking fish at all usual and accustomed places, in common with citizens of the Territory, and of erecting temporary buildings for curing; together with the privilege of hunting, gathering roots and berries, and pasturing their horses and cattle upon open and unclaimed land". The District fits the description of “usual and accustomed places,” and lies within the aboriginal territory of the Kootenai and the Salish (Flathead). Ongoing consultation with the Confederated Salish and Kootenai Tribes ensures that their treaty rights are protected.

Analysis Area

The analysis area for tribal consultation issues is the OLY Project Area. The Kootenai National Forest lies within the aboriginal territory of the Kootenai Tribe. Modern members of the Kootenai and Salish Tribes are represented by the Confederated Salish and Kootenai Tribes (CSKT) and the Kootenai Tribe of Idaho. Area maps of the OLY Project area were given to the identified tribes during both the pre-scoping (NFMA), scoping, and the DEIS phases of project planning.

Meetings with the Tribal Liaison, Tribal Elders (November 12, 2014), and Tribal Preservation (March 2, 2015) were also held to hear concerns and take comments on the project.

Affected Environment

As described above, the OLY project area falls within the lands encompassed by the Hellgate Treaty of 1855. The forest has identified the Confederated Salish and Kootenai Tribes and Kootenai Tribe of Idaho as having general concerns about the management of the project area. In addition, tribal consultation collected specific concerns for the OLY project area. These concerns include, but are not limited to, huckleberry productivity, access to resources, sites, use and possession of sacred objects, protection of areas of cultural importance, and the freedom to practice sacred worship ceremonies.

Methodology

This analysis uses tribal consultation as a means of determining the effects of the proposed project activities. Consultations with the Kootenai Tribe of Idaho and the Confederated Salish and Kootenai Tribes in early planning phases helps the Forest Service meet their responsibilities.

Analysis methods used in this section consists of consultation with the tribes who have been identified as having an interest in the project area. The concerns of the CSKT and the Kootenai Tribe of Idaho were solicited through project scoping as well as in person meetings with Tribal Elders and the Tribal Preservation Department. In addition, the CSKT has provided a Tribal Liaison to work in partnership with the Kootenai National Forest to review project proposals and provide Tribal input. Information obtained from the CSKT and Kootenai Tribe of Idaho is taken into account to assess impact to issues related to cultural sites, traditional plants, and other resources related to treaty rights. Information exchanged through consultation is considered confidential.

Measurement indicators for Tribal Consultation include notification of the proposed activities and opportunity for the Tribes to be informed of the proposed activity and discuss potential impacts with the Forest. Other indicators include adverse or beneficial impacts to areas of concern for the Tribe, and adverse or beneficial impacts to the rights the tribes retain under Treaty.

Environmental Consequences

Alternative 1 - Direct and Indirect Effects

Under this alternative, no actions are proposed, and any previously recorded or as yet undiscovered sites would remain undisturbed.

Alternative 1 - Cumulative Effects

With no action the current condition and trend of the subunit would continue.

Alternatives 2, 3, and 4 - Direct and Indirect Effects

On-going consultation with the Confederated Salish and Kootenai Tribe and the Kootenai Tribe of Idaho resulted in identification of site-specific concerns with the proposed action (Alternative 2). This was one of the key issues used to develop Alternative 3 along with soils concerns (see Issue Identification section of this document). Specifically, the following changes were made to Alternative 2 in response to concerns raised by the CSKT:

- Harvest Units 35, 35A, 35B, 36, and 41B would be converted to Fuels Units F33, F34, F35, F36 and F32 respectively to retain some fuels reduction activities and help protect historic properties.
- The fuels treatment for Fuels Unit F32 was changed from hand piling/burning to slash and grinding due to historic properties.
- Fuels Unit F30 was dropped due to potential concerns associated with ground disturbance necessary for fire line construction.

Only Alternative 3 includes these changes as requested by the CSKT. Therefore Alternatives 2 and 4 do not address concerns expressed by the Tribes. Alternatives 2 and 4 would have adverse impacts to sites of cultural importance to the CSKT. Alternative 3 would not have adverse impacts to sites of cultural importance because of dropping treatment on these areas and because of design features as described in Chapter 2.

Alternative 2, 3, and 4 - Cumulative Effects

Before the NHPA of 1966 was implemented, project planning did not include consideration of impacts to historic properties. Any projects such as timber harvest, road building, and fire suppression activities that occurred prior to this time had the potential to adversely impact historic properties, and many of these projects occurred in areas considered high probability for cultural resources and so probably damaged or destroyed cultural sites. While past actions may have affected cultural resources, no ongoing processes from those past actions are known to be having an effect on cultural resources now.

Since the 1970s, cultural resource inventories have been conducted to locate cultural resources prior to project implementation. Known sites found during earlier inventories, and the refinement of the inventory process to locate properties during current inventories, allows impacts from projects to be avoided or mitigated. While natural deterioration of the resource is ongoing, the current condition and trend of the historic record is that historic properties are being protected from project impacts. Knowledge of the location and condition of historic properties also allows the potential for management action to abate or mitigate natural processes which adversely affect the historic record.

Since the 1980s, the Forest has worked with tribal liaisons from the CSKT to protect areas of cultural value to the tribes.

The ongoing and foreseeable activities listed in Table 34 at the beginning of this analysis were considered in this analysis. Fire suppression activities can impact cultural and other resources important to the tribes; however, Appendix 3 of the Northern Region Programmatic Agreement regarding Cultural Resources Management on National Forests in the State of Montana seeks to limit the potential of fire suppression activities to impact sites by setting out guidelines for protecting cultural resources during these activities. In addition, the Forest works with the tribal liaison of the CSKT during wildfires to allow protection of resources important to the tribes.

Cumulatively, when considering past, proposed, and ongoing and foreseeable actions, the Alternative 3 of the OLY Project will not exacerbate effects to historic properties. The post-project condition and trend would continue the current condition and trend, which protects resources important to the tribes through on-going consultation. However Alternatives 2 and 4 may contribute to impacts to historic properties.

Consistency with the Forest Plan and Other Management Direction

Alternative 3 is consistent with the Kootenai Forest Plan as well as laws and executive orders concerning Government-to-Government Consultation. Alternatives 2 and 4 do not address concerns expressed by the CSKT.

Aquatic Habitat and Species

Introduction

This section reviews fisheries and aquatic habitat and species population status by sub-watershed within the analysis area that could be affected by the project. Potential impacts to these resources under each of the alternatives are described. Additional information relevant to fish habitat conditions and water quality is found in the Water Resources section.

This analysis establishes characterization of baseline conditions within the project area using methodology described in the Methods section. The aquatic habitat and species analysis discusses the potential effects from management activities to aquatic species, aquatic habitat, and riparian resources. Discussion of watershed conditions and sediment sources are discussed in the Watershed section and soil conditions are discussed in the Soils section. Implementation of the Inland Fish Strategy (INFISH) standards is used to protect all aquatic resources from potential effects.

Regulatory Framework

Endangered Species Act

The Endangered Species Act (ESA) of 1973, as amended, declares that "...all Federal departments and agencies shall seek to conserve endangered species and threatened species and shall utilize their authorities in furtherance of the purposes of this Act." Under the Act, Federal agencies must consult with the Secretary of the Interior whenever an action authorized by such agency is likely to affect a species listed as threatened or endangered. Bull trout and white sturgeon are currently listed as threatened and endangered, respectively, under the ESA. Effective January 13, 2010 the U.S. Fish and Wildlife Service proposed a revision of bull trout critical habitat (USFWS 2010). Under the ESA, critical habitat identifies geographic areas that contain features essential for the conservation of a listed species. Critical habitat designations provide extra regulatory protection that may require special management considerations and the habitats are then prioritized for recovery actions. In addition, agencies are required to provide an analysis of effects of proposed actions to primary constituent elements (PCEs) for bull trout critical habitat. The project area is included in bull trout Critical Habitat Unit: 30, Kootenai River Basin. The specific water body proposed for critical habitat designation within the project area includes O'Brien Creek.

National Forest Management Act

Sensitive species are managed under the authority of the National Forest Management Act (NFMA) and are administratively designated by the Regional Forester (FSM 2670.5). FSM 2670.22 requires the maintenance of viable populations of native and desired non-native species and to avoid actions that may cause a species to become threatened or endangered. The NFMA directs the Forest Service to "provide for diversity of plant and animal communities based on the suitability and capability of the specific land area in order to meet overall multiple-use objectives." [16 U.S.C. 1604(g)(3)(B)]. Providing ecological conditions to support diversity of native plant and animal species in the planning area satisfies the statutory requirements. The Forest Service's focus for meeting the requirements of NFMA and its implementing regulations is on assessing habitat to provide for diversity of species.

Forest Service Manual 2670

FSM 2672.42 directs the Forest Service to conduct a biological evaluation (BE) to analyze impacts on Sensitive species. If any unmitigated, significant effects are identified in the BE, the Forest Supervisor must make a decision to allow or disallow the impact. If the significant effects would result in a trend toward Federal listing, the Forest Supervisor cannot allow the project to proceed. The sensitive species analysis in this document meets the requirements for a BE as outlined in FSM 2672.42.

Executive Order 12962

This executive order, signed June 9, 1995 by President Bill Clinton, directs federal agencies, "to the extent permitted by law and where practicable, and in cooperation with States and Tribes, improve the quantity, function, sustainable productivity, and distribution of U.S. aquatic resources for increased recreational fishing opportunities" through a variety of measures. It also mandates disclosure of effects to recreational fishing.

2015 Forest Plan

The 2015 Forest Plan fully integrates the 1995 Inland Native Fish Strategy (USDA Forest Service 1995) through FW-STD-RIP-03 to protect riparian and aquatic resources on National Forest System lands. The Forest Plan also establishes forest-wide goals, desired conditions, and objectives for Kootenai National Forest (KNF) sensitive species. Forest Plan GOAL-WL-02 states the KNF manages and schedules activities to avoid or minimize disturbance to sensitive species and manages habitat to promote their perpetuation into the future. In addition, FW-STD-RIP-03 adapts priority watersheds as conservation and restoration watersheds, identifies consistent riparian protection widths for category 4 streams, and clarifies which INFISH components are standards which are and guidelines consistent with forest plan definitions. Originally, INFISH established stream, wetland, and landslide-prone-area protection zones called Riparian Habitat Conservation Areas (RHCAs) on National Forest System lands. RHCAs are broken into four categories as shown in Table 36.

Table 36. RHCA Categories and Standard Widths in the 2015 Forest Plan.

Stream or Waterbody Category	Standard Width
Fish-bearing streams	Minimum 300 feet each side of the stream
Perennial, non-fish bearing streams	Minimum 150 feet each side of stream
Ponds, lakes, and wetlands greater than 1 acre	Minimum 150 feet from maximum pool elevation
Seasonally flowing or intermittent streams, wetlands less than 1 acre, landslides and landslide-prone areas	Minimum 100 feet from edge

Source: USDA Forest Service 2015

INFISH also identifies riparian management objectives (RMOs) for forested systems that include pool frequency, large woody debris (LWD) frequency, width/mean depth ratio, and water temperature (Table 37). Bank stability is also addressed but is not a required RMO for forested systems. Actions that retard attainment of these RMOs, whether existing conditions are better or worse than objective values, are considered to be inconsistent with the Forest Plan.

Table 37. Interim Riparian Management Objective standards by stream width.

Wetted Width	Pools/mile	LWD/mile	Bank Stability (percent)	Width/Mean Depth Ratio (Pools)	Water Temperature
Less than 10 feet	96	20 pieces greater than 12 inches diameter and 35 feet length	Greater than 80	Less than 10	No increase, less than 59°F
10-20 feet	56				
21-25 feet	47				
26-50 feet	26				

Source: USDA Forest Service 2015.

ºF = Degrees Fahrenheit

The 2015 Forest Plan includes additional aquatic habitat and riparian plan components as follows:

Forest-wide Goals

Goal-RIP-01: Maintain or improve riparian areas in order to support the ecological functions.

Goal- AQH-01: Restore aquatic habitats where past management activities have affected stream channel morphology or wetland function.

Goal-AQS-01: Maintain or improve the distribution of native aquatic and riparian-dependent species and contribute to the recovery of threatened and endangered aquatic species.

Forest-wide Desired Conditions

Riparian Areas

FW-DC-RIP-01: Riparian Habitat Conservation Areas (RHCAs) have healthy, functioning riparian systems and associated habitats that support well-distributed native and desired non-native plant, vertebrate, and invertebrate communities.

FW-DC-RIP-02: Riparian and aquatic ecosystems, including stream channel integrity, channel processes, and sediment regimes function characteristically for a given landscape and climatic setting.

FW-DC-RIP-03: Water quality provides stable and productive riparian and aquatic ecosystems. Streams and lakes are free of chemical contaminants and do not contain excess nutrients. Sediment levels are within reference conditions, supporting salmonid spawning and rearing, and cold water biota requirements.

FW-DC-RIP-04: Composition, structure, and function of riparian vegetation are appropriate for a given landscape and climatic setting. Riparian vegetation adjacent to larger streams with lower gradients and wide valley bottoms is dominated by conifer stands in late-seral stages. These stands have multiple canopy layers with shrub, forb, and ferns underneath stands dominated by large trees. Native hardwoods such as black cottonwood, paper birch, and/or quaking aspen are found in areas along these larger streams. The narrower riparian zones along smaller, higher

gradient streams have vegetation with a wide diversity of seral stages present, from relatively young stands of trees to fairly old stands, with a greater composition of early-seral, shade-intolerant trees species present than found in larger, lower gradient rivers. Natural disturbance regimes occur at intervals that maintain these conditions.

FW-DC-RIP-05: Vegetation in RHCAs is characteristic of reference aquatic and riparian ecosystems and provides: amounts and distribution of large woody debris; vertical structure and habitat for riparian-associated bird, mammal, amphibian, fish, and invertebrate species; summer and winter thermal regulation; ground cover and bank stability to maintain natural rates of surface erosion, bank erosion, and channel migration characteristic of those under which aquatic and riparian ecosystems developed; the capture and storage of sediment; and for recovery of RHCAs after watershed disturbances.

Aquatic Habitat

FW-DC-AQH-01: Waterbodies, riparian vegetation, and adjacent uplands provide habitats that support self-sustaining native and desirable non-native aquatic communities, which include fish, amphibians, invertebrates, plants, and other aquatic-associated species. Aquatic habitats are diverse, with channel, lacustrine, and wetland characteristics and water quality reflective of the climate, geology, and natural vegetation of the area. Water quality supports native amphibians and diverse invertebrate communities. Streams, lakes, and rivers provide habitats that contribute toward recovery of threatened and endangered fish species and address the habitat needs of all native aquatic species.

FW-DC-AQH-02: Connectivity between waterbodies provides for life history functions (e.g., fish migration to spawning areas, amphibian migration between seasonal breeding, foraging, and overwintering habitats) and for processes such as recolonization of historic habitats. Stream channels supply the required structure for desired stream habitat features.

FW-DC-AQH-03: Conservation subwatersheds provide habitats that can support population strongholds of federally listed and sensitive species. Conditions in restoration subwatersheds improve to support population strongholds.

FW-DC-AQH-04: Rare and unique aquatic habitats, such as waterfalls and rock outcrops, are healthy and provide for associated native plant and animal communities.

FW-DC-AQH-05: Stream channels supply the required structure for desired stream habitat features such as pools, pool tails, banks, large woody material, backwaters, and riffles that provide aquatic species the necessary niches for holding, overwintering, spawning, cover, rearing, and feeding.

Aquatic Species

FW-DC-AQS-01: Over the long term, habitat contributes to the support of well-distributed self-sustaining populations of native and desired non-native aquatic species (fish, amphibians, invertebrates, plants, and other aquatic-associated species). In the short term, stronghold populations of native fish continue to thrive and expand into neighboring unoccupied habitats, and depressed populations increase in numbers. Available habitat supports genetic integrity and life history strategies of native fish, macroinvertebrates, and amphibian populations.

FW-DC-AQS-02: Non-native fish species are not expanding into waterbodies that support native fish on NFS lands. Impacts of non-native fish species on native salmonids, such as hybridization

or displacement, are minimized to the extent possible. Aquatic ecosystems are free of invasive species such as zebra mussels, New Zealand mud snails, quagga mussels, bullfrogs, and Eurasian milfoil.

Forest-wide Standards

Riparian Standards

FW-STD-RIP-01: When RHCAs are intact and functioning at desired condition, then management activities shall maintain or improve that condition. Short-term effects from activities in the RHCAs may be acceptable when those activities support long-term benefits to the RHCAs and aquatic resources.

FW-STD-RIP-02: When RHCAs are not intact and not functioning at desired condition, management activities shall include restoration components that compensate for project effects to promote a trend toward desired conditions. Large-scale restoration plans or projects that address other cumulative effects within the same watershed may be considered as compensatory components and shall be described during site-specific project analyses.

FW-STD-RIP-03: The INFISH direction in the Decision Notice (USDA Forest Service, 1995) and terms and conditions in the Biological Opinion (US Fish and Wildlife Service, 1998) shall be applied, with the following clarifications (see appendix B): INFISH Priority Watersheds have been added to and adapted into Conservation and Restoration Watersheds; The description of Standard Widths Defining Interim RHCAs is consistent for all Category 4 streams or water bodies: The area from the edges of the stream channel, wetland, landslide, or landslide-prone area to a distance equal to the height of one site-potential tree, or 100 feet slope distance, whichever is greatest; Site-specific widths can be changed (increased where necessary to achieve management goals and objectives, or decreased where interim widths are not needed to attain RMOs or avoid adverse effects) and requires documentation of rationale supporting the change, but does not require watershed analysis or an amendment; and These INFISH "standards and guidelines" are defined as standards: TM-1, MM-3, MM-4, MM-5, and RA-4. All others are defined as guidelines.

Inland Native Fish Strategy

Standard Widths Defining INFISH Riparian Habitat Conservation Areas (RHCAs)

Category 1- Fish-bearing streams: Interim RHCAs consist of the stream and the area on either side of the stream extending from the edges of the active stream channel to the top of the inner gorge, or to the outer edges of the 100-year floodplain, or to the outer edges of riparian vegetation, or to a distance equal to the height of two site-potential trees, or 300 feet slope distance (600 feet, including both sides of the stream channel), whichever is greatest.

Category 2- Permanently flowing non-fish-bearing streams: Interim RHCAs consist of the stream and the area on either side of the stream extending from the edges of the active stream channel to the top of the inner gorge, or to the outer edges of the 100-year flood plain, or to the outer edges of riparian vegetation, or to a distance equal to the height of one site-potential tree, or 150 feet slope distance (300 feet, including both sides of the stream channel), whichever is greatest.

Category 3- Ponds, lakes, reservoirs, and wetlands greater than 1 acre: Interim RHCAs consist of the body of water or wetland and the area to the outer edges of the riparian

vegetation, or to the extent of the seasonally saturated soil, or to the extent of moderately and highly unstable areas, or to a distance equal to the height of one site-potential tree, or 150 feet slope distance from the edge of the maximum pool elevation of constructed ponds and reservoirs or from the edge of the wetland, pond, or lake, whichever is greatest.

Category 4- Seasonally flowing or intermittent streams, wetlands less than 1 acre, landslides, and landslide-prone areas: This category includes features with high variability in size and site-specific characteristics. At a minimum, the interim RHCAs must include the area from the edges of the stream channel or wetland, to a distance equal to the height of one half of one site-potential tree, or 100 feet slope distance, whichever is greater.

Forest-wide Guidelines

Riparian Guidelines

FW-GDL-RIP-01: Soil and snow should not be side-cast into surface water during road maintenance operations.

FW-GDL-RIP-04: When drafting water from streams, pumps should be screened to prevent entrainment of fish and aquatic organisms. During the spawning season for native fish, pumping sites should be located away from spawning gravels.

FW-GDL-RIP-05: If necessary for the attainment of RHCA desired conditions, ground-based logging equipment should only enter an RHCA at designated locations.

INFISH Guidelines

Recreation Management

RM-1: Design, construct, and operate recreation facilities, including trails and dispersed sites, in a manner that does not retard or prevent attainment of the RMOs and avoids adverse effects on inland native fish. Complete watershed analysis prior to construction of new recreation facilities in RHCAs within priority watersheds. For existing recreation facilities inside RHCAs, assure that the facilities or use of the facilities would not prevent attainment of RMOs or adversely affect inland native fish. Relocate or close recreation facilities where RMOs cannot be met or adverse effects on inland native fish cannot be avoided.

RM-2: Adjust dispersed and developed recreation practices that retard or prevent attainment of RMOs or adversely affect inland native fish. Where adjustment measures such as education, use limitations, traffic control devices, increased maintenance, relocation of facilities, and/or specific site closures are not effective in meeting RMOs and avoiding adverse effects on inland native fish, eliminate the practice or occupancy.

Analysis Area

The OLY Analysis Area lies in the southern half of the Three Rivers Ranger District. All activity within the OLY project area will occur within the O'Brien Creek watershed, Kootenai River face tributaries between the Yaak River and China Creek (i.e. Surprise Gulch, Koot Creek, and China Creek), and tributaries to the Yaak River on the east side of the river north to the Saddle Mountain area (i.e. Kilbrennan Creek and Arbo Creek). Watersheds potentially affected by proposed project activities include Arbo, Kilbrennan, Koot, China, and O'Brien.

Aquatic species potentially affected by the proposed action utilize habitat within this boundary and effects from the proposed action would be potentially measurable at this scale. Proposed activity in other sub-watersheds is so minimal as to have no effect on aquatic species and will not be discussed further with regards to aquatic resources. The O'Brien Creek mainstem is designated as bull trout Critical Habitat and therefore an analysis of project effects to critical habitat is included.

Methodology

Existing conditions were determined through surveys and review of existing data sources to develop effects analysis for aquatic resources in each watershed. Effects to fish populations were assessed based on effects to habitat. This analysis was done to the nearest point of effect for all threatened, endangered or sensitive species. Cumulative effects were analyzed to the lowest downstream point of effect at the confluence with Kootenai River.

The temporal bounds of analysis generally extend 20 to 30 years from present, when vegetative recovery occurs after harvest. Specific actions may be evaluated and referred to as "long-term" which generally refers to a time period of approximately 30-50 years.

The Montana Fish, Wildlife and Park's (MFWP) Montana Fisheries Information System (MFISH), and the Aquatic Biota Information System (ABIS) (USDA Forest Service 1994; MRIS) were reviewed to identify historical fish introductions and to determine current known fish distribution in the project area drainages. Fish distribution surveys were conducted during the 2013-2014 field seasons in selected project area streams to supplement existing fish distribution data. The surveys focused on distribution and connectivity of native fish species in the project area.

Fish habitat surveys were conducted by USFS personnel during 2014 using the draft Region 1 Aquatic Ecosystem Unit Inventory (R1 AEUI) Technical Guide (unpublished 2006) to evaluate habitat conditions in project area streams relative to INFISH RMOs (Table 37). Stream temperature data were collected from project area streams during 2014 using Onset® Pendant thermographs programmed to collect data at one hour intervals. AEUI and temperature data were utilized to evaluate habitat conditions in project area streams relative to INFISH RMOs (Table 37). RMOs established for forested systems by INFISH include pool frequency, large woody debris, temperature, and wetted width to depth ratio. Actions which retard attainment of these RMOs, whether existing conditions are better or worse than objective values, are inconsistent with INFISH.

To address anticipated effects of the project on proposed bull trout critical habitat, alternatives were evaluated for potential effects to PCEs which are considered essential for the primary biological needs of foraging, reproduction, rearing of young, dispersal, genetic exchange, and sheltering.

The PCEs include:

- Springs, seeps, groundwater sources, and subsurface water connectivity;
- Migratory habitats with minimal physical, biological, or water quality impediments between spawning, rearing, overwintering, and foraging habitats;
- An abundant food base, including terrestrial organisms of riparian origin, aquatic macroinvertebrates, and forage fish;

- Complex river, stream, lake, reservoir aquatic environments and processes with features such as large wood, side-channels, pools, undercut banks and substrates, to provide a variety of depths, gradients, velocities, and structure;
- Water temperatures ranging from 36 to 59°F, with adequate thermal refugia available for temperatures at the upper end of this range. Specific temperatures within this range will vary depending on bull trout life-history stage and form; geography; elevation; diurnal and seasonal variation; shade, such as that provided by riparian vegetation; and local groundwater influence;
- Substrates of sufficient amount, size, and composition to ensure success of egg and embryo overwinter survival, fry emergence, and young-of-the-year and juvenile survival. A minimal amount (e.g., less than 12 percent) of fine substrate less than 0.85 millimeter (0.03 inch) in diameter and minimal embeddedness of these fines in larger substrates are characteristic of these conditions;
- A natural hydrograph, including peak, high, low, and base flows within historic and seasonal ranges or, if flows are controlled, they minimize departures from a natural hydrograph;
- Sufficient water quality and quantity such that normal reproduction, growth, and survival are not inhibited; and
- Few or no nonnative predatory (e.g., lake trout, walleye, northern pike, smallmouth bass; inbreeding (e.g., brook trout); or competitive (e.g., brown trout) species present. For each proposed activity, only potentially affected PCEs are discussed.

Default riparian habitat conservation areas (RHCAs) were delineated on all known streams, ponds, lakes, reservoirs, wetlands, landslides, and landslide-prone areas within the planning area. RHCAs are portions of watersheds where riparian-dependent resources receive primary emphasis. RHCA widths are defined by whether a stream is fish bearing and/or perennial, and by the size of the water-body. Generally, fish-bearing waters are buffered by 300 feet on either side of the channel, perennial non fish-bearing streams are given 150-foot buffers, and intermittent non fish-bearing channels, small wetlands, and ponds, lakes, and reservoirs are given 100 foot buffers (Table 36). Widths of RHCA buffers are based on current scientific literature which supports their ability to protect streams from non-channelized sediment inputs and provide for other riparian functions. These riparian functions include delivery of organic matter, large woody debris recruitment, and stream shading. No RHCAs were modified (i.e. adjusted or lessened) for this project.

Project area existing conditions were documented to evaluate the effects of proposed actions. This baseline includes RMO values. The cumulative effects analysis was based on habitat changes from the baseline condition as a result of the proposed activities, ongoing projects, and other foreseeable Federal, State, and private activities. Effects to resiliency and consequently the probability of species persistence within the planning area were based on this cumulative analysis.

Incomplete and Unavailable Information

Fish population data for Surprise Gulch does not exist.

Measurement Indicators

The following resource indicators and measures are used to compare effects of the four alternatives, including the No Action alternative. These were chosen because they are the most likely conduit for effects to aquatic resources by the action alternatives. ECAs and peak flows were not chosen because, as explained in the Water Resources section, the project will yield minimal increases and will have insignificant impacts to basins of importance to aquatic resources.

- Miles of active road work within RHCAs (Quantitative).
- Number of stream crossings receiving treatment (Quantitative).

Affected Environment

Aquatic Species

Presently, a population of bull trout (*Salvelinus confluentus*) exists in the O'Brien Creek drainage as well as westslope cutthroat trout (*Oncorhynchus clarki lewisi*), rainbow trout (*Oncorhynchus mykiss*), non-native eastern brook trout (*Salvelinus fontinalis*), and torrent sculpin (*Cottus rhotheus*). The extent of bull trout critical habitat is from the O'Brien Creek confluence with the Kootenai River upstream to its headwaters (USFWS 2010). Throughout the project area, introgressed bull trout and westslope cutthroat trout appear to be dominant over genetically pure species as a result of historical fish stocking.

Fish introductions in the project area began in 1924 to 1925 when cutthroat trout from the Flathead Lake Salmon Hatchery were introduced to O'Brien Creek. Brook trout are currently distributed throughout much of the project area and continue to pose a competitive threat to bull trout. While there is no record of brook trout being introduced to O'Brien Creek, the species is very common in the system and most likely was illegally introduced. There is genetic evidence of brook trout hybridization with bull trout in O'Brien Creek and hybrids likely predominate over bull trout in the mainstem (Dunnigan et al. 2007, MFISH). Westslope cutthroat trout were stocked in O'Brien Creek in 1924 and 1925 and rainbow trout were stocked in 1978 (MFISH).

Kilbrennan Lake has a stocked population of native Columbia Basin redband trout and has been stocked with rainbow trout (1945, 1950) Brook trout (1934 to 1954), cutthroat trout (1955 to 1956), and westslope cutthroat trout (1988) (MFISH). Non-native fish species including yellow perch and black bullhead were illegally introduced into Kilbrennan Lake and were first detected by MFWP personnel in 1995 (MFISH, MFWP). Largemouth bass have recently been detected in the lake as well (Hanson, personal communication 2014). Abundance of non-natives in Kilbrennan Lake has increased substantially since their introductions. This is of concern given that these non-natives prey on and out-compete native salmonids (Taylor et al. 1984).

Kilbrennan Lake was the site of a nonnative fish eradication effort in 2006 to restore the native fish community and to improve angling quality of Kilbrennan Lake through removal of yellow perch (*Perca flavescens*), black bullheads (*Ameiurus melas*), and eastern brook trout (*Salvelinus fontanalis*) by applying the piscicide rotenone and restocking the lake with native redband (rainbow) trout (*Oncorhynchus mykiss*). This project also installed a barrier structure on Kilbrennan Creek to prevent nonnative fish species from recolonizing the lake after treatment (MFWP 2006). Treatment was unsuccessful in eradication of nonnative species due to environmental factors and nonnative species have been reestablished in the lake.

Arbo Creek is a tributary to the Yaak River and contains native populations of Columbia Basin Redband trout (*Oncorhynchus gairdneri*), and westslope cutthroat trout, as well as introduced rainbow trout. Westslope cutthroat trout were stocked in Arbo Creek in 1976 (MFISH). In the headwaters of the watershed, at about 5,315 feet elevation sits Wee Lake. This approximately 7 acre lake is habitat to genetically pure interior redband trout and introduced rainbow trout. The lake was stocked with rainbow trout in 1931 and with cutthroat trout in the late 1930s and 40s. The watershed experienced a substantial wildfire at mid to high elevations in 1991.

China Creek contains native populations of Columbia River redband trout and westslope cutthroat trout, as well as hybridized redband and westslope cutthroat trout. Koot Creek contains rainbow trout in the lower 500 feet of stream (personal observation, 2014).

Threatened and Endangered Species

White Sturgeon

Since 2009, only 2 adults are believed to have entered the Montana portion of the Kootenai River and one sturgeon has been captured near the Yaak River, but not in the river itself (Sylvester 2016, personal communication). It is possible that the Yaak River below the falls could support juvenile foraging habitat, though no data exists of white sturgeon in this river.

The nearest likely habitat is immediately below the project area in the Kootenai River. White sturgeon would not be affected by the proposed activities regardless of alternative or connected actions. A finding of No Effect was determined for sturgeon for all proposed and connected activities. Sturgeon will not be discussed further in this document.

Bull Trout

Bull trout are native to the upper Columbia River basin in northwest Montana and are currently listed as threatened under the ESA. Bull trout require clean, cold, complex, and connected habitat to thrive. Bull trout have declined by perhaps more than 50 percent because of disruptive land management practices, expansion of introduced fish populations, non-sustainable sportfishing harvest, and loss of habitat connectivity (Rieman et al. 1997; Leary et al. 1993; Rieman and McIntyre 1993; Donald and Alger 1993). Past forest management practices included harvesting in riparian areas which led to bank instability and channel aggradation and harvesting large scale clear cuts which increased peak flows and led to channel scour. In addition, mining and dam operations have adversely affected spawning and rearing habitat conditions for bull trout in the upper Kootenai River meta-population. Some current bull trout habitat is also inhabited by non-native brook trout that threaten the persistence of bull trout by hybridization and interspecies competition.

The majority of migratory bull trout spawning in Montana occur in a small percentage of the total stream habitat available. Spawning takes place between late August and early November, principally in third and fourth order streams. Spawning adults use low gradient areas (less than 2 percent) of gravel/cobble substrate with water depths between 0.1 and 0.6 meters and velocities from 0.1 to 0.6 meters per second. Proximity of cover for the adult fish before and during spawning is an important habitat component. Spawning tends to be concentrated in reaches influenced by groundwater where temperature and flow conditions may be more stable (Baxter and Hauer 2000).

Successful incubation of bull trout embryos requires water temperatures below 9°C (for a review see, McPhail and Baxter 1996; Weaver and White 1985), less than 25 percent of sediments smaller than 6.35 millimeter in diameter (Weaver and White 1985), and high gravel permeability (Rieman and McIntyre 1993). Eggs are deposited as deep as 25 cm below the streambed surface and the incubation period varies depending on water temperature. Spawning adults alter streambed characteristics during redd construction to improve survival of embryos, but conditions in redds often degrade during the incubation period. Mortality of eggs or fry can be caused by scouring during high flows, freezing during low flows, superimposition of redds, or deposition of fine sediments or organic materials (Rieman and McIntyre 1993). A significant inverse relationship exists between the percentage of fine sediment in the incubation environment and bull trout survival to emergence (i.e., higher sediment loads, lower embryo survival). Entombment appeared to be the largest mortality factor in incubation studies in the Flathead drainage (Fraley and Shepard 1989). Groundwater influence plays a large role in embryo development and survival by mitigating mortality factors.

Rearing habitat requirements for juvenile bull trout include cold summer water temperatures (less than 15°C) provided by sufficient surface and groundwater flows. Warmer temperatures are associated with lower bull trout densities and can increase the risk of invasion by other species that could displace, compete with, or prey on juvenile bull trout (McMahon et al. 2007). Juvenile bull trout generally feed on bottom dwelling organisms, rarely stray from cover, and prefer complex forms of cover. High sediment levels and embeddedness can result in decreased rearing densities. Unembedded cobble/rubble substrate is preferred for cover (Polacek and James 2003) and feeding and also provides invertebrate production (Muhlfeld and Marotz 2005). Highly variable streamflow, reduction in large woody debris, bedload movement, and other forms of channel instability can limit the distribution and abundance of juvenile bull trout.

Both migratory and stream-resident bull trout move in response to developmental and seasonal habitat requirements (Homel and Budy 2008; Muhlfeld and Marotz 2005). Migratory individuals can move great distances (up to 250 km) among lakes, rivers, and tributary streams in response to spawning, rearing, and adult habitat needs (Schmetterling 2003). Stream-resident bull trout migrate within tributary stream networks for spawning purposes, as well as in response to changes in seasonal habitat requirements and conditions. Open migratory corridors, both within and among tributary streams, larger rivers, and lake systems are critical for maintaining bull trout populations (Muhlfeld and Marotz 2005).

Historically, bull trout were likely distributed similarly to what their present distribution is within O'Brien Creek, which includes approximately 12.5 miles of the main stem. The current bull trout population within the planning area is composed of a fluvial component that spawns and rears in O'Brien Creek and grows to maturity in the Kootenai River. There is no evidence of a resident bull trout population in tributary streams to O'Brien Creek.

Fish returning to O'Brien Creek from the Kootenai River are large individuals that primarily migrate in the fall during high water events immediately prior to spawning. Within O'Brien Creek, most redds are constructed in the lower, most accessible reaches. Because of the importance of O'Brien Creek meeting all bull trout life history requirements, this stream is designated as critical habitat by the U.S. Fish and Wildlife Service.

There has been a downward trend in the number of bull trout redds detected in O'Brien Creek after a peak through 2005 (Figure 22). Potential reasons for the decline are high levels of subsurface fines and competition with non-native brook trout (Dunnigan, personal

communication, 2014). While there is a significant negative trend in fine sediment levels (r^2 = 0.309; p = 0.032) in O'Brien Creek spawning habitat from 1998 to 2014, fines remain unacceptably high at around 30% (Dunnigan, personal communication, 2014). A number of events in the Rabbit Creek drainage may have contributed to a delayed onset of high subsurface fines downstream in O'Brien Creek bull trout spawning areas and to subsequent lower redd counts. These events, occurring between the mid-1990s and 2009, included wildfires in the headwaters, multiple debris flows, road construction and decommissioning, and fire salvage logging.

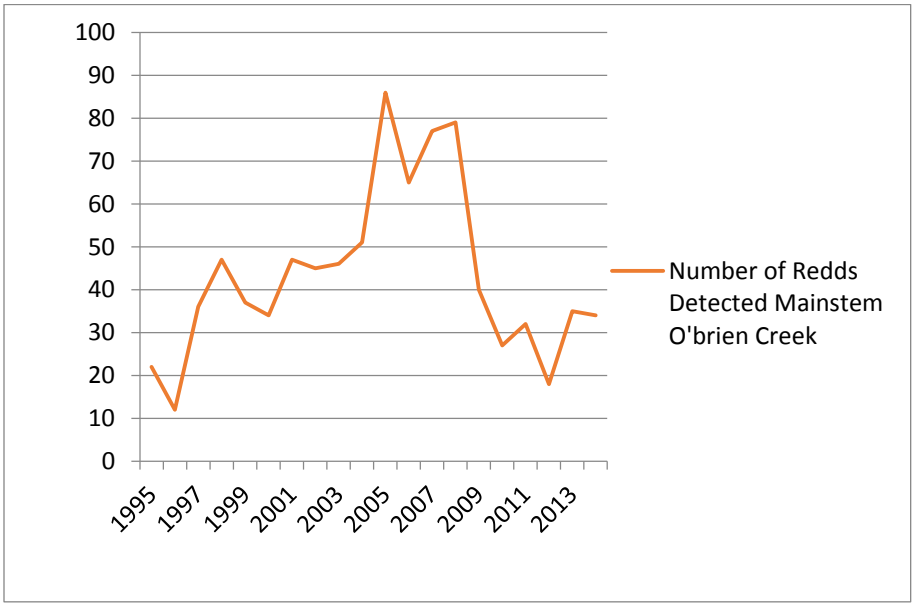


Figure 22. Number of Redds detected Mainstem O'Brien Creek 1995-2014 (Dunnigan et al. 2015)

Sensitive Species

The westslope cutthroat trout (*Oncorhynchus clarki lewisi*) and the Interior Redband (*Oncorhynchus mykiss gairdneri*) are the only sensitive fish species identified within the analysis area (USFS Region 1 Sensitive Species List, 2011). No record exists of the Western Pearlshell mussel (*Margaritifera falcata*) within the project area. Table 38 below displays the sensitive aquatic species on the Kootenai National Forest.

Table 38. Sensitive Aquatic Species on the Kootenai National Forest (USFS Region 1 Sensitive Species List, 2011)

Sensitive Species	Status In Analysis Area*	Comments**
Westslope Cutthroat Trout (*Oncorhynchus clarki lewisi)*	K	5
Columbia River Redband (*Oncorhynchus mykiss gairdneri*)	K	5
Western Pearlshell Mussel (*Margaritifera falcata)*	NS	1

*Status Key:

K = This species is known to occur within the project area.

S = Species is suspected to occur within project area.

NS = Species is not suspected to occur within the project area, and is dropped from further evaluation.

** Select All That Apply

1 = Suitable habitat does not occur in the analysis area

2 = Suitable habitat occurs in the analysis area, but there is no record of species presence

3 = Nesting habitat is present in analysis area, use area is outside of analysis area

4 = Denning habitat is not present in the analysis area

5 = Suitable habitat is present in analysis area

Westslope Cutthroat Trout

Westslope cutthroat trout exhibit both migratory and resident life histories on the Kootenai National Forest. Westslopes are capable of traveling over 100 miles on their spawning migration. Migratory fish typically rear in their natal streams until their third year, at a length of 7-9 inches, when they migrate to either a larger stream or lake to rear to maturity. Sexual maturity is attained at either age 4 or 5, length of 4 to 16 inches at which time these fish migrate back to their natal streams to spawn. Westslopes can typically reach lengths in excess of 20 inches and weigh in excess of three pounds. Resident fish are significantly smaller than their migratory counterparts. Common lifespan for this species is seven years. Westslopes feed primarily on aquatic insects in streams and larger zooplankton in lakes.

The distribution and abundance of westslope cutthroat trout has declined from historic levels (less than 59 percent of historically occupied stream habitat) across its range, which included western Montana, central and northern Idaho, a small portion of Wyoming, and portions of three Canadian provinces (Liknes and Graham 1988; Shepard et al. 2005). Westslope cutthroat trout persist in only 27 percent of their historic range in Montana. Due to hybridization, genetically pure populations are present in only 2.5 percent of that range (Rieman and Apperson 1989). Introduced species have hybridized or displaced westslope cutthroat trout populations across their range. Hybridization causes loss of genetic purity of the population through introgression. Within the planning area, genetically pure populations of westslope cutthroat trout are known to persist in the headwaters of the O'Brien drainage, including North Fork O'Brien, Studebaker Draw, Kedzie Creek as well as in China Creek and Arbo Creek (USDA Forest Service 1994; Leary et al. 2009, MFISH). Some of these remaining genetically pure populations of westslope cutthroat trout are found above fish passage barriers that protect them from hybridization, but isolate them from other populations.

Brook trout are believed to have displaced many westslope cutthroat trout populations (Behnke 1992). Where the two species co-exist, westslope cutthroat trout typically predominate in higher gradient reaches and brook trout generally prevail in lower gradient reaches (Griffith 1988). This isolates westslope cutthroat trout populations, further increasing the risk of local extinction from genetic and stochastic factors (McIntyre and Rieman 1995).

Habitat fragmentation and the subsequent isolation of conspecific populations is a concern for westslope cutthroat trout due to the increased risk of local and general extinctions. The probability that one population in any locality will persist depends, in part on, habitat quality and proximity to other connected populations (Rieman and McIntyre 1993). Therefore, the several small, isolated populations left in the project area are at a moderate risk of local extirpation in the event of an intense drainage-wide disturbance.

Habitat degradation also threatens the persistence of westslope cutthroat trout throughout their range. Sediment delivered to stream channels from roads is one of the primary causes of habitat degradation. Sediment can decrease quality and quantity of suitable spawning substrate and reduce overwintering habitat for juveniles which reduces spawning success and increases overwinter mortality. Roads can also alter the drainage network of a watershed and thereby increase peak flows. The end result of increased peak flows is decreased channel stability and accelerated rates of mass erosion. Across their range the strongest populations of westslope cutthroat trout exist most frequently in the wilderness, Glacier National Park, and areas of low road densities or roadless areas (Liknes and Graham 1988; Marnell 1988; Rieman and Apperson 1989; Lee et al. 1997).

Columbia River (Interior) Redband Trout

The distribution and abundance of interior redband trout has declined from historic levels (42 percent of historically occupied stream habitat) across its range, which includes the Fraser and Columbia River drainages east of the Cascade Mountain divide up to barrier falls on the Pend Oreille, Spokane, Snake, and Kootenai rivers (Muhlfeld et al. 2015, Knudsen et al. 2002, Behnke 1992). Nonhybridized populations are assumed to be present in only 46 percent of currently occupied range, however only 18 percent of this range has been genetically tested, so the actual genetic status of the species is less certain (Muhlfeld et al. 2015). Distribution in Montana is limited to the Kootenai River basin up to the Fisher River. Three Rivers District contains the majority of Montana's redband trout population distribution. Introduced species such as coastal rainbow trout, brook trout, and cutthroat trout have hybridized or displaced redband trout populations across their range. Redband trout are also known to naturally hybridize with native westslope cutthroat trout at low rates (less than 2 percent of population) when the two species co-exist in the same habitat (Hensler, 2015, personal communication). Hybridization causes loss of genetic purity of the population through introgression. Within the planning area, genetically pure populations of redband trout are known to persist in China Creek, Arbo Creek, and potentially Kilbrennan Lake (though purity is questionable here) (MFISH).

Introgressed, hybrid, redband trout populations exist in O'Brien Creek (westslope x redband x coastal rainbow) and in Kilbrennan Creek (redband x coastal rainbow) (MFISH). In the case of O'Brien creek it is likely that a native redband population did not exist here and then become introgressed, but rather that redband x coastal rainbow individual hybrids migrated into the system from a neighboring stream and then hybridized with native westslope cutthroat trout (Hensler, 2015, personal comm). Therefore, O'Brien Creek shall not be considered native redband trout habitat. As in the cases of bull trout and westslope cutthroat trout, habitat

degradation and habitat fragmentation are factors which threaten to reduce redband distribution (Muhlfeld et al. 2015, Williams et al. 1989).

Habitat fragmentation and the subsequent isolation of conspecific populations is a concern for redband trout due to the increased risk of local and general extinctions. The probability that one population in any locality will persist depends, in part on, habitat quality and proximity to other connected populations (Rieman and McIntyre 1993). Therefore, the several small, isolated populations left in the project area are at a moderate risk of local extirpation in the event of an intense drainage-wide disturbance.

Habitat degradation also threatens the persistence of redband trout throughout their range. Sediment delivered to stream channels from roads is one of the primary causes of habitat degradation. Sediment can decrease quality and quantity of suitable spawning substrate and reduce overwintering habitat for juveniles which reduces spawning success and increases overwinter mortality. Roads can also alter the drainage network of a watershed and thereby increase peak flows. The end result of increased peak flows is decreased channel stability and accelerated rates of mass erosion.

Western Pearlshell Mussell

Suitable habitat (stable Rosgen Class C stream channel type) is limited within the project area. No mussels or mussel shells were observed during aquatic surveys in the project area. Standardized mussel distribution surveys were conducted by the Montana Natural Heritage Program (Stagliano 2010, Stagliano 2015) in the Yaak River and other streams in Lincoln County, MT, however no surveys were conducted in the O'Brien Creek basin. Within the Yaak watershed, the number of occupied streams has decreased by 50% since pre-2010 surveys. Population viability at the two sites surveyed adjacent to the project area in the mainstem Yaak River (one at the mouth and one north of Arbo Creek) have each been downgraded to "extirpated" (Stagliano 2015) since the pre-2010 grade of "D" (Stagliano 2010).

Aquatic and Riparian Habitat

This section complements the existing condition narrative in the Water Resources section of this document. In an effort to minimize repetition, only select watershed condition information is summarized as it relates directly to the local TES fish populations. For a thorough review of the existing hydrologic condition, the reader is referred to the Water Resources section.

Stream habitat survey data were collected during 2014 within specific reaches on O'Brien Creek, Lynx Creek, Rabbit Creek, and Kilbrennan Creek. The data for each stream were compared to the INFISH RMOs (Table 39 and Table 40).

In addition, the PacFish-InFish Biological Opinion Effectiveness Monitoring Program (PIBO-EMP) values for index of physical habitat integrity ("index value") for managed sites in O'Brien Creek and Kilbrennan Creek are reported in Table 41. Data show evidence of improvements in fish habitat conditions over time in these two main project area streams. (PIBO Effectiveness Monitoring Data, 2014).

Habitat integrity of a reach is assigned a numeric score 0 (worst) - 100 (best) calculated by summing values of 6 metrics (residual pool depth, percent pools, D50, percent pool tail fines <6 millimeter, large wood frequency, average bank angle) and scaling 0 - 100. D50 is the median stream bed particle size, measured by a pebble count procedure where 100 samples are taken

from pools and riffles according to their percentage of the total length. Index was developed using data from reference reaches as a basis of comparison to managed sites.

Within the project area, Kilbrennan Creek Index value was shown to improve from 19.2 in 2006 to 31.2 in 2011. Further monitoring will take place in 2016. O'Brien Creek Index values were calculated to be 60.5, 46.8, and 62.1 in 2004, 2009, and 2014, respectively.

Table 39. Existing RMOs for O'Brien Creek, Lynx Creek, Rabbit Creek, and Kilbrennan Creek

Stream	Reach Number	Mean Width – Length (feet)	Total LWD / mile[A]	RMO LWD / mile[B]	Pools / mile	Bank Stability (percent)	Width / Mean Depth Ratio
O'Brien Creek	1	30.9 - 710.0	759	82*	37*	92*	25.2
Lynx Creek	1	9.2 - 300.0	246	70*	53	98*	14.4
Rabbit Creek	1	10.0 - 287.0	515	37*	92*	92*	16.5
Kilbrennan Creek	1	8.8 - 309.0	325	17	34	84*	15.2
	2	6.0 - 264.0	40	20*	100*	83*	9.6*

* values meeting INFISH RMO standards.

[A] LWD/mile includes all pieces measured greater than 4 inches diameter and 9 feet length.

[B] RMO LWD / mile includes only single pieces meeting RMO size criteria (12 inches diameter; 35 feet length).

Table 40. Existing temperature RMO for O'Brien Creek and Kilbrennan Creek

Stream[A]	Location	Warmest Week	Average Daily Maximum Temperature Warmest Week (°F)
O'Brien Creek	At mouth, below county bridge	2014	55.69*
O'Brien Creek	Reach 1, YHW PIBO Site, Lower O'Brien, B/W Rabbit & Lynx Creeks	10/10/13 - 3/31/14	44.61*
O'Brien Creek	Reach 3, PIBO site, Upper O'Brien Creek	2004	56.66*
O'Brien Creek	Reach 3, PIBO site, Upper O'Brien Creek	2009	55.58*
Kilbrennan Creek	PIBO site, Upstream of FSR 14315	2001	71.78
Kilbrennan Creek	PIBO site, Upstream of FSR 14315	2006	77.00
Kilbrennan Creek	PIBO site, Upstream of FSR 14315	2011	67.28

* values meeting INFISH RMO standards.

[A] Lynx and Rabbit Creeks not included due to a lack of available thermographs for monitoring stream temperature.

Table 41. Pacfish-Infish Biological Opinion (PIBO) Effectiveness Monitoring Program (EMP) Index of Physical Habitat Integrity

Stream[A]	Location	Year	Index Value*
O'Brien Creek	48.55806, -115.839861	2004	60.5
O'Brien Creek	48.55806, -115.839861	2009	46.8
O'Brien Creek	48.55806, -115.839861	2014	62.1
Kilbrennan Creek	48.587406, -115.911657	2006	19.2
Kilbrennan Creek	48.587406, -115.911657	2011	31.2
Kilbrennan Creek	48.587406, -115.911657	2016	NA**

O'Brien Creek / Lynx Creek / Rabbit Creek

With a few exceptions, all RMO standards were met in each stream. Exceptions included Lynx Creek, where pools per mile were below the RMO standard and in all reaches where width/depth ratio exceeded 10.

In Lynx Creek, historic logging adjacent to the stream on Forest Service land and ground disturbing activities related to fire salvage and road stabilization work may have contributed to channel widening and instability, resulting in pools per mile lower than the RMO objectives. These same events may have also contributed to higher width/depth ratios compared to RMOs across the O'Brien watershed.

Stream temperatures in upper, middle, and lower O'Brien Creek meet the RMO standard. Temperatures are below 59°F and multiple year records do not demonstrate an upward trend (Table 40.).

Kilbrennan Creek

Overall fish habitat conditions within surveyed reaches in Kilbrennan Creek are mixed. Kilbrennan Creek drains Kilbrennan Lake northward along the Kilbrennan Lake Road until its confluence with a small south-flowing tributary. At this confluence the stream flows south and transitions from a mid-gradient, contained channel to a low-gradient channel influenced by a historical beaver marsh. The stream begins to flow west at the south end of Kilbrennan Ridge and at FSR 14394 transitions again into a mid to high-gradient, contained channel and drains into Yaak River one mile downstream.

The first surveyed reach lies just downstream of NFSR 14394. RMO standards were not met at this location, with the exception of bank stability. This was due to the natural condition of the reach, rather than due to historical land use practices. The first reach is located within a wetland area that was historically flooded by beaver dams. Since the area was flooded, the riparian vegetation is now limited to shrubs and grasses. Tree growth in the vicinity has been limited, which has led to low Large Woody Debris (LWD)/mile in the reach. The lack of shade in the area due to the lack of stream side tree growth, in combination with slow moving water due to low gradient, also leads to warmer water temperatures not meeting RMO standards. The limited tree growth and LWD in the area also leads to a lack of channel complexity and hence low pools per mile (also falling below RMO standards).While total LWD per mile was relatively high (325

LWD per mile) the RMO LWD per mile (17 LWD per mile) was below standard. Pool frequency (34 pools per mile) was very low at just over one third of the RMO standard (96 pools per mile) for this size channel. Width/depth ratio was above RMO standard and the average daily maximum stream temperature of the warmest week has remained well over 59°F since at least 2001 (Table 39 and Table 40).

Further upstream in reach 2 within the historic beaver marsh channel conditions are good and all RMO standards with the exception of stream temperature are met. This is likely due to a large section of Reach 2 lacking riparian forest cover within an area that was once a series of beaver ponds. High stream temperatures recorded above FSR 14394 contribute to the predominance of Brook trout, which are tolerant of warmer temperatures.

Arbo Creek

Arbo Creek lies within the northern tip of the project area and is tributary to the Yaak River. A large percentage of the watershed burned during the 1910 and 1991 wildfires. The wildfires and road decommissioning subsequent to the 1991 fire likely increased sediment input to the stream. In addition, riparian vegetation has transformed from mixed conifers to shrubs in the previously burned areas. A boulder/bedrock channel substrate maintains a step-pool channel condition ideal for aquatic habitat. For more history on the fire activity in the Arbo watershed see the Water Resources section.

Koot Creek

Habitat near the mouth is relatively complex with abundant step pools. Most of the wood holding pools in place is not LWD as defined by RMO standards, but seems to be sufficient for maintaining pool habitat in this smaller creek. Pool frequency is relatively high and riparian cover and recruitment is adequate as riparian zones have not been harvested or burned in recent history, if ever.

Flow at higher elevations, in the vicinity of FSR 4445 and proposed harvest units, is intermittent and uninhabitable to fish. Perennial flow is limited to the lower elevations of Koot Creek within the mainstem, where a population of rainbow trout and rainbow x cutthroat hybrids exists.

China Creek

China Creek lies within the southeastern portion of the project area and is tributary to the Kootenai River. A large percentage of the watershed burned during the 1994 wildfire, including riparian areas. The wildfires, salvage harvest activities in 1997, and road decommissioning in 1998 may have increased sediment input to the stream however channel conditions near the mouth remain stable and fine sediment levels remain only slightly higher than reference (see Water Resources Section). Conditions remain stable enough to support populations of interior redband trout and westslope cutthroat trout (MFISH).

Past Actions and their Effects on Current Conditions

The OLY project area has been shaped by a variety of natural and human-caused activities over the last century. Large fires have affected a large proportion of the project area. Much of the fire was intense and resulted in stand replacing conditions. Many tributaries appeared to be heavily affected by fire, including streamside areas. Fires burned parts of the project area in the 1990s and early 2000s including the Arbo fire, China Basin fire (including Koot Creek and Surprise Gulch),

Pulpit fire (including Upper O'Brien and Rabbit Creek), Studebaker fire (including Upper O'Brien & Kedzie Creek), and the Noseeum fire (including Upper O'Brien).

Effects to fish are difficult to estimate over decades post-fire. Fish habitat was likely affected for at least a short time by sediment loading. Sediment decreases habitat diversity, degrades spawning and rearing habitat and consequently fish reproduction and survival. It also reduces aquatic insect production. The density of salmonids in rearing habitat has been shown to be inversely proportional to the level of fine sediment (Bjornn and Reiser 1991). Fine sediment can greatly reduce the capability of winter and summer rearing habitats and when levels reach 30 percent or more, survival to emergence is significantly reduced (Shepard et al. 1984). Fine sediment may have the greatest impact on winter rearing habitat for juvenile salmonids. Fine sediments can cap or fill interstitial spaces of streambed cobbles. When interstitial rearing space is unavailable, juvenile salmonids migrate until suitable wintering habitat can be found (Hillman et al. 1987). Fine sediment has also been shown to cause alterations in macroinvertebrate abundance and diversity. All action alternatives propose BMP implementation on haul roads to decrease sediment and surface flow routing to channels.

In addition, large woody debris recruitment would have been interrupted for a time. Stream temperatures were likely warmer in the summer and colder in the winter. Vegetative recovery may be ameliorating effects to water yields and temperatures at this point in time. The more recent fires likely had little effect on stream temperature, being at high elevations, but probably contributed to increased sediment loading in downstream depositional reaches of affected streams.

The majority of O'Brien Creek mainstem flows through private land where INFISH standards do not apply. As a result, activities such as timber harvest and grazing have occurred close to banks. Historic grazing by livestock occurred and trampling of banks contributed to bank instability and sediment input on private lands. Grazing continues in a few locations on private land but there is currently no grazing on NFS lands in the drainage.

Timber harvest and road construction began on private land in the late 1800s and there was some timber harvesting for lumber, mine timbers, and railroad ties during this time period. The lower, more habitable and workable sections of watersheds were likely converted to pasture in places. Historic timber management on NFS lands was limited until the 1950s, when regeneration harvest was initiated and the beginnings of a substantial road network were being developed. Timber harvest within the project area reached its peak in the 1980s and 1990s and has continued through present day. New road construction associated with timber sales on USFS lands continued through the fire salvage sales of 1996-1997.

Road construction associated with timber harvest likely produced some level of sediment delivery to channels; particularly from roads constructed in the 1960s and 1970s before more current BMP techniques were employed. Most sediment produced from roads is finer grained material that would be readily transported through higher gradient reaches which would be more prone to settle in lower gradient channels in the lower watershed.

Desired Condition

Desired future conditions in the OLY project area watersheds include interconnected streams with perennial flow, cool low flow water temperatures, stable channels, complex habitat with deep pools, overhead cover, and abundant LWD. Management actions to suppress or eliminate nonnative salmonids in O'Brien Creek and its tributaries would be beneficial in the long term to

maintain robust populations of native trout. Non-native removal activities would be beyond the scope of this project.

The O'Brien Creek watershed is a restoration priority due to the presence of bull trout and its designation as critical habitat. Lower O'Brien Creek (i.e. below the confluence with Rabbit Creek) is the primary spawning area for the bull trout population. Stream channel condition improvement should attempt to address elevated subsurface fines which negatively impact embryo development and juvenile survival rates. However, the existing high levels of fines are likely the result of historical, large pulses of sediment input resulting from past wildfires and related salvage activities, discontinued riparian harvest practices, and lower level but constant sediment input from the existing road system.

Maintaining and restoring riparian areas on public and private lands in O'Brien Creek and tributaries would help reduce stream temperature, reduce sediment inputs, and restore desired conditions. Past and future road storage, decommissioning, and BMP implementation will stabilize roads and stream crossings thereby reducing long-term sediment input to stream channels. Restoring riparian areas on private lands is beyond the scope of this project.

Environmental Consequences

Alternative 1 – No Action

Direct and Indirect Effects

Alternative 1 is the no action alternative and would not implement any of the OLY proposed activities including timber harvest, fuels reduction, prescribed burning, and watershed rehabilitation/road stabilization.

Under this alternative, vegetation in previously harvested units would mature over time resulting in gradually decreasing water yield for all watersheds. This recovery should improve overall watershed conditions. If wildfires are successfully suppressed and no prescribed burning occurs, fuel loadings would increase resulting in increasing risk of high intensity fires which could affect watershed conditions.

Any existing roads which fall below BMP standards would continue to channel surface flow and sediment to the streams. Undersized and aging culverts could periodically plug and wash out, resulting in pulsed delivery of sediment to stream channels and aquatic habitat degradation for many years to come. Removing these crossings and the associated risk they pose to bull trout and westslope cutthroat trout habitat in O'Brien Creek and its tributaries and westslope cutthroat trout and interior redband trout in other project area streams is an important component of the watershed improvement/road stabilization work proposed under all action alternatives that would not be implemented under Alternative 1.

Activities on private property would continue with change in watershed condition consistent with past activity. These activities include private development for homes and recreational sites. Small scale agricultural activities would continue as would timber harvest on private lands.

The present aquatic habitat conditions reflect the past and current effects of increased peak flows and input of fine sediments to the watershed from past methods of timber harvest, road-building activities, and natural events. All presently authorized activities would continue. These activities would incrementally affect fisheries and riparian habitat and fish populations through the

continued addition of fine sediment and modification to stream morphology. As culverts on closed roads approach the end of their life expectancy, the rate of failure and delivery of sediment to stream channels can be expected to increase. It is therefore probable that over the long-term the level of effects could be higher than what currently exists. While the relatively small scale and magnitude of effects in the short term would not decrease the viability of fish populations, the indefinite duration of the no action effects may prevent an upward trend in the viability of fish populations within the project area.

Alternatives 2, 3, and 4

Direct and Indirect Effects

Introduction

Alternative 4 proposes 521 less acres of regeneration harvest than alternative 2 and 466 less acres of regeneration harvest than alternative 3. Despite this, the three action alternatives 2, 3, and 4 do not differ markedly with regard to their anticipated effects to fish populations, fish habitat and adjacent riparian conservation areas, so it is appropriate to discuss effects of these alternatives concurrently. This is because effects of the two measurement indicators would be nearly identical across all three action alternatives. All action alternatives propose the same activities which include timber harvest, temporary and new road construction, road maintenance work, fuel treatment, natural fuels burning, watershed rehabilitation/road decommissioning, and recreation improvements.

Implementation of default RHCAs would protect stream habitat from non-channelized sediment inputs, maintain large woody debris recruitment, and ensure nutrient delivery and storage. The surface flow and sediment that is channeled to the streams by roads would be reduced with BMP work and waterbarring the road surface, accelerating hydrologic recovery of affected watersheds and reducing the potential for further degradation of native salmonid habitat.

The primary effects of the action alternatives on aquatic resources center on the watershed restoration and project-related road work that would occur at stream crossings in the Arbo, Kilbrennan and O'Brien watersheds. In addition, road work occurring within RHCAs would likely contribute short-term sedimentation to stream channels. There would be short-term increases of sediment expected with active storage and decommissioning and BMP road reconstruction leading to short-term effects to native salmonids and aquatic habitat. However, sediment production would decrease in the long-term through stream crossing stabilization and implementation of BMP design criteria. Stream channels and fish habitat would begin to be restored and improved. The long-term benefits of reducing water routing and sediment input to stream channels and restoring fish passage would outweigh the short-term negative effects caused by the roadwork. Table 42 summarizes active road work and stream crossing treatments and illustrates that, while many miles of active work is proposed; only a small percentage would actually occur in RHCAs where effects to aquatic resources are more likely.

Only the proposed road work which has the potential to contribute short-term sediment input to streams is reported in this section. These activities include active storage and decommissioning, temporary and new road construction, reconstruction, rerouting, and BMP maintenance on haul routes. Both funded and unfunded road work are reported here. Funded activities would include mandatory core replacement (i.e. active storage), BMP implementation on haul routes, and construction activities needed for access to timber harvest units. Unfunded activities reported here

would take place as funding allows and include all other active road storage and decommissioning associated with watershed improvement. Excluded from this section are passive road storage and decommissioning since these will not have effects beyond the existing condition.

For a full summary of all proposed road work in the project area, see “Activities Common to Alternatives 2, 3, and 4” in Chapter 2.

Table 42. Summary of Active Road Work and Stream Crossing Treatments in Alternatives 2, 3, and 4

NFSR	Activity*	Location Description	Total Length (mile)	Length within RHCA (mile)	Total Stream Crossings	Stream Crossings Actively Treated	Funding Status**
4407B	AS	Yaak Mountain Lookout B	1.80	0.11	3	1	UF
4428	AS	Upper Hummingbird Creek	0.79	0.06	0	0	UF
4428B	AS	Upper Hummingbird Creek	3.30	0.24	4	4	UF
4433	AS	North Fork Lynx	1.18	0.97	2	1	F/COR
4433A	AS	North Fork Lynx A	0.79	0.05	1	1	F/COR
4433B	AS	North Fork Lynx B	1.20	0.15	2	2	F/COR
4650	AS	Studebaker Draw	0.12	0.12	1	1	F/COR
14306	AS	Hummingbird Creek	1.53	0.08	2	2	UF
14349	AS	Gun Barrel	0.42	0.06	1	1	F/COR
2380	AD	North Fork O’Brien	0.30	0.30	0	0	UF
14306	AD	Upper Hummingbird Creek	1.30	0.07	2	0	UF
4420A	ADU	Upper O'Brien	0.23	0.21	1	1	F/COR
4429F	ADU	Upper O'Brien	0.10	0.10	1	1	F/COR
14306B	ADU	Upper Hummingbird Creek	0.64	0.06	1	1	UF
Temporary Road	NC	Harvest Unit 52	0.20	0.00	0	0	F/ACC
Permanent Road	NC	Yaak Mountain/Stimson	0.16	0.00	0	0	F/ACC
14321	RR/NC	Kilbrennan Ridge	1.00	0.00	0	0	F/ACC
14309B	RR/NC	Troy Shooting Range	0.30	0.00	0	0	F/ACC
2380A	RR/RC	North Fork O’Brien	0.70	0.00	0	0	F/ACC
1058	BMP/RC	Yaak River Takeout	0.05	0.05	0	0	F/BMP
14315	BMP/RC	North Slope Yaak	0.76	0.19	2	0	F/BMP

NFSR	Activity*	Location Description	Total Length (mile)	Length within RHCA (mile)	Total Stream Crossings	Stream Crossings Actively Treated	Funding Status**
2380	AD	North O'Brien	0.35	0.35	0	0	UF
2380A	BMP/RC	North O'Brien A	0.20	0.09	0	0	UF
2394A	BMP/RC	Kilbrennan Lake A	0.32	0.04	1	0	F/BMP
2394I	BMP/RC	Off of Kilbrennan Lake Road into Unit 8	0.28	0.04	1	0	F/BMP
331	BMP/RC	Rabbit O'Brien	2.30	0.16	1	0	F/BMP
331	BMP/RC	Rabbit O'Brien	3.63	0.91	1	0	F/BMP
4407	BMP/RC	Yaak Mountain Lookout	3.91	0.29	5	0	F/BMP
4408	BMP/RC	Yaak Mountain	0.93	0.08	3	0	F/BMP
4445	BMP/RC	Lynx Creek	6.30	1.31	15	8	UF
4445C	BMP/RC	Surprise Gulch	0.53	0.33	1	0	F/BMP
4447A	BMP/RC	Old East Side A	0.55	0.12	1	0	F/BMP
4458	BMP/RC	Sear's Flat	0.70	0.07	1	0	F/BMP
4458G	BMP/RC	Sear's Flat	0.39	0.32	0	0	F/BMP
4612	BMP/RC	Middle O'Brien	1.73	0.11	0	0	F/BMP
752	BMP/RC	O'Brien Creek	1.57	0.79	2	0	F/BMP
4429	BMP/RC	Upper O'Brien - Pulpit Mountain Jeep Road	4.50	0.34	3	3	UF
		Total	**45.06**	**8.17**	**58**	**27**	

*Activity: (RC) reconstruction, (BMP/RC) reconstruction associated with BMP improvements on haul routes, (NC) new construction, (AS) active storage, (AD) active decommissioning, (ADU) active decommissioning of undetermined roads, (NC) new construction, (RR) re-route, (SC) stream crossing treatment only

**(UF) unfunded, not required for timber harvest, (F/COR) funded, required core grizzly habitat replacement or to be completed concurrently with this work, (F/ACC) funded, required for timber sale unit access, (F/BMP) funded, required implementation of BMP standards.

Timber Harvest, Harvest-Based Fuels Treatment, and Associated Activities

Timber harvest and harvest-based fuels treatments in the project area include the following treatment acres:

- Alternative 2 – 3,127 acres
- Alternative 3 – 3,069 acres
- Alternative 4 – 2,606 acres

Activity related fuels will either be machine-piled or underburned in all proposed timber units across all action alternatives as described in Chapter 2. Timber harvest and harvest-based fuels treatment shall be referred to as "timber harvest" throughout this section. A large concentration of timber harvest is proposed in the Sears Flat area bounded by the Yaak River, US Highway 2, and the Eastside Road. No streams supporting fish populations exist in this area and therefore Sears Flat will be excluded from further analysis for aquatics. Proposed timber harvest within the analysis watersheds, where aquatic species and habitat are of concern, will be the focus of this analysis.

Sediment

Riparian values for all watersheds such as temperature maintenance, filtration of sediment, nutrients, and contaminants, large woody debris recruitment, and stream bank stability would not be compromised by timber harvest due to the implementation of default INFISH RHCAs. As such, this project would not retard the attainment of INFISH RMOs or affect related critical habitat PCEs. Default RHCAs would also protect streams from non-channelized sediment inputs.

In addition to increases in peak flows, ground based harvest systems and associated activity on haul roads may also increase sediment production. Overall changes in sediment delivery to Arbo, Koot, and China Creek as a result of the OLY project would be indiscernible. Required road storage and decommissioning work proposed under all action alternatives would result in an estimated 500 cubic yard (CY) reduction in sediment in O'Brien Creek. Additional estimated sediment reductions of 450 CY in O'Brien Creek, 1 CY in Arbo Creek, and 30 CY in Kilbrennan Creek could occur if other funding-dependent watershed restoration work is funded (see Water Resources section). As discussed in the Water Resources section, the OLY project will reduce sediment input from haul roads and other roads open to the public through implementation of BMPs.

Nutrients

Typically, there is a 3 to 4 year increase in nitrogen and phosphorus in streams draining a newly harvested area resulting from the breakdown and/or burning of logging slash and the flushing of soil nutrients normally taken up by trees. These short-term indirect and cumulative water quality effects do not generally extend very far downstream because of mitigation by instream sediments and uptake by plants and animals (Murphy and Meehan 1991). These nutrients may potentially affect waters downstream by increasing aquatic productivity for a short time. Therefore, there would be no negative effect of timber harvest on water quality.

Designated Critical Habitat

Timber harvest and associated activities have potential to affect the following bull trout critical habitat PCEs: #3 forage, #4 habitat complexity, #5 water temperature, #6 spawning and rearing substrate, #7 natural hydrograph, and #8 water quality and quantity. However, proposed activities would not increase peak flows in O'Brien Creek to the extent that the existing hydrograph or water quantity would be significantly altered. Implementation of default RHCAs in this drainage would ensure that PCEs dependent upon in-tact riparian zones including forage, habitat complexity, water temperature, spawning and rearing substrate, and water quality would not be degraded.

New and Temporary Road Construction and BMPs

All action alternatives would require about 2 miles of new construction work (0.16 miles to allow Stimson Lumber Company reasonable access to their lands and 1.82 miles to allow NFSR reroutes), 0.2 miles of temporary road construction, and 45 miles of Forest Service haul roads in the analysis watersheds which would require road maintenance, reconstruction, and BMP work. The new road NFSR 14321, atop Kilbrennan Ridge, is proposed to route the existing road around a small wetland in order to access Harvest Units 51-54. The proposed temporary road accessing Harvest Unit 52, also in the Kilbrennan drainage, would have no stream crossings and would yield no sediment input to surface water. The reader should refer to the Water Resources section for a detailed description of the OLY project use of roads.

Forest roads can cause serious degradation of salmonid habitats in streams (Furniss et al. 1991). Roads directly affect natural sediment and hydrologic regimes by altering streamflow, sediment loading/routing, sediment transport and deposition, channel morphology, channel stability, substrate composition and water quality within a watershed (Lee et al. 1997). Roads can interrupt hill-slope drainage patterns and alter the timing and magnitude of peak flows and change base stream discharge and sub-surface flows. Poor road location or concentration of surface and sub-surface water by cross slope roads can lead to road-related mass soil movements. Damaging direct effects to fish habitat occur if roads are located in RHCAs and especially if they cross streams where they can intercept water and sediment and directly route it to streams.

However, the lack of connectivity of the proposed new road work to the hydrologic regime within the project area will minimize, if not prevent, sediment contribution. In addition, BMP and reconstruction work on existing roads in the project area would improve surface drainage and reduce sediment contributions to stream channels. Roadwork may include replacement and installation of drain dips and culverts, constructing or cleaning catch basins, blading, dust abatement, buttressing cut slopes and fill slopes and resurfacing. This would accelerate hydrologic recovery of affected watersheds and reduce the potential for further habitat degradation. The drainage network would be improved and the likelihood of sediment introduction from failed culverts would also be reduced.

Road work within RHCAs would occur after July 15th and no later than September 1st for the analysis watersheds, to minimize potential sediment delivery to fish bearing streams during salmonid spawning periods. Road work occurring on road segments outside of RHCAs would not be subject to timing restrictions. All disturbed areas would be seeded. Nonetheless, short-term increases in sediment from disturbed areas are possible because of the risk of rain events occurring before stabilizing vegetation is established.

Designated Critical Habitat

Road construction/maintenance activities have the highest potential to affect the following PCEs: #6 spawning and rearing substrate and #8 water quality. No temporary or new road construction is proposed in proximity to the O'Brien Creek designated bull trout critical habitat. Potential effects to proposed critical habitat are linked to road BMP work on Forest Service haul roads along mainstem O'Brien Creek. These roads include NFSR 331, the lower section of NFSR 4445, and NFSR 4408. Note that Lincoln County Road 2394 (Kilbrennan Lake Road) will be used as a haul route but will not receive BMP upgrades as this county road lies outside of the jurisdiction of the Forest Service.

Two of the seven stream crossings (i.e. NFSR 331 and NFSR 4445) on haul roads in the analysis watersheds exist within the O'Brien Creek mainstem Critical Habitat. While these crossings contribute minimal sediment annually, they will be treated to meet BMP standards, which will reduce annual sediment contribution. The most substantial road-related sediment source in the project area is where NFSR 4445 crosses O'Brien Creek, since this public access to the Troy Shooting Range is used year round. This bridge sits in a low point on the road grade and collects sediment that ultimately washes into O'Brien Creek. The required BMP will be to pave the bridge approaches. Sediment release generated from paving bridge approaches on NFSR 4445 would be short term and these BMP requirements would ultimately reduce sediment contributions to O'Brien Creek by up to 5 cubic yards per year.

Prescribed Fire

All action alternatives propose natural fuels reduction treatments outside harvest units including: 1) broadcast burning 172 acres in the Arbo Creek watershed, 2) slash/underburning, broadcast burning, and slash/lop/scatter/handpiling a total of 140 acres in the Kilbrennan Creek watershed, 3) slash/underburning, broadcast burning, and slash/lop/scatter/handpiling a total of 384 acres in the O'Brien Creek watershed, 4) and broadcast burning 339 acres along the ridge dividing Surprise Gulch and Koot Creek. Piling would be done mostly by hand crews and ignition would be with both helicopter and hand crews. Machine piling may be used in some cases within the WUI to reduce crown fire potential and stand replacing wildfire.

RHCAs would be implemented on all streams within the proposed units. No fires would be ignited in riparian areas, but fire would be allowed to back into these areas. Incidental inclusion of RHCAs in burns would likely be of low intensity due to moist conditions and vegetation characteristics. With the exception of Arbo Creek, the proposed prescribed burning would not result in measurable increases in peak flow; therefore there would be no effect to fisheries habitat. In Arbo Creek, prescribed fire in combination with timber harvest would result in a minor increase in peak flow which would be more than offset by forest regrowth within previously burned wildfire areas.

Fuels treatments are expected to have minimal offsite effects, protecting soils and retaining a duff layer component due to the high soil moisture present. As a result sediment production from the burned areas would be negligible. Standard erosion control practices would be applied to minimize sediment production from fireline construction. Minor road surface erosion from equipment use may result in minor additional fine sediment loads in streams proximate to operations. Since the magnitude of the expected sediment change is so small, the minor additional load that may result from the proposed activities is anticipated to have an insignificant effect.

Prescribed burning would have some short-term indirect effects on site nutrient levels. The effects of any increased nutrient levels due to the prescribed burning would be similar to natural

environmental fluctuations. Given the distribution over time and space of the proposed burn units, and the dilution of any increased nutrients within fish habitat, any effects from nutrient increases would be minor or neutral.

Low fire intensities within riparian areas, and minimal changes in forest openings in upland areas, would mean no additional cumulative stream temperature effects. Within individual watersheds, the prescribed burns comprise a small proportion of the total watershed. As a result, any changes in fish habitat due to the prescribed burning would be within natural environmental fluctuations.

Designated Critical Habitat

Prescribed fire has potential to influence the following PCEs: #3 forage, #4 fish habitat complexity, #5 water temperature, #6 spawning and rearing substrate, #7 natural hydrograph, and #8 water quality and quantity. However, the design criteria of the proposed prescribed burns, such as igniting outside of RHCAs would reduce the risk of unintended effects to critical habitat in O'Brien Creek.

Watershed Improvement/Road Stabilization

Under all action alternatives approximately 11.1 miles of existing roads in the project area would be stabilized and placed in storage. Stabilization work would include but is not limited to removing undersized culverts or providing armored overflows, recontouring unstable sections of road, water barring, scarifying the road surface, and seeding. In addition, 7.0 miles of road are proposed for passive storage where no active work would take place.

Approximately 1.3 miles of road are proposed to be actively decommissioned and 7.7 miles of road passively decommissioned in all action alternatives. Active decommissioning includes but is not limited to removing culverts, restoring natural stream channels, recontouring unstable fillslopes, waterbarring, ripping, placing slash and duff on the treated road surface, and seeding in some places. In combination this work would reestablish eight stream crossings in the O'Brien Creek watershed and stabilize several others thereby lowering road stream crossing densities and sediment contributions from these sites.

Road decommissioning may create short-term sediment inputs into streams, as culverts are removed or replaced. Wegner's (1999) monitoring of culvert removals on live channels on the Kootenai NF indicates that instream sediment increases are short-lived, with total suspended sediment resembling background levels within 48 hours after the completion of work. Any deposited sediment would likely remain until the next flushing flow (the next spring runoff or major fall precipitation event). These short-term increases in sediment delivery to streams are outweighed by the long term positive benefits of eliminating chronic sediment sources. These benefits at stream crossing sites include restored stream and riparian function by increased depth, complexity, and shading of streams, cooler water temperatures, reduced evaporation, and potentially more stable flows through the summer low flow period. Similar benefits would occur during winter low flows. Intact riparian communities provide an insulatory benefit that prevents streams from freezing during extreme cold. Deeper water also provides better fish overwintering habitat that is less likely to freeze completely.

Disturbances that are outside of the stream channel (from treatments such as re-contouring slopes and ripping road beds) are expected to take 1 to 2 years to heal after decommissioning is completed, based on Hickenbottom's monitoring (2000) of road re-contouring on the Lolo National Forest. Despite all disturbed areas being seeded, short-term increases in stream sediment can occur if rain events occur before the vegetation becomes established in disturbed areas. The

area of road capable of delivering sediment to streams would be limited to the immediate area of the stream crossing. Ditches would be disconnected from streams, thereby precluding sediment delivery from the road, down the ditch, and into the stream. The amount of sediment delivered to a stream at a crossing site of a decommissioned road is expected to be minimal compared to the average amount of sediment naturally mobilized by streams during spring runoff.

The proposed roadwork could produce short-term effects to fish populations by elevating instream fine sediment levels during decommissioning and storage work. Elevated fine sediment production can decrease habitat diversity, degrade spawning and rearing habitat and reduce aquatic insect production. Increased turbidity from road decommissioning can displace fish and other aquatic organisms temporarily. However, downstream effects from road crossing alterations on decommissioned roads are of very short duration, based on past monitoring of similar previous projects (Wegner 1999). The long-term effects from these activities are expected to benefit fish habitat by restoring natural drainage patterns and reducing the risk of future road and culvert failures. Aquatic species habitat would benefit from road decommissioning in the long term due to decreased embeddedness, width-to-depth ratio, sediment, and water temperature, increased pool depth, LWD recruitment, and improved stream bank condition.

Overall, road decommissioning would accelerate the attainment of INFISH RMOs. Therefore, short term effects to aquatic habitat and populations from road decommissioning treatments are expected to be minimal under Alternatives 2, 3, and 4; long term effects are expected to be beneficial.

Designated Critical Habitat

Watershed restoration and road stabilization has the potential to affect the following PCEs: #3 forage, #6 spawning and rearing substrate, and #8 water quality and quantity. While the proposed road stabilization work, culvert removal, and related channel reconstruction has the potential for affecting critical habitat in O'Brien Creek, all of this work will take place at higher elevations of upper O'Brien Creek and tributaries to O'Brien Creek, outside of critical habitat. Much of the sediment produced from active storage and decommissioning may not reach bull trout critical habitat as it may become trapped in wetlands in upper O'Brien or may stop at intermittent sections of tributaries (i.e. Hummingbird Creek). Effects to critical habitat will therefore be negligible.

Recreation Improvements

Under all action alternatives the Kilbrennan Lake Campground boat ramp would be improved using concrete to replace the native material. In addition, the stream crossing on Trail 196 on Prospect Creek would be improved for recreation and watershed improvement. Both improvements are small scale projects which would produce minimal sediment in the short term but should reduce sediment contribution to the respective waterbodies in the long term. Neither Kilbrennan Lake nor Prospect Creek is designated as bull trout Critical Habitat.

Effects of the Action Alternatives on Recreational Fishing

Most streams in the analysis area do not provide a high degree of recreational opportunity for fishing because of their small size. Kilbrennan Lake is a popular recreational fishery. O'Brien Creek, Arbo Creek, and Wee Lake support a low level of recreational fishing. With these exceptions, affected watersheds, especially those on National Forest System lands, provide a limited degree of recreational fishing. There may be some short-term adverse effects to fish habitat, and therefore recreational fishing, as a result of stream crossing work associated with

road activities. However, these activities are not expected to affect entire fish populations and would result in long-term improved watershed condition and potentially contribute to an upward trend in fish abundance. None of the alternatives decreases access to fishing areas including Kilbrennan Lake, Arbo Creek, Wee Lake, and O'Brien Creek. The proposed boat ramp improvement at Kilbrennan Lake (see Chapter 2) will actually increase access to fishing at this location. There are no other known potential effects to recreational fishing.

Cumulative Effects

Past Actions and their Effects on Current Conditions

As described in Chapter 3, Water Resources section, past timber harvest, road construction, and wildfires impacted aquatic resources within the project area mainly through increased sedimentation and water yield. Timber harvest and wildfire has elevated water yields by reducing tree canopy and allowing more water to reach the stream, which has caused the streams to widen through increases in channel erosion. This widening is reflected in the consistently high (greater than 10) existing RMO width/mean depth ratios recorded in project area streams. Forest roads have elevated water yields by intercepting ground water and routing water down ditches to the streams.

Contrasting Effects of Proposed Actions with Past Actions

Since the INFISH amendment (1995) to the 2015 Forest Plan, riparian buffers are left intact, thus limiting the effects to riparian habitat and stream channels. Because proposed actions have been designed to minimize effects to fish habitat, or in the case of watershed improvement/road stabilization work to improve fish habitat, project area streams would continue to trend toward attainment of INFISH RMOs.

Climate Change

Generally speaking, climate change presents a threat to aquatic habitat with projected effects on water temperature and quantity. Recent warming has already driven significant changes in the climate, with a shift towards more rainfall and less snow in the western U.S. (Knowles et al. 2006). Likewise, the peak of spring snowmelt is two weeks earlier in recent years, and this trend is anticipated to continue (Stewart et al. 2004). Probable effects of climate change in the western U.S. will be increased water shortages and warmer water temperatures. These conditions may further restrict distribution of cold water dependent species such as bull trout (Rieman et al. 2007) and cutthroat trout (Williams et al. 2009) while increasing distribution of non-native species more tolerant of warmer temperatures such as brook trout and brown trout (Rahel et al. 2008).

In addition, changes in timing of spring runoff and temperature may alter spawning cues that have maintained temporal segregation of native and nonnative species. However, in highly dissected mountainous areas, such as those within the project area, local responses are highly variable (based on flow regimes, topography, and geology), and current climate models cannot reasonably predict responses at a practical scale. The past and present effects of climate change on project area fish habitat and populations are reflected in the existing condition. Within the 10-year temporal bounds of this analysis, ongoing effects of climate change are not expected to significantly alter baseline habitat conditions.

Cumulative Effects of Ongoing and Reasonably Foreseeable Actions

Ongoing timber management, road maintenance, fire suppression, and weed control activities would be conducted in accordance with INFISH guidelines and designed to minimize or prevent effects to fish habitat.

Reasonably foreseeable activities on private lands within the project area include timber harvest, road building, home site and septic system development, road construction and maintenance, riparian disturbance, streambank armoring, and water withdrawals. Effects to fish habitat resulting from these practices include reduced channel stability, decreased habitat complexity, increased nutrient inputs, increased sedimentation, increased stream temperature, and reduced base flows. Although all of these activities are likely to occur, the amount and intensity on private land would not change the scope or magnitude of effects anticipated from this proposal.

Timber Management

Timber stand improvement within the project area is in the planning phase and is scheduled to occur sometime from 2016 - 2021. These activities include hand thinning and pruning. By default, precommercial thinning occurring outside RHCAs will not retard attainment of RMOs. If precommercial thinning is proposed within riparian zones, it will be done in a manner consistent with INFISH standards and guidelines for timber management (TM-1a, TM-1b; USDA Forest Service 2015).

In addition to precommercial thinning, firewood cutting in the project area will continue. Firewood cutting may occur within RHCAs but is not permitted within 100 feet of any stream. The small scale of tree removal for firewood would preclude measurable effects to fish habitat.

Road Activities

Road maintenance activities would continue as outlined in the Programmatic Road Maintenance Biological Assessment (USDA Forest Service 2013). Activities such as blading, ditch maintenance, resurfacing, snowplowing, and graveling which are done under the auspices of this BA would have a discountable effect to fisheries resources because of design features protecting resource values.

Fire Suppression

Fire suppression activities would continue within the project area. These activities can affect fish. Mortality can occur if toxic fire retardants and fuels are applied to streams or lakes. However, INFISH has clear guidelines regarding retardant, fuel storage and handling and fire suppression activities within RHCAs.

Weed Control

Spraying to control weeds may take place within the area under the Kootenai National Forest Invasive Plant Management Final Environmental Impact Statement and Record of Decision (2007). Design features to protect aquatic species and habitats are included in the decision and are used during implementation. Therefore management of invasive weed species is not expected to contribute toward cumulative effects on aquatic species and habitats.

Data Gathering Activities

Field surveys to gather resource data are likely to continue to occur within the project area. Types of data collection may include vegetation surveys, fire history sampling, cultural resource surveys, ecodata plots, wildlife habitat surveys, noxious weeds surveys, stream surveys, road maintenance surveys, and fuels surveys. These activities are unlikely to impact aquatic species and habitats.

Public Actions on Forest Service Lands

Recreation use will continue; this includes driving open roads, snowmobiling, hunting, fishing, hiking, berry picking, and other activities. These activities are guided by various laws and regulations designed to maintain aquatic species and habitats.

Actions on Private Lands

Within the project area continued development of private land is certain. Development is expected to include commercial timber harvest, subdivision, land clearing, home construction, septic field installation, road construction, water well drilling, livestock grazing, and riprap of migrating stream banks. The Stimson Lumber Company is planning on constructing a short stretch (0.16 miles) of road atop Yaak Mountain which would contain no stream crossings and would have no effects on aquatic species and habitats.

Combined Effects from Past, Proposed, Ongoing and Foreseeable Actions

Implementation of this project in conjunction with the past, proposed, and ongoing activities in the project area would not measurably affect fisheries populations, aquatic or riparian habitat. Although some fish habitat conditions in some stream reaches measured during the 2014 field season currently do not meet desired RMO conditions, ongoing proposed activities would not retard the natural rate of attainment of RMOs.

2015 Forest Plan Consistency of the Action Alternatives

The proposed activities implement default RHCAs to protect riparian resources and function. None of the action alternatives propose harvest or ignition of prescribed burns in RHCAs, and effects from water yield increases would be minimal. Channel conditions would therefore be protected. Proposed channel restoration work would result in a net improvement in channel conditions and water quality within the project area. This would not retard the attainment of RMOs within the project area. Road construction and reconstruction would apply appropriate BMPs to manage surface water runoff and culverts would be appropriately sized to reduce risk of future failure. Recreation site management would meet Forest Plan direction to operate facilities in a manner that does not retard attainment of riparian management objectives. The proposed action and alternatives are consistent with forest wide riparian standards and guidelines and are further discussed below.

GOAL-RIP-01. Maintain or improve riparian areas in order to support the ecological functions.

> The proposed action would contribute to progress toward this goal, primarily through the application of RHCA buffers, improved management of recreational use of riparian areas and roads, and implementation of watershed restoration and road stabilization.

GOAL-AQH-01. Restore aquatic habitats where past management activities have affected stream channel morphology or wetland function.

> Implementation of watershed restoration via culvert removals and stream crossing stabilizations will aid in returning stream channel morphology to its natural state in many locations within the project area. Therefore, the OLY project would contribute to progress toward achieving this goal.

GOAL-AQS-01. Maintain or improve the distribution of native aquatic and riparian dependent species and contribute to the recovery of threatened and endangered aquatic species.

> The proposed action would maintain the current distribution of native species in the O'Brien Creek drainage. Therefore, the OLY project would contribute to progress toward achieving this goal.

FW-DC-RIP-01. Riparian Habitat Conservation Areas (RHCAs) have healthy, functioning riparian systems and associated habitats that support well-distributed native and desired non-native plant, vertebrate, and invertebrate communities.

> Conditions in RHCAs would be maintained or improved during all vegetation management and watershed restoration activities. The decommissioning of 0.3 miles of NFSR 2380 along North Fork O'Brien Creek is one example of how RHCAs will be improved. Therefore, the OLY project would contribute to progress toward achieving this desired condition.

FW-DC-RIP-02. Riparian and aquatic ecosystems, including stream channel integrity, channel processes, and sediment regimes function characteristically for a given landscape and climatic setting.

> The proposed action would maintain or improve stream channel integrity, channel processes, and sediment regimes through application of RHCA buffers, BMPs on roads, and watershed restoration/road stabilization in the project area. Therefore, the OLY project would contribute to progress toward achieving this desired condition.

FW-DC-RIP-03. Water quality provides stable and productive riparian and aquatic ecosystems. Streams and lakes are free of chemical contaminants and do not contain excess nutrients. Sediment levels are within reference conditions, supporting salmonid spawning and rearing, and cold water biota requirements.

> The proposed action moves the project area waters towards this desired condition through application of BMPs on roads and watershed restoration/road stabilization that would reduce fine sediment inputs from unstable banks. Therefore, the OLY project would contribute to progress toward achieving this desired condition.

FW-DC-AQH-01. Waterbodies, riparian vegetation, and adjacent uplands provide habitats that support self-sustaining native and desirable non-native aquatic communities, which include fish, amphibians, invertebrates, plants, and other aquatic-associated species. Aquatic habitats are diverse, with channel, lacustrine, and wetland characteristics and water quality reflective of the climate, geology, and natural vegetation of the area. Water quality supports native amphibians and

diverse invertebrate communities. Streams, lakes, and rivers provide habitats that contribute toward recovery of threatened and endangered fish species and address the habitat needs of all native aquatic species.

> The proposed action would improve riparian vegetation and move it closer to desired reference conditions through the implementation of INFISH RHCAs. Therefore, the OLY project would contribute to progress toward achieving this desired condition.

FW-DC-AQH-02. Connectivity between waterbodies provides for life history functions (e.g., fish migration to spawning areas, amphibian migration between seasonal breeding, foraging, and overwintering habitats) and for processes such as recolonization of historic habitats. Stream channels supply the required structure for desired stream habitat features.

> Stream conditions would be maintained or improved through the implementation of INFISH RHCAs and watershed restoration/road stabilization. Therefore, the OLY project would contribute to progress toward achieving this desired condition.

FW-DC-AQH-03. Conservation subwatersheds provide habitats that can support population strongholds of federally listed and sensitive species. Conditions in restoration subwatersheds improve to support population strongholds.

> O'Brien Creek is an active restoration subwatershed. Watershed restoration/road stabilization and implementation of BMPs on roads, would all improve conditions for TES species present in the watershed. Therefore, the OLY project would contribute to progress toward achieving this desired condition.

FW-DC-AQH-04. Rare and unique aquatic habitats, such as waterfalls and rock outcrops, are healthy and provide for associated native plant and animal communities.

> The large, multi-tiered waterfalls in upper O'Brien Creek adjacent to NFSR 752 and in North Fork O'Brien Creek do not have activities units proposed nearby and in any case INFISH RHCAs will be applied. Health of these features will be maintained. Therefore, the OLY project would contribute to progress toward achieving this desired condition.

FW-DC-AQH-05. Stream channels supply the required structure for desired stream habitat features such as pools, pool tails, banks, large woody material, backwaters, and riffles that provide aquatic species the necessary niches for holding, overwintering, spawning, cover, rearing, and feeding.

> Implementation of INFISH RHCAs and watershed restoration/road stabilization would improve habitat complexity, pool frequency, large woody debris availability, bank and channel stability, and riparian vegetative condition. Therefore, the OLY project would contribute to progress toward achieving this desired condition.

FW-STD-RIP-01. When RHCAs are intact and functioning at desired condition, then management activities shall maintain or improve that condition. Short-term effects3 from

activities in the RHCAs may be acceptable when those activities support long-term benefits4 to the RHCAs and aquatic resources.

> Actions to improve RHCA function are included in the proposed action including channel restoration and road stabilization. RHCA buffers are incorporated in the proposed action to maintain conditions in other areas. Therefore, the OLY project is designed in accordance with this standard.

FW-STD-RIP-02. When RHCAs are not intact and not functioning at desired condition, management activities shall include restoration components that compensate for project effects to promote a trend toward desired conditions. Large-scale restoration plans or projects that address other cumulative effects within the same watershed may be considered as compensatory components and shall be described during site-specific project analyses.

> There are areas in the project area where existing roads are in close proximity to stream channels and hence RHCAs are not intact and functioning at desired condition. The proposed action includes compensatory components to promote a trend toward desired conditions. These include road rerouting, BMP implementation, and active road decommission and storage. Therefore, the OLY project is designed in accordance with this standard.

FW-STD-RIP-03. The INFISH direction in the Decision Notice (USDA Forest Service, 1995) and terms and conditions in the Biological Opinion (US Fish and Wildlife Service, 1998) shall be applied, with the following clarifications (see appendix B):

INFISH Priority Watersheds have been added to and adapted into Conservation and Restoration Watersheds;

The description of Standard Widths Defining Interim RHCAs is consistent for all Category 4 streams or water bodies: The area from the edges of the stream channel, wetland, landslide, or landslide-prone area to a distance equal to the height of one site-potential tree, or 100 feet slope distance, whichever is greatest;

Site-specific widths can be changed (increased where necessary to achieve management goals and objectives, or decreased where interim widths are not needed to attain RMOs or avoid adverse effects) and requires documentation of rationale supporting the change, but does not require watershed analysis or an amendment; and

These INFISH "standards and guidelines" are defined as standards: TM-1, MM-3, MM-4, MM-5, and RA-4. All others are defined as guidelines.

> Stream buffers have been incorporated into sale layout and unit design. The wet areas and corresponding INFISH RHCAs would be avoided. All proposed activities were designed in accordance with this Forest Plan standard.
>
> Based on these factors it is determined that all action alternatives are consistent with the Forest Plan.

Statement of Findings for All Alternatives

Support for the OLY effects determination can be found within the Biological Assessment (BA) (pp. 33-94) which was submitted to U.S. Fish and Wildlife Service on March 30, 2016. Upon completion of formal consultation and receipt of the Biological Opinion (BO), both the BA and BO will be available within the Project Record.

Threatened, Endangered Species

Alternatives 1, 2, 3, and 4 would have **No Effect** on white sturgeon. This conclusion is based on the lack of evidence linking forest management to sturgeon viability.

Based on the analysis, Alternative 1 (no action) would have **No Effect** on bull trout or designated bull trout critical habitat.

Alternatives 2, 3, and 4 each **May Affect, and is likely to adversely affect** bull trout. This determination is based on site specific impacts related to the proposed watershed restoration activities and their short term impacts, such as increases in turbidity and sediment delivery to downstream habitat. These activities would result in short-term effects to bull trout individuals.

Designated Critical Habitat

Based on the analysis, Alternative 1 (no action) would have **No Effect** on designated bull trout critical habitat.

Alternatives 2, 3, and 4 each **May Affect, and is likely to adversely affect** bull trout critical habitat. This determination is based on site specific impacts related to the proposed watershed restoration activities and their short term impacts, such as increases in turbidity and sediment delivery to downstream habitat. These activities would temporarily affect the following critical habitat PCEs: #6 spawning and rearing substrate and #8 water quality.

Sensitive Species

The action alternatives **May Impact Individuals or Habitat, but will not likely contribute to a trend toward Federal listing or loss of viability to the population or species** for westslope cutthroat trout. This determination is based on the short-term effects from the proposed watershed restoration activities and BMP implementation on existing roads and their potential impacts to habitat in the O'Brien and Arbo watersheds. Other aspects of the action alternatives associated with timber harvest and prescribed burning would not affect westslopes or their habitat due to the location of activities and implementation of RHCA buffers. Alternative 1 would have no impact on westslope cutthroat trout. This assessment constitutes the biological evaluation for westslope cutthroat trout.

The action alternatives **May Impact Individuals or Habitat, but will not likely contribute to a trend toward Federal listing or loss of viability to the population or species** for the Columbia Basin (Interior) redband trout. This determination is based on the effects from the proposed watershed restoration activities and other active road work and their potential short-term impacts to habitat in the Kilbrennan watershed as well as the stream crossing improvement in Arbo Creek. Other aspects of the action alternatives associated with timber harvest and prescribed burning would not affect redband trout or their habitat due to the location of activities and implementation of RHCA buffers. Alternative 1 would have no impact on interior redband trout. This assessment constitutes the biological evaluation for interior trout.

The action alternatives would have **No Impact** on the western pearlshell mussel. This determination is based on: a) the absence of mussels in all project area survey reaches, and b) the lack of suitable habitat in the project area drainages. This assessment constitutes the biological evaluation for western pearlshell mussels.

Cultural Resources

Introduction

Cultural and heritage resources include both archaeological sites and historic structures that reflect past human interactions as well as human use of the landscape and its resources. These historic properties have value for their association with important events or people in our history, their distinctive historical style, or their potential to provide information about our past. Cultural resources that are determined to be eligible for the National Register of Historic Places (NRHP) are considered historic properties that are managed to avoid or mitigate impacts to their integrity.

Regulatory Framework

The Forest Service and other Federal Agencies are required to manage historic properties in the United States under several statutes, most notably the National Historic Preservation Act of 1966 (NHPA). These requirements are regulated through 36 CFR 800 and are carried forward in the Forest Plan standards (USFS 2015:36).

Historic properties are identified through a cultural resource inventory and are determined as *eligible* based on their ability to yield information about the past or their relation to important events, persons or historical styles. Cultural resource inventories must be completed prior to road construction, timber harvest, or any other ground-disturbing activities that may have the potential to impact historic properties. Historic properties are managed to either protect them in-place or to mitigate adverse project effects. The State Historic Preservation Office (SHPO) reviews eligibility and management provisions and provides comments about project effects on cultural resources. The process of consultation with SHPO must take place prior to impacts on the ground unless the inventory results fall within a scope of a memorandum of understanding between the Kootenai National Forest (KNF) and SHPO that streamlines consultation.

The 2015 Kootenai Forest Plan includes the following desired conditions relative to cultural resources:

FW-DC-CR-01. Cultural resources are inventoried, evaluated for inclusion on the NRHP, and managed according to their allocation category, including preservation, enhancement-public use, or scientific investigation. National Register *ineligible* cultural resources may be released from active management. Until evaluated, cultural resources are treated as National Register *eligible*. Historically and archaeologically important cultural resources and traditional cultural properties are nominated to the National Register.

FW-DC-CR-02. Cultural resources are safeguarded from vandalism, looting, and environmental damage through monitoring, condition assessment, protection, and law enforcement measures. Interpretation and adaptive use of cultural resources provide public benefits and enhance understanding and appreciation of KNF prehistory and history. Cultural resource studies provide relevant knowledge and perspectives to KNF land management. Artifacts and records are stored in appropriate curation facilities and are available for academic research, interpretation, and public education.

The following guidelines for cultural resources are also included:

FW-GDL-CR-01. Cultural resource protection provisions should be included in applicable contracts, agreements, and special use permits for National Register-listed or *eligible* properties.

FW-GDL-CR-02. Historic human remains should be left undisturbed unless there is an urgent reason (e.g., human health and safety, natural event, etc.) for their disturbance.

The location of cultural resource sites is exempt from public disclosure as described in The Forest Service Handbook sections 6209.13, 11.2, and 11.22. The exemption protects sites from harm and retains confidentiality of sites culturally significant to American Indian Tribes.

Analysis Area

The Lower Yaak, O'Brien, and Sheep (OLY) project area is located north of the Kootenai River near its confluence with the Yaak River, and east of the Yaak River near it's confluence with the Kootenai River. This project area includes numerous treatment units that include up to 3,127 acres of timber harvest units and 1,716 acres of fuels treatment (848 acres of fuels units and 868 acres of ecosystem prescribed burns) in Alternative 2 (Modified Proposed Action). Most of these units are located within the Kilbrennan Creek, O'Brien Creek, Lynx Creek, Surprise Gulch, Koot Creek, and China Creek watersheds of the Kootenai and Yaak rivers. The area of potential effect (APE) for cultural resources includes the proposed harvest units, fuels treatment units, landings, and any new and existing roads used to access these areas.

Methodology Used to Collect Data and Make Scientific Findings

Analysis of cultural resources within the OLY project area began with a review and synthesis of all pertinent literature, records, and documentation available on the history of the project and surrounding areas. This information is both from background historic information and prehistoric research, as well as from many years of Forest Service heritage resource inventories within and adjacent to the project area. Information on previously documented sites also allowed some idea of the type, frequency, and location of sites likely to be found within the analysis area.

This synthesis of past data was then used during field inventories of the proposed APE and adjacent areas of high probability for sites. These inventories included both pedestrian surveys and subsurface testing, with the method of survey adjusted according to the probability of historic or prehistoric materials being recovered in the area. Information from past KNF inventories was used to cover a current APE if upon review it met current inventory standards. Additional inventory was then conducted of the APE in areas where no previous inventory was conducted, where previous inventory was not adequate or around known sites to relocate and verify their location.

Areas of low, medium, and high probability for the occurrence of cultural properties within proposed areas of activity were identified prior to conducting the cultural resource inventory. High probability areas for both historic and prehistoric properties, such as ridges and terraces adjacent to natural water sources, were chosen for more intensive inventory and were selectively shovel tested for subsurface artifacts. Some harvest units and areas planned for "ecosystem burning," on the other hand, are generally steep and have a low probability for the presence prehistoric sites. These areas are most likely to contain historic mining or logging sites, which can often be identified during pre-field research through a study of historic records. Therefore, such areas were generally covered with pedestrian transects, but not tested for subsurface artifacts where no surface expression was observed.

Once the inventory is completed, identified cultural resources within the project area will be evaluated to determine their eligibility for the NRHP. For those considered *eligible*, the potential

effects of the project on that historic property are analyzed. Where adverse effects may occur to a historic property, measures will be designed and implemented to mitigate these effects. The SHPO is consulted for concurrence on each of these three steps. The consultation on all three steps is will be conducted simultaneously.

Measurement Indicators

Indicators for heritage resources are measured in terms of beneficial or adverse effects to historic properties eligible for the NRHP.

Beneficial effects could include stabilizing a historic property by controlling erosion of an archaeological site, restoring and maintaining a historic building, or reducing fuel concentrations around a historic property. Beneficial effects are designed and agreed upon through consultation conducted under Section 106 of the NHPA with the SHPO. In some cases where a beneficial action is possible, a no action determination that does not implement the beneficial action could be adverse if it allows greater degradation or deterioration of the historic property.

Adverse effects are impacts to the integrity of the property which destroy a portion or all of the property and the information it could yield. A direct adverse impact occurs during an activity itself, such as when a road is built through a historic property and the construction process destroys or damages the site. Indirect adverse impacts are a side effect of the activity or occur after the activity is complete, like when runoff from a road erodes a historic property adjacent to it.

This planning process allows adverse impacts to be avoided altogether through project design or mitigated through scientific investigation so that there are no adverse effects to *eligible* historic properties. These avoidance or mitigation measures are agreed to in consultation conducted under Section 106 of the NHPA with the Montana SHPO and allow the project to proceed in compliance with the NHPA.

Affected Environment

The archaeological record suggests that the Kootenai and Yaak River Valleys were not inhabited until approximately 8,000 years before present (BP), after the continental ice sheets that once covered the region had retreated, and the glacial lakes that filled the area had drained. These early native inhabitants were foraging peoples, whose hunting and gathering lifestyle meant that they were highly mobile and lived most of the year in small groups. They moved their camps to take seasonal advantage of fish runs, animal migrations, and seasonal plants. Base camps, where groups would remain for longer periods of time, were often located on river or stream terraces, where plants, animals, and fish were both harvested and processed for storage. Native peoples also used special purpose camps, which are smaller sites that were exploited for a specific purpose over a shorter period of time. From these camps they hunted, collected particular plants and gathered raw tool materials such as argillite and quartzite. The archaeological remnants of these prehistoric native peoples are found in campsites, rock art, trees peeled for their cambium, stone hunting blinds, and any number of other types of sites and features. These early inhabitants of the Kootenai and the Yaak were ancestral to the Salish and Kootenai tribes. Other tribes also used the area, including the Upper Pend Oreille, Coeur d'Alene, and Kalispel people.

The Yaak River Valley was part of a prehistoric travel corridor that both provided access to the entire Yaak Valley and offered a north-south route through the heart of the Kootenai River drainage. According to Kootenai ethnographer Harry Turney-High, an anthropologist who worked

with the Kootenai in the early 1900s, the confluence of the Yaak and the Kootenai was a recognized border between Upper and Lower Kootenai territory (Turney-High 1941:15). The designation of Upper and Lower Kootenai is recognized as a cultural definition amongst the prehistoric Kootenai, differentiating between groups with slightly different subsistence patterns and different dialects of the Kootenai language. In addition, Turney-High believes there was a Kootenai band that was based in this area, known as the "a Kiyienek," or arrow band (Ibid 1941:16). The word Yaak is believed to be derived from the Kootenai word for arrow, which is sometimes spelled "A'ak."

Archaeological evidence suggests the Yaak River drainage was utilized frequently, but the artifacts that have been found suggest that long-term residential camps were not common in the Yaak. In general, it appears prehistoric people were visiting the area either to travel through or for specific hunting, foraging, or other resource-gathering forays.

In the early 1800s, fur trappers entered northwest Montana, including the Kootenai River Valley. The Northwest and Hudson's Bay Fur Companies established early fur trading posts near Kootenai Falls and in other places along the Kootenai and in Northern Idaho. Though European fur traders may not have spent significant time in the Yaak Valley at this time, the demand for furs and hides influenced the aboriginal economy, causing native peoples to focus more time and energy on trapping then they had previously. In the 1860s, European trappers began to give way to miners. In 1864, miners on their way to a gold rush in Wild Horse Creek in Canada made their way through the Yaak Valley, and although they did find some placer gold in the river, did not stay to work it. In the 1880s, prospectors began to return to the valley, and by 1890 a number of claims had been filed in the Lower Yaak. From 1893-1895, there was a gold rush in the Yaak Valley, and the boom town of Sylvanite sprang up. By 1897, Sylvanite had a population of 600 people, but by 1898, most of those people had disappeared. Much of what remained of the town of Sylvanite burned in 1910, putting a halt to activity at several mines that continued to operate in the area. The 1930s saw the resumption of some mining activity in the Yaak, particularly with the reopening of the Keystone Mine.

By the end of April 1892, two sections of the Great Northern Railroad, one that was being built from Bonners Ferry towards Libby and another being built from Libby toward Bonners Ferry, met at what became the "Yakt" railroad siding, on the west side of the Kootenai near the confluence of the Yaak and Kootenai Rivers. The coming of the railroad forever changed the Kootenai and the Yaak Valleys by lessening the geographic isolation of the region and opening it up for settlement (Miss 1994). The railroad carried both people and products to and from the mines, lumber camps, homesteads and fledgling towns that were springing up along the major drainages. The 1910 fires had a profound influence on the area as a whole because of their intensity and the immense area they covered. Most of the forest in the project area burned during this fire.

Some early logging took place in the Yaak Valley in the 1910s and 1920s, but access to the valley and transportation of the logs was still difficult at this point. A logging railroad was constructed some distance up Pipe Creek, but never up the main stem of the Yaak River, itself. In the 1940s and 1950s, the demand for spruce, improvements in the Yaak Highway, and the use of logging trucks opened the Yaak up for logging in earnest.

The prehistoric sites within the OLY project area are largely concentrated along the Yaak and Kootenai Rivers. There are also several historic sites within the project area, some of which are eligible for inclusion on the NRHP. As a result, the treatment units were designed to avoid these

areas and the majority of the sites are outside of the APE for this project. However, there are two historic properties that will require additional resource protection measures to avoid adverse effects if the modified proposed action is chosen.

The evidence of these past occupations can be diminished in value by any change in their historical, architectural, archaeological, or cultural character. Adverse impacts to historic properties can result in their damage or complete destruction, the effects of which are irreversible. In cases of partial damage, the undisturbed portion of the site may still yield valuable information. The Forest Plan, in accordance with Section 106 of the NHPA, requires integration of cultural resource management into the overall multiple resource management effort in order to avoid or minimize adverse impacts. As a result, the design features below will be followed when implementing project activities in order to minimize impacts to historic properties. In addition, the Forest must work closely with the appropriate scientific community and American Indian Tribes concerning these resources.

Design Features

- Upon earth moving activities, if an inadvertent discovery occurs, project work in the area shall stop and the District Archaeologist and Tribal Liaison will be notified immediately. If human remains are uncovered, all activities in the area will be immediately suspended and the District Archaeologist, Tribal Liaison and local law enforcement will be notified. Project work in the area of the inadvertent discovery can resume once the discovery has been assessed by KNF Heritage Personnel and appropriate resource protection measures have been implemented.
- Intact portions of *eligible* or *unevaluated* historic properties will be flagged and avoided during project implementation.
- In culturally sensitive areas with previous surficial disturbance, but potentially intact subsurface cultural deposits, activities must be conducted over dry or frozen ground. See Design Criteria in Chapter 2.
- New road construction and reconstruction of existing roads beyond standard maintenance (e.g. expanding the road prism, adding pull-outs, or adding new hydraulic features) will be assessed by the District Archaeologist prior to implementation.
- Landings placed outside harvest units will be assessed by the District Archaeologist prior to any ground disturbing activities.
- Any areas subject to ground disturbance in association with expansion of trails or parking areas for recreational use will be assessed by the District Archaeologist prior to implementation.

Site Specific Features to Minimize Impacts to Historic properties:

- Filter cloth and gravel or pit run will be placed on National Forest System Road (NFSR) 4447 between US Highway 2 and NFSR 4458 and NFSR 4458G between NFSR 4458 and NFSR 14476 to prevent disturbance to subsurface cultural deposits.
- Avoid piling on historic properties features (e.g. can dumps, foundation remains, ditches, root cellar depressions), specifically in Units 44 and 37 (in Alternative 2), and F31 (all alternatives).
- In unit F30 hand fire line construction is limited to predetermined locations to protect historic properties. Fire line construction must be monitored at all times by the Tribal

Liaison and may be halted if any cultural materials are found. These requirements are only applicable to Alternatives 2 and 4.

- The Tribal Liaison and/or KNF Heritage Personnel must be present for pre- and post-burn monitoring for Units F11, F16, F17, F30-F36, and 24, 27, 33, 34, 35, 35A, 36, and 38A.
- Winter logging over frozen ground and a cut-to-length system (log forwarding) is required in Harvest Units 33, 34, 35, 35A, 36, 37 (west side of powerline only), and 41B. Winter logging in these units will require a cut-to-length system operating on at least 1 inch of frozen soil. During harvest operations, the harvester shall place tops and limbs evenly in the skid trail as it proceeds. Landing locations in these units will be specified in advance of the award of the contract (C6.4#, C6.42#).
- Reuse existing skid trails, roads, and landings to the greatest extent feasible.

Environmental Consequences

Direct and Indirect Effects Alternative 1 – No Action

Under this alternative, no actions are proposed and any previously recorded or as yet undiscovered sites would remain undisturbed. Historic properties would be subject to natural deterioration and decay. The analysis of the no action alternative provides reviewers with a baseline to compare the magnitude of effects on cultural resources from the action alternatives with the potential long-term impacts from not implementing the project.

Direct Impacts. Implementation of the no action alternative would have no direct impact on any known cultural resources. However, under this alternative no surveys would be conducted to locate and identify any previously unrecorded sites, as would occur under either action alternative.

Indirect Impacts. Although there would be no direct impacts under this alternative, fuels would continue to build up over time and could result in a high severity wildfire. This may potentially burn historic structures and other historic resources, and could even impact prehistoric resources by causing spalling or cracking of stone artifacts. Furthermore, because no surveys would be conducted under this alternative, no protective measures could be taken to protect currently unidentified cultural resources within the project area in the event of a wildfire.

Cumulative Impacts. Because no action would be implemented, there would be no cumulative effects to cultural resources with implementation of this alternative.

Direct and Indirect Effects Alternative 2 – Modified Proposed Action

This alternative includes a total of 1,716 acres of fuels treatment (848 acres of fuels units and 868 acres of ecosystem prescribed burns) that will include slashing, chipping, under-burning, hand pile burning, and lop and scatter treatments. This alternative also includes 3,127 acres of timber harvest units.

Direct Impacts. In total there are 29 known NRHP *eligible* or *unevaluated* cultural sites within or directly adjacent to the proposed units and associated access roads (10 prehistoric, 10 historic, and five multicomponent sites that include both historic and prehistoric remnants). Although mitigation measures will be provided to protect any at risk *eligible* or *unevaluated* sites, in compliance with section 106 of the NHPA, potential adverse impacts may include:

1) Stratigraphic disturbance of both known and previously unknown archaeological sites as a result of digging hand-lines, blazing skid roads, or otherwise using ground based equipment.
2) Burning of historic structures or artifacts in the event that fuels reduction burning activities accelerate out of control.

Indirect Impacts. Indirectly, increased artifact visibility and accessibility following the implementation of fuels reduction and timber harvest treatments could result in impacts to cultural resources associated with the potential for looting within the treated areas. However, implementation of this alternative could also result in beneficial impacts to cultural resources by reducing the risk of widespread high-severity wildfires throughout the project area. These wildfires have the potential to burn historic structures, result in mudslides or other post-wildfire erosional effects to cultural resources, or expose archaeological resources to human disturbance by removing protective vegetation cover.

Direct and Indirect Effects Alternative 3

This alternative includes a total of 1,744 acres of fuels treatment (876 acres of fuels units and 868 acres of ecosystem prescribed burns)that will include slashing, chipping, under-burning, hand pile burning, and lop and scatter treatments. This alternative also includes 3,069 acres of timber harvest units.

Direct Impacts. In total there are 12 known NRHP *eligible* or *unevaluated* cultural sites within or directly adjacent to the proposed units and associated access roads (two prehistoric, eight historic, and two multicomponent sites that include both historic and prehistoric remnants). Although mitigation measures will be provided to protect any at risk *eligible* or *unevaluated* sites, in compliance with section 106 of the NHPA, potential adverse impacts may include:

1) Stratigraphic disturbance of both known and previously unknown archaeological sites as a result of digging hand-lines, blazing skid roads, or otherwise using ground based equipment.
2) Burning of historic structures or artifacts in the event that fuels reduction burning activities accelerate out of control.

Indirect Impacts. Indirectly, increased artifact visibility and accessibility following the implementation of fuels reduction and timber harvest treatments could result in impacts to cultural resources associated with the potential for looting within the treated areas. However, implementation of this alternative could also result in beneficial impacts to cultural resources by reducing the risk of widespread high-severity wildfires throughout the project area. These wildfires have the potential to burn historic structures, result in mudslides or other post-wildfire erosional effects to cultural resources, or expose archaeological resources to human disturbance by removing protective vegetation cover.

Direct and Indirect Effects Alternative 4

This alternative includes a total of 1,730 acres of fuels treatment (862 acres of fuels units and 868 acres of ecosystem prescribed burns) that will include slashing, chipping, under-burning, hand pile burning, and lop and scatter treatments. This alternative also includes 2,606 acres of timber harvest units.

Direct Impacts. In total there are 15 known NRHP *eligible* or *unevaluated* cultural sites within or directly adjacent to the proposed units and associated access roads (five prehistoric, eight historic,

and two multicomponent sites that include both historic and prehistoric remnants). Although mitigation measures will be provided to protect any at risk *eligible* or *unevaluated* sites, in compliance with section 106 of the NHPA, potential adverse impacts may include:

1) Stratigraphic disturbance of both known and previously unknown archaeological sites as a result of digging hand-lines, blazing skid roads, or otherwise using ground based equipment.
2) Burning of historic structures or artifacts in the event that fuels reduction burning activities accelerate out of control.

Indirect Impacts. Indirectly, increased artifact visibility and accessibility following the implementation of fuels reduction and timber harvest treatments could result in impacts to cultural resources associated with the potential for looting within the treated areas. However, implementation of this alternative could also result in beneficial impacts to cultural resources by reducing the risk of widespread high-severity wildfires throughout the project area. These wildfires have the potential to burn historic structures, result in mudslides or other post-wildfire erosional effects to cultural resources, or expose archaeological resources to human disturbance by removing protective vegetation cover.

Direct and Indirect Effects Common to all Action Alternatives

There is the potential for adverse effects to cultural resources under all of the action alternatives. Direct impacts would most likely consist of disturbance of both known and previously unknown archaeological sites as a result of digging hand-lines, blazing skid roads, or otherwise using ground based equipment. The design features listed above should prevent or minimize these impacts. Indirectly, increased artifact visibility and accessibility following the implementation of fuels reduction and timber harvest treatments could result in impacts to cultural resources associated with the potential for looting within the treated areas. These indirect effects can be minimized by rehabilitating ground disturbance areas and closing any temporary roads and skid roads created or reopened during the course of this project.

If previously unrecorded cultural sites are encountered in the course of further inventory or project implementation, Heritage Specialists will consult with the SHPO, as required by law, to determine the significance of the discovery and the effects of the project upon them. As required by Section 106 of the NHPA, the SHPO will also be consulted about any adverse effects to known cultural sites prior to project implementation. The Confederated Salish and Kootenai Tribes will be included in discussions concerning properties with aboriginal affiliation. Mitigation measures that may be required in consultation with the Montana SHPO may include avoidance of sites, protection, or scientific investigation.

Cumulative Effects – All Action Alternatives

Past Actions and Effects on Current Conditions: Before the NHPA was implemented, project planning did not consider impacts to cultural resources. Projects such as timber harvest, road building, fire suppression, or any other ground disturbing activity prior to NHPA had the potential to adversely impact cultural resources, and many of these projects occurred in areas considered high probability for cultural materials and so probably did impact cultural sites. Conversely, the remains of some of these activities that took place longer than 50 years ago may now be considered historic properties, and so have added to the historic record. While past actions may have affected cultural resources, no ongoing effects are known to be occurring currently from those past actions.

In addition to impacts from past Forest Service project activities, some cultural resources within the general project areas have also been impacted by looting and other activities associated with private citizens using the national forest for recreational purposes (camping, OHV use, etc.). Furthermore, some prehistoric sites within the general project area extend on to private lands have been impacted by home construction, plowing of fields, and other ground activities associated with private land ownership.

Contrasting Effects of Proposed Actions with Past Actions: Since implementation of the NHPA, cultural resource inventories have been conducted to locate cultural resources prior to project implementation. Known sites found during earlier inventories, and the refinement of the inventory process to locate properties during current inventories, allows impacts from projects to be avoided or mitigated. While natural deterioration of the resources is ongoing (processes include weathering, decay, and erosion) the current condition and trend of the historic record is that historic properties are being protected from project impacts. Knowledge of the location and condition of historic properties allows the potential for management action to abate or mitigate those natural processes that can adversely affect the historic record.

Regulatory Consistency

The guidelines of the 2015 Forest Plan and that of other jurisdictions were recognized in the development of all alternatives. In addition, the laws and policies that govern cultural resource management on Federal lands are coordinated with the Montana SHPO, who serves in an advisory capacity. The policies of the Forest Service and the SHPOs are consistent. All alternatives are consistent with the 2015 Forest Plan (USDA FS 2015) and applicable regulations and laws regarding historic properties.

Economics

Introduction

The management of the Kootenai National Forest (KNF) has the potential to affect local economies. People and economies are an important part of the ecosystem. Use of resources and recreational visitation to the Forest generate employment and income in the surrounding communities and counties and generate revenues that are returned to the Federal treasury.

This section presents concepts used to delineate an affected area and methods used to analyze the economic effects of the project, including the project feasibility, financial efficiency, and economic impacts. Project feasibility and financial efficiency relate to the costs and revenues of doing the action. Economic impacts relate to how the action affects the local economy in the surrounding area.

Regulatory Framework

2015 Forest Plan

Goal

GOAL-SES-01. Contribute to the social and economic well-being of local communities by promoting sustainable use of renewable natural resources. Provide timber for commercial harvest, forage for livestock grazing, opportunities for gathering firewood and other special forest products, and settings for recreation consistent with goals for watershed health, sustainable ecosystems, biodiversity, and scenic/recreation opportunities.

Forest Wide -Desired Condition

FW-DC-SES-01. Outputs and values generated by the Forest contribute to sustaining social and economic systems.

FW-DC-SES-02. The outputs and values provided by the Forest contribute to the local economy through the generation of jobs and income while creating products for use, both nationally and locally. Jobs and income generated by the activities and outputs from national forest management remain stable, contributing to the functional economy surrounding the KNF.

FW-DC-SES-03. The outputs and values provided by the Forest contribute to community stability or growth and the quality of lifestyles in the Plan area.

Federal

The preparation of NEPA documents is guided by CEQ regulations for implementing NEPA [40 CFR 1500-1508]. NEPA requires that consequences to the human environment be analyzed and disclosed. The extent to which these environmental factors are analyzed and discussed is related to the nature of public comments received during scoping. NEPA does not require a monetary benefit-cost analysis. If an agency prepares an economic efficiency analysis, then one must be prepared and displayed for all alternatives [40 CFR 1502.23].

OMB Circular A-94 promotes efficient resource use through well-informed decision-making by the Federal Government. It suggests agencies prepare an efficiency analysis as part of project decision-making. It prescribes present net value as the criterion for an efficiency analysis.

The development of timber sale programs and individual timber sales is guided by agency direction found in Forest Service Manual (FSM) 2430. Forest Service Handbook (FSH) 2409.18 guides the financial and, if applicable, economic efficiency analysis for timber sales.

Analysis Area

The analysis area for the efficiency analysis is the project area identified in Chapter 1. All costs and revenues associated with the project decision were included.

Timber management activities within the project area have the potential to impact the economic conditions of local communities and counties. To estimate the potential effect on jobs and income, a zone of influence (or impact area) was delineated. Counties were selected based on commuting data suggesting a functioning economy and where the timber is likely to be processed (log flows). Recent data on log flows from the KNF was provided by the University of Montana's Bureau of Business and Economic Research. The zone of influence for this project is comprised of Lincoln, Sanders, and Flathead counties in Montana and Boundary and Bonner counties in Idaho.

Affected Environment

The combination of small towns and rural settings, along with people from a wide variety of backgrounds, provide a diverse social environment for the geographical region around the Kootenai National Forest. Local residents pursue a wide variety of life-styles, but many share a common theme, an orientation to the outdoors and natural resources. This is reflected in both vocational and recreational pursuits including employment in logging and milling operations, outfitter and guide businesses, hiking, hunting, fishing, camping and many other recreational activities.

Timber, tourism, mineral development, and agricultural industries are important to the economy of local areas. Despite the common concern for, and dependence on, natural resources within the local communities, social attitudes vary widely with respect to their management. Local residents hold a broad spectrum of perspectives and preferences ranging from complete preservation to maximum development and utilization of natural resources.

A comprehensive socio-economic analysis can be found in the Final Environmental Impact Statement (FEIS) for the 2015 Forest Plan. The 2015 Forest Plan FEIS provides a description of the employment, income and social composition of the counties comprising the analysis area and the impact on counties from management of the KNF. This analysis indicates the counties within the analysis area are affected by timber management on the Forest. See pages 552-580 of the FEIS (USDA Forest Service 2013).

There is local demand for stumpage from the Forest, as evidenced by the amount of timber sales sold on the Kootenai in recent years. In addition, recent analysis indicates timber processing capacity is well above timber supply for the analysis area (Sorenson et al, 2012). Most sales offered have been sold with strong competition.

Methodology

Four measures are appropriate for the economic analysis: project feasibility, financial efficiency, and economic impacts. These measures are described below, including methodologies.

Project feasibility is used to determine if a project is feasible – will it sell, given current market conditions. It relies on the Region 1 Transaction Evidence Appraisal (TEA) System and delivered

log prices. The TEA uses regression analysis of recently sold timber sales to predict bid prices. The most recent appraisal and feasibility model for the area of interest was used to estimate the stumpage value (expected high bid resulting from the timber sale auction) for the timber project. The estimated stumpage value for each alternative was compared to the base rates (revenues considered essential to cover regeneration plus minimum return to the Federal treasury) for that alternative. The project is considered to be feasible if the estimated stumpage value exceeds the base rates. If the feasibility analysis indicates that the project is not feasible (estimated stumpage value is less than the base rates), the project may need to be modified. The infeasibility indicates an increased risk that the project may not attract bids and may not be implemented.

Financial efficiency provides information relevant to the future financial position of the program if the project is implemented. Financial efficiency considers anticipated costs and revenues that are part of Forest Service monetary transactions. Present Net Value (PNV) is used as an indicator of financial efficiency and presents one tool to be used in conjunction with many other factors in the decision-making process. PNV combines benefits and costs that occur at different times and discounts them into an amount that is equivalent to all economic activity in a single year. A positive PNV indicates that the alternative is financially efficient.

Many of the costs and benefits associated with a project are not quantifiable**.** For example, the benefits to wildlife from planned burning to stimulate browse and reduced fuel loadings, are not quantifiable. These costs and benefits are described qualitatively, in the individual resource sections of this document. Title 40, Code of Federal Regulations for NEPA (40 CFR 1502.23) indicates "For the purposes of complying with the Act, the weighing of the merits and drawbacks of the various alternatives need not be displayed in a monetary cost-benefit analysis and should not be when there are qualitative considerations."

Management of the Forest is expected to yield positive benefits, but not necessarily financial benefits. Costs for various vegetation, road, and burning activities are based on recent experienced costs and professional estimates. Non-harvest related costs are included in the PNV analysis, but they are not included in appraised timber value.

Economic impacts are used to evaluate potential direct, indirect and cumulative effects on the economy. Economic impacts are estimated using input-output analysis. Input-output analysis is a means of examining relationships within an economy, both between businesses and between businesses and final consumers. It captures all monetary market transactions for consumption in a given time period. The resulting mathematical representation allows one to examine the effect of a change in one or several economic activities on an entire economy, all else constant. This examination is called impact analysis. IMPLAN translates changes in final demand for goods and services into resulting changes in economic effects, such as labor income and employment of the affected area's economy. The IMPLAN modeling system allows the user to build regional economic models of one or more counties for a particular year. The regional model for this analysis used the 2009 IMPLAN data.

The economic impact effects are measured by estimating the direct jobs and labor income generated by the 1) processing of the timber volume from the project, and 2) dollars resulting from any other activities of the project into the local economy affected by the treatments proposed. The direct employment and labor income benefit employees and their families and therefore directly affect the local economy. Additional indirect and induced, multiplier effects (ripple effects) are generated by the direct activities. Together the direct and multiplier effects comprise the total economic impacts to the local economy. The data used to estimate the direct

effects from timber harvest is information provided by University of Montana's Bureau of Business and Economic Research. The economic effects tied to restoration activities and the multiplier effects (of both timber harvest and restoration activities) were estimated using IMPLAN.

Potential limitations of these estimates are the time lag in IMPLAN data and the data intensive nature of the input-output model. Changes in economic sectors since the latest data for IMPLAN have been adjusted using information from the University of Montana's Bureau of Business and Economic Research.

Environmental Consequences

Project Feasibility

The estimation of project feasibility was based on a transaction-evidence and delivered log price appraisal, which took into account logging system, timber species and quality, volume removed per acre, lumber market trends, costs for slash treatment; and the cost of specified roads, temporary roads and road maintenance. The estimated high bid was compared to base rates (revenues considered essential to cover regeneration plus minimum return to the Federal treasury). The estimated high bid and base rates for each alternative are displayed in Table 43. Given the predicted high bids and the base rates, all action alternatives are feasible.

The predicted high bid is the basis for the timber revenue estimate. The actual timber value will depend on the market when the timber is sold, and may be higher or lower than the predicted high bid.

Financial Efficiency

The financial efficiency analysis is specific to the timber harvest and ecosystem management activities associated with the alternatives (as directed in Forest Service Manual 2400, Timber Management and guidance found in the Forest Service Handbook 2409.18). Costs for sale preparation, sale administration, regeneration, and other activities are included. All costs, timing, and amounts were developed by the specialists on the project's interdisciplinary team. The expected revenue for each alternative is the corresponding predicted high bid from the transaction evidence and delivered log price appraisal. The present net value (PNV) was calculated using Quicksilver, a program for economic analysis of long-term, on-the-ground resource management projects. A four percent discount rate was used over the estimated project lifespan (2016-2026). For more information on the values or costs, see the project file.

This analysis is not intended to be a comprehensive benefit-cost or present net value analysis that incorporates a monetary expression of all known market and non-market benefits and costs that is generally used when economic efficiency is the sole or primary criterion upon which a decision is made. Many of the values associated with natural resource management are best handled apart from, but in conjunction with, a more limited benefit-cost framework. These values are discussed throughout this document, for each resource area.

Changes to resources like fisheries and wildlife habitats are further discussed in the corresponding sections of this FEIS. These resources will not be described in this section in financial or economic terms. The economic efficiency analysis included costs for planned burning outside the timber sale to provide for other benefits, such as reduced fuel loading and improved wildlife habitat. Road decommissioning, road storage, and stream site stabilization activities to

improve fish habitat are also included in the economic efficiency analysis. There is no generated revenue from these activities and they would be funded by some means other than the timber sale.

Planning costs (NEPA) were not included in any of the alternatives since they are sunk costs at the point of alternative selection.

Table 43 summarizes the project feasibility and financial efficiency for each alternative. Values for Alternative 1 are zero, since the no action alternative would not harvest, plant trees, enhance wildlife habitat, implement BMPs on haul routes, return fire to the landscape or take other restorative actions and, therefore, incur no costs. Because all costs of the project are not related to the timber sale, two PNVs were calculated. One PNV indicates the financial efficiency of the timber sale, including all costs and revenues associated with the timber harvest and required design criteria. A second PNV includes all costs for each alternative, including other activities that are non-timber harvest related (e.g., burning to reduce fuels and to improve wildlife habitat, decommissioning of roads, etc.).

Table 43 indicates all action alternatives have positive PNVs and are financially efficient, both for the timber sale as well as additional activities. Alternative 1 has a PNV of zero, since there are no costs or revenues generated. Of the action alternatives, Alternative 3 has the highest PNV for both the timber harvest and non-timber harvest activities. The PNV is slightly higher in Alternative 3 because of slightly higher timer values and slightly reduced amount of planting and road reconstruction under this alternative. Alternative 4 has the lowest PNV of the action alternatives because of a reduced level of timber harvest.

A reduction in the PNV of any alternative as compared to the most efficient solution is a component of the economic trade-off, or opportunity cost, of achieving that alternative. As indicated earlier, many of the values associated with natural resource management are non-market benefits. These benefits should be considered in conjunction with the financial efficiency information presented here. These non-market values are discussed in the various resource sections found in this document.

Table 43. Project Feasibility and Financial Efficiency Summary (2014 dollars)

Category	Measure	Alt. 1	Alt. 2	Alt. 3	Alt. 4
Sawtimber Harvest	Total Sawtimber Volume Harvested (CCF)	0	56,086	54,960	45,580
Rates	Base Rates ($/CCF)	N/A	$31.92	$31.98	$28.00
Predicted Value	Predicted High Bid ($/CCF)	N/A	$83.53	$84.61	$80.92
Revenue	Total Revenue	$0	$4,684,863	$4,650,165	$3,688,333
Timber Harvest and Required Design Criteria	Present Net Value	$0	$1,333,065	$1,357,417	$1,035,646
Timber Harvest and Other Planned Activities	Present Net Value	$0	$820,832	$836,480	$519,318

When evaluating trade-offs, the use of efficiency measures is one tool used by the decision-maker in making the decision. Many things cannot be quantified, such as effects on wildlife, impacts on local economies, and restoration of watersheds and vegetation. The decision-maker takes many factors into account in making the decision.

Economic Impact Effects (Jobs and Labor Income)

Timber production from this proposed project would have direct and indirect effects on local jobs and labor income. The Forest used an input-output model, IMPLAN (Impact Analysis for Planning) to estimate effects on employment and labor income within the zone of influence (impact area).

For timber harvest, the direct employment and labor income response coefficients (e.g., jobs and labor income per million cubic feet) were derived by the University of Montana's Bureau of Business and Economic Research. The indirect and induced multiplier effects were estimated using the IMPLAN model for the economic impact area.

For restoration and reforestation activities, the direct, indirect and induced effects were derived using IMPLAN. The resulting direct, indirect and induced employment and labor income coefficients have been incorporated into a spreadsheet developed by the Regional Economist for the USFS, Northern Region.

The analysis calculated the jobs and labor income associated with timber harvest and other resource activities. In order to estimate jobs and labor income associated with timber harvest, the timber harvest levels were proportionally broken out by product type with an estimated 75 percent of the sale going towards sawtimber and 25 percent to pulp or post and poles. In order to estimate jobs and labor income associated with reforestation and restoration activities, expenditures for these activities were developed for each alternative (see Table 44).

Table 44. Reforestation and Other Restoration Activity Expenditures by Alternative over a twelve-year period (2014 dollars) (does not include overhead costs)

Activity	Alt. 1	Alt. 2	Alt. 3	Alt. 4
Construction/Reconstruction	$0	$388,704	$383,104	$388,704
Road Decommissioning	$0	$25,000	$25,000	$25,000
Storage of Roads	$0	$166,500	$166,500	$166,500
Stream Site Stabilization	$0	$40,000	$40,000	$40,000
Ecosystem Burning	$0	$138,880	$138,880	$138,880
Underburning	$0	$257,950	$261,800	$263,200
Slashing/grinding	$0	$6,020	$13,330	$6,020
Lop and Scatter Natural Fuels	$0	$6,375	$6,375	$6,375
Planting and Reforestation Exams	$0	$745,459	$726,817	$562,627
Total	**$0**	**$1,777,288**	**$1,764,206**	**$1,599,706**

Table 45 displays both direct and total estimates for employment (part and full-time) and labor income that may be attributed to each alternative. Since the expenditures occur over a twelve-year period, the estimated impacts of jobs and labor income would be spread out over the life of the project. These are not new jobs or income, but rather jobs and income that can be attributed to this project.

Table 45. Total Employment and Income (2014 dollars) Over the Life of the Project

Analysis Item	Alt. 1	Alt. 2	Alt. 3	ALT. 4
Direct Employment* (persons)	0	264	259	217
Total Employment* (persons)	0	467	458	383
Direct Labor Income**	$0	$13,197,060	$12,949,060	$10,806,190
Total Labor Income **	$0	$21,149,570	$20,746,150	$17,298,930

*Employment is the total full- and part-time wage, salaried, and self-employed jobs in the region.

**Labor income includes the wages, salaries and benefits of workers who are paid by employers and income paid to proprietors.

Estimates in Table 45 indicate that Alternative 1 would maintain the highest number of jobs and labor income with total employment at 467 persons and total labor income of more than 21 million dollars. Alternative 4 maintains fewer jobs and labor income. Alternative 1 maintains no jobs or income because there are no activities associated with this alternative.

The analysis assumes the timber volume processed would occur within the Kootenai zone of influence. However, if some of the timber were processed outside the region, then a portion of the jobs and income would be lost by this regional economy.

Cumulative Effects

Management of the Kootenai National Forest has an impact on the economies of local counties. However, there are many additional factors that influence and affect the local economies, including changes to industry technologies, management of adjacent national forests and private lands, economic growth, and international trade.

Ongoing and reasonably foreseeable projects that may affect local economies include the following:

The sale of timber on private lands within and near the project area will have a positive impact on the local economy, maintaining jobs and labor income in the surrounding counties.

Large-scale mining activities take place near the project area. Most significant for the economy is the proposed Montanore and Rock Creek mines. The development of large-scale mines would bring a significant amount of jobs and labor income to Lincoln and Sanders Counties.

Private timber lands owned by Plum Creek Timber Company are either for sale or sold and actively being subdivided in the zone of influence. Real estate transactions could potentially be a significant short-term contributor to the local economy, though the loss of natural resource management activities associated with these lands would have a negative impact to the economy.

The project area is very popular for recreation activities such as hiking, hunting, camping, horseback riding, and berry picking. These activities generate income in the local economy through local and non-local participants who purchase goods and services in the area.

Consistency with the 2015 Forest Plan and Other Management Direction

For the OLY project, the jobs and labor income associated with timber harvest, restoration and reforestation activities in the action alternatives would contribute to the stability of the local economy during the life of the project and also for the future.

Fire and Fuels Management

Introduction

The fuels in the OLY project area, like any forested environment, are dynamic and change over time. These changes occur slowly over the course of many years unless a major disturbance event occurs. Expected fire behavior changes as stands age and succession leads to changes in structure, function, species composition and fuel loading. Tree mortality caused by any number of natural and human caused events can lead to increases in both standing and down woody debris; thereby, increasing surface fuel loads. The growth of new trees and other vegetation can affect the abundance of ladder and crown fuels over time. This analysis describes the regulatory framework of fire and fuels management and the affected environment as it relates to expected fire behavior under existing conditions and post-treatment conditions by alternative.

Regulatory Framework

2015 Forest Plan

Applicable Desired Conditions, Standards, Guidelines, Goals and Objectives

Forestwide Desired Conditions:

- **FW-DC-FIRE-01**: Public and firefighter safety is always recognized as the first priority for all fire management activities.
- **FW-DC-FIRE-02**: Hazardous fuels are reduced within the WUI and other areas where values are at risk. Fire behavior characteristics and fuel conditions exist in these areas that allow for safe and effective fire management. Fire behavior is characterized by low-intensity surface fires with limited crown fire potential. Forest conditions, and the pattern of conditions across the landscape, exist in these areas such that the risk is low for epidemic levels of bark beetles, high levels of root disease, and large scale, stand replacement wildfires.
- **FW-DC-FIRE-03**: The use of wildland fire (both planned and natural, unplanned ignitions), increases in many areas across the Forest. Fire plays an increased role in helping to trend the vegetation toward the desired conditions while serving other important ecosystem functions. However, when necessary to protect life, property, and key resources many wildfires are still suppressed.
- **FW-DC-WL-09**: Productive plant communities, with a mosaic of successional stages, structures, and species, are available for migratory landbirds. These habitats support nesting activities or use during bird migration across the Forest. The use of fire, both planned and unplanned ignitions, improves and maintains this mosaic of habitats.
- **FW-DC-WL-14**: A diversity of patch sizes of fire-killed trees (either natural or prescribed burned and where not a safety concern) exists to provide primary habitat for population expansions for species whose habitat requirements include this structural component (refers to FW-DC-VEG-05, FW-DC-TBR-01, FW-DC-FIRE-03).

Forestwide Objectives:

- **FW-OBJ-FIRE-01**: The outcome is the treatment of fuels on approximately 5,000 to 15,000 acres annually on NFS lands, primarily through planned ignitions, mechanical

vegetation treatments, and unplanned ignitions. NFS lands within the WUI are the highest priority for fuel treatment activities.

- **FW-OBJ-VEG-01. Forest Resilience**: Over the life of the Plan, the outcome per decade is:
  - Increased relative representation of early seral, shade-intolerant, drought- and fire-tolerant, insect/disease resistant species dominance types (e.g., ponderosa pine, white pine, western larch, whitebark pine, and hardwoods) on approximately 120,000 to 150,000 acres (these acres are also included in those listed in the following bullet).
  - Treatment of approximately 250,000 acres to maintain and/or improve forest resilience, natural diversity, and productivity and to reduce negative impacts of non-native organisms. Treatments may include timber harvest, planting, thinning, management of fire (including planned and unplanned ignitions), mechanical fuel treatments, revegetation with native species, blister rust pruning, integrated tree improvement activities, noxious weed treatments, and other integrated pest management activities including forest health protection suppression and prevention activities.
- **FW-OBJ-WL-03. Landbird assemblage (insectivores)**: The outcome is the management of planned ignitions on 1,000 to 5,000 acres, annually, to provide habitat for olive-sided flycatchers, hairy woodpeckers, chipping sparrows, and Hammond's and dusky flycatchers. (Also see FW-OBJ-FIRE-02, which provides additional habitat for these species.)

Forestwide Guidelines:

- **FW-GDL-VEG-08**: All silvicultural practices may be used to manage forest vegetation. This includes silvicultural systems (e.g., even-aged, two-aged or uneven-aged), regeneration methods (e.g., clearcutting, seed-tree, shelterwood, and group or single-tree selection), as well as other practices such as improvement cutting, commercial or pre-commercial thinning, use of planned or unplanned ignitions, planting, pruning, invasive terrestrial plant species control, cone collection, tree improvement, insect or disease control, site-preparation, and fuel reduction. Appropriate practices for a given situation depend on numerous factors, including the current and desired forest vegetation conditions at the stand and landscape scales, the biophysical setting, and the management direction and emphasis for the area. Silvicultural practices should generally trend the forest vegetation towards conditions that are more resistant and resilient to disturbances and stressors, including climate change.

Geographic Area Desired Conditions:

- **GA-DC-FIRE-BUL-01**: Threats of wildfire are reduced for the town of Troy, Highways 2 and 56, and outlying communities and structures.
- **GA-DC-FIRE-YAK-01**: Threats of wildfire are reduced for the communities of Yaak, Sylvanite, and outlying communities and structures.

Management Area Desired Conditions:

- **MA2-DC-FIRE-01**: **Wild/Scenic/Recreational.** Fire plays an increased role as a natural disturbance agent.

Management Area Guidelines:

- **MA2-GDL-FIRE-03. Scenic/Recreational**: Natural, unplanned ignitions, as well as planned ignitions, may be managed to meet resource objectives in eligible scenic and recreational river segments.
- **MA5a,b,c -GDL-FIRE-01**: Natural, unplanned ignitions, as well as planned ignitions, may be used to meet resource objectives.
- **MA6-GDL-FIRE-01**: Fuels are reduced, particularly within the wildland urban interface, to reduce the threat of wildland fire.

National Fire Plan

The National Fire Plan (USDI and USDA 2000) provides the national direction for hazardous fuels reduction, restoration, rehabilitation, monitoring, applied research and technology transfer. It also established the framework for a 10-Year Comprehensive Strategy (USDI and USDA 2001). Four priority goals were established from the 10-Year Comprehensive Strategy which includes:

- Improve Prevention and Suppression
- Reduce Hazardous Fuels
- Restore Fire Adapted Ecosystems
- Promote Community Assistance

The OLY project contributes to the first three of these goals in the National Fire Plan.

Federal Policy

Federal wildland fire policy is guided and directed by the Federal Wildland Fire Management Policy (1995 and revised in 2001). Applicable guiding principles include:

- Firefighter and public safety is the first priority in every fire management activity.
- The role of wildland fire as an essential ecological process and natural change agent will be incorporated into the planning process.
- Sound risk management is a foundation for all fire management activities.
- Fire Management Plans and activities incorporate public health and environmental quality considerations.

The OLY project contributes to the first three of these guiding principles in the Federal Wildland Fire Management Policy.

The Federal Wildland Fire Management Policy clearly states that wildland fire analysis will carefully consider the long-term benefits in relation to risks both in the short- and long-term: "Fire, as a critical natural process, will be integrated into land and resource management plans and activities on a landscape scale, and across agency boundaries. Response to wildland fire is based on ecological, social, and legal consequences of fire. The circumstances under which a fire occurs, and the likely consequences on firefighter and public safety and welfare, natural and cultural resources, and values to be protected dictate the appropriate management response to fire."

The National Cohesive Wildland Fire Management Strategy

Wildland Fuels Reduction Guidance

The Forest Service has proposed fuels treatment within the WUI of the OLY project area designed to help reduce wildland fuels. The National Cohesive Wildland Fire Management Strategy provides guidance for prioritizing wildland fuels reduction (The National Strategy 2014):

- Where wildfires are unwanted or threaten communities and homes, design and prioritize fuel treatments (prescribed fire, and mechanical, biological and chemical treatments) to reduce fire intensity, structure ignition, and wildfire extent.
- Where feasible, implement strategically placed fuel treatments to interrupt fire spread across landscapes.
- Continue and expand the use of prescribed fire to meet landscape objectives, improve ecological conditions, and reduce the potential for high-intensity wildfires.
- Where allowed and feasible, manage wildfire for resource objectives and ecological purposes to restore and maintain fire-adapted ecosystems and achieve fire-resilient landscapes.
- Use and expand fuel treatments involving mechanical, biological, or chemical methods where economically feasible and sustainable, and where they align with landowner objectives.

Community Wildfire Protection Plan

The Lincoln County Community Wildfire Protection Plan (2003 and revised in 2005) was developed to position fire protection agencies, county leaders, rural communities, county residents, forestland owners and managers to be better prepared to protect Lincoln County residents and its natural resources from the potentially devastating impacts of wildfire. This plan is located in the project file.

Goals of the Lincoln County Community Wildfire Protection Plan are:

- Emphasize prevention of wildland urban interface fires using a proactive, cooperative approach with incentive measures.
- Promote effective fire risk assessments and fuel treatment programs for homeowners that are carried out on an ongoing basis in all wildland urban interface areas.
- Provide the appropriate resources to maintain an effective emergency response system to WUI fires.
- Sustain a coordinated and cooperative program of timely information and educational programs for county residents, businesses, and recreational homeowners.

Resource Indicators

The following indicators were used to evaluate each alternative's ability to address the Purpose and Need:

Purpose and Need – Promote resilient vegetation conditions by managing towards landscape-level patterns, structure, patch size, fuel loading, species composition, contribute to fire's role on the landscape.

Indicators:

- Patch size and pattern – Number of units and acres that would contribute to landscape-level patch size and pattern (also see the Forest Vegetation section) via the number of fuels units which treat areas over 40 acres and the number of harvest units and their fuels treatment which create patch sizes over 40 acres (this is a key issue).
- Structure – Percent of size class distribution within the project area compared to desired size class distribution.
- Species composition – Acres of seedling/sapling age class increased to trend towards desired conditions as a result of harvest units, their prescribed fuels treatment and non-harvest fuels units. Acres of canopy reduction to maintain or stimulate the understory vegetation via harvest and their fuels treatment and prescribed fire.
- Coarse woody debris and fuel loading within desired conditions post fuels treatment. Acres of low and mixed severity fire regime and acres of fuels reduced to desired conditions through harvest related fuels treatments and fuels units.

Purpose and Need – Reduce crown fire potential and stand replacing wildfire within the WUI.

Indicators:

- Acres of fuels reduction treatments within the WUI, including timber harvest, slashing, grapple and hand piling, and prescribed burning
- Change in Fire Model and Fire Regime

Purpose and Need – Contribute to fire's role on the landscape.

Indicator:

- Acres of mixed severity fuels units achieved

Assumptions and Limitations

Fuel Models are mentioned numerous times in the Fire and Fuels section of the EIS, however these "models" are not mathematical relationships such as the BehavePlus Fire Behavior Model. Fuel Models are input values such as fuel load, fuelbed depth and dead fuel moisture of extinction. The project file contains documents relating to fuel models: Albini_Baughman_1979.pdf; Heinsch_Andrews_2010.pdf; Rothermel_1983.pdf; and Scott_Burgan_2005.pdf.

BehavePlus SURFACE model include assumptions of a homogeneous and continuous fuel bed, the fire is at steady state, fire behavior is only considered in the flaming front (i.e., smoldering is not considered), and fine fuels drive fire behavior. The CROWN component of BehavePlus assumes a 20-foot wind speed and uniform surface fuel moisture. Andrews (2014) states, "The model for crown fire rate of spread is a simple correlation based on seven crown fires (Rothermel 1991). The inputs are only 20-ft wind speed and surface fuel moisture. The model does not utilise a description of either the surface or the crown fuels. It was designed to predict an average crown fire spread rate over several hours. Andrews 2014, also states, "Due to the many influencing

factors and unknowns in crown fire behavior, the results in CROWN are not to be taken as predictions. Rather these calculations are useful in considering the possibility of extreme fire behavior under low-wind conditions."

Analysis Methods

Vegetative Response Units (VRUs), a subset of the Forest's biophysical settings, as described in detail in the Vegetation Section of this document were used to describe vegetation characteristics and their relationship to disturbances and fire regimes. VRUs provide a mechanism to interpret existing vegetation in relation to natural disturbance processes which help determine the desired conditions of a given landscape.

Fire history for the OLY analysis area was derived from records maintained in the GIS library. Records in the GIS library were derived from the Kootenai Fire History Atlas and fire records maintained at the national database in Kansas City.

Fire behavior modeling was accomplished with BehavePlus (version 5. 0. 5) for the pre and post-treatment unit specific fire behavior comparisons at the stand level. The BehavePlus fire modeling system is a computer program that is based on mathematical models that describe wildland fire and the fire environment. It incorporates over 40 models and is best described by Heinsch and Andrews (2010). BehavePlus has been used in various versions for fire management application that involves modeling fire behavior and effects, projecting the behavior of an ongoing fire, planning prescribed fire, assessing fuel hazard, and training (Andrews 2007).

A 3 to 4 mile per hour mid-flame wind speed blowing upslope was used for both comparisons. Mid-flame wind speed is the wind measured at one-half of the flame height. Since wind is extremely variable, it cannot be accurately forecasted across the entire analysis area; thus, it is more important that a constant wind speed be used for equal comparison of pre and post-treatment fire behavior.

Anything that burns could be a fuel source. However, this analysis focuses on vegetation as the fuel source, whether live or dead, standing or fallen. Dead fuels are represented by timelags and size classes which are described in Table 46.

Timelags are defined as the time needed under specified conditions for a fuel to lose about 63 percent of the difference between its initial moisture content and its equilibrium moisture content. Equilibrium moisture content is the condition of balance with the moisture content of the air. Stated simply, it is the point at which the fuel neither gains nor loses moisture. This depends on fuel size, air temperature, and relative humidity of the surrounding air. As can be seen in Table 46, the smallest diameter fuels rapidly respond to environmental conditions; they dry quickly and gain moisture quickly.

Table 46. Dead Fuel Timelag and Size Class Definitions

Dead Fuel Timelag	Dead Fuel Size Class
1-hour fuels	0 to ¼ inch diameter
10-hour fuels	¼ to 1 inch diameter
100-hour fuels	1 to 3 inches diameter
1000-hour fuels	3 to 8 inches diameter

One-hour and 10-hour fuels are the primary carriers of most fires and the biggest concern for fire spread. One-hundred-hour and 1000-hour fuels are good indicators of drought and add significantly to fire intensity, severity, and resistance to control.

Fuel moistures, utilized for this analysis, were typical of conditions found within the analysis area in August for native species and are displayed below:

Fuel Moisture Class		Percentage
• 1-hour	=	2 to 3 percent
• 10-hour	=	3 to 4 percent
• 100-hour	=	8 to 9 percent
• Live Herbaceous	=	30 percent
• Live Woody	=	69 to 70 percent
• Foliar Moisture	=	90 percent

These fuel moistures were developed in Weather Information Management System (WIMS) from weather data collected from the Libby, Montana Remote Automated Weather Station (RAWS) for each fuel model. Weather data collected utilized the years 1995 to 2014, and the data utilized was from May 1 to September 30 of each year. This is the time span in which the Kootenai National Forest receives 90 percent of its wildfires. Fuel moisture values were developed for the 90th percentile and 97th percentile. The 90th percentile equates to the average fire season and the 97th percentile equates to the worst case scenario.

Existing Conditions

Fire History

The OLY analysis area has had many wildfires from 1889 to 2014 which burned approximately 23,761 acres or approximately 35 percent of the analysis area. There have been many large fire years since 1889. Table 47, displays large fires experienced within the OLY analysis area since 1889 and the years burning over 100 acres are presented in bold. Also, Map M-10 shows fire history for the OLY analysis area. In general, large fires occurred primarily on the south, southwest, southeast, and north aspects. There have been approximately 192 fires recorded in the OLY analysis area from 1986 to 2014 averaging nearly seven starts per year. Since 1986, about 54 percent of fires were caused by lightning while 46 percent were caused by equipment use, smoking, campfires, debris burning, railroad, or arson. It should also be noted that 64 percent of the fire starts since 1986 have occurred within the wildland urban interface. With the exception of large fire years, lightning and human-caused wildfires typically burned between 0.1 and 15 acres.

Table 47. Large Fire Years within the OLY Analysis Area

Fire Year	Acres Burned in OLY	Fire Name
1889	**898**	Unknown
1910	**6,761**	Unknown

Fire Year	Acres Burned in OLY	Fire Name
1912	28	Unknown
1913	**256**	Unknown
1914	8	Unknown
1915	**107**	Unknown
1917	38	Unknown
1919	58	Unknown
1920	**705**	Unknown
1921	**645**	Unknown
1922	29	Unknown
1925	**378**	Unknown
1926	**1,144**	Unknown
1931	**122**	Unknown
1940	77	Unknown
1949	**162**	Unknown
1967	55	Unknown
1970	**150**	Unknown
1981	**170**	Unknown
1985	23	Unknown
1990	20	Unknown
1991	**3,272**	Arbo
1994	**7,194**	China Basin, Gunsight, Pulpit, Skinner, Studebaker, Upper Lost Fork
2000	**1,409**	Feeder Mountain 2, Kedzie Creek, Noseeum Creek, O'Brien, Prospect, Pulpit Mountain, Queen Mountain, Studebaker Draw
2008	33	Pulpit Mountain
2009	19	Skyline

Fire Year and acres **emboldened** indicate fires over 100 acres.

Historical Versus Present Fire Regimes

The OLY analysis area would have historically exhibited low, mixed, and stand-replacing fire severities across the landscape. VRUs, as a subset of the Forest's biophysical settings, can be used to classify historic fire regimes and the potential number of fire cycles missed. There are four different fire regimes found in the project area:

- Fire Regime I has a fire return interval of 0 to 35 years and is a low severity fire.
- Fire Regime III has a fire return interval of 35 to 100+ years and is a mixed severity fire.

- Fire Regime IV has a fire return interval of 35 to 100+ years and is a stand replacement fire.
- Fire Regime V has a fire return interval of 200+ years and is a stand replacement fire.

Historically, lands within a given VRU were subject to broadly similar disturbance regimes. Map M-15 displays the location of mapped VRUs in the OLY project area. Missed fire cycles are largely attributed to fire suppression. Other causes in the OLY area include logging, grazing, and housing developments.

According to Peterson et al. (2005), deviation from historical fire regimes caused by fire suppression has been most impactive to drier forests dominated by ponderosa pine and Douglas-fir. In these forest types, fires of low to mixed severity would have controlled regeneration of shade-tolerant tree species (Arno and Allison-Bunnell 2002) and promoted fire-tolerant species such as ponderosa pine, western larch and larger diameter Douglas-fir. Today, these dry forest types in the analysis area have an accumulation of understory fuels and vegetation, increased ladder fuels, fewer large trees and an increased potential for crown fires (Agee 1993, Arno and Brown 1991). This increased potential for surface fires to develop into crown fires is because the understory ladder fuels lower the effective canopy base height and the overstory trees are denser, allowing for crown fire initiation and spread. Scott and Reinhardt (2001) define canopy base height as the lowest height above ground at which there is significant canopy fuel to propagate fire vertically through the canopy. Put more simply, it means having enough ladder fuels to allow a surface fire to transition into a crown fire.

As stated previously, mixed severity fires, including stand replacing crown fire are part of the desired condition to increase fire's role on the landscape in the OLY project area. It is recognized that some species, for example black-backed woodpecker (See the Black-backed Woodpecker section in Chapter 3), benefit from high severity fires. Severe wildland fires will continue to occur under certain environmental conditions, and therefore habitats for species dependent on high-intensity fire would continue. However, crown fires can also be considered the main threat to ecological and human environment values and they are one of the biggest challenges of fire management (Graham et al. 2004). Fire managers recognize three different types of crown fires. ***Passive crown fires*** kill individual trees or small groups of trees. Passive crown fires are often referred to as "torching." ***Active crown fires*** are continuous. They burn the entire tree canopy but they are dependent on heat from surface fires for continued spread. ***Independent crown fires*** also burn the entire tree canopy but they are independent of surface fires. Independent crown fires, which are rare, only occur in the most extreme situations and are poorly understood. Passive and active crown fires are the main concern for the analysis area because of the current conditions of the stands proposed for treatments (dense, high coarse fuel loads, with lots of ladder fuels).

Fuel Condition

Although anything that burns could be considered as fuel, for the context of this analysis "fuels" refers to vegetation such as trees, shrubs, forbs and grasses, both live and dead, which are available to be consumed by fire. The amount, size, and availability of fuels that contribute to fire spread and intensity vary by time of year and weather conditions. For example, during winter months, snow cover causes most fuels to be unavailable for burning. During the spring when most plants are growing vigorously and moisture is abundant, available fuels are limited to the most flammable dead fuels on the driest sites. During late summer, many plants finish their seasonal growth. Their live moisture content decreases. The lack of precipitation combined with hot weather cures this vegetation and dries dead fuel, and much of the live and dead fuel is

available for consumption by fire. During late autumn increases in rainfall as well as the change to shorter days and cooler weather limits the availability of fuels.

Across these seasonal changes in fuel availability there is a range of possible outcomes should a fire occur. While it is not possible to predict when a fire will occur, most lightning fires occur during July and August. Fire season is usually halted by an episode of rainy weather that traditionally occurs between the third week of August and the third week of September. The exceptional years, when this rain does not occur, will see the fire season extending as late as mid-October.

Fuel Models

Fuel models are tools used by fire specialists to estimate fire behavior and characterize the amount of fuels available to burn during a surface fire. A fuel model is chosen by the primary carrier of the fire (i.e. grass, brush, timber litter, slash) and its fuel characteristics (i.e. fuel loading, surface area to volume ratio, fuel depth, etc.). In some cases a fuel model is chosen because it accurately reflects the expected fire behavior even though it does not fit the visible description of the stand or area.

Rothermel (1983) has a detailed discussion on fuel models and how they are used to predict the spread and intensity of forest and range fires.

Fuel models, canopy base heights, and canopy bulk densities for the OLY analysis area were verified with ground reconnaissance and/or aerial photos. Since the fuel models within the project boundary are numerous, this report will briefly describe the most common fuel models (Scott and Burgan 2005) currently existing in the analysis area. A detailed map of all the fuel models across the proposed treatments is contained within Maps M-11 and M-12.

The naming convention used for fuel types used in the fuel models of this analysis are:

- (GS) Grass – Shrub
- (SB) Shrub
- (TL) Timber Litter
- (TU) Timber – Understory

Fuel treatments would move units from a higher fuel load model to a lower fuel model (Table 48). For several proposed OLY units which currently have lower risk fuel loads, the post-treatment fuel model would remain the same as the pre-treatment (see Table 53 and Table 54). The most common pre-treatment and post-treatment fuel models for the OLY analysis area are described in Table 48 below.

Table 48. Most Common Pre-treatment and Post-treatment Fuel Models within the OLY Analysis Area

Fuel Model	Fuel Load	Description
Most common pre-treatment fuel models in the OLY analysis area		
Fuel Model GS2 (122 Moderate load, dry climate grass-shrub)	Moderate	The primary carrier of fire is grass and shrubs combined. Shrubs are 1 to 3 feet high and grass load is moderate. This fuel model can also represent a younger regeneration stand that has had past fuel treatment and a grass understory.

Fuel Model	Fuel Load	Description
Fuel Model TU1 (161 Low load, dry climate timber-grass-shrub)	Low	The primary carrier of fire is a low load of grass and/or shrubs with timber litter. This fuel model usually has a very low load of surface fuels in the understory and fire behavior is usually minimal. The addition of ladder fuels and/or a high density overstory (high crown bulk density) can cause this fuel model to exhibit a crown fire.
Fuel Model TU5 (165 Very high load, dry climate timber-shrub)	Very High	The primary carrier of fire is heavy forest litter with a shrub or small tree understory. TU5 best represents stands with an overstory and heavy component of ladder fuels and/or a high load of dead and downed surface fuels. It is very common to expect a crown fire with this fuel model.
Fuel Model TL5 (185 High load conifer litter)	High	The primary carrier of fire is a high load conifer litter and light slash or mortality fuel. TL5 is similar to TL4 except it has an even higher load of coarse fuels and would exhibit higher fire behavior if all else were equal.
Fuel Model TL8 (188 Long needle litter)	Moderate	The primary carrier of fire is a moderate load of long-needle pine litter. It may include a small amount of herbaceous fuels. This fuel model tends to occur in stands with a heavy component of ponderosa pine without an accumulation of coarse fuels.
Most common post-treatment fuel models in the OLY analysis area		
Fuel Model GS2 (122 Moderate load, dry climate grass-shrub)	Moderate	The primary carrier of fire is grass and shrubs combined. Shrubs are 1 to 3 feet high and grass load is moderate. This fuel model can also represent a younger regeneration stand that has had past fuel treatment and a grass understory.
Fuel Model TU1 (161 Low load, dry climate timber-grass-shrub)	Low	The primary carrier of fire is a low load of grass and/or shrubs with timber litter. This fuel model usually has a very low load of surface fuels in the understory and fire behavior is usually minimal. The addition of ladder fuels and/or a high density overstory (high crown bulk density) can cause this fuel model to exhibit a crown fire.
Fuel Model TL3 (183 Moderate load conifer litter)	Moderate	The primary carrier of fire is a moderate load of conifer litter and a light load of coarse fuels. TL3 best represents closed canopy stands with very little surface fuels.
Fuel Model TL4 (184 Small downed logs)	Moderate	The primary carrier of fire is a moderate load of fine litter and coarse fuels. Includes small diameter downed logs. TL4 represents stands that have started to unravel and include conifer litter and coarse woody fuels. It can be used to represent thinning slash after the red needles have fallen off.
Fuel Model SB1 (201 Low load activity fuel)	Low	The primary carrier of fire is light dead and downed activity fuel. Fine fuel load is 10 to 20 tons per acre, weighted towards fuels in the 1 to 3 inch diameter class. Fuel bed depth is less than 1 foot. SB1 represents a lighter load of post-harvest activity fuels that have not been treated by piling or prescribed fire. This fuel model will only exist in the analysis area if harvest activity fuels are not treated or to represent the red needle stage of thinning slash.

Fuel Model	Fuel Load	Description
Fuel Model SB2 (202 Moderate load activity fuel or low load blowdown)	Low to Moderate	The primary carrier of fire is moderate dead and downed activity fuel or light blowdown. Fine fuel load is 7 to 12 tons/acre, evenly distributed across 0 to 0.25-inch, 0.25 to1-inch and 1 to 3-inch diameter classes. Fuel bed depth is about 1 foot**.** Blowdown is scattered, with many trees still standing. This fuel model will only exist in the analysis area if harvest activity fuels were not treated.

Vegetative Species Composition

The vegetation within the OLY analysis area has been altered over time due to several factors, such as fire suppression and vegetation management. Although the type and frequency of fire experienced varies within a given area and vegetation type, all vegetation types within the project area have historically experienced fires. The project area would have normally experienced a range of fire severities including low, mixed, and stand replacement severity wildfires. These natural disturbance regimes favor fire tolerant species, including older and larger diameter seral tree species such as western larch, western white pine, ponderosa pine, and Douglas-fir.

Fire suppression has altered the vegetation in stands which would have exhibited low to mixed severity fires. These stands now consist of increased shade-tolerant species composition both in the overstory and understory as well as increased fuel loadings in the form of ladder fuels and downed woody material. Although stands that would have experienced stand replacement severity fires may not have missed a fire return interval, with time they are approaching a departure from historic conditions.

In addition, past vegetation management practices that targeted large trees removed the relic seral species, further altered tree size and composition, and promoted the development of climax species and conditions. The close proximity to Troy, Montana influenced the removal of western larch, western white pine, ponderosa pine, and Douglas-fir trees and snags through multiple re-entries in the lower elevation sites that supported local development supplies (e.g., commercial lumber products and firewood).

Insects and diseases have caused a transformation of species composition as well as an increase in down woody fuel loadings. *Armillaria* root rot has affected several species such as grand fir, ponderosa pine, and Douglas-fir leading to increased mortality in these species. Also, *schweinitzi*i root rot is attacking Douglas-fir causing increased mortality. Dwarf mistletoe is present within western larch populations causing a decrease in health and increase in mortality of mature trees as well as regeneration of these species. The Douglas-fir beetle is attacking Douglas-fir in cycles, and high mortality levels are most notably in the China Basin area. In general, the resultant stand patch sizes and occurrence, species composition, stand structure, and fire frequency and severity are departing from historic conditions within the project area. For more information on vegetation within the OLY analysis area, please see the full vegetation report in the project record.

Wildland Urban Interface

The wildland urban interface encompasses approximately 34,912 acres, over 50 percent, of the entire OLY analysis area. The wildland urban interface is defined in the Federal Register: Vol. 66, No. 3, dated January 4, 2001 as the location where humans and their development meet or intermix with wildland fuel. Private individuals, organizations, communities and governmental

agencies recognize the benefit of reducing wildland fuels to help reduce the impact of wildland fire upon structures.

The wildland urban interface is the area where communities abut natural areas, whereas the "intermix area" also takes into account rural settings where homes and structures mix with natural areas susceptible to wildland fire. The home itself and the area extending beyond the home for 100 to 200 feet is called the home ignition zone (Firewise.org accessed 2015). The community protection zone is an area around a community beyond the individual home ignition zone.

There are several concentrations of homes within the OLY analysis area which include the Kilbrennan Ridge, Kilbrennan Lake, Sears Flat, O'Brien Creek, Kootenai Vista, Alvord Lake, and Kootenai Face areas. In addition, other miscellaneous structures such as developed recreation sites exist within the planning area. There is the potential for additional land development across vacant lands within the analysis area, further increasing the number of homes and communities.

Private organizations and governmental agencies provide information, resources, and incentives to encourage the reduction of wildland fuel loads around individual homes and around communities as a whole. Nowicki (2002) states, "Additional thinning beyond the home ignition zone may enhance the ability of firefighters to safely defend community space." Whether an individual home, a community or an intermix of structures in the natural setting, areas where human habitation contact a setting susceptible to wildland fire can benefit from natural fuels reduction to help reduce wildland fire's intensity and impact to those structures.

Home Ignitability

Research (Cohen 2000a) addresses home ignitability, or the potential for a home to ignite, in the WUI. Cohen concludes that homes most often ignite via one of two processes, direct flame contact with the structure and lofted firebrands landing on receptive fuel such as a house. The Structure Ignition Assessment Model (SIAM) developed by Cohen (1995) and results from the International Crown Fire Modeling Experiment generally concur that a flaming front at a distance of 130 feet or more from a structure does not deliver sufficient heat energy to ignite the exterior of a home. This recommendation is based on preventing home ignitions from radiant heat, not protecting firefighters or the homeowner who may be present (in a safe location) as the fire passes.

Proposed treatments for the OLY project are designed to reduce a wildland fire's intensity so that it remains a surface fire and does not develop into a crown fire. This could help reduce the chance of direct flame contact or intense radiant heat on a home. Also, a crown fire would loft more firebrands into the air than a surface fire due to the amount and type of fuel being consumed. A crown fire would likely be more intense, thus producing more wind and convective heating. These forces alone or combined will carry firebrands greater distances. Cohen's analysis (modeling, experiments, and case studies) did not explicitly address firebrand ignitions but he does recognize that firebrand ignitions can originate from distances of ½ mile or more (Cohen 2000a).

The above-cited research exclusively addresses home ignitibility. Not addressed in the research are some of the other issues and problems faced by resource managers, fire professionals, and residents when considering fire in the WUI. When fire enters the WUI, there remains the potential for loss of life, property, and other values even if homes have been made fire safe. When fire enters areas adjacent to private land, there is high probability that firefighting resources will be deployed and members of the public may be exposed to hazards even if all homes have been

made fire safe. Ingress and egress routes may become compromised. Many homeowners would likely find it undesirable to live in an intensely or severely burned-over forest even if their home has survived.

Community Protection Zone

It is important to note that creation of a community protection zone does not require the removal of all trees within the area. It involves thinning the forest to create breaks in the continuity of tree crowns, and removing ladder fuels and small-diameter understory trees.

Nowicki, 2002, talks about the Community Protection Zone in stating, "Additional thinning beyond the home ignition zone may enhance the ability of firefighters to safely defend community space. Creating an area of reduced fuels immediately adjacent to the community can provide options for firefighters to control fire in this space, and can provide a safety zone- an area where firefighters are "free from danger, risk, or injury"(Beighley 1995). This requires breaking up fuel continuity at greater distances from houses than necessary to protect the homes themselves, because injury to humans can occur with a fraction of the heat and time required to ignite wood (Butler and Cohen 1998)."

Due to the challenges and complexities associated with suppressing wildland fire within wildland urban interface areas, fire managers find it desirable to exclude wildfire (to the extent possible) or reduce its severity in the WUI. Reducing wildland fuels within the WUI is one method of accomplishing this goal. Management tools to reduce wildland fuels within the wildland urban interface for the OLY project area include prescribed fire (including broadcast burning, slashing, piling, and/or burning) and mechanical methods (grinding). The use of prescribed fire to manage fuels in some WUI areas could be precluded or limited by sociopolitical constraints (Kalabokidis and Omi 1998, DellaSalla, et al. 1995), but there were no specific concerns submitted during scoping for the OLY project.

Environmental Consequences

Alternative 1 (No-Action)

Direct and Indirect Effects

Under Alternative 1 there would be no new proposed treatments. Natural processes would continue and accumulation of forest debris would increase natural fuel loadings. Many of the forested stands in the analysis area would remain overstocked and ladder fuels would continue to fill-in and crowd the understory. The drier forest stands would continue to lose vigor due to competition from a dense understory of shade tolerant species. This understory would serve as ladder fuels that would permit a surface fire to expand into the canopy of overstory trees. This could result in the mortality of many of the existing overstory trees that would have otherwise survived a surface fire of lower intensity.

The cooler and moister sites would continue to increase fuel loading; additional mortality from insects and disease in these stands would lead to higher fuel loading over time. Timber harvest would not be used to reduce crown densities and ladder fuels. Existing surface fuels would not be treated and would remain a hazard. Although the 2015 Forest Plan does allow the use of unplanned ignitions in certain areas, it can be expected that full suppression activities would continue to occur in the WUI to protect life, property, and key resources (FW-DC-FIRE-03).

Because there would be no new fuel treatments to reduce the fire hazard in the analysis area, the potential for high-severity wildland fires would continue and be more likely than under the action alternatives. Also, private landowners within the OLY analysis area would not be eligible for Stevens Grant Projects to complete fuels reduction activities on their own land because no fuels reduction activities would be occurring on adjacent NFS lands. Furthermore, Stimson Lumber Company would not be able to access their lands in Section 3 on Yaak Mountain which would provide fire severity reduction benefits. Any fire that starts inside the analysis area or starts outside and moves into the analysis area would likely be more expensive, difficult and dangerous to suppress. Development of private lands would continue, increasing the complexity and expense of fire suppression.

Fire modeling indicates that there is a risk of crown fire under the existing conditions. These areas would also exhibit flame lengths and rates of spread that would require indirect suppression tactics utilizing mechanized equipment and aviation resources. As time progresses and stand conditions continue to deteriorate in the analysis area due to insects, disease, wind and snow, the fire hazard would continue to increase. Eventually, conditions would be conducive for fires such as the 1991 Arbo Fire, the 1994 China Basin Fire and the 2000 Pulpit Fire to occur.

Alternatives 2, 3 and 4

Direct and Indirect Effects

The purpose and need specific to the fire and fuels section of the OLY Project is to treat hazardous fuels in order to reduce crown fire potential and stand replacing wildfire within the WUI and other areas while promoting fire behavior characteristics and fuel conditions that allow for safe and effective fire management. In order to meet this purpose and need, the action alternatives are designed to apply the principles of a fire-resilient forest as defined in Table 49. Reintroduction of fire to the ecosystem would be accomplished through the use of planned (prescribed fire) and unplanned ignitions as described the 2015 Forest Plan.

Effects of Treatments on Fire Behavior

The direct effects of the proposed fuel reduction treatments through harvest activities and excavator piling or prescribed burning, would be a modification of potential fire behavior within the treated areas. A reduction in surface and ladder fuel loadings creates lower flame lengths and fire intensity and a surface fire that burns on the ground and not in the tree crowns. Reduced flame lengths and lower fire intensity produces the type of fire behavior that can more easily be controlled or extinguished. Fire behavior within the treated areas would be reduced, resulting in safer conditions for firefighters and/or the public.

The direct effects of the proposed prescribed burning with no harvest would be variable as described earlier. Lower elevation burns without harvest activities will be highly variable and of low- to mixed-severity depending on topography, fuel conditions, and weather factors. Mid-elevation burns would create patchy results, ranging from lower severity to patches of higher severity, which can provide opportunity for firefighters to safely engage in future wildfires.

Effects of Timber Harvesting and Fuels Treatments

Fuel treatments occurring in harvest units following timber harvest would be implemented through the application of prescribed burning or piling and burning (see Table 4, Table 8, and Table 12 in Chapter 2 for acres of each treatment per alternative). Where piling occurs, the slash

would be burned by the Forest Service. In all harvest units, the intent is to reduce surface fuel loadings while leaving large woody debris for long term soil nutrient cycling (amount vary depending on the habitat type).

Treatments in the WUI would reduce fuel loads and fire intensity adjacent to homes and property.

Road maintenance, construction, and reconstruction proposed for timber harvest would also create better access for fire suppression activities and contribute to safer conditions for firefighters.

Table 49. Principles of Fire-Resilient Forests (Agee and Skinner 2005)

Objective	Effect	Advantage	Concerns
Reduce surface and ladder fuels	Reduces potential flame length	Fire control easier, less torching	Surface disturbance less with fire than other techniques
Increase canopy base height	Requires longer flame length to ignite tree crowns	Less torching	Opens understory, may allow surface wind to increase
Decrease crown density	Makes independent crown fire less probable	Reduces crown fire propagation	Surface wind may increase, surface fuels may be drier
Increase proportion of mature fire-resilient tree species	Thicker bark, taller crowns, higher canopy base height	Increases survivability of trees	Removing smaller trees is sometimes problematic

Under the action alternatives, the existing fuel models were converted to post-treatment fuels models for each unit. Pre- and post-treatment fuel models for individual units can be found in the Project File. Table 50, Table 51, and Table 52 include some of the most abundant fuel models and stand characteristics by treatment type for regeneration harvest units (Table 50), improvement harvest (Table 51), and fuels units (Table 52).

One of the goals of fuels reduction is to move from an existing fuel model with higher fuel loads to a fuel model with lower fuel loads.

Table 53 compares pre- and post-treatment fuel models for fuels units under the action alternatives, and Table 54 compares pre- and post-treatment fuel models for harvest units under the action alternatives. Map M-12 is a detailed map of all the post-treatment fuel models within the proposed harvest and fuels units can be found in the Project File.

None of the proposed harvest units, under the action alternatives, are expected to be able to initiate or carry a crown fire because canopy base heights would be raised and crown bulk densities would be low enough that they would not sustain a crown fire after treatments are completed. Units for fuels objectives would still exhibit limited crown fire potential with the exception of proposed Fuels Units F16 and F17 which are maintenance underburns in previously harvested units, in which the harvest treatment created conditions which are not expected to pose any crown fire potential.

Fuels units are not designed to reduce or thin overstory trees that would further reduce canopy bulk densities. They are designed to reduce surface fuels and ladder fuels, and the crown fire potential should be limited to passive crown fires (single and/or group tree torching).

Table 50. Pre- and Post-Treatment Stand Characteristics Used for Fire Behavior Modeling in Regeneration Harvest Units

Fire Behavior Model	Pre-treatment	Post-treatment
Fuel Model	TU1(grass/shrub/timber litter) TU5(heavy forest litter/ shrub/small trees TL5(high load of conifer litter)	GS2 (grass/shrub) TU1(grass/shrub/timber litter) TL3(moderate load of conifer litter)
Canopy Bulk Density* (Kg/m$^{3)}$	0. 10-0. 260	0. 020-0. 070
Canopy Base Height** (feet)	1-10	20-30
Crown Fire Potential	Yes	No

* Canopy Bulk Density is the mass of available canopy fuel per unit of canopy volume (Scott and Reinhardt 2001).

** Canopy Base Height is the lowest height above the ground at which there is a sufficient amount of canopy fuel to propagate fire vertically into the canopy. It is an effective value that incorporates ladder fuels such as shrubs and understory trees (Scott and Reinhardt 2001).

Table 51. Pre- and Post-Treatment Stand Characteristics Used for Fire Behavior Modeling in Improvement Harvest

Fire Behavior Model	Pre-treatment	Post-treatment
Fuel Model	TU1(grass/shrub/timber litter) TU5(heavy forest litter/ shrub/small trees) TL5(high load of conifer litter) TL8(long needle litter)	TU1(grass/shrub/timber litter) TL3 (moderate load of conifer litter)
Canopy Bulk Density* (Kg/m$^{3)}$	0. 080-0. 260	0. 040-0. 150
Canopy Base Height** (feet)	1-10	10-30
Crown Fire Potential	Yes	No

* Canopy Bulk Density is the mass of available canopy fuel per unit of canopy volume (Scott and Reinhardt 2001).

** Canopy Base Height is the lowest height above the ground at which there is a sufficient amount of canopy fuel to propagate fire vertically into the canopy. It is an effective value that incorporates ladder fuels such as shrubs and understory trees (Scott and Reinhardt 2001).

Table 52. Pre- and Post-Treatment Stand Characteristics Used for Fire Behavior Modeling in Fuel Reduction Treatment

Fire Behavior Model	Pre-treatment	Post-treatment
Fuel Model	GS2 (grass/shrub) TU1(grass/shrub/timber litter) TU5(heavy forest litter/ shrub/small trees)	GS2(grass/shrub) TU1(grass/shrub/timber litter) TL4(small downed logs) SB1(low load of activity fuels)
Canopy Bulk Density* (Kg/m$^{3)}$	0. 020-0. 260	0. 020-0. 220
Canopy Base Height** (feet)	1-10 ***20-30	6-15 ***25-35
Crown Fire Potential	Yes, ***No	Limited to passive crown fire, ***No

* Canopy Bulk Density is the mass of available canopy fuel per unit of canopy volume (Scott and Reinhardt 2001).

** Canopy Base Height is the lowest height above the ground at which there is a sufficient amount of canopy fuel to propagate fire vertically into the canopy. It is an effective value that incorporates ladder fuels such as shrubs and understory trees (Scott and Reinhardt 2001).

*** Proposed Fuels units 16 and 17 are maintenance burns in previous harvest treatment units which do not currently pose any crown fire potential. These are the only proposed fuels units which do not pose crown fire potential in their existing condition.

Table 53. Comparison of Pre- and Post-Treatment Fuel Models for Fuels Units under the Action Alternatives

Pre-treatment Fuel Model (primary fire carrier) (fuel load rating)	Post-treatment Fuel Model (primary fire carrier) (fuel load rating)	Alternative 2 (# of units and total acres)	Alternative 3 (# of units and total acres)	Alternative 4 (# of units and total acres)
GS2 (grass/shrub) (moderate fuel load)	GS2 (grass/shrub) (moderate fuel load)	4 units 113 acres	4 units 113 acres	4 units 113 acres
TU1 (Grass/shrub/timber litter) (low fuel load)	GS2 (grass/shrub) (moderate fuel load)	1 unit 242 acres	1 unit 242 acres	1 unit 242 acres
TU5 (heavy forest litter/shrub/small trees) (very high fuel load)	GS2 (grass/shrub) (moderate fuel load)	3 units 431 acres	3 units 431 acres	3 units 405 acres
TU5 (heavy forest litter/shrub/small trees) (very high fuel load)	SB1 (light dead and down activity fuel) (low fuel load)	2 units 41 acres	2 units 41 acres	2 units 41 acres
TU5 (heavy forest litter/shrub/small trees) (very high fuel load)	TU1 (Grass/shrub/timber litter) (low fuel load)	17 units 889 acres	17 units 889 acres	16 units 799 acres

Table 54. Comparison of Pre- and Post-Treatment Fuel Models for Harvest Units under the Action Alternatives

Pre-treatment Fuel Model (primary fire carrier) (fuel load rating)	Post-treatment Fuel Model (primary fire carrier) (fuel load rating)	Alternative 2 (# of units and total acres)	Alternative 3 (# of units and total acres)	Alternative 4 (# of units and total acres)
TL5 (conifer litter/light slash or mortality fuel) (high fuel load)	GS2 (grass/shrub) (moderate fuel load)	2 units 97 acres	2 units 97 acres	3 units 79 acres
TL5 (conifer litter/light slash or mortality fuel) (high fuel load)	TL3 (moderate conifer litter with light load coarse fuels) (moderate)	13 units 329 acres	13 units 329 acres	16 units 294 acres

Pre-treatment Fuel Model (primary fire carrier) (fuel load rating)	Post-treatment Fuel Model (primary fire carrier) (fuel load rating)	Alternative 2 (# of units and total acres)	Alternative 3 (# of units and total acres)	Alternative 4 (# of units and total acres)
TL5 (conifer litter/light slash or mortality fuel) (high fuel load)	TU1 (Grass/shrub/timber litter) (low fuel load)	10 units 560 acres	10 units 560 acres	12 units 352 acres
TL8 (long-needle pine litter) (moderate fuel load)	TU1 (Grass/shrub/timber litter) (low fuel load)	4 units 136 acres	4 units 136 acres	4 units 136 acres
TU1 (Grass/shrub/timber litter) (low fuel load)	TU1 (Grass/shrub/timber litter) (low fuel load)	3 units 65 acres	2 units 62 acres	3 units 65 acres
TU1 (Grass/shrub/timber litter) (low fuel load)	GS2 (grass/shrub) (moderate fuel load)	1 unit 18 acres	1 unit 18 acres	1 unit 18 acres
TU5 (heavy forest litter/shrub/small trees) (very high fuel load)	GS2 (grass/shrub) (moderate fuel load)	18 units 779 acres	18 units 774 acres	22 units 604 acres
TU5 (heavy forest litter/shrub/small trees) (very high fuel load)	TL3 (moderate conifer litter with light load coarse fuels) (moderate)	2 units 59 acres	2 units 59 acres	2 units 59 acres
TU5 (heavy forest litter/shrub/small trees) (very high fuel load)	TU1 (Grass/shrub/timber litter) (low fuel load)	28 units 1083 acres	24 units 1034 acres	27 units 983 acres

Peterson et al. (2005) suggest there is strong support in the scientific literature and case studies that fuel treatments reduce the probability of crown fire. This has been supported as recent as 2005 with the Camp 32 fire on the Rexford Ranger District of the Kootenai National Forest (KNF). However, it is important to recognize that without treatment of slash created by harvest activities and thinning, it is possible that wildfire severity could increase (Omi et al. 2006).

The post-treatment areas would result in low to moderate surface fire conditions and would be unlikely to initiate or sustain a crown fire. Expected flame lengths would be less than four feet and the fire is expected to be a surface fire which would be more conducive to fire suppression activities. These two criteria are the thresholds of fire control for ground-based suppression personnel directly attacking the fire. Also, these conditions would substantially reduce the potential for long range and short range spotting from firebrands, which are associated with high fire intensities, torching, crowning and fire whirls (Rothermel 1983). Fires exhibiting long range spotting pose some of the greatest threats to firefighter and public safety because they are extremely difficult to control.

None of the alternatives can influence the time and place where ignitions may occur. Wildland fire is a natural, ongoing process whose time and location can never be precisely predicted by fire behavior science. There would still be untreated areas of high fuel accumulations that could lead to high-intensity fires. Blowdown, insect and disease mortality, and other causes of fuel accumulation would likely continue in the analysis area. However, treated stands would help reduce fire effects. Omi et al. (2006), found treatments that include thinning followed by slash treatment were the most effective in reducing fire intensity and severity and can last up to a decade in mixed-conifer sites. Beyond this time, maintenance fuel reduction treatments may be needed. These periods of effectiveness could be extended by future thinning with simultaneous fuel treatments.

Under all action alternatives, surface activity fuels and natural fuels would increase prior to fuels treatment (underburning, grapple piling and burning, hand piling and burning, and chipping). This accumulation of surface fuels could be a high fire hazard, and high burn severity would be expected if a wildfire were to occur before fuel treatments were completed. Untreated fuels would be similar to a slash-blowdown fuel model SB1 or SB2. Given the same weather scenario and fuel moistures of the previous model runs, flame lengths of 1 to 10 feet, and rates of spread from 3 to 31 chains per hour (chain = 66 feet), could be expected within the proposed units. In addition, heavy surface fuel loading would allow long residence time and a high resistance to control. Residence time and resistance to control are described as:

> **Residence Time-** The time, in seconds, required for the flaming front of a fire to pass a stationary point at the surface of the fuel. The total length of time the flaming front of the fire occupies one point.
>
> **Resistance to Control-** The relative difficulty of constructing and holding a control line as affected by resistance to line construction and by fire behavior.
>
> http://www.nwcg.gov/sites/default/files/products/pms205.pdf (accessed 09/2015)

Intermediate harvest is proposed in all three action alternatives. The intent is to improve tree vigor, increase tree spacing, increase fire and insect resiliency, favor desirable species and reduce ladder fuels. Whole tree yarding would be utilized to minimize any increase in activity fuels. Slashing would be utilized post-harvest to reduce ladder fuels. Since prescribed fire may not be used immediately after harvest activities, an increase in surface fuels is expected in these stands. This would likely cause an increase in fire behavior but it is expected to remain a surface fire because ladder fuels would be reduced (raising canopy base heights) and crown spacing would be increased (reducing canopy bulk density).

Slashing with lop and scattering is also proposed in all of the action alternatives. Slashing with lop and scattering will cause expected fire behavior to not be conducive for hand suppression tactics in the treated stands. The understory trees or ladder fuels are slashed and then lopped and scattered to reduce fuel heights but they are left on site to decompose. Proposed Fuels units F09 and F10 are to be slashed with lop and scattering and can be characterized by a pre-treatment fuel model TU5 (Very high load, dry climate timber-shrub). Given similar fuel moisture and weather condition as described previously under “Analysis Methods”, an untreated stand would exhibit flame lengths of 7 to 11 feet and a rate of spread of 8 to 19 chains per hour. After treatment has occurred and the needles on the slash have turned red, the fuel model would be represented by a SB1 (Low load activity fuel). Expected fire behavior would exhibit flame lengths of 3 to 5 feet and a rate of spread of 5 to 13 chains per hour. This condition would only occur while the cured red needles are still on the slash. Experience has shown this red needle stage to last 1 to 2 years

after thinning. Once the red needles have fallen off and the fuels start to become more compacted from winter snow, the fuel model will shift to a TL4 (Small downed logs). Expected fire behavior would include flame lengths of 1 to 2 feet and a rate of spread of 2 to 5 chains per hour. This condition would likely exist 2 to 5 years after treatment has occurred.

As part of the OLY project, the KNF is also analyzing proposed road construction for Stimson Lumber Company access onto company lands in Section 3 of Yaak Mountain. From a fire suppression standpoint, the new road would provide access to currently inaccessible terrain. Also, Stimson Lumber Company plans to commercially harvest areas within this section which would decrease crown fire potential and increase safety of visitors utilizing the NFS rental lookout on Yaak Mountain.

An indirect effect of the proposed treatments in each action alternative is the potential to increase surface winds (Albini and Baughman 1979) and more drying of both live and dead surface fuels (Pollet and Omi 2002). This effect would be more impactive in the regeneration harvests than other treatments due to the level of overstory removed. These potentially drier and windier conditions are factored into the post-treatment fire behavior modeling. Most fire managers believe these conditions are offset by the reduction or elimination of crown fires in the post-treatment stands. These same conditions that allow for more drying also allow for more moist conditions during diurnal weather patterns, after precipitation, and seasonal variations. The more open stand conditions after treatment also allow for more effective delivery of aerial retardant or water during wildfire suppression operations.

Another indirect effect of the proposed treatments is their impact on adjacent non-treated stands. Omi et al. (2006) suggest that fuel treatment effects may extend beyond the treated area. Fuel treatments which slow or reduce flame intensity of an oncoming flame front could buffer untreated areas beyond them, especially on the downwind side of a treated area.

All action alternatives propose numerous fuel reduction activities within the WUI immediately adjacent to private property in order to contribute to meeting the purpose and need of this project. Besides reducing fuels on NFS lands, the treatments would likely enhance treatments on private property adjacent to NFS lands or benefit them as described previously. Private landowners would be eligible for Stevens Grant Projects which provides financial assistance to complete fuels reduction activities on private land. It is important to note that the most important factors of a home's ignitability during wildland fires depends on the characteristics of the home and its immediate surroundings. For this reason, it is imperative that landowners do their part in making their homes firewise. More information for landowners can be found at http://www. firewise. org/.

With the potential for use of wildland fire under the 2015 Forest Plan, treatments like those proposed in all action alternatives would allow fire managers and decision makers more options. If adequate fuel reduction activities have occurred in or near values at risk, such as private property, then a decision maker may be more comfortable utilizing other options rather than full fire control.

Fuel treatments and commercial harvest in dry-site old growth are proposed in Alternatives 2, 3, and 4. The vegetation management is designed to reduce ladder fuels via a combination of intermediate harvest, slashing and/or prescribed burning. By reducing ladder fuels and surface fuels, the treatments are expected to maintain or enhance some of the dry-site old growth attributes and help ensure the survivability of the old, large diameter trees in these individual stands. The overall goal is to work towards returning these stands to their appropriate fire regime and increase fire resiliency.

Prescribed burning treatments are proposed in Alternatives 2, 3, and 4 for areas with known historic properties. Ryan (2010) suggests that managing fire effects during prescribed burning requires specifying acceptable fire environment characteristics and ignition pattern to control the intensity and duration of burning. High duff moisture content provides the maximum protection for surface and sub-surface historic properties. Research shows that duff moisture content of 110 percent or greater minimizes duff reduction and subsoil heating. Ryan (2010) also suggests that careful selection of prescribed burning conditions and careful management of ignition patterns can minimize, but not preclude damage to these resources, and manual removal of fuels immediately surrounding such resources may be necessary. This also helps minimize first and second order fire effects to surface and subsurface historic properties. Historic property fire effects can be minimized or eliminated if land managers are made aware of the locations. However, unknown sites may experience detrimental fire effects from prescribed burning operations. For more information on historic properties within the OLY analysis area, please see the full historic properties report.

Lastly, Alternatives 2, 3 and 4 include the storage and decommissioning of roads. All action alternatives include the storage and decommissioning of 27.1 miles of roads which are currently closed to motorized use for the public. Road access is important for a quick initial attack response; thus, road storage and decommissioning is rarely beneficial from a fire suppression standpoint. The roads identified for storage and decommissioning in these alternatives are not vital to wildfire suppression resources. Most of the roads proposed for storage and decommissioning are maintenance level 1 or non-system roads and are not maintained enough for engine access. The majority of the roads proposed for storage and decommissioning are short spurs less than ½ mile in length or longer roads that are within ¼ mile and run parallel to other roads that would not be stored. None of the roads proposed for storage and decommissioning in the action alternatives provide sole access to ridgetops nor are they immediately adjacent to private property.

Alternative 2 (Modified Proposed Action)

Direct and Indirect Effects

Fuel reduction activities specific to Alternative 3 include:

- Total treatment on about 4,842 acres of which 3,751 acres is within the WUI
- Intermediate harvest would occur on 652 acres;
- Regeneration harvests would occur on 2,475;
- Fuel reduction units on about 1,716.
- Prescribed fire on about 4,828 acres of NFS lands. This includes about 1,249 acres of pile burning and 3,579 acres of underburning. Approximately 1,974 acres of the underburning is associated with timber harvest units. The rest of the underburning is associated with fuel reduction units.

Alternative 2 proposes 32 regeneration harvests units that create or contribute to openings over 40 acres in size. On moist sites that would have typically experienced mixed to stand replacing fire severity, these units were proposed to implement treatments that would be more commensurate to historical patch sizes. On drier sites, these units were proposed to emulate historic patch size variability and address undesirable overstory tree species, off-site seed source ponderosa pine plantations, and stands where insects and disease have decimated the overstory. Regeneration harvest results in stands that are more fire resilient for the future.

Implementation of Alternative 2 could have an indirect beneficial impact to cultural resources and historic properties by reducing the risk of widespread high-severity wildfires. However, this alternative also poses potential direct and indirect detrimental impacts from harvest activities, fuel treatments, and prescribed burning to these resources. Alternative 3, described in the next section, was developed to help address known historic properties and fuels treatments were designed accordingly.

Alternative 3

Direct and Indirect Effects

Alternative 3 was designed to address concerns to known historic properties as well as detrimental soil disturbance (DSD). Proposed timber harvest and fuels units were dropped and/or modified to protect heritage properties. Proposed timber harvest units with soil conditions that could not be rehabilitated post-harvest to less than 15 percent DSD values were either dropped or converted to fuels reduction "F units".

Fuel reduction activities specific to Alternative 3 include:

- Total treatment on 4,813 acres of which 3,722 acres is within the WUI;
- Intermediate harvest on 649 acres;
- Regeneration harvest on 2,420 acres;
- Fuel reduction units on 1,744 acres;
- Prescribed burning on 4,782 acres (1,245 acres of pile burning, 1,936 acres of underburning with timber harvest, and 1,601 acres of fuels unit burning);

All the treatments described under fuel reduction activities have the same objectives and direct and indirect effects as those described previously under Alternatives 2, 3 and 4.

Alternative 3 proposes 30 regeneration harvests harvest units that create or contribute to 22 openings over 40 acres in size. The objectives and rationale for the over 40-acre openings is the same as described previously under Alternative 2.

In this alternative there is a reduction in the proposed treatment acres as well as potential treatment acres within the WUI. Foregoing fuels treatment of these additional acres would not reduce fuel conditions on NFS lands near property owners in the Sears Flat area, and could negatively impact access and egress on US Highway 2 if a fire were to get established in this area.

Under Alternative 3, some areas with cultural, water, or soils resource concerns were dropped (Fuels Units F24, F32 and Harvest Unit 41B). The dropped areas would continue to exhibit crown fire potential and would continue to see in increase in surface and ladder fuels. Fire return intervals would continue to be missed, causing a trend away for historical fire regimes. When a wildfire does occur, it is more likely to cause excessive mortality in the old, large diameter trees. Also, since the dropped units would remain untreated, these areas could pose added safety concerns for the public and firefighters if a wildfire engages them.

A direct effect of Alternative 3 is that potential detrimental effects to cultural resources and historic properties have been mitigated, by either excluding the known locations of these resources or by adding protection measures. Map M-9 is a map of the Sears Flats area with detailed protection guidelines for fuels treatments. Generally, hand line or machine fireline dug to

bare, mineral soil is constructed around prescribed fire units. However, a wetline would be utilized for a portion of Unit 38, because ground disturbance would not be allowed. A wetline is a type of fireline that does not involve digging. After excess surface fuels are removed, the line is wetted with water, in lieu of digging a line to bare, mineral soil. An indirect effect of using wetlines during prescribed burning operations is that they are typically less effective in containing the prescribed fire as compared to hand or machine fireline.

Alternative 4

Direct and Indirect Effects

Alternative 4 was designed to respond to public concerns about regeneration harvest openings over 40 acres. No regeneration harvest over 40 acres is proposed under this alternative.

Fuel reduction activities specific to Alternative 4 include:

- Total treatment on 4,337 acres of which 3,311 acres is within the WUI;
- Intermediate harvest on 652 acres;
- Regeneration harvest on 1,954 acres;
- Fuel reduction units on 1,731 acres;
- Prescribed burning on 4,323 acres (1,122 acres of pile burning, 1,596 acres of underburning with timber harvest, and 1,605 acres of fuels unit burning);

All the treatments described under fuel reduction activities have the same objectives and direct and indirect effects as those described previously under Alternatives 2, 3 and 4.

About 400 fewer acres would be treated in the WUI compared to Alternative 2 and 3.

In this alternative, as shown in Table 53, fuels units would convert about 100 fewer acres from TU5 (heavy forest, very high fuel load) to TU1 (grass/shrub/timber litter, low fuel load). Also, as shown in Table 54, harvest units would convert about 200 fewer acres from TL5 (conifer litter/light slash/mortality fuel, high fuel load) to TUI, and would convert about 170 fewer acres from TU5 to GS2 (grass/shrub, moderate fuel load).

Alternative 4 does not address the protection and mitigation of potential effects to historic properties. A direct and indirect effect is the potential for detrimental damage from harvest activities, fuel treatments, and prescribed burning to these resources.

Alternatives 2, 3, and 4

Cumulative Effects

The cumulative effects under the no-action alternative also apply to the action alternatives. These include:

- Cumulatively, fire suppression, past wildfires, and timber management have had and would continue to have the most effect on fire regimes and fuels in the analysis area. Past harvest activities on NFS land that were followed up with fuel reduction activities, such as piling and burning or underburning, are still providing a slowing effect on fire spread.
- The most effective treatments with the greatest longevity for reducing fire behavior are regeneration harvest followed by broadcast burning. Previous large wildfires occurring

from 1991 to present are also providing a reduced fire severity benefit in the burn areas. Although previous regeneration harvest in the project area followed by broadcast burning did not mimic all of the ecological processes that occur during a mixed or stand replacing wildfire, it was effective at reducing fuels and maintaining an individual stand in a mixed or stand-replacing fire regime. Underburning is associated with intermediate harvest or ecosytem burning and typically occurred within the project area in areas within Fire Regimes I or III. In most cases, timber harvest or noncommercial slashing of ladder fuels eliminated the ladder fuels and burning was done to reduce fuels and improve wildlife habitat and/or browse. This type of treatment was effective at maintaining or returning individual or multiple stands to a low or mixed severity fire regime. In general, underburning has a much shorter lifespan on treatment longevity because the lower severity of the burning consumes less fuels, keeps most of the overstory in place and stimulates the growth and vigor of fire adapted native plants allowing for surface fuels to accumulate.

- Timber harvest activities occurring on corporate timber land and private land are providing protection against active crown fires. However, unless the slash created was treated by piling and burning or underburning, fire spread and intensities of a fire experienced on these lands could increase or not be reduced to the same level as it would with fuels treatment.
- The Forestwide Young Growth Project: During the development of the OLY proposed action, all opportunities that appeared to be candidates for treatment were considered and included either in the proposed action or in project alternatives. This would preclude any Young Growth Project treatments in the OLY vicinity in the near term. Please refer to Ongoing and Reasonably Foreseeable Actions in Chapter 2.
- Firewood cutting is also expected to continue in the analysis area. Cumulatively, this has been effective at decreasing hazardous fuel loads within 200 feet of many of the open roads.

The major difference in cumulative effects between the no-action and action alternatives is that the action alternatives, in combination with past harvest activities, fuel treatments, and wildfires would provide greater reduction in expected fire behavior and fire movement across the landscape. The combination of location and juxtaposition of past and proposed treatments as well as past fire history would be more effective at reducing the potential of a high severity wildfire from having negative impacts to the analysis area. This is based on the assumption that natural and activity fuels will be adequately reduced to lower fire severity and intensity.

In order to maintain the treated areas for effectiveness, maintenance treatments would be required. Treatments such as pre-commercial thinning, reduction of surface ladder fuel accumulations, and thinning overstory crowns as they begin to close-in and provide enough canopy fuels to sustain a crown fire would be needed. Maintenance treatments are not likely to be needed for another decade or more.

2015 Forest Plan and Other Regulatory Direction Consistency

Below is a description of how the Modified Proposed Action and Alternatives 3 and 4 meet the following 2015 Forest Plan direction:

Forestwide Desired Conditions:

FW-DC-FIRE-01: Public and firefighter safety is always recognized as the first priority for all fire management activities.

> Each action alternative contributes to progress toward this desired condition to a varying degree.

FW-DC-FIRE-02: Hazardous fuels are reduced within the WUI and other areas where values are at risk. Fire behavior characteristics and fuel conditions exist in these areas that allow for safe and effective fire management. Fire behavior is characterized by low-intensity surface fires with limited crown fire potential. Forest conditions, and the pattern of conditions across the landscape, exist in these areas such that the risk is low for epidemic levels of bark beetles, high levels of root disease, and large scale, stand replacement wildfires.

> Each action alternative contributes to progress toward this desired condition to a varying degree. However, Alternative 4 treats about 440 fewer acres in the WUI.

FW-DC-FIRE-03: The use of wildland fire (both planned and natural, unplanned ignitions), increases in many areas across the Forest. Fire plays an increased role in helping to trend the vegetation toward the desired conditions while serving other important ecosystem functions. However, when necessary to protect life, property, and key resources many wildfires are still suppressed.

> Each action alternative contributes to progress toward this desired condition to a varying degree by using planned ignitions.

FW-DC-WL-09: Productive plant communities, with a mosaic of successional stages, structures, and species, are available for migratory landbirds. These habitats support nesting activities or use during bird migration across the Forest. The use of fire, both planned and unplanned ignitions, improves and maintains this mosaic of habitats.

> Planned ignitions in both fuels units and harvest units support this desired condition by helping to foster varied vegetation types, snags, and other habitat.

FW-DC-WL-14: A diversity of patch sizes of fire-killed trees (either natural or prescribed burned and where not a safety concern) exists to provide primary habitat for population expansions for species whose habitat requirements include this structural component (refers to FW-DC-VEG-05, FW-DC-TBR-01, FW-DC-FIRE-03).

> The variety of harvest and fuels unit sizes (although Alternative 4 has no regeneration units over 40 acres), and the subsequent fuels treatments, contribute to this desired condition.

Forestwide Objectives:

FW-OBJ-FIRE-01: The outcome is the treatment of fuels on approximately 5,000 to 15,000 acres annually on NFS lands, primarily through planned ignitions, mechanical vegetation treatments, and unplanned ignitions. NFS lands within the WUI are the highest priority for fuel treatment activities.

The proposed treatments per each action alternative contribute over 3000 acres of treatment within the WUI and over 4000 acres treated overall.

FW-OBJ-VEG-01. Forest Resilience: Over the life of the Plan, the outcome per decade is:

- Increased relative representation of early seral, shade-intolerant, drought- and fire-tolerant, insect/disease resistant species dominance types (e.g., ponderosa pine, white pine, western larch, whitebark pine, and hardwoods) on approximately 120,000 to 150,000 acres (these acres are also included in those listed in the following bullet).
- Treatment of approximately 250,000 acres to maintain and/or improve forest resilience, natural diversity, and productivity and to reduce negative impacts of non-native organisms. Treatments may include timber harvest, planting, thinning, management of fire (including planned and unplanned ignitions), mechanical fuel treatments, revegetation with native species, blister rust pruning, integrated tree improvement activities, noxious weed treatments, and other integrated pest management activities including forest health protection suppression and prevention activities.

The combination of harvest treatments and planned prescribed fire within regeneration units promotes early seral species. Fuels treatments also provide seed beds and nutrient availability to foster planting efforts (Boerner et al. 2009, Certini 2005).

FW-OBJ-WL-03. Landbird assemblage (insectivores): The outcome is the management of planned ignitions on 1,000 to 5,000 acres, annually, to provide habitat for olive-sided flycatchers, hairy woodpeckers, chipping sparrows, and Hammond's and dusky flycatchers. (Also see FW-OBJ-FIRE-02, which provides additional habitat for these species.)

Planned ignitions in combination with harvest units are moving toward early seral vegetation stages and increased snag habitat.

Forestwide Guidelines:

FW-GDL-VEG-08: All silvicultural practices may be used to manage forest vegetation. This includes silvicultural systems (e.g., even-aged, two-aged or uneven-aged), regeneration methods (e.g., clearcutting, seed-tree, shelterwood, and group or single-tree selection), as well as other practices such as improvement cutting, commercial or pre-commercial thinning, use of planned or unplanned ignitions, planting, pruning, invasive terrestrial plant species control, cone collection, tree improvement, insect or disease control, site-preparation, and fuel reduction. Appropriate practices for a given situation depend on numerous factors, including the current and desired forest vegetation conditions at the stand and landscape scales, the biophysical setting, and the management direction and emphasis for the area. Silvicultural practices should generally trend the forest vegetation towards conditions that are more resistant and resilient to disturbances and stressors, including climate change.

Over 4000 acres under each action alternative would adhere to this guideline after implementation of planned ignitions and other fuels treatments for both fuels units and harvest units.

Geographic Area Desired Conditions:

GA-DC-FIRE-BUL-01: Threats of wildfire are reduced for the town of Troy, Highways 2 and 56, and outlying communities and structures.

> Over 3,000 acres of fuels treatments with the WUI would occur under each of the action alternatives.

GA-DC-FIRE-YAK-01: Threats of wildfire are reduced for the communities of Yaak, Sylvanite, and outlying communities and structures.

> Over 3000 acres of fuels treatments with the WUI would occur under each of the action alternatives.

Management Area Desired Conditions:

MA2-DC-FIRE-01: **Wild/Scenic/Recreational.** Fire plays an increased role as a natural disturbance agent.

> About 270 acres (Alternative 2), 133 acres (Alternative 3), and 121 acres (Alternative 4) of planned prescribed fire within MA2 is designed to mimic natural fire.

Management Area Guidelines:

MA2-GDL-FIRE-03. Scenic/Recreational: Natural, unplanned ignitions, as well as planned ignitions, may be managed to meet resource objectives in eligible scenic and recreational river segments.

> Harvest units proposed in MA2 of about 330 acres (Alternative 2) and 290 acres (Alternatives 3 and 4) are designed to mimic natural processes and meet resource objectives.

MA5a,b,c -GDL-FIRE-01: Natural, unplanned ignitions, as well as planned ignitions, may be used to meet resource objectives.

> Fuels units of about 1,067 acres (Alternative 2) and about 170-acres (Alternatives 3 and 4), proposed in MA5a are designed to mimic natural fire and meet resource objectives.

MA6-GDL-FIRE-01: Fuels are reduced, particularly within the wildland urban interface, to reduce the threat of wildland fire.

> Approximately 4,317 acres of fuels treatments (3,751 acres in the WUI) in Alternative 2; about 4,194 acres (3,722 acres in the WUI) in Alternative 3; and about 3730 acres of fuels treatments (3,311 in the WUI) in Alternative 4 would occur within MA6.

Summary

Fire/Fuels management for the OLY project, through the use of planned prescribed fire, management of unplanned ignitions, and the use of non-ignition fuels reduction, helps meet forestwide desired conditions, objectives, goals, standards and guidelines. The harvest and non-harvest related fuels treatments proposed in the action alternatives help benefit silvicultural practices; wildlife forage and habitat, and natural ecological processes. Fuels treatments under

Alternative 3 were developed to help protect historic properties, which are not addressed under the No Action Alternative or Alternatives 2 and 4. Each of the action alternatives helps reduce hazardous fuels in the WUI.

Within the WUI, there is a high level of risk associated with fire. The primary risks are to public and firefighter safety, capital investments and natural resource values. It is not a question of, if unwanted fire will occur within the WUI, but when. Alternatives 2 (Modified Proposed Action), 3, and 4 treat hazardous fuels to reduce crown fire potential and stand replacing wildfire within the WUI and other areas, while promoting fire behavior characteristics and fuel conditions that allow for safe and effective fire management.

Implementing either the Modified Proposed Action or Alternative 3 treats the greatest number of acres. Implementing Alternative 4 also treats acres but to a much lesser extent. Implementing Alternative 1 does not meet the purpose and need of the project.

Forest Vegetation

Introduction

This section discusses the existing forest conditions and the effects of proposed treatments on forest conditions within the 67,500 acre Lower Yaak, O'Brien, Sheep Project (OLY) (see Vicinity Map M-1). The forest vegetation analysis identifies indicators used in the analysis and analyzes the effects of the alternatives on the forest vegetation resource according to these indicators. In particular, it discusses how the purpose and need seeks to address the existing forest vegetation conditions by: 1) promoting resilient vegetation by managing towards 2015 Forest Plan desired conditions for landscape-level vegetation patterns, structure, patch size, fuel loading, and species composition; 2) providing forage opportunities while maintaining wildlife security; 3) providing wood products that are in demand by the American public; and 4) treating hazardous fuels to reduce crown fire potential and stand replacing wildfire within the WUI.

Analysis Area

The analysis area for the forest vegetation resource is the project area and includes the timber stands that fall completely within the project area and all or a portion of timber stand compartments 401, 450, 451, 452, 453, 454, 455. For organizational purposes stands are aggregated into sub-compartments and compartments, organized by ranger district, national forest, and US Forest Service Region. The analysis area is approximately 67,500 acres with 9,628 acres located within two Inventoried Roadless Areas. The project area includes 34,911 acres within the WUI as well as areas that are somewhat higher in elevation and more remote. (See Chapter 1, Project Area Description). While the analysis focuses on land under Forest Service ownership, the 13,235 acres of non-Forest Service, including 9,433 acres of corporate lands are considered under the Cumulative Effects section of the Environmental Consequences. This analysis area is appropriate as it captures trends and conditions of the forest vegetation. Vegetation conditions and trends outside this analysis area have been summarized within other reports and documents cited within this analysis. The most current information and data for vegetation are displayed in this analysis.

Regulatory Framework

This forest vegetation analysis is guided by several documents, summarized below in Table 55, that establish policy and direction for the forest vegetation resource.

Table 55. Guiding Documents for Forest Vegetation Analysis

Guiding Document	Direction
2015 Kootenai National Forest Land Management Plan (2015 Forest Plan)	The 2015 Forest Plan provides overall guidance for the management of the lands on the KNF. It describes the goals, desired conditions, and objectives toward which the management of the land should be directed. And it establishes standards and guideline to help achieve or maintain the desired condition or conditions, to avoid or mitigate undesirable effects, or to meet applicable legal requirements.
The Multiple Use-Sustained Yield Act of 1960	A Federal law directing the Forest Service to achieve and maintain outputs of various renewable resources in perpetuity without permanent impairment of the land's productivity.

Guiding Document	Direction
National Forest Management Act of 1976	A Federal law amending the Forest and Rangeland Renewable Resources Planning Act of 1974 (RPA), which requires the development of land management plans for national forests and grasslands directing how the Forest Service will manage the multiple uses of forest resources including vegetation, outdoor recreation (including wilderness), range, timber, watershed, wildlife, and fish. The vegetation management approach in the 2015 Forest Plan is one that provides ecological components, patterns, and processes at multiple scales on the landscape, and thereby provides the full spectrum of habitats and conditions needed for all of the biological organisms associated with the various ecosystems (USDA Forest Service 2013c).
Rangeland Renewable Resource Planning Act of 1974	A Federal law directing the Forest Service to ensure the future supply of forest resources while maintaining a quality environment.

Resource Indicators and Measures

The following indicators were used to evaluate each alternative's ability to address the Purpose and Need:

1. Promote Resilient Vegetation Conditions by managing towards historic patch size and pattern –

   Indicators:
   - Number of units and acres restored to historic patch size and pattern
   - Number of units which create patch sizes over 40 acres

2. Promote Resilient Vegetation Conditions by managing towards characteristic forest structure –

   Indicators:
   - Percent of size class distribution within the project area compared to desired size class distribution
   - Acres of seedling/sapling age class increased to trend towards desired conditions

3. Promote Resilient Vegetation Conditions by managing towards historic fuel loadings –

   Indicators:
   - Acres of low- and mixed-severity fire regime restored
   - Acres of fuels reduced through harvest related activities

4. Promote Resilient Vegetation Conditions by managing towards desired species composition

   Indicators:
   - Acres of seedtree, shelterwood, and clearcuts to promote future western larch/white pine/ponderosa pine stands.
   - Acres of root diseased Douglas-fir Forest Type converted to more resilient early seral tree species

- Acres of prescribed burning and acres of canopy reduction to maintain or stimulate the understory vegetation

5. Provide Wood Products

   Indicator:
   - Volume of timber produced

6. Reduce crown fire potential and stand replacing wildfire within the WUI

   Indicator:
   - Acres of fuels reduction treatments within the WUI, including timber harvest, slashing, grapple and hand piling, and prescribed burning

7. Maintain or Improve Water Quality and Native Aquatic Species Habitat and provide a safe and efficient transportation system

   Indicators:
   - These are identified in the fisheries, water, and transportation sections of this document.

Methodology

The Lower Yaak, O'Brien Sheep (OLY) NFMA Landscape Assessment (located in the project file) was done to evaluate the existing condition, historical condition, trends, and desired conditions of the vegetation in the project area. Past management effects, current disturbance agents, and landscape trends for vegetation were identified. Key management issues, questions, and opportunities that would maintain or move vegetation towards the desired condition based on reference conditions were discussed. The assessment identified a variety of resource conditions that do not meet desired conditions as identified in the 2015 Forest Plan. The Forest Plan Revision Analysis of the Management Situation (AMS; USDA Forest Service 2003) also incorporates findings from monitoring and evaluation of past management, historic and current trends of resources, and science and assessments relevant to the resources being managed. Historic range of variability (HRV), presented in a social and environmental context, was used to help establish baseline reference conditions, disturbance regimes, and departures from historic conditions.

Information Sources

Integrated Scientific Assessment for the Interior Columbia Basin - This document was completed in 1996 (Quigley and others 1996) and revised in 2014. It provides a broad-scale context for the terrestrial vegetation and landscape ecology for the interior Columbia River basin of which includes this project area.

Comprehensive Evaluation Report (CER) - This report (USDA 2009) provides updated methodology for vegetation classification and historic range of variability as part of the 2015 Forest Plan revision process. For the purposes of this analysis, it was used primarily to help in establishing baseline reference conditions for forest vegetation.

Analysis of the Management Situation for Forest Plan Revision (AMS) - The AMS of 2003 (USDA 2004) is a summary of background analysis of vegetation, fire risk, and timber production originally prepared for the revision of the 2015 Forest Plan. It incorporates findings from monitoring and evaluation of past management, historic and current trends of resources, and science and assessments relevant to the resources being managed. Historic range of variability is presented in a social and environmental context.

This information was used to help establish baseline reference conditions, disturbance regimes, and departures from historic conditions. The AMS was also referenced for the need for change in management of vegetation, and implications for continuing under current (in 2003) management direction.

Biophysical Setting/Vegetation Response Unit – To characterize the existing, historical, and desired forest vegetation across the KNF, the Forest Plan established three biophysical settings by temperature and moisture gradients: warm/dry; warm/moist; and subalpine.

The three biophysical settings can be broken down further into vegetation response units (VRUs). VRUs are used on the Kootenai National Forest to stratify lands for planning purposes (Gautreaux 1999). Each one is an aggregation of related vegetative communities (habitat types) with similar soils, topography, and climate. Natural processes such as nutrient and biomass cycling, plant succession, fire regimes, and site productivity are also similar. Responses to disturbance from human and natural causes can be expected to follow similar pathways. Historically lands within a given VRU were subject to broadly similar disturbance regimes. There are 11 VRUs classified on the Kootenai NF. The warm/dry biophysical setting consists of VRU 1-3, the cool/moist is VRU 4-6, and the subalpine is VRU 7-11. Map M-15 displays the location of mapped VRUs in the OLY project area.

Fire Regimes – Fire regimes are the patterns, frequency and intensity of wildfires. Fire regimes were taken from Fischer and Bradley (1987) and Smith and Fischer (1997). The fire regimes described in these two publications were mapped at the Forest level using habitat types as the mapping unit. VRUs have also been classified as to their dominant fire regimes. Additional perspectives on applicable fire regimes for this area were taken from Brown and Smith (2000).

FSVeg - Data for the stands within the project area was available from the FSVeg database. This database contains basic site and stand information and stand exam information including slope, aspect, elevation, habitat type, Montana fire group, Idaho fire group, forest type, size class, age class, and year of stand origin.

FACTS - The Forest Activity Tracking Database (FACTS) contains all management activities that have affected stands including activities such as past harvest, fires, thinning, planting, weed spraying, and others.

Region 1 Summary Database - The Region One Project-Level Summary Database is a tool that uses other databases and models. It uses FSVeg stand data where additional information is extracted via Forest Vegetation Simulator (FVS) growth models, wildlife habitat models, fuels models, insect hazard models, and others.

GIS Layers - Various Kootenai NF GIS layers were used as sources of information and for spatial analysis, including the following:

- Stand Data: stand delineations and associated data from FSVeg and FACTS
- Vegetation Response Units (VRU): aggregations of land having similar capabilities and potentials for management
- Regeneration and Intermediate Harvest: past clearcut, seedtree, shelterwood, salvage, liberation, and improvement harvest units from FACTS
- Old Growth: represent a spatial depiction of stands that either currently meet the definition of old growth (Green et al.), or are being managed with an objective of meeting the definition sometime in the future, as the trees age and/or grow larger in size.

- National Agriculture Imagery Program NAIP: 2011 and 2013 color orthophoto mosaic in digital format
- Transportation system: delineations of all roads and trails
- Inventoried Roadless Areas: delineations of Inventoried Roadless Areas
- Land Ownership: delineations of all land ownership
- Stream and wetlands: delineations of streams and wetlands

Forest stand management needs were identified by a silviculturist based on existing vegetation conditions and desired stand conditions. Desired stand conditions were developed to be ecologically compatible with the site, as well as with current, expected and historic disturbance patterns and successional pathways of the landscape vegetation. The management needs identified for each stand are the actions that would move the stands from the existing condition toward the desired condition to maintain or promote forest resiliency in the project area in accordance with the 2015 Forest Plan.

The vegetative objectives from the project purpose and need are tracked by alternative to measure the effectiveness of the alternative actions. Relevant factors, which reflect the project purpose and need, included stand composition, especially the condition and presence of ponderosa pine, western larch, and western white pine, stand structure, and patch size and pattern. The metrics used to gauge the relative degree to which the purpose and need is addressed are displayed in the environmental consequences section. Desired species composition indicates the presence of desired seral species which indicate relative resistance to insect, disease, and fire. By looking at the size class distribution, the analysis can show relative abundance of forest structure. The size of the treated area can indicate relative relationship to historic patch size, and the volume of timber harvest produced by alternative demonstrates the degree to which each alternative contributes to providing wood products. Additional analysis related to employment and income can be found in the Economics section of Chapter 3. Discussions and data displayed in this section will give the reader an idea of how these issue indicators are affected across alternatives relative to the specifics of the project purpose and need. Documentation for the general target stands, site-specific stand data, and stand diagnosis can be found in the project file. A description of the features of various silvicultural systems is included in Chapter 2. A description of proposed harvest units by alternative can be found in Appendix C – Unit Summary Table, and a description of the prescribed burn units can be found in Appendix D – Prescribed Burn Unit Table.

Incomplete and Unavailable Information

The most recent stand exam data available is from 1999 and before. By using field data, knowledge of existing condition, and professional resource judgement, the information used was reviewed and deemed to be still valid. Also, size class estimates on some Forest Service and non-Forest Service stands were estimated using Google Earth Imagery, stand origin data, existing data on stands in the vicinity, and the judgement of the silviculturist trainee.

Reference Conditions

The project area lies within a large ecosystem that stretches across the Northern Rocky Mountains, and is described as the Northern Rocky Mountain Province in the Forest Service's National Hierarchical Framework of Ecological Units. More specifically, the area is included in the Northwestern Montana Forest Region described by Pfister and others (1977) and refined by Arno (1979). The project area includes some of the lowest elevation, warm habitats found on the Three Rivers Ranger District. This includes abundant warm/dry and warm/moist habitat types due to low elevation and southwest aspects. There are some higher elevation subalpine fir/mixed

conifer areas along the northern boundary of the project area. Fire, wind, insects, and disease are important disturbance processes which create a dynamic mosaic of forest conditions. These natural events can occur in small, localized areas or can impose change over broad areas of the landscape. Species composition, habitat diversity, age class distribution, and stand structure are the direct result of such natural disturbances, and also include human influences such as timber harvest and fire suppression. Map M-13 displays the vegetation age classes in the OLY project area. Since plants and animals adapt to habitat and disturbance conditions that are evolving over time, it is considered desirable to manage towards a range of historic conditions. Historic Range of Variability (HRV) is a term found in the literature that describes reference conditions. This provides a baseline range of conditions used to evaluate how existing conditions deviate from situations that resulted largely from natural processes.

Climate

It is generally accepted that the current climate and range of native tree species has existed for about 2,500 years. Keane et al. (2009) state that "Given the uncertainties in predicting climatic responses to increasing CO^2 and the ecological effects of this response….we feel that historic range of variability (HRV) time series derived from the past may have significantly lower uncertainty than any simulated predictions for the future. Recall that large variations in climates of the past several centuries are already reflected in the parameters used to simulate HRV time series. In that light, we suggest it may be prudent to wait until simulation technology has improved to include credible pattern and process interactions with regional climate dynamics and there has been significant model validation before we throw out the concept and application of HRV."

Frissell and Bayles (1996) argue against using HRV in analyzing effects to aquatic ecosystems. One of their major points is that Ecosystem Management should be framed as a conscious experiment with a largely uncertain outcome. However, taking no action also carries risk. Management opportunities identified for the OLY project are consistent with the 2015 Forest Plan management direction and is designed to return a portion of the forested landscape to a sustainable and resilient condition.

Fire Ecology and Forest Succession

Fire has been the major influence on vegetative patterns, composition, structure, function, age and development of both individual stands and the larger landscape (Habeck and Mutch 1973; Arno 1976; Arno 1980; Fischer and Bradley 1987). The intensity and frequency of historic fires and the resulting patch size and vegetative succession response are predictable based on the biological, physical, and climatic factors of the landscape. Forest vegetation adapted to these disturbance processes. For example, western larch and ponderosa pine have evolved with unique traits and can withstand frequent fires of higher intensity more effectively than species with thin bark and shallow roots such as grand fir, Engelmann spruce, and subalpine fir. Historically, stand-replacing fires often left the fire-adapted species as single standing trees or groups with an open canopy (Smith and Fisher, 1997). These stands would then reproduce under the open canopy, thereby perpetuating the seral fire-adaptive species.

Some areas such as riparian settings were less impacted by fire due to their cool, moist environment and the difficulty of fire spreading significantly through the deep, wet duff. Although, under the right conditions, these wet valley bottoms were impacted by lethal, stand replacement fires originating in adjacent, upland areas. When these fires burned into the riparian areas, their severity would generally have changed to more of a mixed severity type. Fires

occurring at elevations above the bottomlands were generally more frequent and left varying sized canopy gaps and patch sizes, depending on the intensity.

Denser stocking did occur on the wetter, more productive sites where moderate topography and better soil development prevailed. The availability of seed from lodgepole pine with serotinous cones meant rapid restocking of burned sites – especially in the mid to upper elevations. Persistent, large diameter fire survivors of larch, Douglas-fir, and ponderosa pine helped to maintain a mix of species.

The lethal fires resulted in the regeneration of relatively pure lodgepole pine stands under scattered overstory larch on cool, moist sites as well as stands dominated by Douglas-fir with some ponderosa pine on warmer, drier sites. While not included in the record, mixed severity fires occurred in a large portion of the area, which introduced diversity through stand age, size class, species composition, and edge habitats, as well as a wide range of stocking conditions. Frequent, light intensity underburns also occurred, particularly on drier, lower elevation sites. The nature of this type of burning maintained patchy open stands dominated by uneven-aged overstory western larch, Douglas-fir and ponderosa pine. Huckleberry and other plants also benefited by mixed severity fires by reducing the canopy cover and allowing more light to the forest floor. More detail on fire and fuels is in the Fire and Fuels section.

Other Disturbance Agents

Disease, drought, insects, and wind affected most ecosystems, but not with equal frequency, occurring as individual events or with other disturbances. For example, insect outbreaks are often related to the effects of drought. Drought also can enhance the ignitability of fuel and increase the potential for fire. Root disease can predispose trees to attack by insects such as bark beetles. Historically, root diseases were also significant factors in reducing competition from Douglas-fir and grand fir in western white pine, western larch and ponderosa pine stands. These species have a high level of resistance and were able to capitalize on this reduced competition. Fire exclusion and the loss of these species through selective harvest and white pine blister rust have reduced the opportunity for early seral species to become established in some root disease areas.

Human Influences

Prehistoric inhabitance of the Kootenai valley has been recorded to more than 7,000 years ago. The occupants of this area were American Indian and they utilized the food and other resources in a hunting and gathering mode. By historical account and evidence provided through fire scar sampling of trees and pollen/charcoal profiles, fire was intentionally used by native people, particularly in low elevation areas. This practice was conducted for a variety of reasons: the maintenance of open stands to enable travel, improve hunting conditions by stimulating growth of vegetation and to drive or surround game, enhancement of medicinal plants, communication, etc. (Barrett and Arno, 1982). This practice also influenced the ecology of the forest and augmented fires caused by lightning.

In the early 1900s, fire suppression, mining and lumbering began in earnest. Fire exclusion allowed shade-tolerant species to become well established in the understory of the stands in the project area, and generally allowed stand biomass, ladder fuels and downed woody fuel loadings to increase in some areas beyond what these sites likely experienced historically. This has created multistoried stands that are consistently dense and continuous – possibly more so than would be expected if fire had continued to play its natural role. But it is important to emphasize that there was a wide range of conditions in these forest types, and extreme conditions are not unusual (yet may not be desirable). Today these stands are more likely to experience high intensity fires with greater mortality due to high biomass, less heterogeneity, increased ladder fuels, and high down

woody fuel loadings. They are also more susceptible to insect and disease problems such as root disease, dwarf mistletoe, and bark beetle mortality due to the increase in Douglas-fir and grand fir.

Forest Structure, Composition, and Function

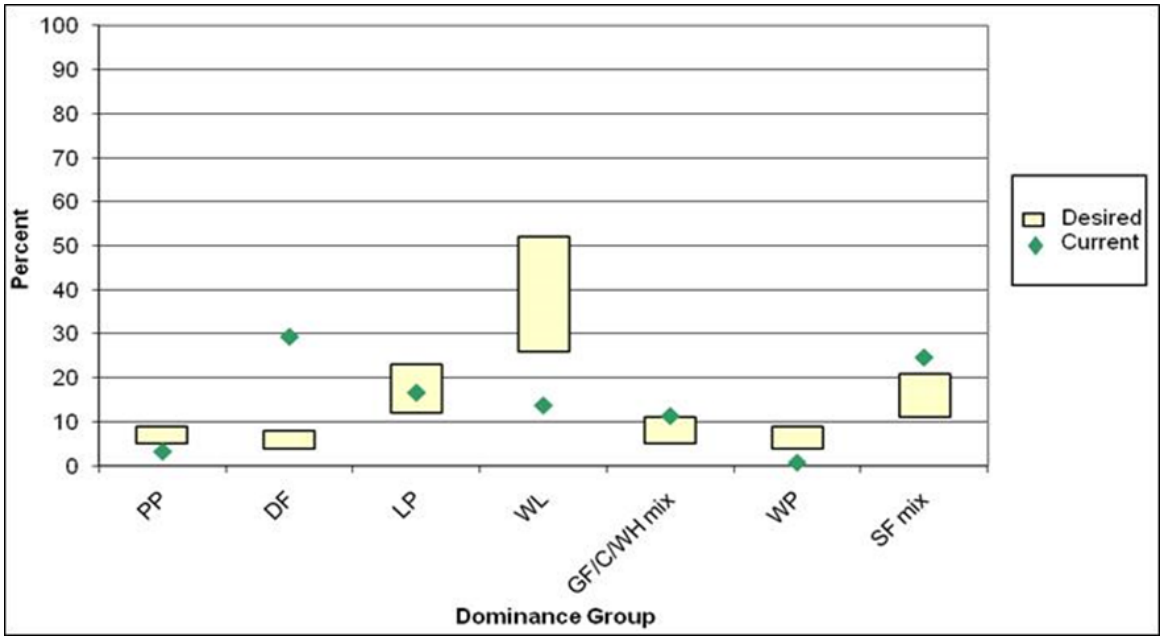


Figure 23. Desired Species Composition by Dominance Group on the Kootenai National Forest

Figure 23 above displays the desired species composition on the Kootenai National Forest as compared to the current species composition. The size and distribution of trees is generally referred to as forest structure. This habitat element changes as forests age and as a result of disturbance. Forest structure is an important indicator of landscape diversity. The amount of forest in the seedling/sapling, small, medium, and large size classes that occurred prior to Euro-American settlement is not precisely known. However, the 1910 fire, as well as other wildfires in the 1920s and 1930s, was the principle cause of a bulge in the present small and medium size class. Although it was a much less significant factor compared to wildfires, regeneration type timber harvesting that occurred from approximately the 1940s to the 1970s also contributed to that bulge (2015 Forest Plan pp. 72-73). See Table 57 in the Forest Structure section, which displays the desired conditions by size class.

It is important to recognize that the reference forest conditions were not static and essentially shifted across the landscape in these relative proportions, in response to disturbance processes. For example, young forests and old growth had a different structure and composition in low elevation, dry, south aspects as compared to that of high elevation, cool, northerly aspects. This created a pattern across the landscape. Pattern is complex and highly variable because it is dependent on vegetation composition and structure, topography, and the disturbance forces that interact with these biotic and abiotic components. The pattern of successional stages across the landscape is diverse and resilient to fire, insects, disease, climate change, and increasing human uses (2015 Forest Plan pp. 17-18).

The cumulative influence of natural and human-caused disturbances delimits the species composition, forest structure, and function of the landscape (Habeck and Mutch 1973; Arno 1976;

Arno 1980; Fischer and Bradley 1987). Wildfire historically played a role in interrupting forest succession and creating much of the existing vegetative diversity and pattern.

Affected Environment

Existing Condition

The existing vegetative patterns of the project area are typical of the broad, surrounding landscape and are characterized by plant communities influenced by both cool, Canadian air masses and the inland maritime weather systems. The latter weather systems moderate the cold winter temperatures, otherwise typical of a montane environment, and produce the type of climate necessary for the survival of coastal species, such as western hemlock, pacific yew and western redcedar. Average annual precipitation ranges from 29 to 113 inches. At higher elevations, most of the precipitation falls as snow. This climate is strongly influenced by rain-on-snow events.

As described in the section on reference conditions, the cumulative influence of natural and human-caused disturbances define the species composition, forest structure and function of the landscape. Wildfire historically played a role interrupting forest succession and creating much of the existing vegetative diversity. The information in Figure 24 displays the distribution in forest types within the project area.

Species Composition

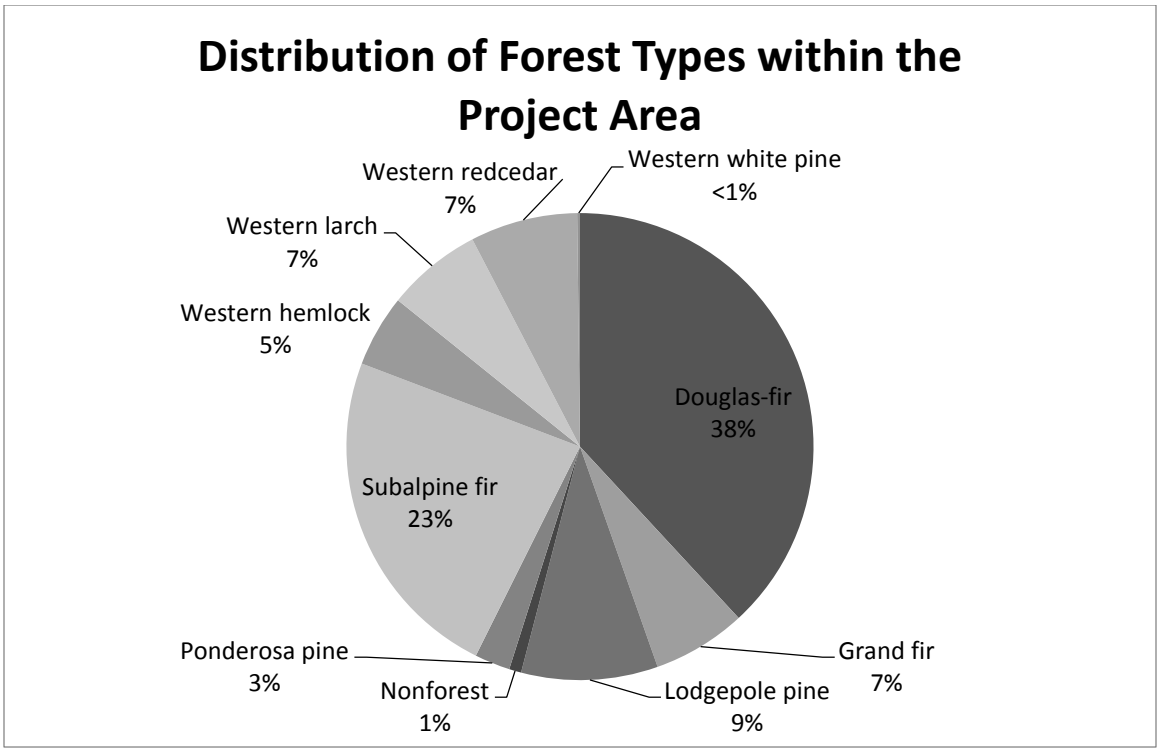


Figure 24. Distribution of Forest Types within the Project Area

In many areas, except the upper elevations of the project area, there is a combination of small areas of open-grown ponderosa pine and or western larch and Douglas-fir, with larger areas of multistoried western larch/Douglas-fir with grand fir, and dense stands of western redcedar and western hemlock with pockets of lodgepole pine. Subalpine fir, lodgepole pine and Engelmann

spruce typically occur in the lower subalpine zone and upper basins as well as lower elevations where cold air settles.

This landscape was influenced by extensive wildfire events in 1889, 1910, 1926, 1994, and 2000. Where mixed severity fires occurred, the results are more variable. Trees which survived these cooler, less severe fires provided a seed source to restock a second size class of western larch, lodgepole pine and Douglas-fir. These stands are located throughout the project area in settings that vary from riparian areas to the warm, dry southerly slopes (see Map M-14: Forest Cover Types).

Table 56. Comparison of Existing and Desired Forest Types by Biophysical Setting

Forest Type	Existing Forest Type for Warm/Dry (percent)	Desired Forest Type for Warm/Dry (percent)	Existing Forest Type for Warm/Moist (percent)	Desired Forest Type for Warm/Moist (percent)	Existing Forest Type for Subalpine (percent)	Desired Forest Type for Subalpine (percent)
Western Red Cedar/ Western Hemlock (WRC/WH)	1.15	0-3	23.04	7-10	0.96	1-4
Douglas-fir (DF)	81.29	2-5	33.90	2-5	11.36	1-4
Grand Fir (GF)	2.23	2-5	11.21	2-5	0.81	2-5
Western Larch (WL)	1.49	43-46	8.09	44-47	7.86	27-30
Lodgepole Pine (LP)	5.37	3-6	12.16	4-7	7.57	32-35
Non-Forest	0.39	NA	0.79	NA	0.63	NA
Ponderosa Pine (PP)	6.12	35-38	2.08	3-6	0.23	0-3
Subalpine Fir (SAF)	1.96	0-3	8.42	7-10	70.45	32-35
Western White Pine (WP)	0.00	1-4	0.32	13-16	0.11	7-10

Data Sources: “Existing” is from FSVeg database; “Desired” is from 2015 Forest Plan

As Table 56 above demonstrates, western larch is well below the desired condition in all biophysical settings. This species was historically one of the dominant early seral species found here, due to its high degree of fire-resistance (Smith and Fischer 1997, Scott et al. 2002). Western larch is the most shade-intolerant conifer in the Northern Rockies (Schmidt and Shearer, 1995). Major factors influencing the lack of this species are the increase in competition from shade tolerant species, the moderate to high incidence of dwarf mistletoe, and the focus of historic logging to remove mature western larch. Ponderosa pine is also well below the desired condition in the warm/dry biophysical setting. This is also likely due to increase in competition from shade tolerant species and fire suppression. As these two species, and western white pine, have reduced in numbers, Douglas-fir and/or, to a lesser degree, grand fir have become the dominant tree species. It is estimated that western white pine population throughout its interior Northwest range

may be less than five percent of what it was at the turn of the 20th Century (Harvey and others, 2008). Western white pine has been greatly reduced in extent due to the blister rust fungus, salvage logging rust infected trees, and the lack of stand replacement fire. Lack of stand replacement fire is also a likely contributing factor to the high percentage of subalpine fir and low percentage of lodgepole pine in the Subalpine Biophysical Setting. The increase in the number of acres dominated by western redcedar and western hemlock in the Warm/Moist Biophysical Setting has occurred due to a reduction in mixed severity fires, loss of white pine, and past timber harvest which targeted other species.

Whitebark Pine (WBP) The whitebark pine is not abundant enough to make up a mapped forest type. It is found generally above 6000 feet in elevation in some areas. Scattered individuals with a few scattered cone producing trees were found on the higher ridges of Pulpit Mountain. The majority of whitebark pine are approximately 12-feet tall or less.

Understory Vegetation In addition to coniferous trees, understory vegetation of various shrubs, forbs, and grasses are present. Understory vegetation in the drier habitat types consists of ninebark, oceanspray, Rocky Mountain maple, common snowberry, grouse whortleberry, common juniper, spirea, kinnikinnick, and creeping Oregon grape. Common grasses occurring in the understory are elk sedge, pinegrass, and occasionally bluebunch wheatgrass. Understory representatives in the moist habitat types are: fool's huckleberry, serviceberry, pachistima, Sitka alder, thimbleberry, spirea, common snowberry, blue and big huckleberry, twinflower, creeping Oregon grape, mountain arnica, round-leaved violet, beargrass, coolwort foamflower, ninebark, mountain sweet cicely, trail plant, queen cup beadlily, sweet scented bedstraw, alpine pyrola, one-sided wintergreen, and starry Solomon-seal.

Forest Structure

Structural diversity within the project area varies from very large patches of single-storied, uniform stands of Douglas-fir with scattered overstory western larch and Ponderosa pine to non-uniform, multistoried stands of mixed species and variable patch size. Existing size classes of conifers range from seedlings to old growth. The area also exhibits a variety of stand sizes, a reflection of its natural and human-influenced disturbance history. The variation in structural attributes can best be explained with respect to the mosaic of natural disturbance, past harvest, and the resultant character of the habitat and its components. Many of the multi-storied stands result from decades of fire suppression, which has enabled further development of the understory trees into the general forest canopy. Areas that may have formerly been composed of grasses, forbs, and shrubs are filling in with conifers as well. Across the project area, there has been a homogenization and simplification of landscape patterns for forest structure. Landscapes have increasingly become dominated by large patches of medium size trees and there is less variability in internal structure or composition of these medium size patches. Meanwhile, the patches of the smallest and largest size classes are fragmented into smaller patches with more edge and less interior area (2015 Forest Plan p. 85).

Table 57. Size Class Distribution of the Project Area

Size Class	Desired Size Class Distribution (percent)	Existing Size Class Distribution (percent)
Non-forested	N/A	1
Seedling/Sapling	16-31	19
Small	10-19	9

Size Class	Desired Size Class Distribution (percent)	Existing Size Class Distribution (percent)
Medium	8-16	8
Large	34-67	50
No Data	N/A	12

Data Sources: "Existing" is from FSVeg database; "Desired" is from 2015 Forest Plan

Table 57 above displays the existing size class distribution of the project area in comparison to the desired size class distribution of the 2015 Forest Plan. Later in this section, size class distribution by biophysical setting is shown. The distribution of current size classes is based on stand data and year of origin. In general, stands in the seedling/sapling size class (0 to 5 inch DBH trees) range from 0 to 40 years old. Stands in the small (5 to 10 inch DBH trees) and medium (10 to 15 inch DBH trees) size classes range in age from 40 to 70 and 70 to100 years old, respectively. Stands in the large size class (greater than 15 inch DBH trees) are generally 100 years old or older. While the seedling/sapling and small sizes appear to be close to historical range, both are on the cusp of change. In the seedling/sapling size class, 853 (8 percent) of the 10,104 acres are within 5 years of moving into the small size class. The majority of these stands are a result of regeneration harvests in the late 1970s. With those stands soon moving into small, a shift will occur in the seedling/sapling percentage to 11 percent and small to 17 percent -putting the seedling/sapling size class below the desired condition and the small size class close to the high bounds of the desired condition. The medium size class appears to be on the low end of the desired condition, but it is likely that a large portion of the 12 percent with no data falls within the medium size class since record keeping did not begin until the mid-1940s and the medium size class contains all of the stands with an origin date from about 1915 to 1944. Fire exclusion and lack of disturbance is also the likely cause of the low non-forested acres due to a lack of meadow retention and park encroachment, especially in the lower elevations. The large size class is near the low end likely due to past logging.

Biophysical Setting/VRUs

The vegetative composition of the project area by biophysical setting and VRU is shown in Table 58. The majority of the project area (51.8 percent) falls into the warm/moist and 43.2 percent falls into VRU 5 in particular.

Table 58. Project Area by Biophysical Setting and VRU

Biophysical Setting	VRU	Acres	% of Project Area
Warm/Dry	VRU 2	10,406	19.4
	VRU 3	1,157	2.2
Warm/Moist	VRU 4	4,143	7.7
	VRU 5	23,181	43.2
	VRU 6	471	0.9
Subalpine	VRU 7	9,044	16.9
	VRU 9	4,593	8.6
	VRU 10	558	1.0
Water/Agriculture land	N/A	125	0.2

The following paragraphs are breakdowns of the biophysical settings by VRU of the project area with an explanation of the departures from desired conditions. VRUs 3, 6, and 10 were not included due to each having a very small representation in the project area. For more information on these VRUs, refer to Gautreaux, 1999.

Warm/Dry Biophysical Setting

The size class distribution for within the warm/dry biophysical setting is displayed within Table 59 below.

Table 59. Size Class Distribution in Warm/Dry Biophysical Setting

Size Class	Desired Size Class Distribution (percent)	Existing Size Class Distribution (percent)
Non-forested	N/A	1
Seedling/Sapling	13-27	10
Small	9-17	8
Medium	7-15	11
Large	38-74	65
No Data		5

Data Sources: “Existing” is from FSVeg database; “Desired” is from 2015 Forest Plan

VRU 2-Moderately Warm and Dry

Occurring primarily on south and westerly slopes (e.g. Kootenai Face, and Kilbrennen Ridge), these dry, lower elevation open ridges are composed of mixed Douglas-fir and ponderosa pine in well stocked and fairly open grown conditions. Moist, upland sites and dense draws also include western larch and lodgepole pine, with lesser amounts of ponderosa pine. Under natural conditions, tree regeneration occurs in patches and is largely absent in the understory due to frequency of fire. These sites can have low to moderate site productivity due to a general lack of soil moisture and the minimal presence of volcanic ash-influenced soils.

Prior to intensive fire suppression, fire was an important agent in controlling density and species composition in this VRU. Low to moderate intensity fires on a frequency of 15 to 45 years were the predominant disturbance, playing a major role in maintaining the seral community of conifers. The low intensity fires would burn non-uniformly consuming the litter and undergrowth. This usually left an open overstory of western larch, ponderosa pine and Douglas-fir largely intact and created small canopy gaps. Structural diversity remained high under these mosaic conditions. Studies indicate a patch size from 20 to 200 acres may be a representative range for this VRU.

Departures from Desired Conditions: Over the last 100 years or so, fire suppression and timber harvest have essentially replaced frequent, low intensity underburns as the determining factors of influence. This has resulted in a higher stand density of middle-aged trees, composed of more Douglas-fir and the general absence of ponderosa pine regeneration. Many of these stands have a more uniform stand structure and a closed canopy. A dense layer of Douglas-fir understory has developed; stressing the stands and making them less resilient against insects and disease. Many areas are experiencing greater tree mortality due to increased root disease and bark beetle impacts. Therefore, while it appears as though the large size class at 65 percent is well within the desired range, many are experiencing high mortality and are not likely to progress or maintain their structure for long. There is a general lack of seedling/sapling stand initiation except where

regeneration harvest has occurred, or past wildfires. The seedling/sapling size class is below the desired level. Non-native plants are more common in big game winter range areas. Winter/snow-damaged trees are more abundant due to higher stand densities. Patch size and pattern are currently more uniform and there are fewer open, park-like stands.

Warm/Moist Biophysical Setting

The size class distribution for within the warm/moist biophysical setting is displayed within Table 60 below.

Table 60. Size Class Distribution in Warm/Moist Biophysical Setting

Size Class	Desired Size Class Distribution (percent)	Existing Size Class Distribution (percent)
Non-forested	N/A	1
Seedling/Sapling	15-31	18
Small	10-20	9
Medium	9-17	10
Large	33-65	47
No Data	N/A	14

Data Sources: “Existing” is from FSVeg database; “Desired” is from 2015 Forest Plan

VRU 4-Moderately Warm and Moist

Occurring primarily on lower slopes and valley bottoms (e.g. east side of Yaak Mountain, Troy Shooting Range), these more moist sites are composed of mixed Douglas-fir on the dryer areas and western redcedar and western hemlock on the warm and more moist sites, and subalpine fir in the cooler sites. It occurs on all aspects and elevation ranges from 2,400 feet to 5,100 feet. The VRU is one of the more diverse due to climate. Species composition is largely a result of longer fire free intervals. Grand fir is common in many areas of this VRU, however due to slower initial establishment and growth; it is usually subordinate to Douglas-fir and western larch. Douglas-fir is a major seral component on most sites. Engelmann spruce and lodgepole pine occur on the wet, colder habitat types. Western larch can be a major species where fire has created openings; otherwise its occurrence is sporadic. Western white pine and ponderosa pine are scattered.

There is a wide range of fire free intervals within this VRU due to the wide moisture gradient and the influence of surrounding stands. Fire severity varies from minor ground fires on moist sites to stand replacement fire. Evidence from fire scar studies indicate that historic fire severity was non-uniform including mixed severity fires on an average of 30 to 85 years and stand replacing fires occurring about every 100 to 200 years. Mixed severity fire would create a multi-aged and multi-storied condition. This VRU has a higher potential for insects and disease outbreaks due to the longer fire free intervals and high densities of shade tolerant trees. Fire history studies indicate a mean patch size of 437 acres, with a range of 5 to 2,000 acres.

Departures from Desired Conditions: Fire exclusion has reduced the scope of mixed severity fires; but to this point, it has had less impact on occurrence of stand replacement fires due to their naturally long fire free intervals. This partially explains the minimal departure in size class distribution from desired conditions. Root disease levels are low to moderate, but increasing due to increased stand density. Some areas are experiencing greater tree mortality due to increased root disease, Douglas-fir beetle, and western spruce budworm impacts. Dwarf mistletoe

infestation is high in the western larch. Winter/snow-damaged trees are more abundant due to higher stand densities. Patch size and pattern are currently more uniform and there are fewer mosaic patches from mixed severity fires.

VRU 5-Moderately Cool and Moist

This vegetation response unit has some of the highest biological productivity on the Forest and occurs commonly along benches, stream bottoms, and many of the midslope settings in the project areas (e.g. O'Brien Creek, Rabbit Creek). The common occurrence of loess deposits largely contributes to these sites having good nutrient availability and high moisture carrying capacity. Conifer species noted in these low to mid elevation settings include Engelmann spruce, western hemlock, western white pine, western larch, western redcedar, and lodgepole pine.

Due to its proximity to riparian areas and the moist, humid site conditions, fire frequency is relatively infrequent. However, summer drought can create conditions conducive to potentially extensive severe fires. Quite often, the origin of a fire in these moist settings is wind carrying fire from adjacent forest stands.

In general, fires in this VRU can be characterized as non-uniform with infrequent but often extensive stand replacing fires on an average frequency greater than 200 years. On drier sites, this fire regime is periodically interspersed with mixed severity fires on an average frequency of 75 years and, to a lesser extent, low severity underburns. These mixed severity fires can be quite variable, ranging from low intensity, creeping fires that kill primarily shade tolerant trees to severe stand replacing fires that create favorable conditions for tree growth and regeneration of seral species.

The more exposed upper slope ridges and the more protected riparian areas, north slopes, toe slopes and benches are the areas with the highest likelihood of avoiding lethal fires. The rapid drying of exposed sites increases the probability of more frequent, understory fires. In contrast, moist sites experienced patchy lower severity underburns, during upland lethal fire events, and long interval lethal fires. Patch size for this VRU is similar to VRU 4 – mean of 437 acres with a range of 5 to 2,000 acres.

Departures from Desired Conditions: Fire exclusion has reduced the scope of mixed severity fires but to this point, it has had less impact on occurrence of stand replacement fires. This partially explains the minimal departure in size class distribution from desired conditions. The western white pine cover type is significantly reduced due to the blister rust fungus, selective harvest and, to a lesser degree, the lack of stand replacement fires. The lack of mixed severity fires has reduced the abundance of western larch, due to competition from species not requiring disturbance for establishment and a general increase in dwarf mistletoe. The increased composition of western hemlock, grand fir and Douglas-fir has increased the occurrence of root disease. To a large extent, harvest has replaced fire as the disturbance agent since the 1940s in this area. However, harvest has not replicated the larger patch size of natural fire disturbance and historically fire adapted trees were removed in the operations. Some stands have fewer of the large, old overstory seral trees due to insects, disease and salvage harvest. Fire suppression has impacted the role of smaller mixed lethal fires as an agent of disturbance creating more heterogeneous stands. Current patch size is smaller, more isolated, with more uniformity in size and age class. Forage and browse such as huckleberry, service berry and grasses are at lower vigor and population levels due to lack of fire – both mixed and high severity.

Subalpine Biophysical Setting

The size class distribution for within the warm/moist biophysical setting is displayed within Table 61 below.

Table 61. Size Class Distribution in Subalpine Biophysical Setting

Size Class	Desired Size Class Distribution (percent)	Existing Size Class Distribution (percent)
Non-forested	N/A	1
Seedling/Sapling	17-33	27
Small	10-20	9
Medium	8-16	3
Large	32-64	45
No Data	N/A	15

Data Sources: “Existing” is from FSVeg database; “Desired” is from 2015 Forest Plan

VRU 7-Cool and Moist

This vegetation response unit occurs in the moist lower subalpine forest setting and is common on northwest to east facing slopes, stream floodplains, and poorly drained subalpine sites, and moist frost pockets (e.g. East side of Gunsight Mountain, West side of Pulpit Mountain). This landscape is typically bordered by warmer sites (VRU 5) and cool, drier subalpine sites (VRU 9) and includes characteristics of each. Vegetative productivity is moderate to high because of the high moisture-holding capacity and nutrient productivity of loess deposits, adequate precipitation, and a good growing season. The predominant conifer species are subalpine fir, lodgepole pine, Engelmann spruce, with scattered white pine and western larch.

Moisture and temperature gradients create a complex influence on the fire ecology and the vegetation response in VRU 7. Fires in this vegetation response unit generally burn non-uniformly and are more intense but less frequent than that of VRU 9. Research demonstrates that infrequent stand replacement fires on a 100+ year fire return interval (Arno and Davis, 1980) were the most common, occurring within a mosaic of nonlethal and mixed lethal burning. Well-drained upland sites experienced a higher percentage of stand replacement fires.

Cool and moist conditions, coupled with broken topography and lush understories, undoubtedly limit fire spread and create non-uniform conditions. With fuels drying out slowly, under most conditions fires either burn very small areas or burn large areas in a patchy pattern (Smith and Fisher, 1997). However, because much of this VRU is relatively narrow and is often flanked by riparian areas this fire regime is strongly influenced by that of neighboring landscapes.

Although lightning strikes may be frequent in this fire group, few large fires apparently originated in these stands (Barrett, 1982). Most large fires probably moved in from drier sites during severe fire weather. This severe fire weather resulted in patches of a minimum of 200 acres and could have been as extensive as several thousand acres.

Departures from Desired Conditions: Disturbed areas have more non-native plants. There is less natural regeneration of western larch, lodgepole pine due to fire exclusion favoring Douglas-fir, subalpine fir, and spruce. There are fewer natural openings and a loss of whitebark pine. The understory vegetation is less developed due to canopy closure. Stand structure is becoming more storied and denser where subalpine fir ingrowth has followed lodgepole pine mortality. Overall,

expansive even-aged lodgepole pine stands are currently less homogenous due to active management. There is a much greater proportion of older stands and fewer young stands due to suppression of mixed severity fires. Patches are becoming smaller.

VRU 9-Cool and Moderately Dry

These sites are generally found on rolling ridges and upper reaches of mountain slopes generally above 5,400 feet in elevation (e.g. East side of Pulpit Mountain). The climate is characterized by a short growing season with early summer frosts. Due to generally shallow soils (low water holding capacity), slope position, and aspect, soil moisture is often limited during late summer months. These settings are very suitable to lodgepole pine and subalpine fir, the most common conifers, with scattered Douglas-fir and larch.

Historically, fire was the predominant disturbance type in these fire regimes and played a major role by regularly interrupting succession and perpetuating the presence of lodgepole pine. This is especially true following large scale, stand replacing fires that generally occurred on the moist lodgepole pine sites. Losensky's research (1994) shows that 80 percent of these areas had lethal non-uniform burns every 113 years; and 20 percent had a mixed, non-uniform burn every 50 to 71 years. The severe fires may have been extensive due to extreme weather conditions such as high winds. It would be common for the risk of reburn to be high during early successional stand development due to the amount of available fuels. In contrast, the nature of moderate intensity fires resulted in some areas underburned, leaving the forest structure intact, while other mixed severity fires set back succession to a forb or shrub stage. Mixed lethal burns regenerated uneven patches that may have been 50 to 300 acres in size.

Departures from Desired Conditions: There is a loss of seral species due to high stand densities and lack of mixed severity fires. Also, whitebark pine and lodgepole pine mortality coupled with fire suppression has increased the ingrowth of subalpine fir and Engelmann spruce. The exception is in upper subalpine basins where there is actually a reduced spruce component. Stand structure is more uniform and less storied, with less shrub field development due to fire exclusion. However, recent fires in the Brush Creek and O’Brien Creek drainages have likely added to the early seral acres while reducing the mature acres. There is decadent understory vegetation such as huckleberries, serviceberry and mountain maple from lack of fire. Some stands have fewer of the large, old overstory trees due to insects, disease and salvage harvest. When stand replacement fires do occur, they tend to be of higher intensity. There is more homogeneity as patch sizes are getting smaller and there is more uniformity in size and age classes of stands. White pine mortality is at higher levels. Western Spruce budworm is common; which is a typical result of dense stocking of shade tolerant trees.

Snags and Coarse Woody Debris

Snags are ecologically important for a number of reasons: they provide habitat structures for a variety of wildlife species, provide substrate for some mosses and lichens, improve environmental conditions on harsh sites, and become downed wood. Snags can be standing dead trees, broken topped live trees, or live cull trees. Tree mortality is an inevitable outcome within a forested stand. The agent of mortality as well as the size, distribution, and longevity of the resulting snags are not as predictable. Snags are created by events such as insect and disease, wildfire, physical damage, weather, over-crowding, or simply from old age. They are lost by falling down, through both natural (i.e. decomposition and wind) and human (i.e. woodcutting and timber harvest) mechanisms. Snags are relatively short-term and vary greatly throughout the life cycle of a forest stand. Most snags only remain standing for a few years but can vary by species, size, age, and site factors. Refer to the wildlife and soils sections of this chapter for more information on wildlife habitat and soils.

In order to quantify and describe the existing snags in the OLY project area, a Region One report on snag densities for western Montana using Forest Inventory and Analysis (FIA) data collected on the forest was used (2015 Forest Plan p. 80-83). As presented earlier, the KNF and the project area have three Biophysical Settings (warm/dry, warm/moist, and subalpine). The Estimates of Snag Densities for Western Montana Forests in the Northern Region describes three habitat groups (dry, low to mid elevation moist, and subalpine) (Bollenbacher et al. 2009), which correspond very closely to those biophysical settings. The dry habitat type (warm/dry biophysical setting) has the lowest density of snags, especially in the larger diameter classes due to more frequent, low- to mid- severity fires. Predominant trees are ponderosa pine and Douglas-fir on the drier sites with western larch found within the moister range of this type. The low and mid moist habitat (warm/moist biophysical setting) is diverse in conifer species and include western larch snags in the early and late seral forest condition. This group has the highest density of snags of all size classes. The wet sites with increased productivity and periodic mixed severity fires between stand replacing fires encourages the growth of large trees. Finally, the subalpine habitat type (subalpine biophysical setting) has high diversity of species depending on elevation and cold tolerance. Some sites are too cold for western larch and Douglas-fir. Fire frequencies can vary depending on the site composition and location. Snag density is high in the smaller diameter class and moderate in the larger classes compared to other habitat types. Snag density, distribution, and longevity can be affected by timber harvest and human access in timbered managed areas and possibly climate change and fire suppression in unmanaged areas (i.e. wilderness or roadless) (Bollenbacher et al. 2009).

Although the report is for the entire Kootenai National Forest, the project area follows the same density and distribution patterns by habitat group. The distribution of snags across the landscape is clumpy and uneven due to the fact that many snags are created as a result of periodic, broad- and fine-scale disturbances such as fire, insects, and diseases; and these disturbances do not occur evenly across space. Snag densities are most likely lower in areas closer to town and visual observations suggest that snag levels can be as low as zero along open roads due to firewood cutting. Conversely, the project area contains a lot of land area without road access, in the warm/moist biophysical setting, that is further away from town, and, therefore, likely to have medium to high snag densities. Also, areas such as Gunsight, Pulpit, and Arbo Mountains have very high snag densities due to recent wildfires.

Coarse woody debris (CWD) is another important component of forest ecosystems, providing for soil protection and productivity as well as wildlife habitat (e.g. cover, reproduction, and foraging opportunities). This dead, woody material is derived from trees in various stages of decay and any material larger than 3 inches in diameter is considered CWD (Graham et al. 1994). The ecological processes and functions of down wood material are discussed in many research papers (e.g. Bull et al. 1997; Graham et al. 1994; Maser and Trappe 1984; Maser et al. 1988). These are incorporated by reference.

Prior to the 1990s, harvest resulted directly in the loss of down coarse woody debris, especially the practice of dozer piling; as well as indirectly through reductions in trees and snags that would have become down woody materials in the future. Road construction and the amount of roads open to public motorized use also reduced the availability of down CWD due to firewood collection. Since the 1987, application of Forest Plan direction has resulted in the better retention of down CWD as well as snags that will become downed material in the future. Also, there has been more reliance on intermediate harvest that leaves more trees that will become down CWD in the future. Application of these standards and management trends has since provided better protection and maintenance of down wood material.

Coarse woody debris surveys were conducted in the project area during the 2014 field season. These surveys were conducted according to the Handbook for Inventorying Downed Woody Material (Brown 1974). Existing tons/acre of CWD generally exceed the 2015 Forest Plan guideline and the level is currently being met mostly in the form of smaller diameter CWD with larger CWD, especially those greater than 16 inches, having greater occurrence within some units than others. However, it was found that 23 units within the project area were deficient in CWD levels by an average of 2 to 4 tons, especially in the Warm/Dry biophysical setting where dozer piling occurred in the past (refer to the project file for CWD summary from exams).

Forest Health

As described in the discussion of historic vegetative conditions, the long-term health of ecosystems is linked to disturbance. Recurrence of disturbance and recovery within ecosystems is an important mechanism for energy flow, maintenance of habitat diversity, vegetative succession, canopy reduction, etc. Insects and diseases are part of a natural system as are dead and dying trees. The amount and extent of these are the challenge.

For this project, the major insects and diseases affecting species composition stand structure, and fuel loads are described below within the framework of forest health. There are other active insects and diseases associated with the project area, but levels are generally low and not considered as threatening to species composition or stand structure. Many of these agents are found in young trees and, while there are affects to species composition, it is considered within the "normal range" of a natural process. A consideration of forest health emphasizes prevention as opposed to suppression as a management strategy for insects, pathogens and natural disturbances that are considered detrimental to resource production. This emphasis is made with recognition of their beneficial role with regard to resources and ecosystem functions.

Dwarf Mistletoe

Dwarf mistletoe is a native parasitic plant that survives off water and nutrients extracted from living host trees such as western larch, Douglas-fir, and lodgepole pine. The mistletoe plant causes brooms, stem cankers, and branch or stem swelling on infected trees. Although the primary impact is loss of height and diameter growth, a reduction in seed and cone crops and direct mortality or predisposition to other pathogens or insects can occur. The typically long life cycle of this parasite results in a slow population build-up. The occurrence of dwarf mistletoe in the project area is at low to moderate endemic levels and occurs primarily in scattered old western larch overstory trees. Areas such as Kootenai Face, Kilbrennen Ridge, and along the Eastside Road exhibit a much higher level of mistletoe-infected trees, likely due to tree age and fire exclusion.

Historically, wildfire has been the most important single factor governing the distribution and abundance of dwarf mistletoes (Alexander and Hawksworth, 1975). Also, several species of insects and fungi attack and kill shoots or fruits. Fires that kill the host trees will reduce the population of dwarf mistletoe in the short term. Where infected residual overstory survives the fire, a ready source of seeds for the infection of young regenerating trees becomes a concern. Where western larch is planned as a major component of the reforestation effort, dwarf mistletoe in reserved seed trees is a concern.

Stem Diseases and Decays

The most commonly noted decays in the project area are *Enchinodontium tinctorium* (Indian paint fungus) and *Phellinus pini* (ring-scale fungus). The *Cryptoporus volvatus* (pouch fungus) also occurs and is a major cause of sap rot. This fungus is particularly noticeable in Douglas-fir

that has been attacked by bark beetles. The most common stem disease in the project area is the fungal disease *Cronoartium ribicola* (white pine blister rust). Introduced into western North America from Europe in 1910, this disease has caused as much as 90 percent mortality in what were once vigorous, well-stocked stands of white pine. The selective harvest of dead white pine and the continuing tree mortality has led to the increase in Douglas-fir, grand fir, and hemlock.

Root Diseases

Although they are less obvious, conifer root diseases are generally the most impactive group of tree diseases. Diseases of concern are *Armillaria spp*, *Phellinus weirii*, *Fomes annosus*, and *Phaeolus schweinitzii.* Root disease decays and kills cambium in roots and root collars, causing mortality in groups or scattered individual trees. Douglas-fir and grand fir are primary hosts for *Phellinus weirii* and *Armillaria spp* (Rippy et. al, 2005). Armillaria (*Armillaria spp.)* is the most common and widely distributed root pathogen in the project area as well as the Northern Region. Where significant root disease and susceptible species arepresent, stand development is likely to remain in early succession and advance to climax stages is not expected. Despite the occurrence of periodic fire, root pathogens stay in the stand and tree mortality continues where regeneration occurs in these patches.

It is estimated that 3,500 acres of the project area are experiencing high levels of root disease incidence and 34,800 acres are ranked at low to moderate. Pockets are scattered throughout the project area and root diseases are present in about 54 percent of the Douglas-fir forest type. A site visit to the project area by the Region 1 Plant Pathologist, Blakey Lockman, occurred the summer of 2014. Armillaria root disease and Schweinitzii root and butt rot were found in the area. She concluded that decreasing the impact from root disease will require decreasing the component of Douglas-fir where possible, and planting to root disease tolerant species when using regeneration harvest (Lockman, 2014).

Windthrow, Snow, and Ice Damage

Wind is a natural disturbance agent that can affect healthy or unhealthy trees. Within the project area, a number of landtypes contain characteristics making the area susceptible to windthrow. Factors that contribute to windthrow are shallow soils, soils with high water tables, and soils that have layers that are restrictive to tree roots. Topographic position of the stand also affects the stands susceptibility to windthrow.

Windthrow can affect stand structure and species composition subtly as individual trees or clumps or more obviously as patches. Windstorms may damage natural stands or expand harvest areas. Examples of both can be found in the project area, some of which are the result of several wind events that occurred in the last fifteen years or so. In particular, wind, snow and ice damage from the winter of 1996 to 1997 impacted a number of stands. In some areas, the older dead lodgepole pine and Douglas-fir trees have also come down as a result of these storms.

Bark Beetles

In the late 1990s and early 2000s the *Douglas-fir beetle* was one of the most common and visible disturbance agents in the project area, occurring within most forest cover types and across all elevations. While normally a component of this ecosystem in small, localized populations; snow, ice and wind damaged trees during the winter of 1996 to 1997, setting the stage for a rise in the number of beetles in the forest. Drought during the summer of 1998 increased the severity of the outbreak by stressing the Douglas-fir trees. The occurrence of Douglas-fir beetle on the Kootenai National Forest has been recorded since about 1950. The recent outbreak is considered to be the most significant, although during the years 1950 to 1952 a major outbreak was noted for Region 1

as a whole. Douglas-fir beetle activity significantly increased from 2013 to the present. This increase may, in part, be associated with high levels of Western spruce budworm damage in Douglas-fir forests over the past few years (USDA 2013).

The *mountain pine beetle* continues to be mildly active in many of the lodgepole pine stands. However, populations are at high levels in surrounding forests including the Idaho Panhandle, Flathead, Lolo, Helena, etc. (USDA 2013). Past harvest in the project area has concentrated on reducing the lodgepole pine component in stands; resulting in stand conversions to an early successional stage of mixed conifer trees - reducing the threat of mountain beetle attacks. Past mountain pine beetle infestation in the Yaak drainage (and most of the Kootenai National Forest) peaked around 1984 in stands generally of the same age class. It is expected that infestation in the project area will increase for a few years, but that there are not enough susceptible stands to support a major outbreak.

Western Spruce Budworm

This insect is a defoliator (meaning it eats the foliage), which prefers true fir, Douglas-fir, spruce and larch. Observations in this project area indicate only true firs and Douglas-fir are being attacked. The larvae mine the buds and old needles in the spring, and then consume new needles as they emerge. After several years of heavy defoliation, branch dieback, top kill and tree mortality can occur (USDA 2003). Mortality is rare on the Kootenai NF for overstory trees as the larvae's defense against predators (birds) is to drop out of the tree via a silk thread to the lower canopy or understory trees. If mortality occurs, it is more common in these understory trees. Thousands of acres in the project area are currently infested with western spruce budworm. Although some understory tree mortality has been observed, little overstory tree mortality has been observed. The 2013 Kootenai National Forest bark beetle conditions report (USDA 2013) revealed western spruce budworm-defoliated stands on almost 30,000 acres. Recent visits by the Forest Service Forest Health Protection group show that the budworm outbreak in this project area has been long-lived and extensive, beginning around 2000 (USDA 2009A). Stand conditions that are conducive to the budworm are high density, multi-layered canopies of desired species – a common characteristic in this area. Discussions with regional entomologists indicate that this out break could be related to delayed effects of drought in the mid part of this decade, and that a return to normal moisture level may likely help the budworm population to subside.

In addition to the direct effects of the budworm, affected stands could be more susceptible to bark beetle activity.

Insects and Disease and Climate Change

Climate-induced changes in disturbance regimes such as fire, insect outbreaks, and non-native invasive species, are likely to affect forest vegetation sooner and more dramatically than incremental changes in temperature and precipitation associated with long-term trends. While it is true that forests are dynamic ecosystems in constant change, climatic changes that are exceptionally rapid or larger than historic variability are already being documented and are expected to continue.

Disruption of natural fire cycles and the associated reduction of stand density and tolerant conifer species has likely contributed to increased incidence of insects and disease across the landscape. Combined with the predicted climate change this disruption may contribute to an acceleration of the insect and disease infestations. Warming climatic conditions appear to be accelerating seasonal insect growth and development (Logan, et al., 2003). Northern and high-elevation species are expected to experience greater effects than southern or low elevation ones. The majority of research on the climate change effects on forest insect pests indicates that insect

attacks will intensify in severity, frequency, and size (acreage) (ibid). Results are logical because stressed trees are more likely to succumb to insect and disease attacks, and climate change could stress a portion of the current forest. Current research on mountain pine beetle, gypsy moth, spruce beetle, and spruce budworm confirm this prediction (ibid).

Carbon Cycling and Storage

Forests cycle carbon. They are in a continual flux, both emitting carbon into the atmosphere and removing it through photosynthesis. Carbon sequestration is the process by which atmospheric carbon dioxide is taken up by vegetation through photosynthesis and stored as carbon in biomass (trunks, branches, foliage, and roots) and soils. Forests also release carbon dioxide to the atmosphere as a result of respiration and decay of dead wood, litter, and organic matter in soils. In addition, forest fires release some stored carbon into the atmosphere in the combustion process, and insect outbreaks, fires, pathogens, drought stress, and wind storms kill trees and increase the amount of biomass available for decomposition by microorganisms. Timber harvesting removes carbon from the forest, although some of it is stored in wood products or used to produce energy – displacing the fossil fuel use.

The importance of carbon storage capacity of the world's forests is tied to their role globally in removing atmospheric carbon that is contributing to ongoing global warming. It is recognized that global research indicates the world's climate is warming and that most of the observed 20th century increase in global average temperatures is very likely due to increased human-caused greenhouse gas emissions. Refer to the Climate Change report in the Project File for full assessment of the project in regards to climate change.

Vegetative Conditions Related to Past Harvest

Due to the project area being in the immediate vicinity of Troy, Montana, evidence of past management activities is evident, going back to the settlement of Troy in 1892. This proximity to infrastructure resulted in the removal of the most valuable trees, including western larch and western white pine, leaving less commercially important species such as grand fir. District stand records indicate that the project area has received a moderate to high level of timber harvest over the last eight decades (See Harvest History map M-17 and Table 62 and Table 63 below). For Forest Service lands, 30 percent has been harvested by an intermediate treatment and 50 percent by a regeneration harvest (some of these occurred on the same site). These activities include a variety of management practices, ranging from intermediate salvage harvests to regeneration harvests. Records for regeneration harvest date to the 1930s while intermediate harvest records date back to the 1940s yet record keeping was not reliable prior to the 1980s. In the 1950s significant harvest entries began in the lower subalpine basins.

In the past three decades, salvages for the Arbo, China Basin, Pulpit, and Studebaker wildfires and Douglas-fir beetle outbreaks have been the focus of silvicultural entries. These large wildfires, along with logging activities, are the dominant disturbance factor in the forest. Both artificial (planting) and natural reforestation has been used to increase the abundance of seral species and restock these sites However, prior to knowledge of breeding zones, off-site tree-seedlings were planted. The planting of off-site ponderosa pine has resulted in unhealthy stands that are not adapted to the local growing conditions. These disturbance factors have had an influence in the species composition, size class distribution, and function of the ecosystem. The approximately 4,780 acres of planted trees and natural regeneration in the most recent projects (1990s and 2000s) have initiated the seedling/sapling size class. Without these projects, the size class distribution would be much lower for the seedling/sapling size class and the medium size class (the majority of past harvest actions were in this age class) would be much higher- making it

further above and outside the desired ranges. A portion of the harvested areas were in the large size class which reduced that size class further below desired ranges. Many units in the previous timber sales had a sub-objective (salvage being the primary objective of these treatments) to reduce stand density, improve tree growth, and promote a more open stand structure that is conducive to the future use of prescribed fire.

Older regeneration harvest activity in the project area (pre-1987 forest plan) had a similar effect on the size classes by creating young stands but material in the large size class was typically targeted for harvest. This contributed to the reduction of large size class as well as increasing the seedling/sapling and small size classes above reference conditions. Approximately 12,400 acres were harvested by a regeneration method prior to 1987 (about 23 percent of the project area).

It is important to clarify that harvest of the older, larger trees was common practice prior to about the 1980s, and was thought to be the best way to manage the forest. Since then, understanding of ecosystems and the importance of other Forest resources such as wildlife, water, and soils has improved. The 1987 Forest Plan was a step in that direction by providing standards and guidelines for balancing the various resource values across the Forest. Additional research and publications in the subsequent decades provide the basis for current harvest practices designed to beneficially manage multiple Forest resources. Stand structure from past regeneration harvest units are different than what would be expected after a natural disturbance such as wildfire. Harvesting removes the majority of trees in a regeneration harvest system. Typical post fire-disturbance conditions would be large amounts of standing live and dead trees, the majority of which would eventually fall down. Natural regeneration would slowly capture the site under the partial shade of the standing trees while the dead trees that fall down would also damage some of the seedling/sapling trees, effectively thinning some of the trees in the stand. A harvested stand will have far fewer standing trees, may re-forest faster than natural due to planting trees, and may need to be thinned to prevent stagnation and favor seral species. With regeneration harvest, “edges” are created between harvested and non-harvested areas with a hard transition from forested to non-forested. This edge may be more drastic than what may occur naturally.

Most of the stands cut in the 1980s and 1990s have sufficient tree regeneration and the current vegetation is considered adequate for wildlife hiding cover. Please refer to the project file for the quantity and type of post-harvest treatments that have occurred and refer to the harvest history map for their spatial relationship within the project area.

Table 62. Previous Regeneration Harvest on National Forest

Decade of Harvest	Acres Harvested
1950s	724
1960s	3,872
1970s	3,483
1980s	3,415
1990s	14,713
2000s	522
Total	**26,729**

Past intermediate harvest generally reduced stand density to effectively thin the stand to allow more growing space for the leave trees while also favoring seral species. These actions can resemble a mixed severity fire by removing much of the small to medium size vegetation while

favoring the overstory. Effects to various age classes were to maintain the stands progression towards maturity. Standing structure of dead trees would be less than with a wildfire since woody material is being removed. Intermediate harvest in the 1970s and before often targeted removal of the overstory seral trees. This effectively reduced the seral component and converted stands from seral dominated or mixed conifer to shade tolerant dominated. Beginning in the late 1970s and early 1980s, emphasis was given to promoting seral species as understanding of forested ecosystems expanded.

Table 63. Previous Intermediate Harvest on National Forest Lands

Decade of Harvest	Acres Harvested
1950s	480
1960s	706
1970s	2,703
1980s	4,438
1990s	178
2000s	509
Total	**9,014**

Management Direction

Desired Condition

The purpose and need was developed to move the project area towards the Forest Plan desired conditions for multiple resources. The Forest Plan desired vegetative condition for the project area includes healthy stands of early-seral species including western larch, western white pine, and ponderosa pine as well as healthy stands of Douglas-fir in areas where root rot is not active (FW-DC-VEG-01). Vegetation would be resilient and adapted to fire, insects, and disease (FW-DC-VEG-06). Fire would be restored to the landscape where feasible and appropriate to maintain fire adapted species, maintain patches of open forest conditions, and reduce accumulated fuel levels (FW-DC-VEG-02, FW-DC-VEG-04, FW-DC-VEG-05). Vegetative management activities occur in areas where needed based on forest health conditions (FW-DC-VEG-07). Vegetation in the WUI provides for defensible space and firefighter safety in the vicinity of homes within the project area.

A mosaic of diverse, productive habitats would be available that provide both cover and forage for wildlife species. Lower elevation dry ponderosa pine/Douglas-fir forests would provide habitat for wildlife adapted to these habitat types which is relatively scarce on the District. Prescribed fire would be used to promote the growth and development of large trees and snags; as well as provide forage and snag habitat in a mosaic pattern with areas of cover (FW-DC-VEG-07, FW-DC-VEG-08).

Environmental Consequences

This section displays the environmental consequences of the proposed activities on the forest vegetation resource. It compares both the effects across alternatives, using the indicators discussed in the methodology section of this section, and analyzes the direct, indirect and cumulative effects of each alternative.

Below, Table 64 compares the acres of each proposed treatment across alternatives. Table 65 compares the degree to which each alternative addresses the Purpose and Need. Table 66 shows the effects of harvest activities on size classes in the project area for Alternatives 2, 3 and 4.

Table 64. Comparison of Silvicultural Prescriptions Acres across Alternatives

Proposed Treatment	Alt.1 Acres	Alt. 2 Acres	Alt 3 Acres	Alt 4 Acres
Seedtree Cut	0	1,300	1,248	961
Clearcut with Reserves	0	691	689	501
Shelterwood Cut	0	125	125	107
Improvement Cut	0	626	623	652
Improvement Cut with Openings	0	385	385	385
Total Harvest	**0**	**3,127**	**3,070**	**2,606**
Fuels Treatment	**0**	**1,715**	**1,743**	**1,730**
Total Acres Treated	**0**	**4,842**	**4,812**	**4,336**

Table 65. Alternative Comparison by Purpose and Need Objectives for Forest Vegetation

Purpose and Need	Indicator/Measure	Alt 1	Alt 2	Alt 3	Alt 4
Patch Size	Acres Restored to Historic Patch Size and Pattern	0	2,874	2,853	1,526*
	Number of Units over 40 acres	0	32	30	0
Forest Structure	Percent Size Class Distribution	See Table 66			
	Acres of Seedling/Sapling Size Class Increased	0	2,984	2,930	2,437
Fuel Loadings	Acres of Low- and Mixed-Severity Fire Regime Restored	0	1,884	1,908	1,899
	Acres of Fuels Reduced by Timber Harvest	0	3,127	3,070	2,606
Species Composition	Acres Treated to Promote ponderosa pine/western larch/white pine	0	2,116	2,062	1,569
	Acres of Root Diseased Douglas-fir Converted to More Resilient Early Seral Species	0	1,501	1,465	1,149
	Acres of Improved Understory Vegetation	0	4,842	4,812	4,336

Purpose and Need	Indicator/Measure	Alt 1	Alt 2	Alt 3	Alt 4
Provide Wood Products (MMBF/CCF)	Saw Log MMBF/CCF:	0	28.4/56,086	27.8/54,960	23.1/45,580
	Non-Saw MMBF/CCF:	0	10.2/19,630	10.0/19,236	8.3/15,953
Reduce Crown Fire Potential and Stand Replacing Fire in the WUI	Acres of Treatment within the WUI	0	4,181	4,151	3,740

*These units are fuels units only. Refer to the direct and indirect effects of the action alternatives below for further information.

Table 66. Effects of Harvest Activities on Size Class in the Project Area for Alternatives 2, 3, 4

Size Class (years)	Desired Project Acres (percent)	Existing Project Acres (percent)	Alternative 2 Project Acres (percent)	Alternative 3 Project Acres (percent)	Alternative 4 Project Acres (percent)
Non-forested		1	1	1	1
Seedling/Sapling	16-31	19	23	23	22
Small	10-19	9	9	9	9
Medium	8-16	8	7	8	8
Large	34-67	50	47	47	48
No Data*		12	12	12	12

*The majority of the stands with no data most likely fall into the large size class because some of them are in remote areas that have been inaccessible for timber harvest and/or their origin date would be before the Forest Service record keeping began in the 1940s.

Alternative 1 – No Action

Alternative 1 is the No Action Alternative— under which no prescribed burns, tree harvest, fuels reduction, or watershed improvement would take place. Only natural processes and fire suppression would occur within these stands. This alternative would not contribute to the purpose for this project.

The effects of Alternative 1-No Action provide a baseline from which to compare the action alternatives. The following trends were discussed in greater detail in the Existing Condition section and are summarized again below. These trends would continue under the no action alternative:

- Species composition (as defined by forest type or dominance class) is outside of the HRV, as is the size class distribution within the project area, (2015 Forest Plan).
- Ponderosa pine, western larch, and western white pine are declining in many stands; and there is an elevated risk of losing many of these trees due to wildfire, dwarf mistletoe, blister rust, and interspecies competition from shade tolerant species.
- Production of understory vegetation important to wildlife has decreased due to increases in tree canopy cover/stand density and lack of mixed severity fire.
- Of the approximately 20,400 acres of stands with a Douglas-fir forest type, approximately 11,100 acres have root rot disease present and mortality would continue.

- Snags and coarse woody debris would continue at current levels in the short-term. However, with continued fire suppression and lack of active management, the indirect effects of this alternative would include a loss of preferred snag species, such as western larch, and the potential spread of more severe fires would result in an abundance of snags initially, but would fall within 20 years (Bull 1997, Morrison and Raphael 1993, Harris 1999, Russell et al. 2006) with little recruitment of new snags for several years. CWD would follow a similar pattern as a loss in snags reduces the future recruitment of large diameter CWD. Without a reduction of the dense understory, the development of large diameter trees would continue to decline. Also, if a high severity fire occurs due to the uncharacteristic fuels conditions then much of the existing CWD would either be consumed by the fires or altered to a condition less usable by wildlife.

The following address the direct and indirect effects of no action on the indicators of the Purpose and Need:

Desired patch size and pattern – this alternative would not create any large openings of historic patch size and pattern. With continued fire suppression, forage potential would continue to decline and many stands would continue to be outside of their historic fire regimes.

Characteristic forest structure – no action would result in stands moving further away from desired forest structures. Many stands in the small, medium, and large size classes would continue to decline; preventing them from attaining the characteristics necessary to reach desired structure. There would be no increase in the seedling/sapling size class, other than by natural processes.

Historic fuel loadings –this alternative would not restore any of the low- and mixed-severity fire regimes. Stand densities would continue to be above desired conditions.

Desired species composition – this alternative would not improve species composition towards the desired condition of healthy, resilient ponderosa pine, western larch, and western white pine. Stands dominated by mature Douglas-fir with high root disease would not benefit from treatment designed to promote early seral and less root rot susceptible species; causing stands to remain in early succession and prevent them from reaching desired climax condition.

Provide wood products – this alternative would not provide any timber to support the local and regional economies.

Reduce crown fire potential and stand replacing wildfire within the WUI – no action would not provide for safe and effective fire management or reduce fuel loadings within the WUI. The risk of a high mortality disturbance event is higher.

In summary, under the No Action Alternative forest vegetation would continue trending away from the Desired Conditions and does not meet the Purpose and Need as described in the Existing Conditions and Changes from Historical Conditions sections above.

Alternative 2 – Proposed Action

Silvicultural Treatments

Table 67 provides the acres of harvest treatment by Management Area (MA). Map M-22 displays Management Areas in the project area. All proposed activities in MA2 are within the scenic/recreation category with none in the wild category.

Table 67. Alternative 2 Proposed Harvest Treatments by Management Area

Proposed Treatment	Management Area	Acres
Clearcut with Reserves	2	59
Clearcut with Reserves	6	631
Shelterwood Cut	2	18
Shelterwood Cut	6	107
Seedtree Cut	2	217
Seedtree Cut	6	1,082
Improvement Cut	2	33
Improvement Cut	6	586
Improvement Cut with Openings	6	385
Total Acres of Timber Harvest		**3,127**

Summary of Alternative 2 Treatments

Table 68 shows which VRUs would be affected by the prescribed burning and harvest proposed in Alternative 2.

Table 68. Alternative 2 Proposed Fuels Treatment and Harvest by VRU and Biophysical Setting (Warm/Dry, Warm/Moist, Subalpine)

Alternative 2 Proposed Treatments	VRU 2 (Warm/ Dry)	VRU 3 (Warm/ Dry)	VRU 4 (Warm/ Moist)	VRU 5 (Warm/ Moist)	VRU 6 (Warm/ Moist)	VRU 7 (Sub alpine)	Total
Fuels Treatment Acres	1,116	0	167	341	7	84	**1,715**
Harvest Acres	675	155	1,053	1,244	0	0	**3,127**
Total Acres Treated	**1,791**	**155**	**1,220**	**1,585**	**7**	**84**	**4,842**

Table 65 above shows how the proposed treatments relate to the Purpose and Need for this project, in terms of the number of acres that meet the stated purpose and need. Many of the proposed activities meet multiple objectives, such as promoting early seral tree species, increasing the forage component and seedling/sapling age class by reducing canopy coverage, and providing wood products. Refer to Appendix C -Unit Summary table and Appendix D - Prescribed Burn Summary table for information on which treatment units address the purpose and need for this project. In addition to the purpose and need identified in Appendix C and D, Table 65 includes additional metrics that further define resilient vegetative conditions related to species composition, fire regimes and fuel loadings.

Promoting ponderosa pine, western larch, and western white pine would be accomplished through regeneration, as well as with the improvement cuts, which favor these species. Regeneration harvest would occur in stands where these early seral species are a minor component and in stands that are currently occupied by root diseased Douglas-fir. Since ponderosa pine, western larch, and western white pine are all more resilient to these pathogens, regeneration harvest is the most effective method in promoting their establishment. Additionally, healthy individuals of these

species, as well as sites where healthy Douglas-fir exists, would be left in all regeneration harvest units where available. Reducing the canopy through harvest or burning would allow more sunlight to the forest floor for big game forage and browse species. Wood products would come from all proposed harvest units. Characteristic patch sizes would be moved towards desired conditions with a number of units designed to mimic historic fire regimes and reduce fragmentation.

Restoration of fire regime characteristics involves burning in the low severity fire regimes associated with the warm/dry biophysical setting (VRU 2), while restoring the mixed severity fire regimes would be accomplished through burning in the warm/moist and subalpine biophysical settings (VRUs 4, 5, 6, and 7).

Alternative 2 – Direct and Indirect Effects

Resilient Vegetation Conditions

Historic patch size and pattern – this alternative would create 32 harvest units that are of historic patch size and pattern. Additionally, there are 11 fuels units which are designed to mimic a mixed-severity fire which would create a mosaic of patches and patterns across the treatment area. Thirty-two harvest units create or contribute to openings over 40 acres in size and would require approval from the Regional Forester. Understory vegetation would increase and stands would mimic their historic fire regimes. These characteristic patches would trend the project area landscape towards a more natural appearing and functioning landscape.

Characteristic forest structure – Treatments in a variety of age classes would move the project area towards reference conditions and set those stands on a trajectory towards attaining the characteristics necessary to reach the desired structure. Table 66 shows that size class distribution is within desired ranges except for the medium size, which is 1 percent low. Under Alternative 2, there would be an increase in the seedling/sapling size class, specifically young stands comprised of early seral species of which 75 percent is in the warm/moist biophysical setting. In alternative 2 the medium size class would decrease and be outside the desired condition even further, and the large size class would decrease by 3 percent but will still be within the desired condition. Treatments proposed for intermediate harvest would favor healthy western larch, ponderosa pine, Douglas-fir, and western white pine where they exist. The intent of this treatment is to improve stand vigor, and aid these stands in growing to the next age class. Openings created by timber harvest and areas treated by prescribed fire would stimulate understory plants and add to the vegetative diversity.

Historic fuel loadings – by reducing fuel loadings through mechanical treatments and/or burning, this alternative would restore the low- and mixed-severity fire regimes. Stand densities would be lowered to desired conditions. Regenerating these stands to be dominated by a mix of (some or all) ponderosa/larch/white pine with scattered overstory would maintain these species and allow for a future large-tree component on the landscape. These treatments would somewhat mimic the historic effects of stand-replacing and mixed severity fires. With the larger fire-tolerant trees remaining, and the smaller and non-fire tolerant trees being killed. Proposed fuel reduction activities for the harvest units include machine piling and burning, underburning, and yarding tops of trees to the landing area for burning, and are summarized in Chapter 2.

Prescribed burns for maintaining and/or enhancing habitat or natural ecosystem processes would result in a reduction in fuel loadings and reduce the hazard of high severity fire and aid in the maintenance of existing moderate hazard over time.

Desired species composition – this alternative would improve species composition towards the desired condition of healthy, resilient ponderosa pine, western larch, and western white pine. Stands dominated by mature Douglas-fir in high root disease areas would benefit from treatment designed to promote early seral and less root rot susceptible species; enabling them to reach desired condition. These stands would be converted to more resilient early seral species while maintaining a mix of species diversity; incorporating healthy western redcedar, lodgepole pine, Douglas-fir, grand fir, and others where appropriate. This alternative would trend the landscape towards the 2015 Forest Plan desired condition species composition and increase resilience to insects and disease.

Prescribed burns and fuels treatments within harvest units employing burning would result in a short-term reduction in species such as huckleberry, buffalo berry, serviceberry, snowberry, mountain maple, and pinegrass. However, under the light to moderate burning conditions that would be in effect, all of these species would return to at least pre-fire levels within 3 to 5 years. All of the species listed above are important wildlife foraging species that are adapted to fire (Smith and Fischer 1997), and in fact many are fire-obligates. Also the proposed harvest would increase sunlight on the forest floor allowing the existing understory plants to increase in abundance as well as extent within 3 to 5 years. Most of the regeneration harvest units have few understory plants due to the dense canopy cover with the understory plants growing only in areas where there are gaps in the canopy. These units would see a large increase in plant abundance.

Provide wood products – Alternative 2 would produce about 38 million board feet of timber products for the local and regional economies.

Reduce crown fire potential and stand replacing wildfire within the WUI – by lowering stand densities and returning to desired fuel loadings, fuel breaks are created and ladder fuels are reduced; resulting in a reduction of crown fire potential and stand replacing fire within the WUI. See the Historic Fuel Loadings section above and Fuels section of this chapter for more information on how these two concepts are connected.

In summary, under Alternative 2, forest vegetation would trend toward the desired conditions and does meet the purpose and need.

Effects Related to the Key Issues

Regeneration Harvest Units Greater Than 40 – Harvest Units 14, 18, 20, 25, 31B, 33, 34, 37, 38A, 39, 40, 42, 43, 44, 45, 45A, 45C, 47, 48, 49, 51, 52A, 52B, 52D, 53, 54, 57, 61, 68, 70, 74, and 77 would create or contribute to openings greater than 40 acres in size. Aside from 33, 40, 42, 52B, and 61, which are in, or have portions, in MA2, the rest of these units are in MA6. Forest composition of these units are currently dominated on the drier sites by a dense mixture of Douglas-fir and grand fir where ponderosa pine and western larch historically made up a fire-maintained open landscape Similar conditions exist on the moister sites, except where Douglas-fir and grand fir have taken over sites in which western larch, western white pine, and, to a lesser extent, ponderosa pine historically dominated. Root rot is present in these stands and dwarf mistletoe occurs in patches of western larch throughout. The intent of the proposed treatments is to create stand conditions somewhat similar to what would occur post wildfire, with the larger, fire-tolerant trees remaining, and the smaller and non-fire tolerant trees being killed.

Effects to Snags and CWD

Management activities can both create and reduce snag and CWD densities. Timber harvest can reduce these densities by directly removing dead or defective trees during harvest (incidentally or for safety reasons). Prescribed fire can weaken standing snags during fuel reduction treatments,

causing them to fall prematurely. The same activities can damage or kill live trees and create snags. There is potential to reduce both existing and future sources of CWD, through green tree removal or fuels consumption, as well as create CWD by damaging or killing trees and falling existing snags. Short-term availability of down material could be reduced. Long-term availability would be influenced by the amount of CWD and trees left on site post treatments and would increase over time to levels that one might expect to find in untreated areas.

Snag density is averaged over the entire analysis area with some areas of high concentrations of snags, and some areas with few to none. The same is true for proposed treatment units; therefore, the range of snags remaining is not intended or expected to occur on every acre harvested within a project area (Bollenbacher et al. 2009). Table 69 shows the recommended number of snags by biophysical setting. These recommendations will be incorporated into the silvicultural prescriptions and design features specify that all snags be left on site where they do not pose a safety hazard in both timber and fuels units. Hazardous/unstable snags that are felled for safety reasons would be left on site for CWD. Proposed post-harvest girdling of mistletoe infected western larch would increase snag densities within those units and, in time, would contribute towards CWD levels.

Table 69. Snag and Snag Recruitment Levels to retain (where they exist) after Vegetation Management Activities (including Post-harvest Activities), by Harvest Type (2015 Forest Plan pg. 20)

Dominance Group	Biophysical Setting	Snags > 15”+ DBH	Live Trees > 15.0” DBH
Ranges per Acre where Treatments result in a Seedling/Sapling Size Class (Regeneration Harvest)			
All except lodgepole Pine	Warm/Dry	1.5 – 3.5	1.5 – 4.0
	Warm/ Moist	3.5 – 8.5	1.5 – 4.5
	Subalpine	4.0 – 5.5	1.5 – 2.5
Lodgepole pine	All	0.5 – 1.5	0.5 – 1.0
Ranges per Acre where Treatments result in a Small or Medium Size Class (e.g., Commercial Thin)			
All except lodgepole pine	Warm/Dry	0.5 – 2.5	9.5 – 16.5
	Warm/Moist	3.0 – 7.5	10.0 – 20.5
	Subalpine	3.0 – 4.5	10.0 – 13.0
Lodgepole pine	All	0.5 – 1.5	4.0 – 7.0
Ranges per Acre for Treatments in the Large Size Class (e.g., Restoration)			
All except lodgepole pine	Warm/Dry	2.0 – 5.0	22.0 – 30.5
	Warm/Moist	3.5 – 13.0	31.0 – 54.0
	Subalpine	5.5 – 8.5	29.5 – 36.5

The same variable spatial distribution is true for CWD as it was for snags. In the units known to be deficient in CWD, the standing dead snags that are left on site will contribute toward CWD recruitment. Table 70 below displays the 2015 Forest Plan desired levels which would be incorporated into the silvicultural prescriptions.

Table 70. Levels of Coarse Woody Debris to Retain after Vegetation Management Activities for each Biophysical Setting (2015 Forest Plan pg. 19-20)

Biophysical Setting	Total Coarse Woody Debris to Retain (tons/acre)	Number and Size of Logs to Retain	
		Number of Logs/Acre	Desired Size
Warm/Dry	Drier Sites: 5 – 12	6–14	Diameter: >10 inch with at least 2 pieces >20 inch
	Moister Sites: 10 – 20		Length: >12 feet
Warm/Moist	12 – 33	20–30	Diameter: >12 inch with at least 10 pieces >20 inch Length: >12 feet
Subalpine	Moister Sites: 12 – 25	Moister Sites: 20–30	Diameter: >10 inch (8 inch for lodgepole pine)
	Drier Sites: 7 – 15	Drier Sites: 15–20	Length: >12 feet

Alternative 3

Historic patch size and pattern – In Alternative 3, thirty regeneration harvest units create or contribute to openings over 40 acres. An unharvested movement corridor would be left between Harvest Units 33 and 34, and these two units would each be 40 acres or less. In Alternative 2, Units 33 and 34 abut each other, without a movement corridor between them; these two units would contribute to an opening greater than 40 acres. Regeneration openings greater than 40 acres require approval from the Regional Forester.

Understory vegetation would increase and stands would mimic their historic fire regimes. These characteristic patches would trend the project area landscape towards a more natural appearing and functioning landscape.

Silvicultural Treatments

The proposed harvest unit treatments in Alternative 3 (Table 71) are the same as Alternative 2, except that 21 acres were dropped completely and 36 acres were changed from harvest treatment to fuels treatments – totaling 57 acres of changes. Harvest Units 34 and 37 had portions dropped. Harvest Units 35, 35A, 35B, and 36 were changed to Fuels Units F33, F34, F35, and F36, respectively, where the proposed treatment is slash and grind. Harvest Unit 41B was changed to Fuels Unit F32 with a proposed treatment of slash and underburn. Rationale for these changes is covered in Chapter 2. Table 72 shows the proposed fuels treatment and harvest for Alternative 3 by VRU and biophysical setting.

Table 71. Alternative 3 Proposed Harvest Treatments by Management Area

Proposed Treatment	Management Area	Acres
Clearcut with Reserves	2	57
Clearcut with Reserves	6	631
Shelterwood Cut	2	18
Shelterwood Cut	6	107
Seedtree Cut	2	187
Seedtree Cut	6	1,059
Improvement Cut	2	30
Improvement Cut	6	586
Improvement Cut with Openings	6	385
Total Acres of Timber Harvest		**3,070**

Table 72. Alternative 3 Proposed Fuels Treatment and Harvest by VRU and Biophysical Setting (Warm/Dry, Warm/Moist, Subalpine)

Alternative 3 Proposed Treatments	2 (Warm/ Dry)	3 (Warm/ Dry)	4 (Warm/ Moist)	5 (Warm/ Moist)	6 (Warm/ Moist)	7 (Sub alpine)	Total
Fuels Treatment Acres	1,116	0	166	368	7	84	1,743
Harvest Acres	673	155	1,032	1,211	0	0	3,070
Total Acres Treated	**1,789**	**155**	**1,198**	**1,579**	**7**	**84**	**4,813**

Summary of Alternative 3 Treatments

Alternative 3 contains the same activities and treatments as Alternative 2 with the following changes:

- 21 less acres of historic patch size restoration.
- 54 less acres of an increase in the seedling/sapling size class.
- 24 more acres of low- and mixed- severity fire.
- 57 less acres of fuel loadings reduced by timber harvest.
- 54 less acres treated to promote ponderosa pine, western larch, and western white pine.
- 36 less acres of root diseased Douglas-fir converted to more resilient early seral species.
- 30 less acres of improved understory vegetation.
- 0.6 MMBF / 1,126 CCF less sawlogs produced and 0.2 MMBF / 394 CCF less non-saw.
- 30 less acres of reduction of crown fire potential and potential for stand replacing fire in the WUI.

Since the treatments and proposed activities in Alternative 3 are very similar as those in Alternative 2, except for the noted differences, the rationale and details of effects will not be

repeated here. Alternative 3 meets the purpose and need, but to a lesser extent than Alternative 2. Table 65 shows how the proposed treatments for all alternatives relate to the purpose and need for this project, in terms of the number of acres that meet the stated purpose and need.

Alternative 4

Silvicultural Treatments

Proposed harvest unit prescriptions are the same as the Proposed Action and Alternative 3, except that all regeneration harvest units are 40 acres or less. The acres of harvest in Alternative 4 are 521 acres less than in Alternative 2. Table 73 displays the proposed treatment acres in Alternative 4 by prescription and management area (MA) and Table 74 shows the acres of fuels treatments and harvest by biophysical setting and VRU.

Table 73. Alternative 4 Proposed Harvest Treatments by Management Area

Proposed Treatment	Management Area	Acres
Clearcut with Reserves	2	59
Clearcut with Reserves	6	441
Shelterwood Cut	2	18
Shelterwood Cut	6	88
Seedtree Cut	2	180
Seedtree Cut	6	781
Improvement Cut	2	33
Improvement Cut	6	619
Improvement Cut with Openings	6	385
Total Acres of Timber Harvest		**2,606**

Table 74. Alternative 4 Proposed Fuels Treatment and Harvest by VRU and Biophysical Setting (Warm/Dry, Warm/Moist, Subalpine)

Alternative 4 Proposed Treatments	2 (Warm/ Dry)	3 (Warm/ Dry)	4 (Warm/ Moist)	5 (Warm/ Moist)	6 (Warm/ Moist)	7 (Sub alpine)	Total
Fuels Treatment Acres	1,118	0	168	352	7	84	1,730
Harvest Acres	595	127	865	1,020	0	0	2,606
Total Acres Treated	**1,713**	**127**	**1,033**	**1,372**	**7**	**84**	**4,336**

Summary of Alternative 4 Treatments

Alternative 4 contains the same activities and treatments as the Proposed Action with the following changes:

No regeneration harvest will exceed 40 acres in size. Harvest Units 14, 18, 20, 25, 34, 37, 38A, 39, 40, 42, 43, 45, 45A, 45C, 49, 52B, 52D, 53, 57, 61, 68, 70, 74, and 77 are reduced in size to be 40 acres or less. All other units are the same as in Alternative 2.

Since the treatments and proposed activities are the same for these units as for Alternative 2, the rationale and details of effects will not be repeated here except that Alternative 4 does not meet the purpose and need of managing towards characteristic landscape-level vegetation patterns and patch size with harvest units. However, there are 11 fuels units which are designed to mimic a mixed-severity fire which would create a mosaic of patches and patterns across the treatment area. Alternative 4 meets the remaining purpose and need measures, but to a lesser extent than the proposed action or Alternative 3. Table 65 above shows how Alternative 4 compares to the other alternatives' ability to meet the purpose and need.

Refer to Appendix C – Harvest Unit Summary and Appendix D – Prescribed Burn Summary for information as to which treatment units address the purpose and need for this alternative with the one difference being that, for Alternative 4, none of the harvest units would meet the characteristic patch size purpose and need, but 11 of the prescribed burn units would to some degree. In addition to the purpose and need identified in Appendix C – Harvest Unit Summary, Table 65 includes additional metrics that further define resilient vegetative conditions.

Alternative 2, 3, and 4 - Cumulative Effects

Spatial and Temporal Context for Cumulative Effects Analysis

The cumulative effects area for this resource is the project area and the temporal analysis includes all known activities and events that have affect or will affect the vegetation. These analysis boundaries are appropriate in order to disclose the conditions and trends of the vegetation and the effects to vegetation from all effects including human and natural. Exact timeframes in years (short term vs. long term) cannot be exact due to the variability in response to vegetation from treatments. The modeled rate of vegetative recovery and the associated hydrologic response following a reduction in forest cover depends on the site productivity. For simplification purposes, the site productivity is assumed to be moderate in all the treatment areas although the watersheds all support a range of slower to fast growing areas. Full water yield recovery takes 60 to over 100 years depending on the site productivity. However, 80 percent of hydrologic recovery is expected within 50 years on most sites within project area. The time required for hydrologic response is longer than the response of other resources and is the most conservative estimate of the longevity of openings caused by even-aged regeneration harvests (refer to the water resources section for more information). Therefore, short term can be approximated as within 0-50 years of disturbance to vegetation and any time beyond that as long term.

Past Actions and their Effects on Current Conditions

As described previously in the effects section, wildfire and past actions like timber harvest, precommercial thinning, and prescribed burning have had a direct influence on the existing age class distribution and species composition (see Table 75 and Figure 25) of the project area. Natural disturbances, such as fire, have been greatly reduced by fire suppression while timber harvest has been a more dominate factor in changing the vegetation, including the 10,022 acres of non-Forest Service lands. Of the privately owned lands within the project area, it is estimated that 6,569 acres have had regeneration harvest and 7,513 acres of intermediate harvest since the 1950s. Openings historically created by fire have been replaced to a limited extent by timber harvest. Most harvested areas have fewer trees, fewer snags and a different shape and size as compared to areas burned by wildfire because trees were removed and boundaries were based on topographic features, property lines, or 40-acre limits. Fire suppression has been most effective in extinguishing low to mixed severity fires resulting in increased tree canopy layers, ladder fuels, and more shade intolerant species (the past regeneration harvest units on Forest Service lands are

stocked with seral species resulting in species composition more in line with reference conditions).

Current Condition and Trend

As was described above in the Affected Environment section, the current stand conditions are trending away from the historic range of variability with regards to species composition and age classes represented.

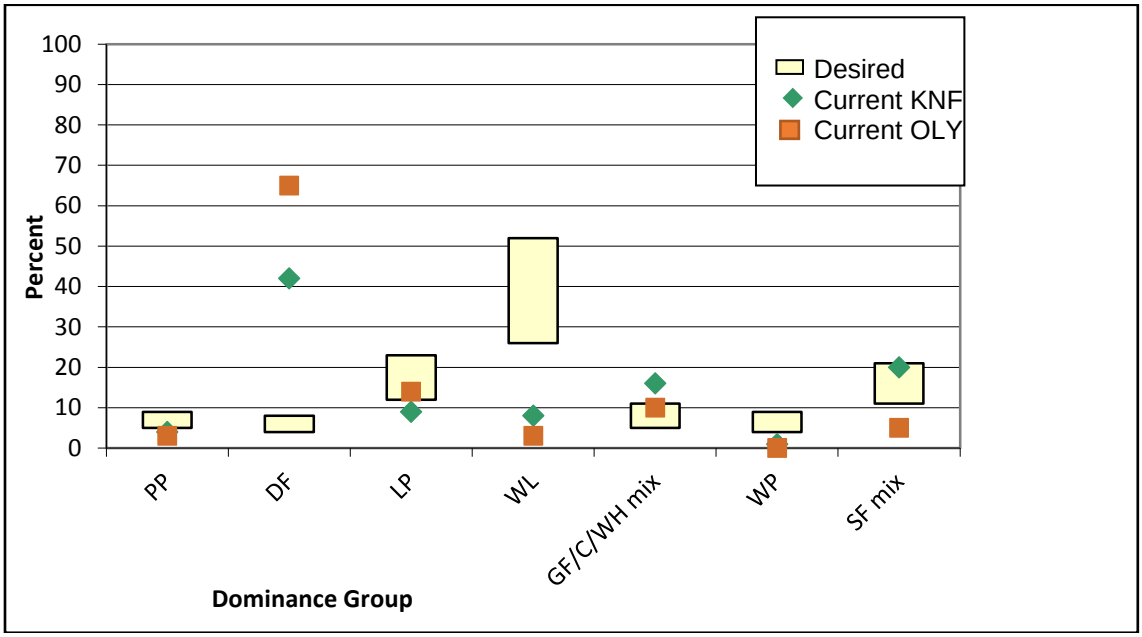


Figure 25. A Comparison of KNF Desired Species Composition to Current All Ownership Conditions

Figure 25 above depicts the current species composition compared to the desired. Ponderosa pine, western larch, and western white pine are all below desired condition and are likely to decline further and be outcompeted by shade tolerant species. These stands currently do not provide quality foraging opportunities for big game, and are unlikely to in the future because of the overabundance of shade tolerant species and high stand densities.

Table 75. Size Class Distribution for All Ownerships

Size Class	Desired Size Class Distribution for Forest Service Land (percent)	Existing Size Class Distribution (percent)
Non-forested	N/A	2
Seedling/Sapling	16-31	23
Small	10-19	13
Medium	8-16	10
Large	34-67	40
No Data	N/A	12

Table 75 shows the size class distribution for the entire project area across all ownerships. In order for a stand to move along in succession, it must be healthy and have the structure to support it. With the majority of these stands outside of desired conditions (i.e. insect and disease infestations and species compositions absent of early serals), it is highly unlikely that they will develop into larger diameter stands; but over time trees will continue to die and create fuel loading above desired levels.

Contrasting Effects of Past Actions with the Proposed Activities

Implementation of harvest activities would affect the distribution and composition of age classes of vegetation in the project area to varying degrees depending on acreage treated (see Table 64). These activities have helped to form the existing vegetation conditions in the project area as well as keep fire as a disturbance process on the acres treated. Some of the distant past harvest activities did not leave snags or the current recommendation for down woody debris or riparian area management, nor did it implement current BMP standards in part because these standards had not been developed yet. Some of these past actions resulted in impacts for snag habitat, riparian areas, and loss of large diameter early seral species. The proposed harvest and burning activities would not result in these negative consequences due to ecosystem management knowledge. Emphasis on maintaining snags, down woody debris, riparian habitat management, and promotion of fire tolerant early seral species has become standard practices based on science and experience, as our knowledge of the importance to maintain these features has increased with experience and research.

Effects of Current and Reasonably Foreseeable Actions

There are currently no active timber sales within the project area and only two small blowdown salvage sales on lands adjacent to the project area. There is about 650 acres of precommercial thinning and one commercial thinning (small post and pole sale of about 20 acres planned for the near future), most likely starting in 2015. The thinning treatments would reduce tree stocking and competition, maintain vigor, and improve species diversity. These activities would also aid these stands in growing and achieving the next age class. These ongoing actions are consistent with the purpose and need for the OLY project and help to maintain the trajectory of these forest conditions towards a desirable future condition. Potential harvest on Stimson land is estimated to be 910 acres (5 percent regeneration harvest). This action would slightly decrease the large size class and increase the seedling/sapling size class. The conditions displayed in Table 75 would be the same with these treatments included since the acreage is small and the affected age classes would still be within reference ranges. The KNF has proposed a project called the Forest-wide Young Growth. This project proposes to manage previously harvested and regenerated stands younger than the 1960s era of harvest in order to follow up on precommercial thinning and commercial thinning that was planned in order to keep the regenerated stands healthy. The initial proposed treatment acres is 400,000 acres forestwide, but various site-specific treatment based on environmental thresholds (i.e. avoid impacts to Threatened and Endangered Wildlife, plant species, and sensitive areas) would decrease the actual, on-the-ground treatments and would be considerably less than the initial proposed acreage. Therefore, the site-specific cumulative effects of the Young Growth implementation within the OLY analysis area would be considered prior to moving forward with any treatments. Within the OLY project area, approximately 1,500 acres are candidates for precommercial thinning and approximately 10,000 acres are candidates for commercial thinning. No other timber sales are planned in this project area.

Other activities like mineral exploration, road maintenance, recreation, noxious weed treatments, communication site maintenance, have had very little effect to the native vegetation in the project area (see Noxious Weeds section in this chapter for more information on invasive species).

Individual tree removal for road maintenance and mineral exploration, removing brush along roadways and trails, treating weeds with herbicides, and removal of brush and individual trees near communication sites will continue to happen and entail a very small portion of the project area and have a minimal effect on forest vegetation. Please refer to the beginning of Chapter 3 of this FEIS for more information activities which were considered for this analysis.

Combined Effects from Past, Proposed, Ongoing and Foreseeable Actions

Prior regeneration harvest areas are growing into young forests providing habitat for organisms that utilize that forest structure. Many areas that have been logged in the distant past are functioning forest stands now and would not be recognized as past harvest by some members of the public. Effects from past logging on vegetation are difficult to quantify because they do emulate – to some extent – natural disturbances that affect these landscapes and are reflected in the existing conditions of vegetation with in the project area. Over time these areas regenerate similarly to natural disturbances but are typically enhanced with planted trees. As with any disturbance the vegetation reacts to its surrounding environment and competes with other organisms for nutrients, water, light and growing space. These forests are dynamic and actually require disturbance to maintain their composition, structure and function.

Without the role of fire - the major disturbance - the composition, structure and function of these forests are declining or trending away from desired conditions. Logging, precommercial thinning, prescribed burning, and similar human activities are not the same as a natural disturbance but can have a similar effect to forest stand conditions. Reducing stand density through timber harvest and prescribed burning has created more growing space, increased tree vigor, and allows for increased defenses against insects and diseases. Regenerating stands would reduce the abundance of Douglas-fir dominated stands. Reforesting the units to a mix of species including vigorous western larch, ponderosa pine, and western white pine dominated stands would trend the project area toward reference species composition and age classes and help aid the stands in growing large diameter, resilient trees. Species diversity will aid these stands in adapting to changing climatic conditions. While the past actions have influenced the existing conditions discussed at the beginning of this section, the proposed actions, along with the other planned precommercial thinning, foreseeable private land harvest, and proposed Forest-wide Young Growth, will move the vegetation towards the desired condition.

Tradeoffs to these actions, such as potential soil and water effects and effects to wildlife species inhabiting the existing forest structure, are discussed in other resource analyses in this chapter.

Carbon Cycling and Storage

The proposed actions being considered here may alter the rates and timing of the carbon flux (as discussed in the Existing Condition section) within the individually affected forest stands. These changes would be localized and infinitesimal in relation to the role the world's forests play in ameliorating climate change and indistinguishable from the effects of not taking the action. Nevertheless, effects of the proposal on carbon cycling and storage are discussed below.

Alternative 1 – No Action

Direct and Indirect Effects

There would be no direct human-induced emissions of carbon into the atmosphere under this alternative. Forest stands would likely continue as carbon sinks until the next disturbance event (fire, wind, insect infestation, etc.) occurs. When the next forest stand replacing disturbance event

(high tree mortality) occurs, the affected areas would convert to a carbon source condition (emitting more carbon than is being sequestered). This state would continue for up to a decade or more until the rate of forest regrowth, assuming trees regenerate, meets and exceeds the rate of decomposition of the killed trees. As stands continue to develop, the strength of the carbon sink would increase (typically peaking at an intermediate age and then gradually declining, but remaining positive) (Pregitzer and Euskirchen 2004). Carbon stocks would continue to accumulate, although at a declining rate, until again impacted by subsequent disturbance.

For at least the short term, on-site carbon stocks would remain higher under the No Action alternative than under the Action alternatives. Nevertheless, caution is advised against interpreting carbon inventory maintenance or gains from deferred or foregone timber harvest in any specific forest or stand as affecting atmospheric concentrations of greenhouse gases. This only holds true if harvest does not occur elsewhere in the world to supply the same world demand for timber (Gan and McCarl 2007; Murray 2008; Wear and Murray 2004). The result can be a net carbon impact if the timber is replaced in the marketplace with higher carbon source products such as steel or concrete or is harvested in a manner that does not result in prompt reforestation (McKinley, et al. 2011; Ryan, et al. 2010; Harmon 2009).

The risk of some high mortality disturbance events is greater under the no action alternative. The long-term ability of these forests to persist as a net carbon sink is uncertain (Galik and Jackson 2009). Drought stress, forest fires, insect outbreaks and other disturbances may substantially reduce existing carbon stock (Galik and Jackson 2009, Hicke et al 2012). Climate change threatens to amplify risks to forest carbon stocks by increasing the frequency, size, and severity of these disturbances (Dale, et al. 2001; Barton 2002; Breashears and Allen 2002; Westerling and Bryant 2008; Running 2006; Littell, et al. 2009; Boisvenue and Running 2010). Recent research indicates that these risks may be particularly acute for forests of the Northern Rockies (Boisvenue and Running 2010). Increases in the severity of disturbances, combined with projected climatic changes, may limit post-disturbance forest regeneration, shift forests to non-forested vegetation, and possibly convert large areas from an existing carbon sink to a carbon source (Barton 2002; Savage and Mast 2005; Allen 2007; Strom and Fulé 2007; Kurz, et al. 2008a; Kurz, et al. 2008b; Galik and Jackson 2009). Leaving areas of forest densely stocked, as in the no action alternative, maintains an elevated risk of carbon loss due to disturbance. Thinning, prescribed fire, and other management actions are often suggested as climate change “adaptation actions” because they may increase forest resilience to these multiple stresses, and thus increase the likelihood of sustaining forest carbon benefits in the long-term (Millar, et al. 2007; Joyce, et al. 2008; Ryan, et al. 2008b). The no action alternative foregoes such climate change adaptation actions.

Alternatives 2, 3, & 4 – The Action Alternatives

Direct and Indirect Effects

In the short term, the action alternatives would remove and release some carbon currently stored within treatment area biomass through harvest of live and dead trees and other fuel reduction activities, including prescribed burning. A portion of the carbon removed would remain stored for a period of time in wood products (US EPA 2013; Depro, et al. 2008). Additionally, motorized equipment used during any of the proposed activities will emit greenhouse gasses.

For at least the short term, on site carbon stocks would be lower under the action alternatives than under No Action. The amount of carbon stocks retained would be proportional to the number of acres and amount of vegetation treated by alternative. Actions such as those proposed here may, in some cases, increase long term carbon storage over time (Finkral and Evans 2008; North, et al. 2009; Mitchell, et al. 2009) but current research in this field shows highly variable and situational

results (McKinley, et al. 2011; Mitchell, et al. 2009; Reinhardt and Holsinger 2010; Ryan, et al. 2010).

The proposed stand vegetation and fuel reduction treatments would reduce existing carbon stocks and temporarily reduce net carbon sequestration rates within treated stands, in some areas possibly enough that for the short term the stands would emit more carbon than they are sequestering. These stands would remain a source of carbon to the atmosphere (or weakened sink) until carbon uptake by new and remaining trees again exceeds the emissions from decomposing dead organic material. As stands continue to develop, the strength of the carbon sink would increase and gradually decline, but remain positive (Pregitzer and Euskirchen 2004). Carbon stocks would continue to accumulate, although at a declining rate, until impacted by future disturbances.

As discussed elsewhere, the risk of some high mortality disturbance events is greater under the no action alternative. To the extent the proposed actions reduce the risk or delay the event of future stand replacing disturbance events, potential emissions from those events would be reduced or forestalled.

Sustaining forest productivity and other multiple-use goods and services requires that land managers balance multiple objectives. The long-term ability of forests to sequester carbon depends in part on their resilience to multiple stresses, including increasing probability of drought stress, high severity fires, and large scale insect outbreaks associated with projected climate change. Management actions, such as those proposed with this project that maintains the vigor and long-term productivity of forests and reduce the likelihood of high severity fires and insect outbreaks can maintain the capacity of the forest to sequester carbon in the long-term. Thus, even though some management actions may in the near-term reduce total carbon stored below current levels, in the long-term they maintain the overall capacity of these stands to sequester carbon, while also contributing other multiple-use goods and services (Reinhardt and Holsinger 2010).

Cumulative Effects

Neither the No Action alternative nor the Action Alternatives would have a discernable impact on atmospheric concentrations of greenhouse gases or global warming, considering the limited changes in both rate and timing of carbon flux predicted within these few affected forest acres and the global scale of the atmospheric greenhouse gas pool and the multitude of natural events and human activities globally contributing to that pool.

Although not a statutorily defined purpose of National Forest System management, forests do provide a valuable ecosystem service by removing carbon from the atmosphere and storing it in biomass (Galik and Jackson 2009). Forests in the United States are a strong net carbon sink, absorbing more carbon than they emit (Houghton 2003; US EPA 2013; Heath, et al. 2011). For the period 2000 to 2008, U.S. forests sequestered (removed from the atmosphere, net) approximately 481.1 teragrams of carbon dioxide per year, with harvested wood products sequestering an additional 101 teragrams per year. Our national forests accounted for approximately 30 percent of that net annual sequestration. National forests contribute approximately 3 teragrams carbon dioxide to the total stored in harvested wood products compared to about 92 teragrams from harvest on private lands (Heath, et al. 2011).

The total carbon stored on the Kootenai National Forest is approximately 163 teragrams, or about thirty-six one hundredths of one percent (0.0036) of approximately 44,931 teragrams of carbon stored in forests of the coterminous United States (Heath, et al. 2011). The Lower Yaak, O'Brien,

Sheep Project would affect only a tiny percentage of the forest carbon stock of the Kootenai National Forest, and an infinitesimal amount of the total forest carbon stock of the United States.

Within the United States, land use conversions from forest to other uses (primarily for land development or agriculture) are identified as the primary human activities exerting negative pressure on the carbon sink that currently exists in this country's forests (McKinley, et al. 2011; Ryan, et al. 2010; Conant, et al. 2007). The affected forest lands in this proposal would remain forests, not converted to other land uses, and long-term forest services and benefits would be maintained.

Regulatory Framework Findings

2015 Forest Plan

The 2015 Forest Plan provides desired conditions, objectives, standards, and guidelines for OLY. The following are applicable to the actions in this project:

Goals:

GOAL-VEG-01: Plant communities are trending toward the desired conditions for composition, structure, patterns, and processes. The ecological integrity of the communities is high and they exhibit resistance and resiliency to natural and man-caused disturbances and stressors, including climate change.

> Alternative 1 would not trend the forest towards the desired conditions for composition, structure, pattern, and processes. Alternatives 2, 3, and 4 would contribute to progress achieving this goal.

GOAL-TBR-01: Provide a sustainable level of timber products for current and future generations. Production of timber from NFS lands contributes to an economically viable forest products industry.

> Alternative 1 would not provide any timber products. The action alternatives would contribute:
>
> Alternative 2: 28 MMBF saw and 10.2 MMBF non-saw
> Alternative 3: 28 MMBF saw and 10.0 MMBF non-saw
> Alternative 4: 23 MMBF saw and 08.3 MMBF non-saw

Desired Conditions:

FW-DC-VEG-01: The composition of the forest is within the desired ranges for the dominance groups. More of the forest is dominated by western white pine, ponderosa pine, western larch, and whitebark pine. Conversely, less of the forest is dominated by grand fir, western hemlock, western redcedar, Douglas-fir, and subalpine fir. Although they are not depicted in figure 2, more hardwood trees occur in the Forest such as quaking aspen, black cottonwood, and paper birch.

> Alternative 1 would not trend the forest towards the desired species composition. Alternatives 2, 3, and 4 would promote ponderosa pine, western white pine, and western larch and would contribute to progress achieving this desired condition.

FW-DC-VEG-02: The structure of the forest is within the desired ranges for each size class. More of the forest is dominated by stands occurring in the large size class. Less of the forest is dominated by stands that occur in the small and medium size classes.

Alternative 1 will not trend the forest towards desired forest structure. While Alternative 2, 3, and 4 increase the small and medium size classes in the short term, in the long term these stands would be healthier and be more resilient. Thus enabling them to reach the large size class and would contribute to progress achieving this desired condition.

FW-DC-VEG-04: Tree densities and the number of canopy layers within stands are generally decreased.

Alternative 1 would not lower tree densities or number of canopy layers. Alternatives 2, 3, and 4 would all decrease tree densities and would contribute to progress achieving this desired condition.

FW-DC-VEG-05: The pattern of forest conditions across the landscapes consists of a range of patch sizes that have a diversity of successional stages, densities, and compositions. Formerly extensive, homogenous patches of forests that are dominated by species and size classes that are very susceptible to disturbance agents have been diversified. Generally, there is an increase in the size of forest patches dominated by trees in the seedling/sapling size class, as well as in the large size class. There is a decrease in the size of the patches that are dominated by trees in the small and medium size classes.

Alternative 1 would not create a pattern across the landscape and it would remain largely homogenous with a lack in diversified disturbance agents. Alternatives 2, 3, and 4 would create patches that are characteristic of a diversified heterogeneous landscape. The landscape will be more resilient to a variety of disturbance agents and would contribute to progress achieving this desired condition. Alternative 4 would be less effective due to the lack of creation of larger characteristic patches across the forest.

FW-DC-VEG-06: Root disease fungi, such as *Armillaria* and *Phellinus*, are killing fewer trees as the composition of the forests trends toward less susceptible tree species such as: western larch, ponderosa pine, and western white pine. Forest insects, such as Douglas-fir bark beetle, mountain and western pine beetles, fir engraver beetle, and the western spruce budworm, are generally causing less tree mortality. Impacts from the non-native fungus that causes the white pine blister rust disease are reduced as the abundance of rust-resistant western white pine and whitebark pine increases.

Alternative 1 would not trend the forest towards a species composition of less susceptible to insects and disease. Alternatives 2, 3, and 4 would promote western larch, ponderosa pine, and western white pine and would contribute to progress achieving this desired condition. Rust-resistant western white pine would be planted where appropriate.

FW-DC-VEG-07: Snags occur throughout the forest in an uneven pattern, provide a diversity of habitats for wildlife species, and contribute to the sustainability of snag dependent species. Snag numbers, sizes, and species vary by biophysical setting and dominance group. Table 1 displays the desired range of snag densities. Over time, the number of large-diameter snags (20 inches in DBH or greater) increases in all biophysical settings.

Under Alternative 1, no new snags would be created through prescribed fire or girdling. Alternatives 2, 3, and 4 would have an emphasis in snag retention and

recruitment in the silvicultural prescriptions and would contribute to progress achieving this desired condition.

FW-DC-VEG-08 Down wood occurs throughout the forest in various amounts, sizes, species, and stages of decay. The larger down wood (i.e., coarse woody debris) provides habitat for wildlife species and other organisms, as well as serving important functions for soil productivity.

Alternative 1 would not increase or decrease existing down wood. Harvest and fuels treatments in Alternatives 2, 3, and 4 would have an emphasis on the amount of down wood in the silvicultural prescriptions and would contribute to progress achieving this desired condition.

FW-DC-TBR-01 Production of timber contributes to ecological, social, and/or economic sustainability, and associated desired conditions. A sustainable mix of timber products (including both sawtimber and non-sawtimber) is offered under a variety of harvest and contract methods in response to market demand. Salvage of dead and dying trees captures as much of the economic value of the wood as possible while retaining the amount needed for wildlife habitat, soil productivity, and ecosystem functions.

Alternative 1 would not produce any timber. Alternatives 2, 3, and 4 propose timber harvest that will contribute to ecological, social, and/or economic sustainability, and associated desired conditions. Additionally, the action alternatives would contribute to a sustainable mix of timber products offered under a variety of harvest and contract methods.

FW-DC-TBR-02 Lands identified as suitable for timber production have a regularly scheduled timber harvest program. Where appropriate, thinning or other types of stand treatments are used to increase tree growth and create additional growing space for the desirable tree species, to address forest resilience objectives, and reduce mortality and fuel loading. Lands are adequately restocked within 5 years of final regeneration harvest, following a site-specific silvicultural prescription.

Alternative 1 would not produce any timber. Alternatives 2, 3, and 4 propose timber harvest in 2,067 acres, 2,062 acres, and 1,703 acres, respectively, of lands identified as suitable for timber. There are no known regeneration issues that would preclude successful reforestation either through planting or natural regeneration. Regeneration stocking surveys would be completed the first, third, and fifth year after harvest to monitor the natural and planted regeneration. Replanting would be implemented if the early stocking surveys are not satisfactory.

FW-DC-TBR-03 Timber cutting on other than suitable for timber production lands occurs for such purposes as salvage, fuels management, insect and disease mitigation, protection or enhancement of biodiversity or wildlife habitat, or to perform research or administrative studies, or recreational and scenic-resource management consistent with other management direction. Restocking of these lands varies, based on the purpose and need for the project, and is determined through the project-level interdisciplinary process and the silvicultural prescription. Based on the site-specific silvicultural prescription and desired conditions, lands may be restocked within 5 years. In some instances, such as when lands are harvested to create openings for fuel breaks and vistas or to prevent encroaching trees, these lands may not be restocked.

Alternative 1 would not produce any timber. Alternatives 2, 3, and 4 propose timber harvest on 875 acres, 826 acres, and 744 acres, respectively, on lands where timber harvest is allowed, but are outside of the timber production lands. There are no known regeneration issues that would preclude successful reforestation either through planting or natural regeneration. Regeneration stocking surveys would be completed the first, third, and fifth year after harvest to monitor the natural and planted regeneration. Replanting would be implemented if the early stocking surveys are not satisfactory.

FW-DC-TBR-04: The Allowable Sale Quantity (ASQ) is 802 MMBF over the first decade the Plan is implemented. Timber harvest will not exceed this amount over the first decade of implementation. The long term sustained yield capacity (LTSYC) for the Forest is approximately 17 MMCF (approximately 90 MMBF).

Alternative 1 would not produce any timber. Alternatives 2, 3, and 4 would contribute 2,067 acres, 2,062 acres, and 1,703 acres, respectively.

Alternative 1 would not produce any timber. Alternatives 2, 3, and 4 would contribute 28 MMBF, 28 MMBF, and 23 MMBF, respectively.

Objectives:

FW-OBJ-VEG-01: ***Forest Resilience***–Over the life of the Plan, the outcome per decade is: Increased relative representation of early seral, shade-intolerant, drought- and fire-tolerant, insect/disease resistant species dominance types (e.g., ponderosa pine, white pine, western larch, whitebark pine, and hardwoods) on approximately 120,000 to 150,000 acres. Treatment of approximately 250,000 acres to maintain and/or improve forest resilience, natural diversity, and productivity and to reduce negative impacts of non-native organisms. Treatments may include timber harvest, planting, thinning, management of fire (including planned and unplanned ignitions), mechanical fuel treatments, revegetation with native species, blister rust pruning, integrated tree improvement activities, noxious weed treatments, and other integrated pest management activities including forest health protection suppression and prevention activities.

Alternative 1 would not contribute any acres towards this objective. Alternatives 2, 3, and 4 are designed specifically to contribute 4,842 acres, 4,812 acres, and 4,336 acres, respectively, towards forest resilience and contribute towards progress of achieving this objective.

FW-OBJ-TBR-01: Annually offer timber for sale at the estimated predicted volume sold of 47.5 MMBF.

Alternative 1 would not produce any timber. Alternatives 2, 3, and 4 would contribute 28 MMBF, 28 MMBF, and 23 MMBF, respectively.

Standards:

FW-STD-TBR-01: Regulated timber harvest activities shall occur only on those lands classified as suitable for timber production.

Alternative 1 would not have any timber harvest. Alternatives 2, 3, and 4 would have 2,067 acres, 2,062 acres, and 1,703 acres, respectively, of timber harvest on lands classified as suitable for timber production. However, these treatments are

proposed because their existing conditions do not match the desired conditions of the purpose and need.

FW-STD-TBR-02: If individual harvest openings created by even-aged silvicultural practices are proposed that would exceed 40 acres, then NFMA requirements regarding public notification and approval shall be followed. These requirements do not apply to the size of areas harvested because of catastrophes such as, but not limited to, wildfire, insect and disease attacks, or wind storms.

Alternative 1 would not have any timber harvest. Alternative 2 would have 32 regeneration harvest units which create or contribute to 22 openings over 40 acres. Alternative 3 would have 30 regeneration harvest units which create or contribute to 20 openings over 40 acres. These actions would only occur after a 60-day public notice and upon Regional Approval (reference the Over 40 analysis in the Project Record). Alternative 4 does not have any regeneration harvest openings over 40 acres.

FW-STD-TBR-03: Timber harvest activities shall only be used when there is reasonable assurance of restocking within 5 years after final regeneration harvest. Restocking level is prescribed in a site-specific silviculture prescription for a project treatment unit and is determined to be adequate depending on the objectives and desired conditions for the Plan area. In some instances, such as when lands are harvested to create openings for fuel breaks, wildlife habitat, and vistas or to prevent encroaching trees, it is adequate not to restock.

Alternative 1 would not have any timber harvest. Alternatives 2, 3, and 4 would have a restocking level prescribed in a site-specific silvicultural prescription. There are no regeneration issues that would preclude successful reforestation either through planting or natural regeneration. Regeneration stocking surveys would be completed the first, third, and fifth year after harvest to monitor the natural and planted regeneration. Replanting would be implemented if the early stocking surveys are not satisfactory. The FACTS database was used to summarize reforestation survey records on the District. All regeneration harvests from 1976 to 2014 were analyzed (see project file). Results show that 92 percent have been satisfactorily stocked within 5 years and 98 percent are progressing or certified as stocked now. Poor performance was typically due to droughty conditions in the mid- 1980s and late-1990s and early-2000s, and on harsh sites with shallow soils. All sites that did not get certified within 5 years had trees growing but not at the desired density. This information demonstrates assurance that the proposed regeneration harvest can be adequately restocked within the required timeframe. The Forest Service is required by law to reforest per the Knutson-Vandenberg Act (16 USC 576b, 6/9/30).

FW-STD-TBR-04: Even-aged stands shall generally have reached or surpassed culmination of mean annual increment (95 percent of CMAI, as measured by cubic volume) prior to regeneration harvest, unless the following conditions have been identified during project development: When such harvesting would assist in reducing fire hazard within the WUI; and when harvesting of stands will trend landscapes toward vegetation desired conditions.

Alternative 1 would not have any timber harvest. All regeneration harvests in Alternatives 2, 3, and 4 would assist in reducing fire hazard within the WUI and would trend the landscapes toward vegetation desired conditions.

FW-STD-TBR-05: Harvesting systems shall be selected based on their ability to meet desired conditions and not strictly on their ability to provide the greatest dollar return.

> Alternative 1 would not have any timber harvest. Alternatives 2, 3, and 4 are designed in accordance with this standard.

FW-STD-TBR-06: Clearcutting shall be used only where it is the optimum method for meeting Forest Plan direction.

> Alternative 1 would not have any timber harvest. Clearcutting (with reserves) in Alternatives 2, 3, and 4 is proposed on 665 acres, 663acres, and 501 acres, respectively, and would be prescribed by a Certified Silviculturist as the optimum method to contribute to progress achieving the desired condition.

FW-STD-TBR-07: Even-aged prescriptions other than clearcutting (seed tree, shelterwood, etc.) shall be used when appropriate to meet Forest Plan direction.

> Alternative 1 would not have any timber harvest. Even-aged prescriptions, other than clearcutting, in Alternatives 2, 3, and 4 would be proposed on 1,425 acres, 1,373 acres, and 1,068 acres, respectively, and would be prescribed by a Certified Silviculturist as the optimum method to contribute to progress achieving the desired condition.

Guidelines:

FW-GDL-TBR-01. Timber harvest on other than suitable lands may occur for such purposes as salvage, fuels management, insect and disease mitigation, protection or enhancement of biodiversity or wildlife habitat, or to perform research or administrative studies, or recreation and scenic-resource management consistent with other management direction.

> Alternative 1 would not produce any timber. Alternatives 2, 3, and 4 propose timber harvest on 875 acres, 826 acres, and 744 acres, respectively, on lands where timber harvest is allowed, but are outside of the timber production lands. There are no known regeneration issues that would preclude successful reforestation either through planting or natural regeneration. Regeneration stocking surveys would be completed the first, third, and fifth year after harvest to monitor the natural and planted regeneration. Replanting would be implemented if the early stocking surveys are not satisfactory. Harvest from unsuitable lands where timber harvest is allowed will improve foraging habitat for big game species.

FW-GDL-VEG-03: Vegetation management activities should retain the amounts of coarse woody debris (including logs) that are displayed in table 3. A variety of species, sizes, and decay stages should be retained. Exceptions may occur in areas where a site-specific analysis indicates that leaving the quantities listed in the table would create an unacceptable fire hazard to private property, people, or sensitive natural or historical resources. In addition, exceptions may occur where the minimum quantities listed in the table are not available for retention.

> Alternative 1 would not affect existing coarse woody debris. Alternatives 2, 3, and 4 are designed in accordance this this guideline and would require treatments to retain the desired amounts where feasible (see the Coarse Wood Debris section in the Vegetation section above).

FW-GDL-VEG-04: Vegetation management activities should retain snags greater than 20 inches DBH and at least the minimum number of snags and live trees (for future snags) that are displayed in table 4. Where snag numbers do not exist to meet the recommended ranges, the difference would be made up with live replacement trees. Exceptions occur for issues such as human safety and instances where the minimum numbers are not present prior to the management activities.

> Alternative 1 would not enable the creation of new snags; however with continued tree mortality from insects, wildland fire, and disease, existing levels are expected to increase. Silvicultural prescriptions for Alternatives 2, 3, and 4 would emphasize the retention and recruitment of snags. New snags would be created through girdling for dwarf mistletoe sanitation where feasible.

FW-GDL-VEG-05: Where vegetation management activities occur and snags (or live trees for future snags) are retained, the following direction should be followed:

- Group snags where possible;
- Retain snags far enough away from roads or other areas open to public access to reduce the potential for removal (generally more than 150 feet);
- Emphasize retention of the largest snags and live trees as well as those species that tend to be the most persistent, such as ponderosa pine, larch, and cedar;
- Favor snags or live trees with existing cavities or evidence of use by woodpeckers or other wildlife; and
- In fire salvage areas, untreated areas may be used to meet the snag density differences if persistent snags are not available for retention in treatment units.

> Alternative 1 does not apply. Alternatives 2, 3, and 4 are designed in accordance with this guideline and would include this as a design feature or be incorporated into the silvicultural prescription.

FW-GDL-VEG-06: During vegetation management activities (e.g., timber harvest), and in the event that retained snags (or live trees being retained for future snags) fall over or are felled (for safety concerns), they should be left on site to provide coarse woody debris.

> Alternative 1 does not apply. Alternatives 2, 3, and 4 are designed in accordance with this guideline and would include this as a design feature.

FW-GDL-VEG-08: All silvicultural practices may be used to manage forest vegetation. This includes silvicultural systems (e.g., even-aged, two-aged or uneven-aged), regeneration methods (e.g., clearcutting, seed-tree, shelterwood, and group or single-tree selection), as well as other practices such as improvement cutting, commercial or pre-commercial thinning, use of planned or unplanned ignitions, planting, pruning, invasive terrestrial plant species control, cone collection, tree improvement, insect or disease control, site-preparation, and fuel reduction. Appropriate practices for a given situation depend on numerous factors, including the current and desired forest vegetation conditions at the stand and landscape scales, the biophysical setting, and the management direction and emphasis for the area. Silvicultural practices should generally trend the forest vegetation towards conditions that are more resistant and resilient to disturbances and stressors, including climate change.

> Alternative 1 does not have any silvicultural treatments. The units proposed in Alternatives 2, 3, and 4 have all been individually diagnosed and reviewed by a

Certified Silviculturist to prescribe the best silvicultural practice to trend the forest vegetation towards more resistant and resilient conditions. Alternatives 2, 3, and 4 are designed in accordance with this guideline.

Management Area

MA2-DC-VEG-01 Natural ecological processes (e.g., plant succession) and disturbances (e.g., floods, fire, insects, and disease) are the primary forces affecting the composition, structure, and pattern of vegetation.

Alternative 1 does not propose any treatments. Alternatives 2, 3, and 4 would treat 328 acres, 293 acres, and 291 acres of treatment in MA2, respectively. This is less than 13 percent of the total of MA2 in the project area, leaving natural ecological processes as the primary force within most of this MA. In addition, proposed treatments are designed to mimic ecological processes, meet the purpose and need of the project, and move these stands to the desired condition. Given the small area that would be treated, this project would remain neutral toward this desired condition.

MA2-GDL-TBR-02 Timber harvest is allowed to maintain or restore the values for which the eligible scenic or recreational river was identified. Timber harvest is not scheduled and does not contribute toward the allowable sale quantity.

Alternative 1 does not propose any treatments. Alternatives 2, 3, and 4 would treat 328 acres, 293 acres, and 291 acres of treatment in MA2, respectively. This is less than 13 percent of the total of MA2 in the project area, leaving natural ecological processes as the primary force within most of this MA. In addition, proposed treatments are designed to mimic ecological processes, meet the purpose and need of the project, and move these stands to the desired condition. Given the small area that would be treated, this project would remain neutral toward this desired condition.

MA6-DC-VEG-01 In much of this MA, vegetation management activities have a dominant role in affecting the composition, structure, and pattern of vegetation. These management activities trend the vegetation towards the desired conditions. Although natural ecological processes and disturbances are still present, they are influenced more by human activity in this MA than in others.

Alternative 1 does not propose any treatments. Alternatives 2, 3, and 4 would treat 2,790 acres, 2,768 acres, and 2308 acres in MA6, respectively. This is about 7 percent of the total of MA6 in the project area, which would contribute to progress toward this desired condition.

MA6-DC-TBR-01 Timber production occurs on suitable lands within this MA.

Alternative 1 does not propose any treatments. Alternatives 2, 3, and 4 would treat 2,067 acres, 2,062 acres, and 1,703 acres, respectively, on suitable production lands in MA6.

MA6-STD-TBR-01 On lands suitable for timber production, timber harvest is allowed for the purpose of timber growth and yield while maintaining productive capacity. Timber harvest is scheduled and contributes to the allowable sale quantity.

Alternative 1 does not propose any treatments. Alternatives 2, 3, and 4 would treat 2,067 acres, 2,062 acres, and 1,703 acres, respectively, on suitable production lands in MA6.

Geographic Area

Bull Geographic Area - no additional desired conditions are applicable to vegetation for OLY.

Yaak Geographic Area – no additional desired conditions are applicable to vegetation for OLY.

Federal Law

National Forest Management Act

The **National Forest Management Act** requires the development, maintenance, and, as appropriate, the revision of land and resource management plans (forest plans) for units of the National Forest System. These forest plans provide for the multiple use and sustained yield of renewable resources in accordance with the Multiple-Use Sustained-Yield Act of 1960. NFMA requires all projects and activities authorized by the Forest Service to be consistent with the applicable plan components (16 U.S.C. 1604(i)) as described by 36 CFR 219.17 (subject to valid existing rights).

The previous section describes the project's consistency with applicable 2015 Forest Plan direction.

Short-term Uses and Long-term Productivity

NEPA requires consideration of "the relationship between short-term uses of man's environment and the maintenance and enhancement of long-term productivity" (40 CFR 1502.16). As declared by the Congress, this includes using all practicable means and measures, including financial and technical assistance, in a manner calculated to foster and promote the general welfare, to create and maintain conditions under which man and nature can exist in productive harmony, and fulfill the social, economic, and other requirements of present and future generations of Americans (NEPA Section 101).

Timber harvest and prescribed burning are some of the short-term uses of the Forest expected to occur for the planning period of the 2015 Forest Plan. The short-term effects of the proposed vegetation management actions in this project would decrease stand densities, rejuvenate understory vegetation, and increase the number of acres in the seedling/sapling size class.

The management requirements contained in the forestwide and MA standards and guidelines were developed to ensure that the long-term productivity of the land is not impaired by short-term uses. As described in this vegetation section, the proposed actions and associated design features under alternatives would not affect long-term productivity of forest vegetation.

Unavoidable Adverse Effects

There are no unavoidable adverse effects identified for the vegetation resource.

Required Monitoring

Regeneration stocking surveys would be completed in all proposed regeneration harvest units in the first, third, and fifth year after harvest to monitor the natural and planted regeneration.

Summary of Environmental Effects

Changes to vegetation in terms of the various stages of successional development are a natural part of the forested ecosystem in the OLY area, and fires were the primary agent in making these changes. Plants and animal need these stages, as they provide conditions or habitat that is needed.

For plants, fire provides openings where grasses/brushes/forbes take the competitive advantage to occupy the site until brush and small trees move in. These small trees progress to pole-sized trees, then to larger trees. For animals, each of these stages provide a habitat necessary for activities like foraging/hunting, security/travel corridors, nesting/denning, etc. Some stages are critical to survival for some plants and animals. Fires can maintain some stages in some sites, or provide a mosaic of heterogeneous patches across a landscape. Changes to vegetation from wildfire have been limited since the advent of fire suppression. Generally, the forest has become more homogenous, as described in the large scale assessments like the UCRB, CER, AMS, and numerous other large- and mid- scale forest assessments on the Kootenai and other forests of the inland Northwest.

The desired condition for the forest vegetation in this project area considers how these forests have developed overtime, in relation to human and ecological events and potential future climatic conditions. All action alternatives trend the vegetation conditions toward desired conditions. Table 65 shows how all the alternatives meet the purpose and need and shows that Alternatives 2, which proposes to treat the most acres, is the most effective at trending the landscape towards the desired vegetative conditions.

Invasive Plant Species

Introduction

This section addresses the existing condition and the effects of the alternatives on the invasive plant species including noxious weeds of the OLY project area. The term "noxious" is a legal designation. To be considered noxious, a plant species must be listed by a state or county in their noxious weed list. The Montana list is provided below. Some additional plant species are considered invasive. These include species that have previously been intentionally planted, such as smooth brome. While this analysis includes invasive species, the noxious weeds have been the primary concern within the project area. Other invasive plant species are no longer planted and occupy some areas within the project area, but do not generally threaten the persistence of native species or spread rapidly the way that the noxious species do.

Therefore this report will focus primarily on the effects of the project alternatives on noxious weeds within the project area. Additional invasive species will no longer be planted or introduced to the project area, have not been identified as a concern for this project, and will not be further addressed.

Regulatory Framework

The Montana Local County Weed Act (MCA 7-22-2116) states "it is unlawful for any person to permit any noxious weed to propagate or go to seed on the person's land, except that any person who adheres to the noxious weed management program of the person's weed management district or who has entered into and is in compliance with a noxious weed management agreement is considered to be in compliance with this section." The Kootenai National Forest has entered into an agreement with Lincoln County in the form of a Memorandum of Understanding (MOU). This MOU states "the purpose of this agreement is to document the sharing of expenses and materials between the Forest Service and the County to accomplish mutually beneficial objectives related to the control of invasive and noxious weeds on National Forest System lands and/or private lands" within specific provisions and in accordance with a Financial and Operating Plan. The noxious weed list for Montana, effective as of September 2010, is included in Table 76 below.

Table 76. Montana Noxious Weed List

Priority Level	Description of Priority significance and associated weed species
Priority 1A	These weeds are not present in Montana. Management criteria will require eradication if detected; education; and prevention. - Yellow starthistle (*Centaurea solstitialis*)
Priority 1B	These weeds have limited presence in Montana. Management criteria will require eradication or containment and education. - Dyer's woad (*Isatis tinctoria*) - Flowering rush (*Butomus umbellatus*) - Japanese knotweed complex (*Polygonum spp.*) - Purple loosestrife (*Lythrum spp.*) - Rush skeletonweed (*Chondrilla juncea*) - Eurasian watermilfoil (*Myriophyllum spicatum*) - Scotch broom (*Cytisus scoparius*) - Curlyleaf pondweed (*Potamogeton crispus*)

Priority Level	Description of Priority significance and associated weed species
Priority 2A	These weeds are common in isolated areas of Montana. Management criteria will require eradication or containment where less abundant. **Management shall be prioritized by local weed districts.** - Tansy ragwort (*Senecio jacobaea*) - Meadow hawkweed complex (*Hieracium spp*.) - Orange hawkweed (*Hieracium aurantiacum*) - Tall buttercup (*Ranunculus acris*) - Perennial pepperweed (*Lepidium latifolium*) - Yellowflag iris (*Iris pseudacorus*) - Blueweed (*Echium vulgare*) - Hoary alyssum (*Berteroa incana*)
Priority 2B	These weeds are abundant in Montana and widespread in many counties. Management criteria will require eradication or containment where less abundant. **Management shall be prioritized by local weed districts.** - Canada thistle (*Cirsium arvense*) - Field bindweed (*Convolvulus arvensis*) - Leafy spurge (*Euphorbia esula*) - Whitetop (*Cardaria draba*) - Russian knapweed (*Centaurea repens*) - Spotted knapweed (*Centaurea stoebe* or *maculosa*) - Diffuse knapweed (*Centaurea diffusa*) - Dalmatian toadflax (*Linaria dalmatica*) - St. John's-wort (*Hypericum perforatum*) - Sulfur cinquefoil (*Potentilla recta*) - Common tansy (*Tanacetum vulgare*) - Oxeye daisy (*Chrysanthemum leucanthemum or Leucanthemum vulgare*) - Hound's-tongue (*Cynoglossum officinale*) - Yellow toadflax (*Linaria vulgaris*) - Saltcedar (*Tamarix spp*.)
Priority 3	Regulated Plants: (NOT MONTANA LISTED NOXIOUS WEEDS) These regulated plants have the potential to have significant negative impacts. The plant may not be intentionally spread or sold other than as a contaminant in agricultural products. The state recommends research, education and prevention to minimize the spread of the regulated plant. - Cheatgrass (*Bromus tectorum*) - Hydrilla (*Hydrilla verticillata*) - Russian olive (*Elaeagnus angustifolia*)

Laws

The principal statutes governing or supporting the management of aquatic and terrestrial invasive species on the National Forest System include but are not limited to, the following statutes. Except where specifically stated, these statutes apply to the entire National Forest System.
Organic Administration Act of 1897 (16 U.S.C. §§473 *et seq*.): Authorizes the Secretary to establish regulations governing the occupancy and use of national forests and to protect national forests from destruction.

Knutson-Vandenberg Act of June 9, 1930 (16 U.S.C. 576, 576a-576b). Section 3 of the Act, codified at 16 U.S.C. 576b: Provides that the Secretary may require any purchaser of National Forest timber to make deposits of money in addition to the payments for the timber, to cover the cost to the United States of planting, sowing with tree seeds, and cutting, destroying or otherwise removing undesirable trees or other growth, on the National Forest land cut over by the purchaser, in order to improve the future stand of timber, or protecting and improving the future productivity of the renewable resources of the forest land on such sale area.

Anderson-Mansfield Reforestation and Revegetation Act of October 11, 1949 (16 U.S.C. 581j (note), 581j, 581k): Requires the agency to accelerate and provide a continuing basis for the needed reforestation and re-vegetation of National Forest System lands and other lands under Forest Service administration or control.

Granger-Thye Act of 1950 (16 U.S.C. §§580h): Authorizes the Secretary to use a portion of grazing fees for range improvement projects on National Forest System lands. Specific projects mentioned are artificial re-vegetation, including the collection or purchase of necessary seed and eradication of poisonous plants and noxious weeds, in order to protect or improve the future productivity of the range. Section 11 of the Act authorizes the use of funds for rangeland improvement projects outside of National Forest System lands under certain circumstances.

Sikes Act (Fish and Wildlife Conservation) of September 15, 1960 (16 U.S.C. 670g-670l, 670o, P.L. 86-797), as amended; Section 201: Directs the Secretary of Agriculture to plan, develop, maintain, coordinate, and implement programs for the conservation and rehabilitation of wildlife, fish and game species, including specific habitat improvement or species management [including invasive species management] projects, on lands and waters under the Secretary's jurisdiction. The Act also provides for carrying out wildlife and fish conservation programs on Federal lands and waters including authority for cooperative State-Federal plans and authority to enter into agreements with States to collect fees to fund the programs identified in those plans.

Multiple-Use Sustained-Yield Act of 1960 (16 U.S.C. §§528 et seq.): Authorizes the Secretary to: administer National Forest System lands for outdoor recreation, range, timber, watershed, and wildlife and fish purposes; to develop the surface renewable resources for multiple use and sustained yield of several products and services to be obtained from these lands, without impairment of the productivity of the land; and, to cooperate with interested State and local governmental agencies and others in the development and management of the national forests. The Act also recognizes and clarifies Forest Service authority and responsibility to manage wildlife and fish on national forests.

The Endangered Species Act (ESA) of 1973 (16 U.S.C. §§1531 et seq.): Provides for the conservation of threatened and endangered species of plants and animals. Section 7 of the Act requires Federal agencies to ensure that actions they authorize, fund, or carry out are not likely to jeopardize the continued existence of any threatened or endangered species or result in the destruction or adverse modification of the species' critical habitat. This section also requires Federal agencies to consult with the U.S. Fish and Wildlife Service (for non-marine species) or the National Oceanic and Atmospheric Administration's National Marine Fisheries Service whenever an agency action is likely to affect a threatened or endangered species or result in the destruction or adverse modification of its critical habitat.

Forest and Rangeland Renewable Resources Planning Act (RPA) of 1974 as amended by the National Forest Management Act (NFMA) of 1976: Section 6 of the Act codified at 16 U.S.C. §§1600 et seq.: Provides for the Secretary to promulgate regulations, under the principles of the

Multiple-Use Sustained-Yield Act of 1960, specifying guidelines for land management plans developed to achieve the goals of the Program. The guidelines should provide for diversity of plant and animal communities based on the suitability and capability of the specific land area in order to meet overall multiple-use objectives.

Further, within the multiple-use objectives of a land management plan adopted pursuant to this section provide, where appropriate, to the degree practicable, for steps to be taken to preserve the diversity of tree species similar to that existing in the region controlled by the plan.

Surface Mining Control and Reclamation Act of 1977 (30 U.S.C. 1201, 1201 (note), 1236, 1272, 1305); Section 515: Directs the establishment on the mined areas, and all other lands affected, of a diverse, effective and permanent vegetative cover of the same seasonal variety native to the area of land to be affected and capable of self-regeneration and plant succession at least equal in extent of cover to the natural vegetation on the area; except that introduced species may be used in the re-vegetation process where desirable and necessary to achieve the approved post mining land use plan.

Cooperative Forestry Assistance Act of 1978 (16 U.S.C. 2101 (note), 2101-2103, 2103a, 2103b, 2104-2105; Section 3 (16 U.S.C. 2102): Details the assistance that may be given to State foresters or equivalent State officials and State extension directors, in the form of financial, technical, educational, and related assistance. Section 8 (16 U. S. C. 2104) details actions that may be taken directly on the National Forest System, in cooperation with other Federal departments on other Federal lands, and in cooperation with State foresters, or equivalent State officials, subdivisions of States, agencies, institutions, organizations, or individuals on non-Federal lands to: enhance the growth and maintenance of trees and forests; promote the stability of forest related industries and employment associated therewith through the protection of forest resources; aid in forest fire prevention and control; conserve forest cover on watersheds, shelterbelts, and windbreaks; protect outdoor recreation opportunities and other forest resources; and extend timber supplies by protecting wood products, stored wood, and wood in use.

The North American Wetland Conservation Act 1989 (16 U.S.C. 4401 (note), 4401-4413, 16 U.S.C. 669b (note)); Section 9 (U.S.C. 4408): directs Federal agencies to cooperate with the Director of the U.S. Fish and Wildlife Service to restore, protect, and enhance the wetland ecosystems and other habitats for migratory birds, fish and wildlife within the lands and waters of each agency to the extent consistent with the mission of such agency and existing statutory authorities.

Consolidated Appropriations Resolution, 2003: Section 323 of the Act, codified at 16 U.S.C. 2104: Provides authority to the Forest Service to enter into stewardship contracts with public or private entities or persons to perform services to achieve land management goals for the National Forest System lands that meet local and rural community needs. Stewardship agreements may be entered into for other land management goals such as the following: removal of vegetation or other activities to promote healthy forest stands, reduction of fire hazards; watershed restoration and maintenance; restoration and maintenance of wildlife and fish habitat; prevention and control of invasive species; and reestablishing native plant species.

Healthy Forests Restoration Act of 2003 (H.R. 1904), (16 U.S.C. 6501-6502, 6511-18, 6541-42, 6571-78): Provides improved statutory processes for hazardous fuel reduction projects on certain types of at-risk National Forest System and Bureau of Land Management lands and also provides other authorities and direction to help reduce hazardous fuel and restore healthy forest and rangeland conditions on lands of all ownerships.

The National Historic Preservation Act of 1966 (16 U.S.C. §§470 et seq.): Requires agency heads to assume responsibility for the preservation of historic properties owned or controlled by the agency and to develop a preservation program for the identification, evaluation, and nomination of historic properties to the National Register. Management activities to protect and preserve historic properties and cultural sites may include actions to prevent and control invasive species threatening or impacting those areas. The Act requires agency heads to evaluate the effects of an undertaking on property that is included or eligible for inclusion in the National Register and to afford the Advisory Council a reasonable opportunity to comment on the undertaking. Defines undertaking to include permitting activities or Federal financial assistance under the jurisdiction of an agency.

The Plant Protection Act of 2000 (7 U.S.C. 7701 et seq) as amended by the Noxious Weed Control and Eradication Act of 2004 (P.L. 108-412): Among other provisions, the Plant Protection Act authorizes the Secretary of Agriculture to prohibit or restrict the importation, entry, exportation, or movement in interstate commerce of any plant, plant product, biological control organism, noxious weed, article, or means of conveyance, if the Secretary determines that the prohibition or restriction is necessary to prevent the introduction into the United States or the dissemination of a plant pest or noxious weed within the United States. The Act defines the term "Noxious Weed".

Wyden Amendment (P.L. 109-54, Section 434): Authorizes the Forest Service to enter into cooperative agreements to benefit resources within watersheds on National Forest System lands. Agreements may be with willing Federal, Tribal, State, and local governments, private and non-government entities, and landowners to conduct activities on public or private lands. Under this authority, the Forest Service may enter into agreements to support or conduct invasive species management activities on aquatic and terrestrial areas owned by local and State governments, Tribes, other Federal agencies, and private individuals or organizations, to benefit and protect the National Forest System and other resources within a watershed at risk from invasive species.

Clean Water Act of 1977 (33 U.S.C. 1251, 1254, 1323, 1324, 1329, 1342, 1344; 91 Stat. 1566): This act amends the Federal Water Pollution Control Act of 1972. Section 313 is strengthened to stress Federal agency compliance with Federal, State and local substantive and procedural requirements related to the control and abatement of pollution to the same extent as required of nongovernmental entities. Invasive species management to improve watershed condition supports the Act's charge to maintain the ecological integrity of our nation's waters, including the physical, chemical and biological components.

National Environmental Policy Act of 1969 (16 U.S.C. 4321): Requires agencies to analyze the physical, social, and economic effects associated with proposed plans and decisions, to consider alternatives to the action proposed, and to document the results of the analysis. The provisions of NEPA and the Council on Environmental Quality implementing regulations apply to invasive species management (FSM 1950; FSH 1909.15).

Wilderness Act of 1964 (16 U.S.C. §§1131 et seq.): Authorizes the Secretary to administer certain congressionally designated National Forest System lands as wilderness. Directs the protection and preservation of these wilderness areas in their natural state, primarily affected by nature and not man's actions. Integrated pest management actions [including aquatic and terrestrial invasive species] in Wilderness are authorized to meet provisions of the Act and consistent with Forest Service policy and guidance for Wilderness management.

Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA), (7 U.S.C. s/s 136 et seq.): Describes pesticide regulations and requirements related to hazardous material use and worker protection standards for employees in the planning and application of pesticides.

The **Carlson-Foley Act, Public Law 90-583 of 1968** authorizes and directs heads of Federal Departments and Agencies to permit control of noxious plants by State and local governments on a reimbursement basis in connection with similar and acceptable weed control programs being carried out on adjacent non-Federal land. In other words, this act permits county and state officials to manage noxious weeds with herbicides on Federal lands and to be reimbursed for that management, given that other applicable laws such as NEPA are also met.

Public Law 94-579, the Federal Land Policy and Management Act of 1976, provides authority to control weeds on rangelands as part of a rangeland improvement program.

Regulations

The authority to manage for invasive species on National Forest System (NFS) lands and other lands under Forest Service control is delegated from the Secretary of Agriculture to the Under Secretary for Natural Resources and Environment at Title 7, Code of Federal Regulations (CFR), section 2.20 (7 CFR 2.20). This authority has been delegated in turn from the Under Secretary for Natural Resources and Environment to the Chief of the Forest Service at Title 7, Code of Federal Regulations, section 2.60 (7 CFR 2.60). Title 36, Code of Federal Regulations (including Parts 221, 222, 228, 241, 251, 261, 290, 292, 293, 296, and 297) provides additional authorities to manage and regulate invasive species across the National Forest System, including establishing requirements and prohibitions to prevent and control aquatic and terrestrial invasive species. In addition, Forest Service regulations at 36 CFR 222.8 acknowledge the Agency's obligation to work cooperatively in identifying invasive species (including noxious weeds) problems and initiating control programs in aquatic and terrestrial areas of the National Forest System.

Policy on Noxious Weed Management: Departmental Regulation 9500-10 (DR 9500-10) (January 18, 1990)). Establishes U.S. Department of Agriculture (USDA) policy to manage and coordinate noxious weed activities among USDA agencies in order to improve the quality and ecological conditions of crop and rangeland in the United States.

Policy on the Management of Wildlife, Fish, and Plant Habitat; Departmental Regulation 9500-4 (DR 9500-4): Guides the management of Wildlife, Fish, and Plant Habitat on public lands.

Gypsy Moth Policy (USDA) of 1990: Departmental Regulation 5600-001 (DR 5600-001): This regulation establishes the Departmental Gypsy Moth Policy. It assigns responsibilities to USDA agencies and defines agency roles to avoid unnecessary duplication and to provide maximum coordination of USDA activities dealing with the gypsy moth. The Forest Service plays a significant role in the management of Gypsy Moths in the United States.

Departmental Regulation 9500-4: USDA policy on wildlife, fish, and plant habitat management on National Forest System lands and waters. This regulation provides that the Department will promote the concept and use of integrated pest management practices in carrying out its responsibilities for pest control, and will seek to alleviate damage by plant and animal pests to farm crops, livestock, poultry, forage, forest and urban trees, wildlife, and their habitats. Departmental agencies, through management and research programs, will develop or assist in developing new techniques and methodologies for the prevention of

damage to agricultural or forestry production. The agencies also will strive to reduce potential depredation through improved management of USDA programs. Pest control techniques and considerations will be incorporated into appropriate management and education programs.

Native Plant Materials Policy (FSM 2070): Forest Service manual direction on the use of native plant materials in re-vegetation, rehabilitation, and restoration of both aquatic and terrestrial ecosystems across the National Forest System.

Pesticide Use Management and Coordination Policy (FSM 2150): Provides agency policy and guidance on the use of pesticides as part of an integrated pest management approach. Additional guidance provided in the Pesticide Use Management Handbook (FSH 2109).

Executive Orders

Executive Order 13112 issued February 3, 1999 (E.O. 13112): Directs Federal agencies to: (1) identify actions that may affect status of an invasive species; (2)(a) prevent introduction of such species; (b) detect and control such species; (c) monitor population of such species; (d) provide for restoration of native species; (e) conduct research on invasive species and develop technologies to prevent introduction of such species; (f) promote public education of such species; and (3) not authorize, fund, or carry out actions likely to cause the introduction or spread of invasive species in the United States or elsewhere unless the benefits of the action clearly outweigh the harm and the agencies take steps to minimize the harm.

Executive Order 11246 issued September 24, 1965 (E.O. 11246): Requires entities doing business on behalf of the Forest Service to comply with Title VI of the Civil Rights Act and applicable USDA regulations.

State of Montana Office of the Governor Executive Order No. 13-2014: Establishes the Montana Invasive Species Advisory Council to advise the Governor on a science-based, comprehensive program to identify, prevent, eliminate, reduce, and mitigate the impacts of invasive species in Montana.

Forest Plan

The **2015 Kootenai National Land Management Plan** lists Forest wide desired conditions. Page 14 of the Plan includes the following:

FW-DC-VEG-10. Newly invading, non-native invasive plant species are treated and populations are contained or eradicated. The weed program on the Forest uses integrated pest management approaches, including prevention and control measures that limit introduction, intensification, and spread due to management activities. Agreements with cooperative weed management areas assist control efforts across jurisdictional boundaries.

Page 19 includes the following Objective:

FW-OBJ-VEG-02. Non-native Invasive Plant Species–Over the life of the Plan, the outcome per decade is:

- All sites that are discovered with newly invading non-native invasive species are treated.
- The treatment of approximately 30,000 to 75,000 acres to reduce non-native invasive plant density, infestation size, and/or occurrence (these areas are also included in FW-OBJ-VEG-01).

The Kootenai National Forest Invasive Plant Management EIS and ROD of 2007 provide additional direction with respect to implementation of the management of invasive plant species.

Forest Service Manual and Handbook Direction

Forest Service Manual (FSM) 2080 (USDA 2001) has been replaced by **FSM 2900** (USDA 2011) which stipulates that all proposed projects analyze potential weed risk and ensure that unnecessary increases of weeds do not occur. FSM 2900 states "Management activities for aquatic and terrestrial invasive species (including vertebrates, invertebrates, plants, and pathogens) will be based upon an integrated pest management approach on all areas within the National Forest System, and on areas managed outside of the National Forest System under the authority of the Wyden Amendment (P.L. 109-54, Section 434), prioritizing prevention and early detection and rapid response actions as necessary." Strategic objectives listed include prevention, early detection and rapid response (EDRR), control and management, restoration, and organizational collaboration.

Forest Service Handbook (FSH) 2109.14, the Pesticide-Use Management and Coordination Handbook, guides the use of pesticides on NFS lands.

Forest Weed Species of Concern

Table 77 below lists the species of concern on the Kootenai National Forest (Kootenai National Forest 2002). This list was developed prior to development of the current Montana noxious weed list (2010) which dropped common crupina and poison hemlock. Common crupina was dropped because monitoring over time appeared to show that the species was not able to establish in habitat available in Montana. Poison hemlock, which is different than the native water hemlock though both are quite poisonous, was dropped from the Montana list as a result of confusion about which species was listed, and that the target species was actually native (Burch personal communication). Because the Forest is on the western border of Montana, some species that are a problem in Idaho and Washington have been added to the Forest list of concern. These include species such as plumeless thistle and bugloss. The Montana noxious weed list has added several species that have become a threat within the state. These species are flowering rush, curlyleaf pondweed, perennial pepperweed, and yellowflag iris. Future revisions of the Forest invasive plant species of concern list will likely include these species.

Table 77. Noxious and Invasive Plant Species of Concern on the Kootenai National Forest

Category 3 - Potential invaders, not known to occur – high probability of causing economic and environmental damage; goal is to prevent and eradicate promptly, if found.	
Flowering rush	*Butomus umbellatus*
Hoary alyssum	*Berteroa incana*
Plumeless thistle	*Carduus acanthoides*
Yellow star-thistle	*Centaurea solstitialis*
Common crupina	*Crupina vulgaris*
Dyer's woad	*Isatis tinctoria*
Purple loosestrife	*Lythrum salicaria*
Eurasian water-milfoil**	*Myriophyllum spicatum*
Saltcedar	*Tamarix* spp.

Category 2 - New Invaders – high probability of causing severe economic and environmental damage; goal is to eradicate small infestations and reduce larger infestations. Divided into subcategories based on size and number of known populations.	
Bugloss	*Anchusa officinalis*
White bryony	*Bryonia alba*
Whitetop (hoarycress)	*Cardaria draba*
Musk thistle	*Carduus nutans*
Meadow knapweed	*Centaurea pratensis*
Russian knapweed	*Centaurea repens*
Dwarf snapdragon	*Chaenorrhinum minus*
Rush skeletonweed	*Chondrilla juncea*
Chicory	*Cichorium intybus*
Poison-hemlock	*Conium maculatum*
Scot's broom	*Cytisus scoparius*
Blueweed	*Echium vulgare*
Russian olive	*Elaeagnus angustifolia*
Leafy spurge	*Euphorbia esula*
Spotted cats-ear	*Hypochaeris radicata*
Kochia	*Kochia scoparia*
Dalmatian toadflax	*Linaria dalmatica*
Yellow toadflax	*Linaria vulgaris*
Scentless chamomile	*Matricaria maritima var. agrestis*
Scotch thistle	*Onopordum acanthium*
Japanese knotweed	*Polygonum cuspidatum*
Tall buttercup	*Ranunculus acris*
Tansy ragwort	*Senecio jacobaea*
Category 1 - Established and widespread - high probability of causing severe economic and environmental damage; goal is to contain inside infested area and reduce plant populations.	
Common burdock	*Arctium minus*
Absinth wormwood	*Artemisia absinthium*
Cheat grass	*Bromus tectorum*
Diffuse knapweed	*Centaurea diffusa*
Spotted knapweed	*Centaurea maculosa*
Oxeye daisy	*Chrysanthemum leucanthemum*
Canada thistle	*Cirsium arvense*
Field bindweed	*Convolvulus arvensis*
Common hound's-tongue	*Cynoglossum officinale*

Orange hawkweed	*Hieracium aurantiacum*
Meadow hawkweed complex (Yellow hawkweed, king devil hawkweed, mouse-ear hawkweed, meadow hawkweed)	*Hieracium sp. (H. caespitosum, H. floribundum, H. piloselloides, H. pratense)*
Common St. John's-wort	*Hypericum perforatum*
Sulfur cinquefoil	*Potentilla recta*
Common tansy	*Tanacetum vulgare*
Mullein	*Verbascum spp.*
Germander speedwell	*Veronica chamaedrys*
Common speedwell	*Veronica officinalis*

** Eurasian watermilfoil has since been located in the Noxon Reservoir on the Kootenai National Forest, Cabinet Ranger District. Future revisions of this list would move watermilfoil to category 2 (Kootenai National Forest Noxious Weed Handbook 2008)

Analysis Area and Scope of Analysis

The analysis area for noxious weeds is the OLY project area.

Methodology

This analysis considers information from weed surveys, project area herbicide application records, and field visits within the project area as well as experience across the District and Forest. Forest Plan monitoring reports provide summary information for the Forest over a number of years. Activities likely to spread noxious weeds are quantified, and design features identified to reduce weed spread. An estimate of acres of soil disturbance is made based on the soil analysis for this project. Because soil disturbance can contribute to weed spread, a comparison of acres of soil disturbance by alternative is then made.

Affected Environment

Existing Condition

For a number of years, the KNF completed roadside weed surveys while searching for new invader weed species such as rush skeletonweed. These surveys were used to monitor trends in noxious weed infestation across the Forest. Table 78 shows the findings from the 2002 KNF Roadside Weed Survey (USDA FS 2003).

Table 78. 2002 KNF Roadside Weed Survey*

Weed Species	Percent of Roadside surveys that detected weed species
Spotted Knapweed (*Centaurea maculosa*)	83
Canada thistle (*Cirsium arvense*)	74
Oxeye daisy (*Chrysanthemum leucanthemum*)	62
Hawkweed (*Hieracium* spp).	55
St. John's-wort (*Hypericum perforatum*)	52

* 2002 represents the latest available data for this type of survey.

The above composition of weed species is generally descriptive of the Lower Yaak/O'Brien/Sheep Planning Subunits. Records from 2007-2011 weed spraying seasons document established populations of state listed noxious weeds and regulated plants in the project area including the species listed above as well as common tansy (*Tanacetum vulgare*), Dalmatian toadflax (*Linaria dalmatica*), common hound's-tongue (*Cynoglossum officinale*), and common mullein (*Verbascum thapsus*).

On the Three Rivers Ranger District, roadsides have generally been the first areas infested with weeds over the last several decades, with some species staying largely on roadsides and disturbed sites, and others spreading out into other undisturbed or only lightly disturbed areas. Orange hawkweed and the meadow hawkweed complex (several yellow exotic hawkweed species) have been the most invasive in both disturbed and undisturbed areas within the project area. In many cases, hawkweeds have spread from roadsides into harvest units of various ages, and have colonized old road beds.

Dalmatian toadflax is present at moderate amounts within the project area, specifically close to the town of Troy, Montana and on portions of the Kootenai Face NFSR 4445. This species is considered a Category 2 - New Invader on the Kootenai National Forest. Category 2 species are considered to have a high probability of causing severe economic and environmental damage. The goal for these species is to eradicate small infestations and reduce larger infestations.

Rush skeletonweed is also present in the project area. This species is also considered a Category 2 new invader on the KNF and is a high priority for eradication in the state of Montana. All known populations in the project area are treated and monitored annually. Plants were last seen in the project area in 2008 on the Upper Rabbit Creek NFSR 4425. Infestations have been found at 17 discreet sites including sites on the Kootenai Mountain road 4445, Upper Rabbit Creek road 4425, Feeder O'Brien road 2376, Rabbit O'Brien road 334, Yaak Mountain Lookout road 4407, Hummingbird road 14306, and Lower China road 14344.

Spotted knapweed is a very successful invasive plant in the project area in addition to being the number one problem weed on rangeland in western Montana. It was introduced from Europe as a contaminant in alfalfa crop seed (Muller et al. 1988) and in soil used as ships' ballast (Roche and Talbott 1986 as cited in Sheley and Petroff 1999 pg. 351). Knapweeds may be annuals, biennials, or perennials, meaning they take one, two, or more years, respectively, to complete their life cycle (Wilson and Randall 2005). Like other invasive plants, knapweeds are prolific seed producers; a robust plant can produce tens of thousands of viable seeds in one growing season. Knapweed seeds are known for their longevity and durability and have the potential to germinate shortly after maturity. Several studies have shown that knapweed seeds are readily transported by vehicles travelling through infested areas (Trunkle and Fay 2010, Taylor and Rew 2011). Once established, spotted knapweed is able to form monotypic stands because its age class hierarchy allows it to occupy all available niches. It is believed to produce allelopathic chemicals which render the soil unfit for competing plants; this helps it occupy a habitat as a monoculture, excluding all other vegetation (Bais et al. 2003).

Knapweed infestations have been shown to increase soil erosion and sediment loss, and to reduce surface water quality compared to native species compositions (Lacey and Marlow 1990). The enemy release hypothesis states that plant species, when introduced to a new region, experience a decrease in regulation by herbivores and other natural enemies, resulting in a rapid increase in plant distribution and abundance (Keane and Crawley 2002). Classical biological control (biocontrol) re-unites invasive plants with their host-specific natural enemies, usually insects,

from the plants' native range. These natural enemies have been quarantined and extensively tested to ensure that they will not attack non-target plants. Biocontrol agents may feed on a weed's flowers, seeds, roots, foliage, and/or stems. At many locations in Montana, knapweed biocontrols have succeeded in reducing seed production and plant densities (Duncan et al. 2001).

The deceptively named **Canada thistle** is actually native to North Africa and Eurasia. It was reported in 1952 to infest more acreage than any other noxious weed in the states of Idaho, Montana, Oregon, and Washington (Rees et al. 1996). It is present in the project area in disturbed sites such as roadsides and old harvest landings.

Oxeye daisy is prevalent throughout the project area. Monitoring across the Forest has indicated that this is one of the most prevalent noxious weeds on the Forest. Grazing encourages the spread of this weed because livestock avoid it and graze competitive grasses (Olson and Wallander in Sheley and Petroff 1999). The potential for soil erosion is higher in areas with high levels of oxeye daisy because bare soil is prominent (Ibid). Plants produce as many as 26,000 seeds per year, and these seeds are long-lived, with 82 percent of seeds still viable after 6 years, and 1 percent of seed still viable after 39 years (Ibid). No biological controls are available for this species.

Invasive hawkweeds, including **orange hawkweed** (*Hieracium aurantiacum*), and the **meadow hawkweed** complex possess several adaptations which give them a competitive advantage over native plants. These include multiple modes of reproduction including seeds, rhizomes, stolons, and adventitious root buds (Wilson and Callihan in Sheley and Petroff 1999). Originally from northwestern Eurasia, orange hawkweed has successfully colonized North America from Alaska to Florida (USDA PLANTS database), probably through multiple introductions as a showy flower in gardens. The orange hawkweed found in the project area is genetically identical to orange hawkweed found in an area of Czech Republic, where it is believed to have originated (Loomis and Fishman 2009). This area is characterized by temperate forest and high mountain meadows and lies at almost exactly the same latitude and elevation range as the project area. This means orange hawkweed is pre-adapted to many of the conditions it finds here, which helps to explain why it is thriving in northwest Montana. Like spotted knapweed, the exotic hawkweeds are believed to release allelopathic chemicals into the surrounding soil that can kill neighboring plants (Makepeace et al. 1985). The invasive hawkweeds are known to produce allelopathic pollen that can inhibit a competitor's seed germination, seedling emergence, sporophytic growth, or sexual reproduction (Murphy and Aarssen 1995).

The signature feature of an established hawkweed infestation is a dense mat of vegetation in which no other forbs or grasses can survive. Hawkweed seeds are small and ribbed, with minute barbs that facilitate hitching a ride on animal fur or your shoelaces; and with a pappus, a parachute-like structure of fine hairs for wind dispersal.

Orange hawkweed and the meadow hawkweed complex can quickly colonize disturbed or compacted soil areas in succession, with orange appearing to be the pioneer and the yellow hawkweeds filing in the gaps. Hawkweeds do not require any soil disturbance to invade into an established native plant community where they can begin to completely take over (McDougall and Michelmore 2009). At least five species of biocontrol insects have been released in New Zealand where hawkweed is found in pastures, roadsides, and national parks. However, there are no hawkweeds native to New Zealand. Here in Montana there are several native hawkweed species, and as many as 14 native species exist in western North America. For this reason, development of biological controls that will not attack native hawkweeds has been difficult. As a

result, only one type of biocontrol insect has been released in the United States. This insect is a gall wasp (*Aulcidea subterminalis*) that lays its eggs in the stolons of exotic hawkweeds. Native hawkweeds lack this stolon and thus, are not attacked. Several releases of this insect have been made on the Forest; none of these have been in the project area or on the District.

St. John's-wort, also known as goatweed or Klamath weed, is a perennial, herbaceous plant with many flowers. Seed production averages between 15,000 to 33,000 seeds per plant (Piper in Sheley and Petroff 1999) and the seeds can persist in the soil for many years. The species also reproduces asexually. Seeds are disseminated short distances by wind (Tisdale et al. 1959) or longer distances through adherence to animals, facilitated by a gelatinous seed coat, ingestion by animals, water movement, and human activities (Piper in Sheley and Petroff 1999).

References often describe St. John's-wort as a species of rangelands, but it is also common in forest openings on the district. In the Lower Yaak/O'Brien/Sheep project area, this species is found on many of the roads. The Klamath beetle, a biological control insect, is established on this weed on portions of the district.

Common tansy is a large perennial forb growing up to six feet tall and producing up to an estimated 50,000 seeds per plant. It also reproduces via rhizomatous roots and prefers soil disturbance. It is toxic to horses and cattle. It exists in sporadic patches on roadsides and landings within the project area. Biological controls are not yet available for this species.

Common hound's-tongue is also toxic to livestock. Seeds are tick-shaped burrs that cling to the hair coat of wildlife, pets, and livestock. This species appears to be expanding its range within the project area with seeds likely being transported on big game species.

Desired Condition

Historically, noxious and invasive plant species did not occur in the project area. The ideal desired condition would bring the project area back to natural or historic conditions with native plant communities in pre-settlement abundance and a complete absence of noxious weeds or other invasive species. As this ideal condition is potentially unrealistic, the next most desirable condition would be for noxious and invasive species to be suppressed through a variety of management methods to the point of no longer dominating or spreading within plant communities, and being replaced by native plant species to the extent possible.

Noxious Weed Control

Since the mid-1990s, the Three Rivers Ranger District has had an Integrated Weed Management program. Integrated Weed Management refers to weed management that employs a variety of control measures such as herbicides, hand pulling, and biological control. These efforts have resulted in some roads being converted from long contiguous patches of seed-bearing weed infestation to native forbs along with native and exotic grasses with a reduced composition of invasive weeds. Distribution of biocontrol agents for spotted knapweed continues to reduce the dominance of that species in some parts of the district. Integrated Weed Management recognizes that prevention is the least expensive management alternative, and prioritizes education and awareness of our human ability to spread invasive species in our everyday outdoor activities. It also includes a component known as Early Detection and Rapid Response (EDRR) for high priority new invader species that have the potential to spread quickly and cause significant negative economic or ecological impact. EDRR is sometimes referred to as the second line of

defense after prevention. The goal of EDRR is containment and eradication of these new invader species.

Recent Weed Control Measures (2007-2014):

Table 79 displays the herbicide treatments in the OLY project area from 2007-2014.

Table 79. 2007-2014 Herbicide Treatment in the OLY Project Area

Drainage	Application Site and Year	Acres	Spot or Broadcast
2007			
Kootenai River	Alvord Lake Campground	1.37	Spot
Kootenai River	Kootenai Mountain Road 4445	0.40	Broadcast
Kootenai River	Alvord Lake Road 14381	0.30	Spot
O'Brien Creek	Rabbit O'Brien Road 331	9.43	Broadcast
O'Brien Creek	O'Brien Lynx Creek Road 4429	0.20	Broadcast
O'Brien Creek	Pulpit Ridge Trailhead 366	0.03	Spot
O'Brien Creek	Pulpit Mountain Trailhead 709	0.01	Spot
O'Brien Creek	O'Brien Creek Road 752	2.80	Broadcast
O'Brien Creek	Lynx Creek (Kootenai Face) 4445	3.70	Broadcast
O'Brien Creek	Upper Rabbit Creek Road 4425	1.20	Broadcast
O'Brien Creek	Hummingbird Road 14306	0.01	Spot
Kilbrennan Creek	Feeder Creek Road 2376	0.01	Spot
Kilbrennan Creek	Kilbrennan Lake	0.30	Spot
2008			
Kootenai River	Kootenai Mountain Road 4445	0.10	Hand pulling (toadflax)
Kootenai River	Lynx Creek gravel pit	1.00	Broadcast
Kootenai River	Kootenai Mountain Road 4445	12.08	Broadcast
O'Brien Creek	2394E	2.00	Hand pulling
Kootenai River	China Rim Trail 43	0.00	Hand pulling
O'Brien Creek	Rabbit O'Brien Road 331	1.15	Broadcast
O'Brien Creek	Yaak Mountain Lookout Road 4407	3.57	Broadcast
O'Brien Creek	Upper Rabbit Creek Road 4425	4.76	Broadcast
2009			
O'Brien Creek	Yaak Mountain Lookout Road 4407	7.10	Broadcast
O'Brien Creek	Rabbit O'Brien Road 331	40.80	Broadcast
O'Brien Creek	Upper Rabbit Creek Road 4425	5.30	Broadcast
Kootenai River	Kootenai Mountain Road 4445	35.30	Broadcast

Drainage	Application Site and Year	Acres	Spot or Broadcast
O'Brien Creek	King Mountain Road 4439	2.40	Broadcast
Kootenai River	Lower China Road 14334	0.10	Spot
O'Brien Creek	Feeder O'Brien Road 2376	0.10	Spot
2010			
Kootenai River	Kootenai Mountain Road 4445	4.00	Broadcast
O'Brien Creek	Yaak Mountain Lookout Road 4407	6.25	Broadcast
O'Brien Creek	Hummingbird Road 14306	0.20	Spot
O'Brien Creek	Rabbit O'Brien Road 331	2.25	Broadcast
O'Brien Creek	Upper Rabbit Creek Road 4425	5.00	Broadcast
Kootenai River	Alvord Lake area	5.75	Broadcast
O'Brien Creek	Feeder O'Brien Road 2376	0.10	Spot
2011			
Kootenai River	Alvord Lake Outdoor Classroom	0.1	Spot
O'Brien Creek	Noseeum/ O'Brien Gravel Pit	5.00	Broadcast
O'Brien Creek	Feeder O'Brien Road 2326	0.10	Spot
O'Brien Creek	Upper Rabbit Creek Road 4425	0.30	Spot
Kootenai River	Kootenai Mountain Road 4445	0.30	Spot
O'Brien Creek	Rabbit O'Brien Road 331	0.10	Spot
O'Brien Creek	Yaak Mountain Lookout Road 4407	0.10	Spot
2012			
O'Brien Creek	Yaak Mountain Lookout Road 4407	3.50	Broadcast
O'Brien Creek	Feeder Ck. 14294	0.60	Broadcast
O'Brien Creek	North Fork O'Brien Road 2380	4.50	Broadcast
2013			
Kootenai River	Kootenai Mountain Road 4445	0.10	Spot
O'Brien Creek	Yaak Mountain Lookout Road 4407	0.01	Spot
O'Brien Creek	Feeder O'Brien Road 2376	1.80	Broadcast
O'Brien Creek	Rabbit O'Brien Road 331	0.10	Spot
2014			
Kootenai River	Kootenai Mountain Road 4445	0.60	Broadcast
O'Brien Creek	Rabbit O'Brien Road 331	1.00	Broadcast
O'Brien Creek	Yaak Mountain Lookout Road 4407	0.30	Broadcast
	Total Acres	**177.28**	

Biological Control in the Project Area: Since 1996, 24 separate releases of biological control agents have been made within the project area at 18 separate release sites. Some of these releases have been at duplicate locations with the same species of control insect released to help bolster the population of control agents. Some of the locations have had more than one species of biological control released at the site. The following table details biological control agents released, weed species targeted, and number of releases. Table 80 displays the biological control agents released in the OLY project area.

Table 80. Biological Control Agents Released within the OLY Project Area

Biological Control Agent	Weed Species Targeted	Number Of Releases In The Project Area
Agapeta zoegana	Spotted knapweed	2
Aplocera plagiata	St. John's-wort	1
Brachypterolus pulicarius	Dalmatian toadflax	3
Calophasia lunula	Dalmatian toadflax	1
Ceutorhynchus litura	Canada thistle	1
Larinus minutus	Spotted knapweed	2
Mecinus janthiniformis	Dalmatian toadflax	13
Urophora cardui	Canada thistle	1
Total releases		**24**

One reason the project area has had so many releases of biological control agents is its close proximity to the ranger station where insects are delivered and ease of releasing them into appropriate sites. The project area is also generally weedier than some other project areas due to lower elevation and a higher proportion of vulnerable drier habitat types. In addition, the close proximity to town may have resulted in more disturbance events and a higher level of potential weed seed dispersal activities.

While no releases of *Cyphocleonus achates* have been made in the project area, two other species of knapweed biological control are present in the project area. The banded gall fly (*Urophora affinis* and/or *U. quadrifasciata*) is well established throughout the district. This species attacks the seed head and reduces seed production. *Agapeta zoegana*, also known as the sulphur knapweed moth, was released in the project area in 1996. This species attacks the roots of spotted knapweed. Small plants are often killed by this root feeding activity (Rees et al. 1996, Winston et al. 2014).

Two species of biological control for Canada thistle have been released in the project area. *Ceutorhynchus litura* is a stem boring weevil that allows other insects and pathogens to attack the plant and reduce its vigor. *Urophora cardui*, the thistle stem gall fly, damages the host by creating a gall that looks like a small green crab apple in the middle of the stem (Rees et al. 1996) reducing overall plant vigor. No monitoring has been completed to examine establishment or impact from these biological controls.

Three species of biological control have been released for Dalmatian toadflax in the project area. Of the three, *Mecinus janthiniformis* seems to be well established and redistributing itself on Dalmatian toadflax. What was originally released on the KNF as *M. janthinus,* and presumed to

be potentially effective on Dalmatian and yellow toadflaxes, turned out to actually be two separate species. *M. janthinus* attacks yellow toadflax, of which there is little or none in the project area. *M. janthiniformis* attacks Dalmatian toadflax (Winston et al. 2014) and is well established in the project area. While Dalmatian toadflax continues to produce seed and spread, it is visibly less vigorous due to the effects of *M. janthiniformis*.

Brachypterolus pulicarius was also released on the district and in the project area for Dalmatian toadflax. This species reduces the number of healthy flowers, but has minimal impact (Winston et al. 2014). The third species of biological control released was *Calophasia lunula*, a moth that attacks new vegetative shoots and terminal portions of stems, flowers, and older foliage. This species also has minimal impact on toadflaxes and is no longer a priority for redistribution (ibid.).

One species, *Aplocera plagiata*, has been released in the project area for control of common St. John's-wort. This release was done in the 1990s. Since that time, emphasis on this species has been low due to limited abundance, low populations after release, and minimal damage (Winston et al. 2014). Another species of biological control for St. John's-wort has established itself in the project area however. *Chrysolina hyperici* and *C. quadrigemina* were released into the United States throughout the western states from 1945 to 1946. These insects reduced St. John's-wort by more than 97 percent at most open, sunny sites (ibid.). These insects are not effective in shady habitats. The insects and weeds follow a boom/bust cycle with weed populations increasing until insect populations catch up. This cycle is followed by a crash in the weed population and a crash in the insect population (ibid.). These species are common in the project area.

In general, biological controls need large infested areas, ideally of ten acres or more, to establish and thrive. Many weed infestations on the district are linear along road systems. These are not ideal locations for establishment of biological controls, and can be managed with periodic herbicide application in many cases. Biological controls are ideally suited to weeds that are already wide-spread and well established. Such weed populations do exist in the project area for spotted knapweed, Dalmatian toadflax, and several other weed species. Biological controls are not effective for eliminating new invader weed species.

Environmental Consequences

Alternative 1 - Direct and Indirect Effects

This alternative would not implement any of the management activities described in Chapter 2. Noxious weed management would proceed in the project area in accordance with the KNF Invasive Plant Management EIS and ROD and as funding and priorities allow. No new soil disturbance or overstory removal would be implemented, thus the potential for noxious weed spread would not be increased in the short-term. Long-term effects are less obvious or certain. Stands would continue to be unnaturally dense, fuel ladders would remain present, susceptibility to bark beetles and other forest pathogens would remain high, ponderosa pine, western larch, and white pine stands would not be restored, fuel loadings would remain high, browse for wildlife would not be regenerated, and timber products would not be contributed to the economy. While minimization of soil disturbance and maximization of tree canopy would help reduce the total area susceptible to weed infestation in the short term, long-term effects regarding weeds would likely be detrimental. Lack of management of extremely dense stands may ultimately result in more intense wildfires at some unknown future time. These more intense fires are more conducive to establishment of noxious and invasive plant species than lower intensity prescribed

burning. So a lack of management now may have the long-term effect of higher disturbance due to fire. Higher disturbance would result in a risk of greater spread of noxious weeds.

Cumulative Effects

Activities throughout the proposed treatment area have affected the spread of weeds. Past soil disturbing activity and vehicle traffic have helped spread noxious weeds into the analysis area; this would include areas of past logging, road building, and road maintenance activities. Recreation, private development, construction of or burying utility lines, fire-fighting efforts, and prescribed and wildfire have also contributed to the spread of weeds in the area. Equipment washing, required in all timber sale contracts and special use permits since the late 1990s, has greatly reduced introductions of weed seed from some of these sources.

Currently all open and gated roads within the project area are listed for noxious weed treatment on a rotational basis in the district pesticide use proposal, under the 2007 KNF Invasive Plant Management EIS and ROD. This management would continue. Releases of biocontrol agents would similarly continue as availability and priorities across the District dictate. Management of noxious weeds is also prioritized at recreation sites and project-area trailheads and trails. Active gravel pits containing established weed populations are a priority for treatment, in order to reduce the number of seeds and other reproductive plant parts that will be transported elsewhere in material for road construction, maintenance, and improvement.

Weed dispersal events would still continue in the project area due to existing populations and dispersal activities including vehicle travel, activities on adjacent private lands, and various natural modes of seed dispersal such as wind, water, animals, and the vegetative spread of adventitious roots, buds, and shoots.

Biological control agents already present in the project area will continue to establish and reduce the vigor of project area weeds, giving native species a slightly better chance to compete and reoccupy infested sites on some level. As more biological control agents become available and established in the project area, the potential for reducing the dominance of noxious weeds will increase.

Under the no action alternative, access to Stimson Lumber Company lands on Yaak Mountain would not be provided. Associated logging on Stimson lands would not take place. Effects of this non-treatment would be similar to that described for NFS lands, with weed spread reduced in the short term due to avoidance of timber harvest and road construction. Long-term effects are less certain with the potential for weed spread increased at some future date should wildfire take place or be stand-replacing due to high fuel concentrations.

Alternative 2 (Modified Proposed Action) – Direct and Indirect Effects

As described in Chapter 2, Alternative 2 proposes approximately 3,127 acres of timber harvest, including 652 acres of intermediate harvest, 385 acres of mixed intermediate and regeneration harvest, and 2,090 acres of regeneration harvest, along with associated fuels treatments. Alternative 2 also proposes prescribed burning on approximately 11,623 acres and 21 miles of road stabilization work for watershed improvement. Approximately 0.2 mile of temporary road construction would be required to access Unit 52. Two segments of road totaling approximately 0.8 miles would be rerouted for resource protection. Road maintenance work would be completed on approximately 23 miles of haul route. One segment of new system road of approximately 0.3 miles would be constructed to access Unit 8. Maintenance work would include weed treatment

with herbicide as approved under the Kootenai National Forest Invasive Plant Management ROD (2007).

Effects of Timber Harvest: Timber harvest generally results in some soil disturbance. The amount of soil disturbance depends on the season of harvest, the soil and vegetation types, logging system, and soil moisture. Timber harvest is designed to feasibly harvest timber while still protecting soil and keeping detrimental disturbance to less than 15 percent of the harvest area. Disturbed areas of soil are vulnerable to noxious weed infestation. Design features that minimize soil impacts also help minimize areas vulnerable to weed infestation. Conversely, treatment areas with the highest levels of soil disturbance are typically most vulnerable to weed infestation. Table 110 in the soils resource section shows average soil disturbance by harvest type on the Forest as determined by field monitoring. As is displayed in the table, summer tractor operations have higher soil disturbance than other logging systems, and therefore have the highest potential for increasing weed spread. Approximately 33 percent of harvest operations in the project are proposed to be winter logged, on frozen ground, which will minimize soil disturbance and, therefore, weed spread.

Regeneration harvest areas are more susceptible to weed infestation than partial harvest treatments due to higher levels of sunlight reaching the forest floor. Within the project area, past regeneration harvest units with depauperate understories (very little understory vegetation due to very little light reaching the forest floor prior to harvest) have partially revegetated to noxious weeds and ruderal species (both native and non-native non-invasive) after harvest. Informal monitoring on the district has shown that, over time, weeds are suppressed by the growth of new trees as they reach pole timber size and native vegetation does return.

Regeneration harvest in stands with established understory vegetation does not necessarily result in weed infestations. The extent of weed invasion into these treatment areas is more related to amount of soil disturbance (more disturbance results in more potential for weeds) and whether weed seed is transported onto disturbed soils from adjacent areas. Washing of logging equipment to remove weed seed, and spraying of weeds adjacent to or within harvest units is prescribed to reduce the spread of weeds into harvest units.

Forty-eight harvest units are proposed for summer harvest in Alternative 2 for a total treatment area of approximately 2,086 acres. On Forest monitoring of summer tractor logging has determined that an average of 8 percent detrimental soil disturbance results. Winter tractor logging has been determined to result in 4 percent detrimental soil disturbance. Excavator piling of summer logged units also adds an average of 2 percent detrimental soil disturbance. These summer log units may also be winter logged at the discretion of the contractor, which would result in reduced soil disturbance. Mandatory winter logged units that include summer excavator piling would also have another 2 percent detrimental soil disturbance on 353 acres (See Table 4 in Chapter 2 for a list of harvest methods, seasons and fuels treatment by unit).

Table 114 in the soils resource section of this Chapter shows estimated disturbance for each proposed harvest unit in Alternative 2, based on an estimation of existing disturbance, harvest method and season of harvest. Table 81 below calculates estimated total soil disturbance from timber harvest for all of the action alternatives and includes the estimated disturbance from proposed temporary roads. These numbers are estimates based on monitoring of projects on Forest, and are most useful for comparing disturbance levels across alternatives. For Alternative 2 it is estimated that 145 acres will have detrimental disturbance from proposed timber harvest and fuels treatment activities.

Table 81. Estimated Detrimental Soil Disturbance from Harvest Related Activities

Detrimental Soil Disturbance Category	Alternative 2 (Acres)	Alternative 3 (Acres)	Alternative 4 (Acres)
Total Harvested Area	3,127	3,069	2,606
Disturbance from Past Activities	221	212	183
Proposed Project Disturbance	145	143	122
Total Cumulative Disturbance	**366**	**355**	**305**

Design features included in Chapter 2 of this document will reduce the potential for noxious weed spread into timber harvest units. These features include: spraying haul routes as needed to reduce or eliminate noxious weed seed adjacent to harvest units; washing all off-road logging equipment and all road maintenance equipment prior to entry on NFS lands.

Effects of Prescribed Fire: Underburning to reduce fuels can increase risk of weed spread or establishment by exposing bare soil, and reducing native plants and the competition needed to help keep weeds in check. However, broadcast burning within prescription, or selectively piling and burning within prescription (high soil moisture levels), has little or no effect on the surface soil material (Meurisse 1996 as quoted in Kuennen 2007). The effect of fire on invasive weed spread varies with burn intensity, composition of understory vegetation, and presence or absence of weeds in the pre-fire stand. Most of the invasive weed infestations have been found to occur along roads within the project area, and design features are included for this project that includes spraying of these infestations before the project occurs. The prescribed burning proposed in this project is designed to reduce fuel loadings while still maintaining a healthy overstory. Because burn severities would generally be low, the post-burn stands would maintain healthy understory plant communities and any soil exposure would be spotty, small, and short-lived, and less vulnerable to weeds than intensely burned stands. Therefore proposed burning should only slightly increase the risk of weed spread as compared to current conditions.

Fuels augmentation, in the form of slashing smaller understory trees, may occur within prescribed burn units. This slashing is designed to achieve objectives of burning by helping fire spread throughout the treatment area and by reducing potential for crowning of desirable overstory trees. Because no soil disturbance or seed dispersal is likely from this activity, the slashing will not result in additional affects to weed spread in these burns.

Effects of Temporary and Permanent Road Construction: Alternative 2 includes 0.2 miles of temporary road to access Harvest Unit 52, two segments of road rerouting for a total of 0.8 mile, one 0.3 mile segment of permanent road to access Unit 8, and 0.2 mile of new permanent road on NFS lands to access Stimson Lumber Company lands on Yaak Mountain. Considering 2 acres per road mile of disturbance, these 1.5 miles of new permanent or temporary road will result in an additional 3 acres of disturbance. Roads often do become infested with weeds due to the frequency of dispersal “events” such as vehicle traffic and road blading.

Effects of Road Storage and Decommissioning for Watershed Stabilization: As described in Chapter 2, a total of 11.1 miles of active road storage and 7.0 miles of passive road storage are proposed for all action alternatives. Approximately 1.3 miles of active decommissioning (NFR 14306) and 7.7 miles of passive decommissioning are also proposed for all action alternatives.

In the short term, road storage and decommissioning work may increase the spread of on-site noxious weeds and increase the risk for seed transport off site through dirt attached to equipment leaving the site. The disturbance from ripping the road surface and removing or installing various drainage structures creates a favorable seed bed for weed seed. Monitoring has shown that herbicide treatment of existing weeds prior to storage work helps reduce weed densities and population size post treatment. Long-term effects of road storage include reduced rates of spread to and from these areas due to lack of vehicle traffic. This is especially true for new invaders as they are not typically introduced to an area without a mechanism of spread. Required washing of road storage equipment prior to delivery to NFS lands prevents introduction of additional weed seed to the project area.

Once stored or decommissioned roads revegetate, they become less susceptible to weed infestation. Long-term experience on the District has shown that native species do re-establish on these road beds over time. Some weed species, particularly the hawkweeds, do seem to have a competitive advantage on existing compacted soils on old road beds. It seems likely that the stoloniferous habit of exotic hawkweeds would give an adaptive advantage on compacted areas where most plants would not be able to establish a root system. No research has been done and this observation is anecdotal but has been observed across the district.

NFSR 4425, Upper Rabbit Creek Road, is currently a gated road and has known populations of rush skeletonweed. These populations have been managed for approximately fifteen years; however the seed for rush skeletonweed appears to be able to last longer. Past experience reconstructing this road has shown that ground disturbing activities stimulate seed in the soil and increase the activity and number of plants in the infestation. For this reason, a design feature has been added that minimizes soil disturbance associated with storing this road. Additionally the road bed will be left in a condition that is easily walked by persons carrying backpack sprayers since the infestation needs to be continuously monitored and any plants that emerge treated. These conditions should minimize the impact on this population of high-priority invasive species.

Additionally NFSR 2376, Feeder O'Brien Road, a barriered road, has a known rush skeletonweed population. This population is not as extensive or as active as the one on NFSR 4425. Passive storage work is again proposed to avoid activating any viable seed still potentially present. This road also will be left in a condition to facilitate walk in monitoring and backpack treatment of any plants that might emerge. Since this road is currently bermed, there will be no change to the existing condition.

Effects of Road Status Changes to Conduct Harvest Activities in BMU 14: To allow for timber harvest in areas that do not currently have roaded access, some currently restricted (gated) roads would become barriered core habitat while currently barriered roads would become restricted (gated). Several currently gated or bermed roads would be accessed as described in Chapter 2. Brushing and reconstruction of these roads followed by utilization for timber harvest is likely to provide suitable habitat for weed colonization. Because weeds are present in some adjacent areas, seed will likely be introduced even if only by wind dispersal. Design features including equipment sanitation will greatly reduce the rate of weed spread into this area.

Roads that would go in to core habitat using an earthen barrier would no longer be accessible with motorized vehicles. These include roads 4425 (Upper Rabbit Creek), 4433 (North Fork Lynx), 4433A, and 4433B for a total 7.0 miles. These road systems have patchy existing infestations of weeds, including spotted knapweed, oxeye daisy, hawkweeds, St. John's-wort, and common tansy. Road 4425 is currently a gated drivable road. Pre-storage weed treatment will be

completed prior to placement of the earthen barrier to put the road into core habitat. This road will receive a passive storage treatment, meaning that the only ground disturbing activity will be the construction of the earthen barrier. This activity is expected to leave the road in a stable condition with respect to weeds. Weeds will still grow on the road prism, but no increase from activity is expected.

Heavy alder on the 4433 system will limit the amount of pre-storage weed treatment that can be completed due to limited access. The hawkweeds, along with other common district weeds, are present on this road system, and can persist under a canopy of alder. Over time, however, it is likely that invasive species will decline and native species recover with the lack of disturbance and dispersal events. Some level of invasive plant species infestation is likely to continue on this road system.

Alternative 3 – Direct and Indirect Effects

As described in Chapter 2, Alternative 3 proposes approximately 3,069 acres of timber harvest, including 623 acres of intermediate harvest, 385 acres of mixed intermediate/regeneration harvest, and 2,061 acres of regeneration harvest, along with associated fuels treatments. Alternative 3 also proposes prescribed burning over approximately 1,743 acres. Road decommissioning and storage work and access changes would be the same as described for Alternative 2. Road maintenance work would be completed on approximately 23 miles of haul route. Weed treatment on haul routes would be completed with herbicide as approved under the Kootenai National Forest Invasive Plant Management ROD (2007).

Effects of Timber Harvest: For Alternative 3, approximately 31 percent of harvest operations in the project are proposed to be winter logged, which will minimize soil disturbance, and therefore, weed spread. Table 110 in the soils resource section displays levels of soil disturbance by logging system and season as determined by soil monitoring on the Forest. Summer tractor harvest units have the highest soil disturbance and therefore are more susceptible to weed invasion.

Forty-eight harvest units are proposed for summer harvest in Alternative 3 for a total treatment area of approximately 2,119 acres. For Alternative 3 it is estimated that 143 acres will have detrimental disturbance from proposed timber harvest and fuels treatment activities.

Table 81 above calculates estimated total soil disturbance from timber harvest for all of the action alternatives. Table 114 in the soils resource section of this Chapter shows estimated disturbance for each proposed harvest unit in Alternative 3. These numbers are estimates based on monitoring of projects on Forest, and are most useful for comparing disturbance levels across alternatives.

Design features included in Chapter 2 of this document will reduce the potential for noxious weed spread into timber harvest units. These features include: spraying haul routes as needed to reduce or eliminate noxious weed seed adjacent to harvest units; washing all off-road logging equipment and all road maintenance equipment prior to entry on NFS lands.

Effects of Temporary and Permanent Road Construction: Alternative 3 includes the same temporary and permanent road construction as well as the same new road for Stimson access. Therefore the effects to weeds are the same as those described for Alternative 2.

Road Storage and Decommissioning: These effects for these activities are the same as described for Alternative 2.

Effects of Prescribed Fire: These effects for these activities are generally the same as that described for Alternative 2 with the exception that 27 more acres will be burned. These additional acres are the result of some harvest units under the modified proposed action (Alternative 2) being converted to fuels reduction prescribed fire units in Alternative 3.

Effects of Road Status Changes to Conduct Harvest Activities in BMU 10: These effects would be the same as those described for Alternative 2.

Alternative 4 – Direct and Indirect Effects

Alternative 4 is essentially the modified proposed action with openings from regeneration harvest units not exceeding 40 acres in size. This alternative would harvest approximately 1,569 acres of regeneration harvest, 652 acres of intermediate treatment, and 385 acres of mixed intermediate/regeneration harvest for a total of 2,606 acres of timber harvest. Alternative 4 also proposes prescribed burning over approximately 1,730 acres. Access changes and road decommissioning and storage work would be the same as included in Alternative 2. There would be 16 miles of haul route. These would be treated where needed for noxious weeds pre and post timber sale. Approximately 0.5 mile of temporary road would be needed to access Unit 52. This temporary road would be recontoured and seeded following use.

Effects of Timber Harvest: For Alternative 4 approximately 29 percent of harvest operations in the project are proposed to be winter logged, on frozen ground, which will minimize soil disturbance and therefore weed spread. Table 110 in the soils resource section displays levels of soil disturbance by logging system and season as determined by soil monitoring on the Forest.

Summer tractor harvest units have the highest soil disturbance and therefore are more susceptible to weed invasion. Fifty-nine harvest units are proposed for summer harvest in Alternative 4 for a total treatment area of approximately 1,858 acres. For Alternative 4 it is estimated that 122 acres will have detrimental disturbance from proposed timber harvest and fuels treatment activities.

Table 81 above calculates estimated total soil disturbance from timber harvest for all of the action alternatives. Table 114 in the soils resource section of this chapter shows estimated disturbance for each proposed harvest unit. These numbers are estimates based on monitoring of projects on Forest, and are most useful for comparing disturbance levels across alternatives.

Design features included in Chapter 2 of this document will reduce the potential for noxious weed spread into timber harvest units. These features include spraying haul routes as needed to reduce or eliminate noxious weed seed adjacent to harvest units, and washing all off-road logging equipment and all road maintenance equipment prior to entry on NFS lands.

Effects of Temporary and Permanent Road Construction: Alternative 4 includes the same temporary and permanent road construction as well as the same new road for Stimson access. Therefore the effects to weeds are the same as those described for Alternative 2.

Effects of Road Decommissioning and Storage: Alternative 4 includes the same road decommissioning and storage work as included in Alternative 2; therefore the effects of this work are the same as described in Alternative 2 above. These effects are separate from timber sale effects and would not have a different combined effect resulting from different harvest levels.

Effects of Prescribed Burning: Alternative 4 includes 1,730 acres of fuels treatment/prescribed burning not associated with timber harvest. These effects for these activities are generally the same as described for Alternative 2, which has 1,714 acres of such treatments.

Effects of Road Status Changes to Conduct Harvest Activities in BMU 10: These effects would be the same as those described for Alternative 2.

Alternative 2, 3, and 4 – Cumulative Effects

Past Actions and their Effects on Current Conditions

Commercial timber harvesting on a large scale and the subsequent logging road construction in the project area started in the 1940s, peaked in the 1980s, and continues at a much reduced scale today. Prior to the 1980s ground-based timber harvest methods often resulted in large amounts of soil disturbance. Dozer piling of logging slash was a common practice during the 1970s. This practice created a great deal of soil disturbance which was favorable to weed spread. In the 1980s, the Forest discontinued dozer piling in favor of less soil disturbing fuel reduction methods, thus reducing the area favorable to weed spread after timber harvest. Spotted knapweed began spreading across the Forest during the 1970s though was not widely distributed until later. The seed source for knapweed was present, but the potential for spread was relatively unknown, as was the effect of soil disturbance on weed spread. Spread of this and other species escalated in the 1980s and 1990s.

Other past activities that may have negatively influenced weed spread across the Forest are wildfire and firefighting efforts such as fire line construction, motor vehicle traffic, use of contaminated forage and mulch products, fuel reduction burning, and any other activities that would transport seeds or plant parts or disturb soil.

As described for the No Action alternative, biological control agents are currently present in the project area and are reducing the competitiveness of weeds through reduced seed production and plant vigor. As additional releases are made and new agents become available, weed competitiveness should be reduced over the long term.

Associated logging on Stimson lands includes an estimated 78 acres of harvest for 2017 and potentially as much as 138 acres in 2019. The harvest prescription will most likely be shelterwood. Some level of soil disturbance will likely result due to logging and new road construction on Yaak Mountain. These activities will potentially increase weed spread additively to the activities on NFS lands. Efforts to suppress weed spread on NFS lands will also reduce potential weed spread on Stimson lands. Biological controls will also reduce the vigor of weeds on private timber and residential lands.

Contrasting Effects of the Proposed Actions with Past Actions

Prior to the mid-1990s there were few noxious weed prevention measures in place. Preventative measures to avoid weed spread have been adopted and implemented on the Forest, including integrated pest management strategies authorized in the 1997 KNF Herbicide Weed Control Decision Notice, Region 1 weed best management practices (BMPs), which include contractual provisions requiring washing of equipment to remove weed seeds and plant parts prior to entry onto NFS land, contractor herbicide spraying of haul routes, and use of weed-seed-free grass seed to re-vegetate disturbed ground. These weed control measures have been included with timber harvest, road building, and fire suppression activities to reduce the risk of weed spread. Equipment washing prior to entry onto NFS lands was first required as a design feature to reduce weed spread on the District in 1998, as was seeding with weed-seed-free grass seed. The Spar Copter Timber Sale in 2001 was the first timber sale on the District to require contractor herbicide spraying of haul routes. Since then, treatment of haul routes prior to operations standard operating

procedure. Post-harvest treatment of haul routes has also been a contract requirement on all major timber sales on the District. In 2007, the Kootenai National Forest Invasive Plant Management Record of Decision was signed and continues to guide weed control efforts on the Forest today.

The FY 2007 KNF Monitoring and Evaluation Report states "The KNF has used herbicides to control noxious weeds with success. Spraying of roadsides, administrative sites, and gravel pits has visibly reduced weed populations in many areas and prevented weeds from spreading to un-infested areas." The Kootenai spends approximately $200,000 per year for the weed control program with an annual accomplishment of 600 to 900 acres of forest land treated with herbicides and other integrated methods. Since the last monitoring report, over 2,500 miles of roads have been treated. In 1996, a timber sale contract provision, Noxious Weed Control Provision C(T) 6.26, was added to timber sale contracts. This is a mandatory provision. The clause requires off-road equipment such as tractors, skidders, and processors to be washed prior to delivery to NFS lands. This clause is expected to continue to help prevent the establishment of new weeds to disturbed sites. Washing of equipment, use of weed-free seed and herbicide spraying of haul routes by a contractor will be included in timber sales that could result from this environmental impact statement.

Effects of Ongoing and Reasonably Foreseeable Actions

Some future activities that have the potential to contribute to the spread of weeds are routine road maintenance, road improvement work, along with the continued recreational activities by forest visitors, and private land development. See Table 34 in this chapter to see a complete list of ongoing and foreseeable activities.

Combined Effects from Past, Proposed, Ongoing and Foreseeable Actions

The project activities, when considered with these past, foreseeable, and ongoing activities would increase the risk of weed spread due to associated soil disturbance; however, the design features found in Chapter 2 have been included to minimize this risk.

Comparison of Alternatives

Table 82 below displays a comparison of the estimated disturbance acres for all activities by alternative.

Table 82. Comparison of Estimated Disturbance Acres for All Activities by Alternative

Alternative	Total Harvest Acres	Miles of Temporary Roads/Acres Disturbed	Miles of Permanent Roads/Acres Disturbed	Total Prescribed Burning (Acres)	Estimated Soil Disturbance for Proposed Project Activity (Acres)	Cumulative Soil Disturbance Within Proposed Activity Areas (Acres)
1	0	0/0	0	0	0	0

Alternative	Total Harvest Acres	Miles of Temporary Roads/Acres Disturbed	Miles of Permanent Roads/Acres Disturbed	Total Prescribed Burning (Acres)	Estimated Soil Disturbance for Proposed Project Activity (Acres)	Cumulative Soil Disturbance Within Proposed Activity Areas (Acres)
2	3,126	0.2/0.4	0.3/0.6	1,716	145	366
3	3,069	0.2/0.4	0.3/0.6	1,744	143	355
4	2,606	0.2/0.4	0.3/0.6	1,731	122	305

Conversion of miles of temporary road to acres is done considering two acres of disturbance per mile of temporary or permanent road. Acres of disturbance are estimates used for the sake of comparison and based on estimates of disturbance used for soil analysis and determined through monitoring of activities on the Kootenai National Forest.

A comparison of total estimated acres of disturbance by alternative shows that Alternative 2 has the highest levels of soil disturbance of all alternatives, with Alternative 3 the second highest, and Alternative 4 the lowest. Prescribed burn activities vary only slightly through alternatives and, in general, do not cause soil disturbance. Therefore the alternative with the highest level of timber harvest also has the highest level of soil disturbance and potential for weed spread. However, these planned treatments may have benefits in the form of reduced burn intensity should a wildfire burn through the area in the future and the proposed activities also provide emphasis for treatment of weeds in the project area. Design features included in the project will help reduce the potential for weed spread for any chosen alternative.

Consistency with the 2015 Forest Plan and Other Management Direction

The design features described in Chapter 2 would be applied to this project to help meet the goal for noxious weed management as stated in the 2015 Forest Plan. Specifically, the desired condition to treat newly invading, non-native invasive plant species (FW-DC-VEG-10) would be met through the design features to minimize disturbance on NFSRs 4425 and 2376 and to allow for continued treatment of rush skeletonweed populations found there. Following the design features included in Chapter 2 also facilitate compliance with the Participating Agreement with the Lincoln County Weed District and the Federal Noxious Weed Act. Forest Service Regional Supplement 2000-2001-1 requires that BMPs be used for many aspects of the operations required to accomplish the activities discussed above. Those practices, designed to protect soil and water, would also help reduce the potential negative effects on the spread of noxious weeds from the activities. Herbicide application is authorized under the Forest's Invasive Plan Management decision (USDA Forest Service 2007).

The project also complies with the National Strategy and Implementation Plan for Invasive Species Management as outlined by FSM 2900 (USDA 2011) which stipulates that all proposed projects analyze potential weed risk and ensure that unnecessary increases of weeds do not occur.

Inventoried Roadless Areas (IRAs)

Introduction

For National Forest System lands in Montana, Inventoried Roadless Areas (IRA), are those mapped under the 2001 Roadless Area Conservation Rule. These areas are also identified in Appendix C of the FEIS for the 2015 KNF Forest Plan (USDA FS 2013). The official set of maps is maintained at the national headquarters office of the Forest Service.

The project area boundary encompasses parts of two IRAs totaling approximately 25,769 acres (see Table 1 and Figure 1 in Chapter 1).

Flagstaff – (No. 01-690) – The area is located just north of and adjacent to the Kootenai River between Hunter Gulch and China Creek, running north to O'Brien Mountain. Access is provided via the Kootenai River Road, Quartz Creek Road, and roads leading up O'Brien Creek, Lynx Creek, and Kootenai Mountain. A National Recreation Trail traverses the Quartz Creek portion of the roadless area.

Saddle Mountain - (No. 01-168) – This area is located east of the Yaak River, south of Seventeen Mile Creek. The area includes Saddle, Conn, Arbo, Feeder, and Gunsight mountains. The area is surrounded by roads, and has an irregular shape with three lobes.

This section displays the effects of the proposed activities on Inventoried Roadless Areas in the OLY project area.

Regulatory Framework

2015 Forest Plan

The 2015 Forest Plan provides overall guidance for the management of the lands on the KNF. It describes the desired conditions toward which the management of the land should be directed. It establishes standards and guidelines to help achieve or maintain the desired condition or conditions, to avoid or mitigate undesirable effects, or to meet applicable legal requirements.

The plan components which provide specific IRA resource direction relevant to this project include:

MA5a, b, c - DC-VEG-01. Natural ecological processes (e.g., plant succession) and disturbances (e.g., fire, insects, and disease) are the primary forces affecting the composition, structure, and pattern of vegetation.

MA5a, b, c - DC-FIRE-01. The use of fire serves as the primary tool for trending the vegetation towards the desired conditions as well as serving other important ecosystem functions.

MA5a, b, c - DC-AR-01. These areas provide more remote and undeveloped recreation experiences largely through the management of the various trail systems (i.e., motorized and non-motorized).

MA5a, b, c - GDL-FIRE-01. Natural, unplanned ignitions, as well as planned ignitions, may be used to meet resource objectives.

GOAL-IRA-01. Inventoried roadless areas will be managed to protect values and benefits of roadless areas.

FW-STD-IRA-01. Within inventoried roadless areas, outside of the state of Idaho, the 2001 Roadless Area Conservation Rule (36 CFR 294 Subpart B, published at 66 Fed Reg. 3244-3273) shall apply. IRAs are identified in a set of inventoried roadless area maps, contained in the Forest Service Roadless Area Conservation, Volume 2, dated November 2000, which are held at the national headquarters office of the Forest Service, or any subsequent update or revisions of those maps (36 CFR 294.11). Maps of the IRAs are also found in Appendix C of the Forest Plan FEIS.

Roadless Area Conservation Rule

The Department of Agriculture, Forest Service adopted the Roadless Area Conservation Rule (RACR) in 2001 (36 CFR 294 Subpart B, published at 66 Fed Reg. 3244-3273) with the purpose "to establish prohibitions on road construction, road reconstruction, and timber harvesting in inventoried roadless areas on National Forest System lands. The intent of this final rule is to provide lasting protection for inventoried roadless areas within the National Forest System in the context of multiple-use management."

Northern Region (Region 1) Direction for Roadless Area Analysis

Region 1 provides additional guidance for roadless area analysis in a draft document titled "Our Approach to Roadless Area Analysis of Unroaded Lands Contiguous to Roadless Areas" (12/2/10). In summary this paper is based on court history regarding the Roadless Area Conservation Rule. The "Our Approach" document states that "projects on lands contiguous to roadless areas must analyze the environmental consequences, including irreversible and irretrievable commitment of resources on roadless area attributes, and the effects for potential designation as wilderness under the Wilderness Act of 1964. This analysis must consider the effects to the entire roadless expanse; that is both the roadless area and the unroaded lands contiguous to the roadless area.

Resource Indicators and Measures

Determination of IRA Boundaries and Consideration of Unroaded Areas

For NFS lands in Montana, inventoried roadless areas are those areas mapped under the 2001 Roadless Area Conservation Rule (36 CFR 294 Subpart B). These areas are also identified in Appendix C of the FEIS, for the 2015 Forest Plan.

Analysis Area

The analysis area for effects to the roadless resource is the portion of the two IRAs and unroaded areas that make up the roadless expanse, located within the project area (see Figure 1 in Chapter 1). The area selected for analysis is of a scale suitable for the recognition of direct, indirect, and cumulative effects on the resource.

Table 83 shows the IRA acres within the project area and the acres of the proposed prescribed burning within those IRAs. No timber harvest is proposed in an IRA.

Table 83. IRA Acres within the OLY Project Area

IRA	Total IRA Acres	IRA Acres in the OLY project area	Acres of Proposed Prescribed Burning within IRA in the OLY project area
Saddle Mountain #168	14,666	7,866	172
Flagstaff #690	11,103	1,762	0

Analysis Methods

This analysis focuses on the potential effects of project activities on roadless characteristics as described in the document Our Approach to Roadless Area Analysis of Unroaded Lands Contiguous to Roadless Areas (12/2/10).

Table 84 shows the crosswalk or relationship between the wilderness attributes and the roadless area characteristics defined in the 2001 Roadless Area Conservation Rule (36 CFR Subpart B 294.11). The roadless characteristics are used to compare the effects of the proposed treatment activities on roadless characteristics of each roadless expanse in the project area.

Table 84. Wilderness Attributes and Roadless Characteristics Crosswalk

Wilderness Attributes	Roadless Characteristic
Natural: Extent to which the area's ecological systems are substantially free from the effects of modern civilization and generally appear to have been affected primarily by forces of nature.	High quality or undisturbed soil, water, and air. Source of public drinking water. Diversity of plant and animal communities. Habitat for threatened, endangered, proposed, candidate, and sensitive species dependent on large, undisturbed areas of land.
Undeveloped: Degree to which the area is without permanent improvements or human habitation.	Natural appearing landscapes with high scenic quality. Reference landscapes of relatively undisturbed areas.
Solitude and Primitive Recreation: Personal subjective value defined as the isolation from the sights, sounds, and presence of others and the developments of man	Primitive, semi-primitive non-motorized, semi-primitive motorized Recreation Opportunity Spectrum (ROS) classes of dispersed recreation.
Special Features: Unique and/or special geological, biological, ecological, cultural, or scenic features.	Other locally identified unique characteristics, traditional cultural properties, and sacred sites.
Manageability/boundaries: Ability to manage a roadless area to meet the minimum size criteria (5,000 acres) for wilderness.	No criteria

Affected Environment

Existing Condition

Management activities that have occurred in IRAs the project area include trail management, surveys for noxious weeds, wild and prescribed fire, and ongoing studies for threatened\endangered species such as Canada lynx, bull trout, and grizzly bear. The existing condition for each IRA's roadless characteristics is listed below.

Saddle Mountain IRA #168

Approximately 7,866 acres (54 percent of total IRA) of the Saddle Mountain IRA are located within the project area boundary. This area is located east of the Yaak River and south of Seventeen Mile Creek. The area includes Saddle, Conn, Arbo, Feeder, and Gunsight mountains. The area is surrounded by roads, and has an irregular shape with three lobes. Most of the area is allocated to MA5a (desired condition provides opportunities for year-round non-motorized use) (2015 Forest Plan pg.63) and MA5c (desired condition provides opportunities for year-round non-motorized use and over-snow vehicle use) (2015 Forest Plan pg.63) (see Map M-22).

The Saddle Mountain IRA area is popular for recreational use including backpacking, hunting, and berry picking, with little snowmobiling opportunities which are confined to the south end of the IRA. The area is very scenic and remote. Several trails access the various mountain summits offering visitors spectacular scenery and solitude.

Saddle Mountain IRA has several small (less than 100 acre) unroaded areas contiguous to the IRA within the OLY project boundary. A work map with historical mapping of all roads and harvest units was reviewed (found in the Project File). The majority of the small unroaded areas are between old unit boundaries, roads or at topography (ridges) or contour lines.

There are three contiguous unroaded areas are greater than 100 acres that are included in the analysis: an unroaded triangular shaped area that is between the East Side road and the IRA boundary and positioned north of #196 Arbo\Wee Lake Trail (T33N R33W Sec 9), the second is located directly east of Kilbrennan Lake and between the East Side road and NFSR #2376, with trail #517 Feeder Creek Trail going through the middle of the area (T33N R33W Sec 28) and lastly a thin long area that is located just south of the North Fork of O'Brien Creek and south of Feeder Mountain (T33N R33W Sec 25).

The **natural** attribute of the IRA is rated Medium\High. With the exception of wildfire suppression, human-induced changes in the area have been minimal. Some signs of timber harvest remain in the IRA with old road prisms and stumps although vegetation growth has obscured most evidence. Satellite imagery shows clear evidence of human-induced management practices all around the IRA. A relatively narrow corridor (NFSR #471) separates Saddle Mountain IRA and the 29,657 acre Roderick Mountain IRA.

Long-term ecological processes are predominately intact. Storm events, including wind, snow, rains, and insect and disease outbreaks continue to reshape the vegetation and landscape. Historical fires of varying sizes and intensities also contribute to shaping the vegetation and wildlife that inhabit the area. Current fire management does allow for natural fires (unplanned ignition) to burn under some circumstances (see the Fire\Fuels section in Chapter 3). To date, all wildfires have all been suppressed (see Map M-10 Fire History Map).

The **undeveloped** attribute of the area is rated Medium\High. There is little evidence of manmade features or structures in the IRA. There is evidence of old road prisms and fire lines but overtime these have become heavily overgrown with brush. There are a few trails in the IRA but most do not get traveled often and there are no constructed recreation sites. The main use is during hunting season in the fall (September-November). Ridgelines and trails receive most of the concentrated use with weather playing a key role in access. During the remainder of the year, use is relatively low in the IRA.

Opportunities for remoteness and solitude overall in the IRA is High. However, opportunities for remoteness and solitude in those unroaded areas contiguous to the IRA, near proposed harvest units 59, 60, 61, 61A and 62, is low because they are between past harvest units and an open road. The IRA has some steep, rocky terrain however most of the area is densely timbered. Recreational use is primarily on the Forest Service system trails. Traveling off trails may be challenging due to thick vegetation. Wee Lake is the only lake in the IRA and it receives very little use.

Special features are rated Medium\Low. The area provides habitat for grizzly bears and Canada lynx.

Flagstaff IRA #690

About 1,762 (16 percent) acres of the Flagstaff IRA are located within the project area boundary. The area is located just north of and adjacent to the Kootenai River between Hunter Gulch and China Creek, running north to O'Brien Mountain. Access is provided via the Kootenai River Road, Quartz Creek Road, and roads leading up O'Brien Creek, Lynx Creek, and Kootenai Mountain. A National Recreation Trail traverses the Quartz Creek portion of the roadless area. Most of the area is allocated to MA5a and MA5c (see Map M-22).

The area is dominated by Flagstaff Mountain (6,100 feet), O'Brien Mountain (6,800 feet), and Quartz Mountain (6,300 feet) lying just outside the project area boundary.

The area is generally surrounded by forest developments such as roads and past harvest units. Snowmobiling is present in the northern end of the IRA. The area contains bighorn sheep, primarily on the face overlooking the Kootenai River. Bighorn sheep have been transplanted into the area as recently as February of 2014. Viewing them from Highway 2 in the spring is one of the area's main attractions. The Kootenai Trail or Bighorn Trail travels along the north shore of the Kootenai River and adjacent the IRA. The trail is popular for river access, ease of travel, wildlife viewing and cultural and historical qualities.

Flagstaff IRA has several small (less than 100 acres) unroaded areas contiguous to the IRA within the project boundary. A work map with historical mapping of all roads and harvest units was reviewed (located in the project). The majority of the small unroaded areas are between old unit boundaries, roads, or at topography (ridges) or contour lines. Two areas are greater than 100 acres and are included in the analysis: an area northwest of the IRA boundary and east of #706 Skyline NRT Trail (T32N R33W Sec 1) and lastly the area west of the IRA's southwest corner and north of the Kootenai Falls (T31N R33W Sec 11).

There is no harvest, prescribed burning, road construction or re-construction in the Flagstaff IRA or unroaded areas.

The **natural** attribute of the area is rated Medium\High. Human-induced changes have been minimal in the area. Wildfire suppression has also induced change historically. Otherwise, long-term ecological processes are intact and operating. Weather events and insect and disease agents continue to shape the vegetation in the area. Current fire direction does allow natural fires (unplanned ignition) to burn in the IRA under certain circumstances. Noxious weeds, primarily spotted knapweed and hawk weed, are present in the IRA.

The **undeveloped** attribute is rated High. The area has not had much human activity. There are a few hiking trials in the area, with the Skyline NRT #706 being the most popular. Evidence of past

fire suppression efforts are fading away with time. Remnants of old lookouts still exist on Flagstaff and O'Brien Mountains including some wire and concrete footings.

Opportunity to experience solitude is rated High. The area provides visitors with opportunities for hunting, hiking, and wildlife viewing. Hunting is the most popular activity occurring mainly in the fall. The area overall is remote and user interaction is minimal. Sounds from the railroad and U.S. Highway 2 may be heard in the distance. The town of Libby to the southeast may be seen.

Special features are rated Medium\High. The area includes habitat for grizzly bears and Canada lynx.

Environmental Consequences

Alternative 1-Direct, Indirect, and Cumulative Effects

Natural ecological processes would continue with the exception of fire, which would continue to be controlled through fire suppression efforts during the critical fire season. Unplanned ignitions may be allowed to burn in some areas under certain circumstances during the non-critical fire season (see Fire and Fuels section of Chapter 3). Other natural processes including weather, insect, disease, and time would continue to shape the IRAs. The spread of noxious weeds will continue. The apparent **naturalness** of the IRAs would continue for persons viewing and entering the IRA. The **undeveloped** attribute would remain unchanged for most areas. However, this and the **opportunity for solitude** may decrease over time due to factors such as: 1) if more persons utilize the IRAs for recreational activities, and 2) if the local area becomes more populated. No **special features** would be affected by the IRAs' change.

The suppression of fire in the IRAs would result in existing openings continuing to see encroachment from a variety of trees and vegetation, and also reduced huckleberry, mountain ash and other shrub and forage components. Lack of fire in these areas reduces the release of nutrients into soils, creates higher fuel loadings for future wildfires, and affects those plants and animals that are dependent on fire and fire ecology. Succession will play a large role with conifers re-establishing populations on past burned landscapes.

The old road prisms along the boundaries of the both IRAs would continue to naturalize over time and evidence of their existence would eventually be obscured. **Opportunity for solitude and special features** are currently good and would remain primarily unchanged.

Direct and Indirect Effects Common to All Action Alternatives

There are no proposed harvest treatments, road building or watershed improvement activities in the IRAs in either Alternatives 2, 3, or 4. The only activity that would occur within the IRA boundaries is one proposed prescribed burning fuels unit, F1, in the Saddle Mountain IRA (see Maps M-6, M-7 and M-8). Activities within the IRA are consistent with the 2001 Roadless Area Conservation Rule, as prescribed burning would maintain or restore the characteristics of ecosystem composition and structure, such as to reduce the risk of uncharacteristic wildfire effects (36 CFR 294.13(b)).

Prescribed burn Units F5 and F6 are both located in unroaded areas contiguous to the Saddle Mountain IRA. Small portions of Harvest Units 57, 59, and 60 are within portions of unroaded

areas. The unroaded areas do not have a special designation; the Forest Plan and Management Area designation guide management.

Effects of Harvest Activity within the Roadless Expanse

Impacts from the use of mechanical equipment and motorized vehicles would be more obvious in the short term and would include removal of vegetation for passage, skid trails tracks of egress and ingress (Units 57 and 60 are proposed winter harvest which will minimize this). Project implementation activities would reduce the attributes of remoteness and solitude by the presence of workers, vehicles, and the sound of equipment until all the proposed projects are complete and ground cover has re-grown. However, these attributes are already low because units border roaded areas that provide direct views to the sights and sounds of traffic and management activities on adjoining National Forest.

Effects to primitive and unconfined recreation would be minor and limited to those time periods when activities are taking place. People could be displaced from favorite areas while project implementation was occurring. The vast majority of the proposed harvest units will be occurring where historically harvest has occurred before. Unroaded areas closest to the roaded areas are most affected by past, present, and proposed management activities. The Unroaded areas closest to the roaded areas also have the lowest roadless characteristics.

Table 85 displays activity units that were further analyzed because of their proximity to Saddle Mountain IRA.

Table 85. Activity Units Analyzed for Their Proximity to the Saddle Mountain IRA

Units	Alternative	Acres	Proposed Harvest Treatment	Logging System	Fuels Treatment	Roadless Expanse
F1	2,3,4	172	No Harvest	Not Applicable	Prescribed Burn	Saddle Mountain IRA
F5	2,3,4,	88	No Harvest	Not Applicable	Prescribed Burn	Unroaded 88 Acres
F6	2,3,4	43	No Harvest	Not Applicable	Prescribed Burn	Unroaded 43 Acres
57	2, 3	68	Seed Tree \ Reserves	Tractor\Winter	Slash \ Underburn	Unroaded 9 Acres
59	2, 3, 4	11	Seed Tree \ Reserves	Tractor	Slash \ Grapple Pile	Unroaded 4 Acres
60	2, 3, 4	24	Seed Tree \ Reserves	Tractor\Winter	Slash \ Grapple Pile	Unroaded 15 Acres
61	2, 3	51	Clearcut \ Reserves	Tractor\Winter	Slash \ Grapple Pile	Unroaded (12 Acres)
61A	2, 3, 4	34	Clearcut \ Reserves	Tractor	Slash \ Grapple Pile	Unroaded (7 Acres)
62	2, 3, 4	24	Seed Tree\Reserves	Tractor	Slash \ Grapple Pile	Unroaded (18 Acres)
57	4	30	Seed Tree \ Reserves	Tractor\Winter	Slash \ Underburn	Unroaded (30 Acres)

Units	Alternative	Acres	Proposed Harvest Treatment	Logging System	Fuels Treatment	Roadless Expanse
57A	4	18	Slash \ Underburn	Tractor\Winter	Slash \ Underburn	Unroaded (5 Acres)
61	4	25	Clearcut \ Reserves	Tractor\Winter	Slash \ Grapple Pile	Unroaded (2 Acres)
61B	4	15	Clearcut \ Reserves	Tractor\Winter	Slash \ Grapple Pile	Unroaded (5 Acres)

The project file contains Google Map images with Saddle Mountain IRA overlay mapping and IRA validation letters, and a work map with historical mapping of all roads and harvest units. None of the above units are within the Saddle Mountain IRA roadless expanse and are not discussed in detail.

This project does not propose any new road construction or road reconstruction in the roadless expanse.

Effects of Prescribed Burning Activity

There is one prescribed burn fuels unit (F1), totaling 172 acres, in Alternatives 2, 3, and 4, within the Saddle Mountain IRA; in addition, fuels units F5 and F6 are both located in unroaded areas of the roadless expanse.

Flagstaff IRA and roadless expanse have no prescribed burning activities.

Fuels unit F1 is a higher elevation treatment. Forage and berry production is reduced due to tree canopy closure, re-vegetation encroachment, lack of fire, and /or browse pressure. The proposed treatment will be implemented using aerial and/or hand ignition which will create a mixed severity fire. The timeframe for this treatment will be spring or late summer/fall.

The objective of this proposed burn is to reintroduce fire on the landscape, maintain existing open conditions; stimulate forage/browse reproduction for big game and other wildlife species; and improve huckleberry production in higher elevation locations, where present, thus benefitting grizzly bear recovery efforts.

Fuels units F5 and F6 are located in the unroaded area within the roadless expanse. Prescribed fire treatments in the unroaded areas would not greatly affect the roadless characteristics because low and moderate intensity fires are typical of the forest ecosystems in the area and influence the development of the forest communities. Management ignited prescribed fire and associated treatments are a form of “modern human control or manipulation” and would to some extent affect the natural character with the roadless expanse. Though the appearance of the vegetation would change, it would be within the parameters of natural integrity and apparent naturalness. Using low and severity burning would mimic a wildfire within its natural regime as opposed to an unnaturally intense wildfire, thereby enhancing or helping to maintain the roadless characteristic of naturally appearing landscape. In contrast the areas untreated could appear unnatural to visitor when compared to treated areas.

The **natural** attribute of the roadless expanse would be improved by introducing fire to areas where it has been excluded. Historical fire records and stand data show that the exclusion of fire

through wildfire suppression is a threat to the natural character of these areas. Many plant and animal species found in these areas are dependent on the element of fire to maintain the habitats and vegetation they need to survive (see wildlife and PTES sections in Chapter 3). Exclusion of fire allows for encroachment of fire-intolerant species and may actually reduce the biological values apparent to naturalness characteristics. .Reintroducing fire would enhance the characteristic of "naturalness" throughout the area, by establishing forest characteristics that would have been more typical of this area if fire had been allowed to play its natural role in landscape processes.

The proposed prescribed burn will not require construction of fire line due to natural features and use of prescriptions that naturally contain fire through availability of fuel and moisture (see Fire and Fuels analysis). As a result, this burn would have minimal effects on the **undeveloped** characteristics of these IRAs.

Remoteness and solitude may be interrupted for a brief time during ignition of prescribed burning by field crews and\or helicopter ignition. This would be a very short-term effect and overall the remoteness and solitude related to the modified proposed action would remain unchanged.

One of the **special features** listed for the IRAs is habitat for grizzly bears and other wildlife. Restoring fire to these areas would enhance those attributes and benefit this special feature by creating improved grass\shrub production including huckleberries. Other special features would not be expected to change.

Cumulative Effects Common to All Action Alternatives

Past actions and their Effects on Current Conditions

Timber harvest, road building, watershed restoration, and wildfire suppression are a few of the activities that have occurred in the project area. All of these activities, with the exception of fire suppression occurred outside, adjacent to, or within short distances of the currently established boundaries of these IRAs. The effects of past management have diminished over time and current conditions meet the natural, undeveloped, opportunity for solitude, special features, and manageability characteristics. Natural ecological processes would continue with the exception of fire, which would continue to be controlled through fire suppression efforts during the critical fire season.

Effects of Ongoing and Reasonably Foreseeable Actions

Through implementing a prescribed burn, maintaining a mosaic of forest openings across the landscape will create conditions representing more natural vegetation patterns and be beneficial for wildlife. Forest users will also benefit from varied habitat conditions that will provide improved grass\native shrub production such as huckleberries both in a visual context as well as for possible berry gathering.

Outside of prescribed burning, fire suppression efforts may continue during the critical fire seasons and would continue to affect natural processes and associated changes in vegetation and habitat conditions. Some use of wildfire for resource benefit within appropriate MAs may be considered as weather and fuel conditions allow.

Combined Effects from Past, Proposed, Ongoing, and Foreseeable Actions

Since roadless characteristics are maintained with this project, there would be no adverse cumulative effects to IRAs as a result of the proposed activities. With the exception of fire suppression, natural processes would continue to influence conditions in IRAs. Trail maintenance would continue on existing trails as funding allows.

Consistency with the 2015 Forest Plan

The proposed activities make progress towards **GOAL-IRA-01,** which states that IRAs will be managed to protect values and benefits of roadless area, because prescribed burning will improve threatened species habitat. The modified proposed action maintains the desired condition for MA5a and MA5c for prescribed burning**: MA5a, b, c-DC-Fire-01** the use of fire serves as the primary tool for trending the vegetation towards the desired conditions as well as serving other important ecosystem functions (2015 Forest Plan, pg. 62).

The project is consistent with the Guideline **MA5a, b, c-GDL-Fire-01**, which states that natural, unplanned ignitions, as well as planned ignitions, may be used to meet resource objectives. This guideline meets the objective set in the modified proposed action for Fuels Unit F1 by utilizing planned ignitions to restore ecosystem composition.

The proposed prescribed burning included in Alternatives 2, 3, and 4 would enhance the natural ecological processes in the areas and would be consistent with Standard **FW-STD-IRA-01** which states "within inventoried roadless areas, outside of the state of Idaho, the 2001 Roadless Area Conservation Rule….shall apply" because there is no timber to be cut, sold, or removed within IRAs**.**

Old Growth

Introduction

As illustrated in the 2015 Forest Plan FEIS, the amount of old growth that is predicted to occur across the Forest in the future increases substantially during the next 50 years. Two methods were used to substantiate this prediction. The first used FIA plot information and simply "age" the trees on the plots to determine how much of the Forest may meet the old growth criteria in the future. As discussed in more detail in Bush and Reyes (2013), the tree ages on the plots were increased by 10 years in five increments over a 50-year period. Although the Bush and Reyes (2013) analysis does not factor in tree growth or natural or man-caused mortality during that 50-year period, it does provide evidence that in the absence of large scale dramatic disturbances over the Forest, old growth amounts should increase in the future due to the large number of acres of forest stands on the KNF that currently meet every old growth criteria except age, and will meet the age criteria relatively soon.

The second approach that was used to investigate how much old growth may occur on the KNF in the future utilized the SIMPPLLE and Spectrum modeling efforts that were undertaken to predict how forest succession, disturbances, and management activities would influence forest vegetation conditions over time. The primary advantage of this approach over the use of the FIA plots is that this modeling effort is able to capture how wildfire, forest insects and diseases, climate change and even management activities may impact forest conditions in the future. In addition, the SIMPPLLE model is able to simulate how the various disturbances, forest succession and management elements interact with one another in a spatial context[3]. The results indicate that if no active management (with the exception of fire suppression) were to occur on the Forest for the next 50 years, and the future climate scenario of a warmer/drier climate is assumed, then the acreage of stands that would have structures similar to old growth is predicted to increase by approximately 78 percent over current amounts. The dramatic increase in old growth-like stands over the 50-year simulation period occurred despite a substantial amount of predicted wildfire, root disease; bark beetle and defoliator caused disturbances (Ecosystem Research Group 2012).

In order to support this prediction, the 2015 Forest Plan deliberately includes language within two components (FW-DC-VEG-03, FW-GDL-VEG-01) that would allow vegetation management activities to occur within old growth stands **if** the activities were designed to increase the resistance and resiliency of the stands to disturbances or stressors, **and** if the activities would maintain the criteria for age and number of trees and basal area for the specific old growth type as described in Green et al. 1992[4]. Managing forestwide vegetation composition, structure, pattern, and process within HRV (GOAL-VEG-01), including managing to increase old growth habitat, is part of the 2015 Forest Plan's coarse filter framework for providing for species diversity in the plan area (FW-DC-WL-11).

Management activities (timber harvesting, road construction, prescribed fire etc.) have the potential to impact old growth habitat or specific components of old growth; such as interior

[3] The methodology used for the modeling efforts is described in appendix B of 2015 Forest Plan FEIS as well as in Chew (2012), Henderson (2013), and Ecosystem Research Group (2012).

[4] Both the terms resilience as well as resistance (see forest plan glossary for definitions) are used in in the context of forest ecosystems and the desire to increase the resistance and resiliency of the forest vegetation to disturbances and stressors, such as wildfires, droughts, insects and diseases, and potential climate change effects.

habitat and vertical structure. This is of course beneficial to some species (e.g., flammulated owl) and not beneficial to others and may vary by old growth type; but by increasing the resistance and resiliency of the forest to disturbances, there is an increase in the chances that those stands will persist into the future.

Map M-18 displays the old growth within the OLY project area.

Regulatory Framework

Table 86 displays the regulatory framework guiding the old growth analysis.

Table 86. Guiding Documents and Direction

Guiding Document	Direction
2015 Kootenai National Forest Plan	The 2015 Forest Plan provides overall guidance for the management of the lands on the KNF. It describes the goals, desired conditions, and objectives toward which the management of the land should be directed. And it establishes standards and guideline to help achieve or maintain the desired condition or conditions, to avoid or mitigate undesirable effects, or to meet applicable legal requirements..

2015 Forest Plan

The 2015 Forest Plan defines old growth stands as those that meet the definitions in "Old-Growth Forest Types of the Northern Region" (Green and others 1992, corrected 12/2011). Because old growth stands provide valuable ecological and social functions, the KNF developed a number of plan components that are designed to increase the quantity of old growth in the future, increase the resistance and resilience of the old growth to disturbances and stressors, and to increase the size of the old growth patches that exist in the future. These include:

FW-DC-VEG-03 The amount of old growth increases at the forestwide scale. At the finer scale of the biophysical setting, old growth amounts increase for the Warm/Dry and Warm/Moist settings while staying close to the current level for the Subalpine setting. Relative to other tree species, there is a greater increase in old growth stands that contain substantial amounts (i.e., 30% or more of the total species composition) of one or more of the following tree species: ponderosa pine, western larch, western white pine, and whitebark pine. Old growth stands are more resistant and resilient to disturbances and stressors such as wildfires, droughts, insects and disease, and potential climate change effects. The size of old growth stands (or patches of multiple contiguous old growth stands) increase and they are well- distributed across the five Geographic Areas on the Forest.

FW-STD-VEG-01 Within old growth stands, timber harvest or other vegetation management activities shall not be authorized if the activities would likely modify the characteristics of the stand to the extent that the stand would no longer meet the definition of old growth.

FW-GDL-VEG-01 Timber harvest or other vegetation management activities may be authorized in old growth stands if the activities are designed to increase the resistance and resiliency of the stand to disturbances or stressors, and if the activities are not likely to modify stand characteristics to the extent that the stand would no longer meet the definition of old growth.

FW-GDL-VEG-02 Road construction (permanent or temporary) or other developments should generally be avoided in old growth stands unless access is needed to implement vegetation management activities for the purpose of increasing the resistance and resilience of the stands to disturbances.

GA-DC-VEG-YAK-01 Management of vegetation toward the desired vegetation condition provides habitat for moonworts and northern beechfern and increases in late succession and/or old growth vegetation.

Analysis Area and Scope of Analysis

The analysis area for direct impacts to old growth is the project area, since this is the area that will be directly affected by proposed activities. Cumulative effects to old growth are analyzed at the project level. The project has a total of 6,034 acres of old growth, which amounts to about 3 percent of the total old growth on the Kootenai National Forest.

Methodology

"Old-Growth Forest Types of the Western Montana Zone" was used as the criteria to identify stands that may qualify as old growth habitat (Green and others 1992, corrected 12/2011 pp. 25-32). Data sources to identify old growth stands include District files and surveys, R1 summary database old growth reports, the Kootenai National Forest old growth GIS layer which was developed from stand-level old growth inventory that was aggregated and summarized at the Forest scale, and the Forest Inventory and Analysis (FIA) data which collects and reports data at the Forest scale. The most current information and data for old growth are displayed in this analysis.

The following indicators were used to evaluate each alternative's impacts on old growth:

- Promote resilient vegetation conditions by managing towards characteristic old growth structure –

  Indicators:
  - Acres of surface and ladder fuels and canopy bulk density reduction in old growth within the warm/dry biophysical setting.
  - Acres of surface and ladder fuels and canopy bulk density reduction in old growth within the warm/moist biophysical setting.
  - Acres no longer meeting minimum old growth criteria due to proposed treatment activities.
- Promote resilient vegetation conditions by managing towards desired old growth species composition –

  Indicators:
  - Acres of old growth in the warm/dry biophysical setting treated to promote early seral species.
  - Acres of old growth in the warm/moist biophysical setting treated to promote early seral species.
- Increase the resiliency and resistance of old growth stands to disturbance or stressors such as wildfire, droughts, insects and disease, and potential climate change effects –

  Indicators:
  - Acres of harvest treatments in old growth.
  - Acres of harvest treatments in recruitment potential old growth.

- Acres of maintenance burning in old growth.
- Acres of maintenance burning in recruitment potential old growth.

Affected Environment

Existing Condition

Existing conditions are a result of past natural and man-caused events, including historic timber harvest and wildfires. Regarding the historic range of variability of old growth in the analysis area, there is no way to accurately determine how much of the forest may have met the Green et al. (1992) definitions of old growth. In order to determine whether or not a forest stand meets those definitions, it requires detailed information on how many trees per acre exist in the stand over a certain diameter and age, the total stand density, the forest type and lastly, the habitat type group that the stand occupies. No historical information exists that can provide that level of detail. Therefore, a numeric desired condition or an HRV estimate for old growth is not included in this analysis. Refer to the reference conditions section of the vegetation report for a full discussion on how the climate, fire ecology, forest succession, other disturbance agents (i.e. insects and disease, drought, and wind), and human influences (i.e. fire suppression and past harvest) have affected the existing condition.

Approximately 6,034 acres (about 9 percent of the project area) meet or exceed the minimum quantifiable old growth criteria. There are 16 miles of open road existing through old growth. It is expected that most, if not all, snags would have been removed within 100 feet of open roads. However, the stands continue to have the other attributes associated with old growth. There are approximately 1,898 acres (about 3percent of the project area) that do not meet the minimum old growth criteria at this time, but have many old growth characteristics and are being managed for old growth recruitment. These stands have the potential to develop into old growth within 40 years and are referred to as recruitment potential old growth. The existing conditions for these stands are covered in the vegetation section.

Table 87 displays the acres of old growth occurring on NFS lands in the OLY project area and Kootenai National Forest.

Table 87. Old Growth Acres on NFS Lands in the OLY Project Area and Kootenai National Forest

Geographic Context*	Total NFS (Acres)	Total OG in NFS (Acres)	Percent of OG within the Geographic Context	Percent of all KNF OG within the OLY Project Area
OLY Project Area	53,675	6,034	11%	3%
KNF	2,217,400	217,733	10%	na

* Forestwide acres are from KNF Old Growth Layer File, and project area acres are updated as of August 2015.

Stand Structure and Composition

Green et al. describes eight old growth types for the Kootenai National Forest (Green and others 1992, corrected 12/2011). These adopted old growth definitions are specific to forest type (the dominant tree species) and habitat type group, and are defined by a minimum number of trees, of a minimum age and diameter, in stands with a minimum density. The most common old growth types within the project area are Old Growth Type Code 1 and Old Growth Type Code 4. In Old

Growth Type Code 1, the minimum characteristics are 8 trees per acre 21 inches diameter breast height (DBH) or more, large trees 170 years old or more, and 60 square feet of basal area per acre or more. The major forest types are ponderosa pine, Douglas-fir, and western larch and they are typically single-storied, but may vary depending on the disturbance history (wildfire, insect infestation, windthrow, etc.). These stands occur within the warm/dry biophysical setting. Old Growth Type Code 4 is characterized by having 10 trees per acre 21 inches DBH or more, large trees 180 years old or more, and 80 square feet of basal area per acre or more. Major forest types are Engelmann spruce-subalpine fir (less represented in the project area), western redcedar, western larch, grand fir, and Douglas-fir and they can be either single or multistoried; however, multi-storied stands predominate. These stands occur within the warm/moist biophysical setting. Other attributes associated within the different forest types are the amount of snags and coarse woody debris (CWD). Figure 26 shows the breakdown of the old growth stands within the project area by biophysical setting. Refer to the vegetation section for a complete discussion of biophysical settings, VRUs, snags, and CWD. Map M-16 displays the biophysical settings in the OLY project area.

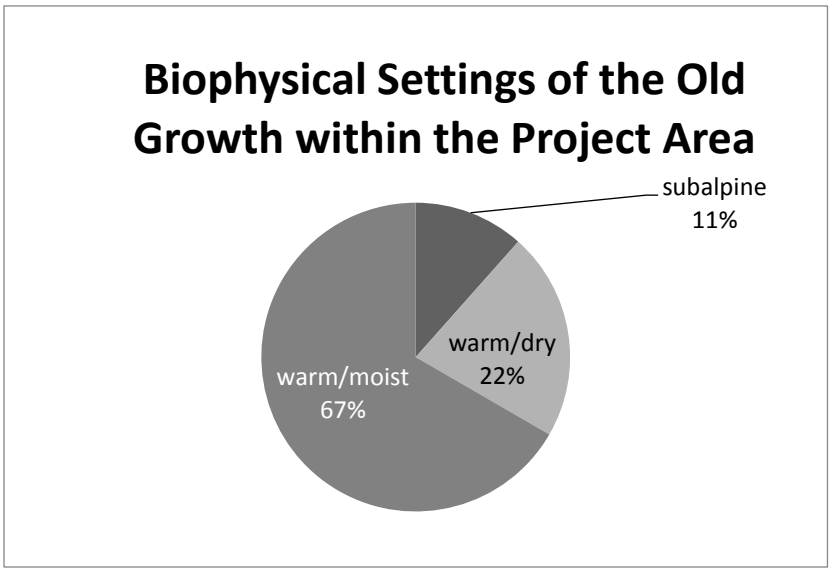


Figure 26. Biophysical Settings of Old Growth within the Project Area

Old Growth by Biophysical Setting:

Warm/Dry

In old growth within the warm/dry biophysical setting (VRUs 2-3), fire historically was an important agent in controlling density and species composition. Low to moderate intensity fires on a frequency of 15 to 45 years played a major role in maintaining the seral community of conifers, typically ponderosa pine with some western larch and lodgepole pine in moister areas, and would burn non-uniformly consuming the litter and undergrowth. Over the last 100 years or so, fire suppression has essentially replaced those frequent, low intensity underburns. The result is a higher stand density of middle-aged trees. A dense layer of Douglas-fir and other shade tolerant species have developed in the understory- stressing the stands and making them less resilient. This condition puts them at risk for stand replacing fires and insect and disease mortality.

There are 1,315 acres of the old growth that fall within this biophysical setting. As Figure 27 illustrates below, Douglas-fir is dominating the majority of those stands and there is a lack of early seral species.

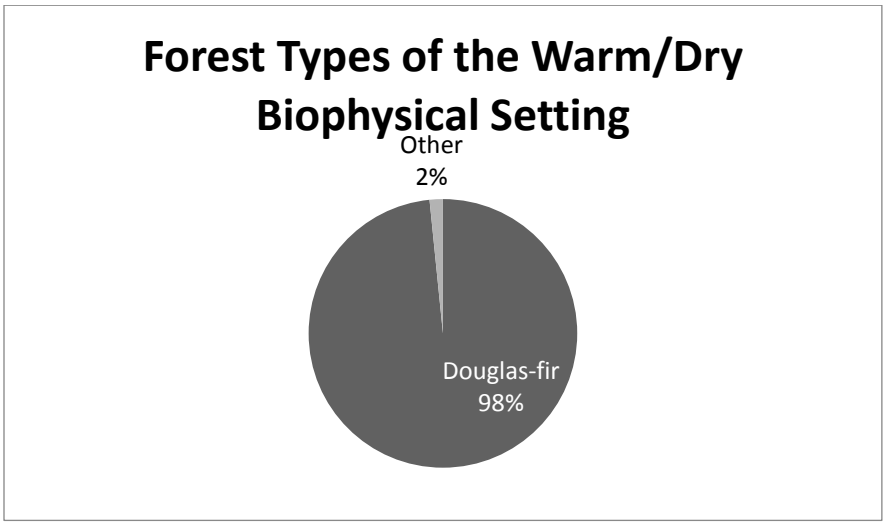


Figure 27. Forest Types of the Warm/Dry Biophysical Setting Within the Project Area

Warm/Moist

Old growth within the warm/moist biophysical setting (VRUs 4-6) typically occurs on lower slopes and valley bottoms or on benches, stream bottoms, and midslope settings in the project area. This setting experiences a wide range of fire free intervals due to the wide moisture gradient and influence of surrounding stands. Historic fire severity was non-uniform including mixed severity fires on an average of 30 to 85 years with stand replacing fires occurring about every 100-200 years. These mixed severity fires would create a multi-aged, multi-storied condition. Species composition tends to vary across this biophysical setting as well. Western larch can be a major species component where fire has created opening and mixed severity fires have reduced the abundance of non-fire adapted species. Douglas-fir is a major seral on most sites and other species such as western white pine, lodgepole pine, western redcedar, grand fir, and western hemlock are common. Fire exclusion has reduced the scope of mixed severity fires; but, in many areas, has had less of an impact due to their naturally long fire free intervals. However, some old growth stands are experiencing greater tree mortality due to increased root disease and winter/snow-damaged trees are more abundant due to higher stand densities.

There are 4,021 acres of old growth within this biophysical setting in the project area. As Figure 28 illustrates, the amount of western larch is low; most likely due to high stand densities and the abundance of shade tolerant species taking over due to the lack of mixed severity fire.

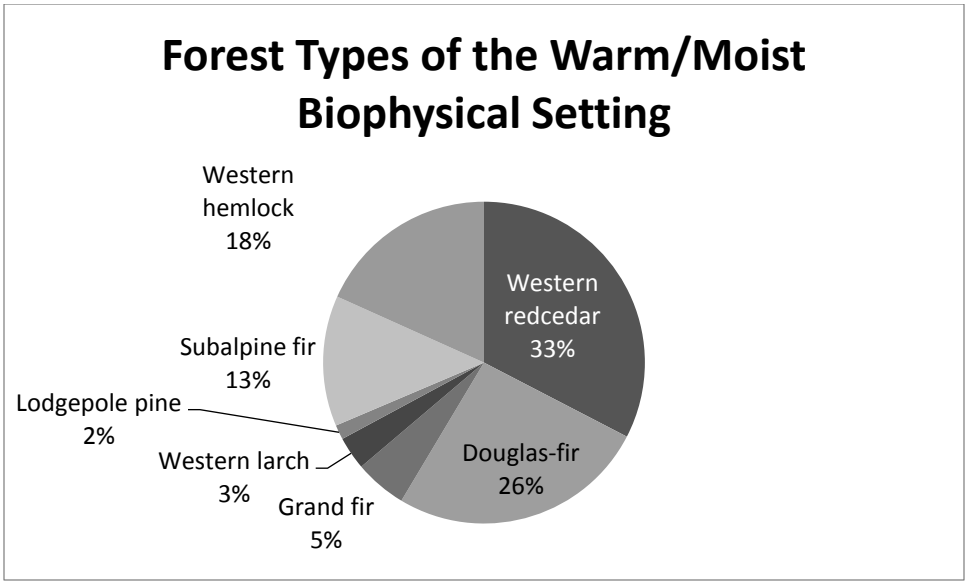


Figure 28.Forest Types of the Warm/Moist Biophysical Setting within the Project Area

Subalpine

In old growth within the subalpine biophysical setting (VRUs 7-10) varied moisture and temperature gradients create a complex influence on the fire ecology. These stands typically occur in the moist lower subalpine forest setting or on the upper reaches of mountain slopes generally above 5,400 feet in elevation. Infrequent, stand replacing fire is common in this setting with most large fires moving up from drier sites during severe fire weather. Cool and moist conditions, coupled with broken topography and lush overstories, limit fire spread and create non-uniform conditions. Old growth develops in these unburned areas. These settings are very suitable to lodgepole pine and subalpine fir, with scattered Douglas-fir and western larch. Fire exclusion has resulted in a loss of seral species due to high stand densities and lack of mixed severity fires.

There are 698 acres of old growth within this biophysical setting within the project area. Figure 29 illustrates the decreased amount of lodgepole pine due to ingrowth of subalpine fir and mountain pine beetle.

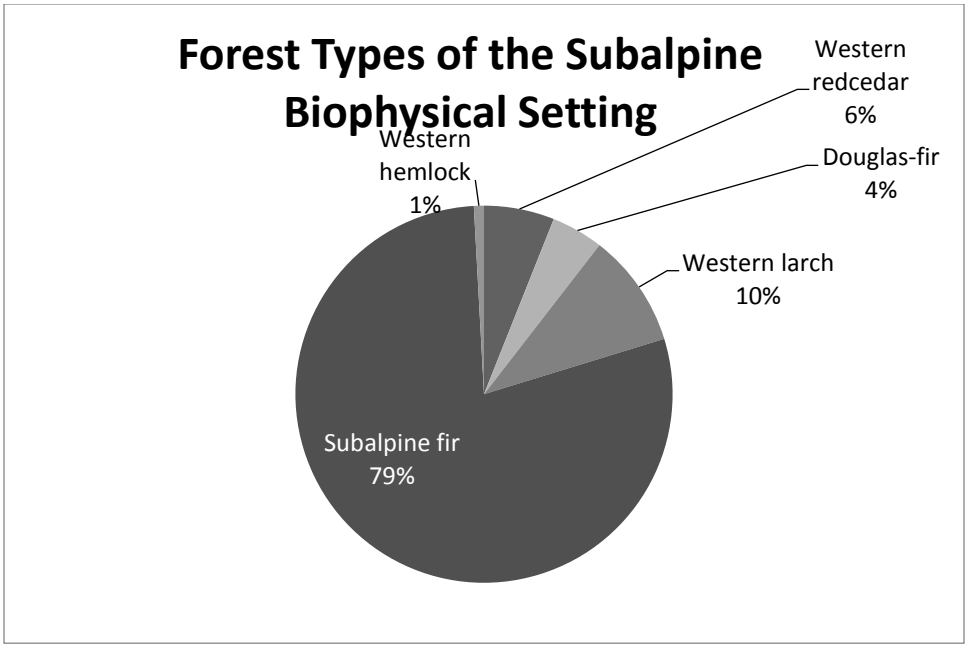


Figure 29. Forest Types of the Subalpine Biophysical Setting

Patch Size

There are a total of 6,034 acres of old growth within the OLY project area. These acres are situated in 64 patches ranging from 7 to 1,559 acres in size. Of these old growth patches, 44 percent are greater than 50 acres in size. In the warm/dry biophysical setting, patch size and pattern are currently more uniform and there are fewer open, park-like stands. In the warm/moist and subalpine biophysical settings there are fewer mosaic patterns from mixed severity fires and patches are becoming smaller. Although smaller-sized patches still provide important ecological characteristics, they generally have an increase in edge and offer a fragmented habitat for some terrestrial wildlife species. The increase in edge can make stands more susceptible to windthrow, snow, and ice damage. The size, shape, and topographical position on the landscape are factors that influence the susceptibility to damage (see the windthrow, snow, and ice damage section in the vegetation report). As the fuels and forest structures have homogenized, the potential for large, high-intensity wildfires has increased, and climate change effects will likely exacerbate this trend (USDA Forest Service 2010b). Refer to the vegetation section for more information concerning patch size.

Environmental Consequences

This section displays the environmental consequences of the proposed activities on old growth. It compares both the effects across alternatives, using the indicators and measures in the methodology section and analyzes the direct, indirect, and cumulative effects of each alternative. Table 88 compares the acres of each proposed treatment across alternatives, and compares the degree to which each alternative addresses the impacts to old growth and recruitment potential old growth.

Table 88. Summary of Measurement Criteria to Evaluate Effects to Old Growth

Impacts	Indicator/Measure	Alt 1	Alt 2	Alt 3	Alt 4
Old Growth Structure	Acres of surface/ladder fuels and canopy bulk density reduction in the warm/dry biophysical setting	0	496	496	496
	Acres of surface/ladder fuels and canopy bulk density reduction in the warm/moist biophysical setting	0	35	35	35
	Acres no longer meeting minimum old growth criteria due to proposed treatments	0	0	0	0
Old Growth Species Composition	Acres treated to promote early seral species in the warm/dry biophysical setting	0	496	496	496
	Acres treated to promote early seral species in the warm/moist biophysical setting	0	35	35	35
Old Growth Resistance and Resilience	Acres of proposed harvest treatments in old growth	0	155	155	155
	Acres of proposed fuels treatments in old growth	0	376	376	376
	Acres of proposed harvest treatments in recruitment potential old growth	0	34	34	34
	Acres of proposed fuels treatments in recruitment potential old growth	0	164	164	164

Alternative 1 No Action- Direct, Indirect Effects

This alternative would have no direct effect on old growth. The conditions for all measurement criteria (see Table 88) would remain unchanged. No old growth would be treated through timber harvest or fuels treatments. There would be no effects from these activities, such as soil compaction, weed introduction, or modification of stand structure.

As stated in the introduction, the results from using the SIMPPLLE model indicate that if no active management (with the exception of fire suppression) were to occur on the Forest for the next 50 years, and the future climate scenario of a warmer/drier climate is assumed, then the acreage of stands that would have structures similar to old growth is predicted to increase by approximately 78 percent over current conditions. However, the 2015 Forest Plan FEIS discusses the fact that simply reserving old growth stands may not lead to long-term protection or survival of these stands. The FEIS cites Thomas et al. 2006 which reviewed implementation of the Northwest Forest Plan: “Several of the key points that the authors make are very relevant to the management of old growth on the KNF. In order to continue to conserve old-growth trees and forests, the authors suggest that classic old-growth within the wetter habitat types be reserved, and that appropriate fuel treatments be undertaken in the drier habitat types to prevent the old trees from being killed from wildfires or bark beetles. Dry old growth forest types are at high risk from wildfire, due to increasingly dense understories composed of drought- and fire- intolerant species that have created ladder fuels, as well as increases in ground fuels and in main canopy densities (Agee and Skinner 2005, Hessbureg et al. 2005, Noss et al. 2006, Spies et al. 2006, Abella et al. 2007, Brinkley et al. 2007, Egan 2007, Fiedler et al. 2007a, Johnson 2007).”

As discussed in the existing condition, fire suppression has disrupted the disturbance patterns of the old growth, particularly within the warm/dry and warm/moist biophysical settings, in the project area. The affected stands have developed fuel loading and ladder fuels that are uncharacteristic for some sites. This tree component has now developed to the point that these high density fire intolerant species compete for resources with the large old trees. The high density increases the occurrence of insect and disease infestations and the risk of very high intensity crown fires by creating ladder fuels or a conduit to bring fire from the ground up into the older dominant canopy. These conditions would continue to accrue until a natural disturbance occurs. This alternative does not propose any fuel treatments, prescribed fire, or harvest treatments, as is proposed in the action alternatives, increasing the risk of large-scale wildfires in the future that could affect old growth recruitment of future old growth. Potential natural disturbances (wildfire, insect or disease epidemics, wind) could reduce old growth characteristics or completely remove an area of old growth under extreme conditions. While these events might occur, extreme conditions are not predictable so it cannot be said, with reasonable certainty, whether or not these events would have more or less effect than the action alternatives.

The direction in the 2015 Forest Plan is to retain existing old growth and promote the development of future old growth (see FW-DC-VEG-03, FW-DC-VEG-05, FW-STD-VEG-01, and FW-GDL-VEG-01), while also improving resistance and resiliency to disturbances and stressors. Stands (particularly those on drier sites) with species or conditions that put old trees at risk for mortality from fires or other disturbances (such as bark beetles) that could kill the old growth trees, could be considered for treatments (see FW-GDL-VEG-01) as opportunities arise. No action in the proposed old growth stands within the OLY project area would be missing the opportunity to increase the resistance and resilience to disturbance and stressors in old growth. Additionally, this alternative would not meet the purpose and need of the OLY project by not managing towards a characteristic forest structure, historic fuel loadings, and historic species composition.

Action Alternatives – Direct and Indirect Effects

The desired result of developing resilient old growth conditions through management techniques is to meet restoration objectives while maintaining composition and structure that conforms to the Green et al old growth definition. Based on the current literature, this approach to maintaining resilience in old growth ecosystems has been incorporated into all the action alternatives (e.g. Hawe and Delong 1997, Fiedler 2000b, Quesnel and Steeger 2002, Steeger and Quesnel 2003, Briana et al. 2004, Lindh and Muir 2004, Sala and Callaway 2004, Spies et al. 2006, Kolb et al. 2007, Ritchie et al. 2008, Zhang et al. 2008, Elzinga and Shearer 1997, Arno et al. 1997, Harrington 2007, Erickson et al 2008). Several studies show that increasing forest resilience can be accomplished with various silvicultural treatments (Fiedler 2002, Agee and Skinner 2005, Stephens and Moghaddas 2005, Metlen and Fiedler 2006, Youngblood et al. 2006, Fettig et al. 2008, Ritchie et al. 2008, Zhang et al. 2008, Fulè et al. 2012). Additionally, past projects on the Kootenai National Forest have been designed and implemented to maintain the old growth attributes while treating excess fuel accumulations. In particular, on the Three Rivers Ranger District, the West Troy project had intermediate treatments in old growth that maintain the number of large trees and reduced the threat of potential wildfires reaching lethal intensities. West Troy Unit 60 is within the warm/dry biophysical setting and falls into the Old Growth Type Code 1 (Ponderosa pine/Douglas-fir). Pre- and post- treatment monitoring surveys were done in Unit 60 to measure the effectiveness of attaining the desired conditions. Post- treatment monitoring proved that the treatment was successful in reducing stand densities while still meeting the Green et al old growth definition after treatment. Unit 60 is a little over 4 miles from

the OLY project boundary and has very similar vegetative characteristics as many of the old growth stands within the OLY project area (refer to the project file for the West Troy Unit 60 pre- and post- treatment monitoring records).

Alternative 2, 3, and 4

Silvicultural Treatments

All proposed harvest and fuels treatments are within Management Area (MA) 6- General Forest and are displayed in the following tables (Table 89, ** The 16 acres of old growth within Unit 75 would only have an improvement cut. No seed tree or shelterwood openings would occur within these 16 acres.

Table 90, Table 91, and Table 92). Note that in Table 89, the 16 acres of old growth within Unit 75 would only have an improvement cut. No seed tree or shelterwood openings would occur within these 16 acres.

Table 89. Proposed Harvest Treatments in Old Growth for all Action Alternatives

Unit	Unit Acres	Acres of Old Growth within Unit	Proposed Harvest Treatment	Fuels Treatment
21	129	129	Improvement Cut	Slash, Underburn
63	10	10	Improvement Cut	Slash, Grapple Pile
75	50	16	Improvement Cut with Seed Tree or Shelterwood Openings **	Slash, Underburn
Total:	**189**	**155**		

** The 16 acres of old growth within Unit 75 would only have an improvement cut. No seed tree or shelterwood openings would occur within these 16 acres.

Table 90. Proposed Fuels Treatments in Old Growth for all Action Alternatives

Unit	Unit Acres	Acres of Old Growth within Unit	Proposed Fuels Treatment
F13	230	230	Ecosystem Burn
F19	339	33	Slash, Underburn
F25	242	106	Underburn
F26	4	4	Slash, Grapple Pile
F29	3	3	Slash, Hand Pile
Total:	**818**	**376**	

Table 91. Proposed Harvest Treatments in Recruitment Potential Old Growth* for All Action Alternatives

Unit	Unit Acres	Acres of Recruitment Potential Old Growth within Unit	Proposed Harvest Treatment	Fuels Treatment
37A	34	34	Improvement Cut	Slash, Underburn
Total:	**34**	**34**		

* Recruitment Potential Old Growth: Forest stands that do not meet the definition of old growth in Green et al. 1992 (errata corrected 12/11) but are being managed with the goal of meeting that definition in the future.

Table 92. Proposed Fuels Treatments in Recruitment Potential Old Growth* for all Action Alternatives

Unit	Unit Acres	Acres of Recruitment Potential Old Growth within Unit	Proposed Fuels Treatment
F02	76	76	Ecosystem Burn
F05	88	88	Ecosystem Burn
Total:	**164**	**164**	

* Recruitment Potential Old Growth: Forest stands that do not meet the definition of old growth in Green et al. 1992 (errata corrected 12/11) but are being managed with the goal of meeting that definition in the future.

Summary of Treatments

The proposed treatments by biophysical setting are shown in Table 93 and in Figure 30, Figure 31, Figure 32 and Figure 33.

Table 93. Proposed Harvest and Fuels Units by Biophysical Setting for all Action Alternatives

Unit	Warm/Dry Biophysical Setting (acres)	Warm/Moist Biophysical Setting (acres)	Total Unit Acres
21	121	8	129
63	4	6	10
75	16	0	16
37A	0	34	34
F13	216	14	230
F19	33	0	33
F25	106	0	106
F26	0	4	4
F29	0	3	3
F02	1	75	76

Unit	Warm/Dry Biophysical Setting (acres)	Warm/Moist Biophysical Setting (acres)	Total Unit Acres
F05	85	3	88
	Total warm/dry: 582	**Total warm/moist: 147**	**Grand Total: 729**
% of Grand Total	**80%**	**20%**	

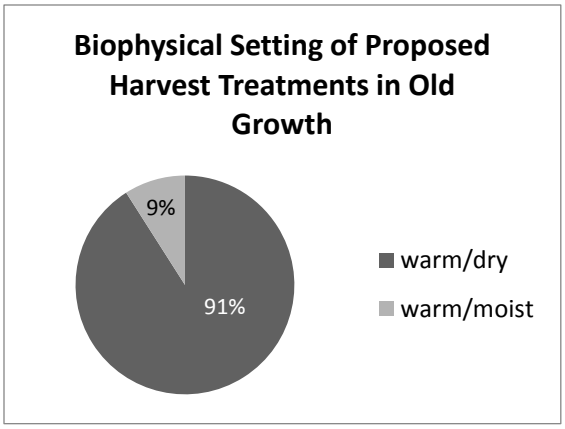


Figure 30. Biophysical Setting of Proposed Harvest Treatments in Old Growth

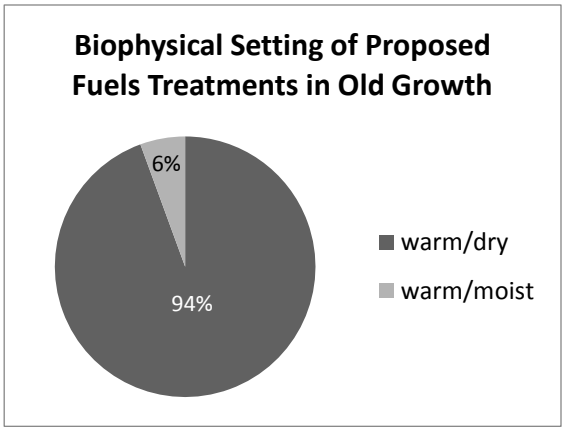


Figure 32. Biophysical Setting of Proposed Fuels Treatments in Old Growth

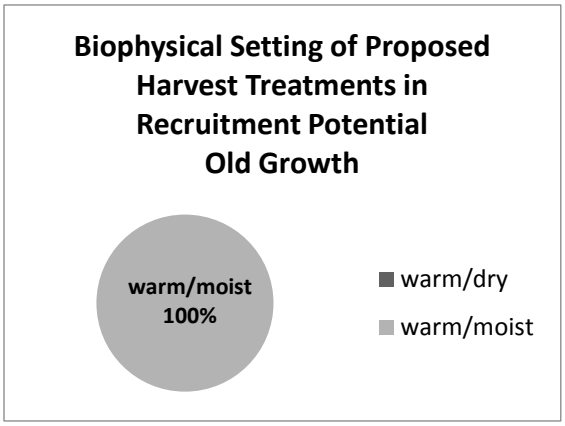


Figure 31. Biophysical Setting of Proposed Harvest Treatments in Recruitment Potential Old Growth

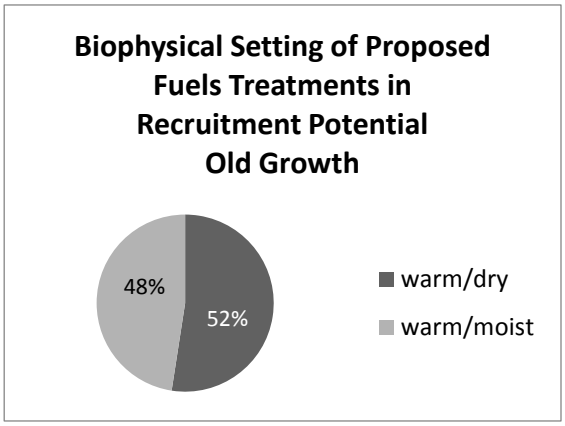


Figure 33. Biophysical Setting of Proposed Fuels Treatments in Recruitment Potential Old Growth

The 2015 Forest Plan FEIS includes examples of actions that could be taken to achieve the desired condition of old growth stands that are more resistant and resilient to disturbances and

stressors. It adds that for the examples, if cutting smaller trees is needed and the removal of the cut trees is necessary to meet the site-specific restoration objectives, then timber harvest may be proposed. The modified stand structure and fuel complex that results from the activities described in the examples above could increase the resistance of the large trees to potential mortality from disturbances and/or stressors (e.g., high intensity wildfire, bark beetle attacks, and/or potential climate change impacts such as more frequent or intense droughts).

Example 1: Within old growth stands that occur in the warm/dry biophysical setting and that contain a substantial component of ponderosa pine or western larch, prescribed fire alone or in combination with the cutting of smaller trees could be used to emulate a non-lethal or mixed-severity wildfire that was relatively common on these sites historically, and that often maintained fairly open stands dominated by shade intolerant and fire resistant ponderosa pine and/or western larch tree species.

As shown in Table 93, 80 percent of all proposed treatments in old growth and recruitment potential old growth are in the warm/dry biophysical setting. Of the proposed harvest treatments in old growth, 91 percent are in this setting. As discussed in the existing condition section, many stands in this biophysical setting, the proposed units included, differ from the desired conditions and are not set on a trajectory to persist into the future. Example 1 from the 2015 Forest Plan FEIS (above) applies to the intent of all the proposed treatments in the warm/dry biophysical setting for this project. The proposed treatments would move these stands from their current condition to the desired condition of being more resistant and resilient to disturbances and stressors.

Example 2: Within old growth stands that occur in the warm/moist biophysical setting and contain substantial amounts of shade intolerant species, prescribed fire alone or in combination with the cutting of smaller trees could be used to emulate a non-lethal or mixed-severity wildfire that occasionally occurred on these sites historically, and that served to extend the time that shade intolerant western larch or ponderosa pine could maintain their presence in stands that would otherwise become dominated by shade tolerant species (e.g. western hemlock, western redcedar, grand fir).

As shown in Table 93, 20 percent of all proposed treatments in old growth and recruitment potential old growth are in the warm/moist biophysical setting. Of the proposed harvest and fuels treatment in old growth, nine and six percent are in this setting, respectively. All of the proposed stands in this setting have been identified as having an existing condition that has departed from the desired condition (see the existing condition section). Example 2 from the 2015 Forest Plan FEIS (above) applies to the intent of all the proposed treatments in the warm/moist biophysical setting for this project. The proposed treatments would move these stands from their current condition to the desired condition of being more resistant and resilient to disturbances and stressors.

Alternative 2- Direct and Indirect Effects

Species Composition

This alternative would improve species composition towards the desired condition of healthy, resilient ponderosa pine, western larch, and western white pine (where possible) in both the warm/dry and warm/moist biophysical settings. Of the proposed harvest treatments in both old growth and recruitment potential old growth, 100 percent of them are currently of the Douglas-fir forest type. Of the proposed fuels treatments, 99 percent in old growth and 42 percent in

recruitment potential old growth are of the Douglas-fir forest type. By removing a large component of the dense Douglas-fir (and other shade tolerant species) understory, these stands would be converted to more resilient early seral species while maintaining a mix of species diversity; incorporating healthy, large, mature trees of all species where appropriate. These stands would be more fire resilient by having substantial amounts of the seral species. Overall, this alternative would trend the landscape towards the 2015 Forest Plan desired species composition in old growth (FW-DC-VEG-03) and increase resistance and resilience to disturbances and stressors.

Stand Structure

This alternative would improve forest structure by reducing the surface and ladder fuels and canopy bulk density and maintaining the thick bark trees in the stand. Restoring forest composition and structure before wildfires occur should allow fire to play its characteristic role in maintaining ecosystem structure and function in the forest (Noss et al. 2006, Johnson and Franklin 2007). The proposed treatments would increase the resilience of old growth by reducing the potential severity of wildfire and insect outbreaks. Managing the density of trees can improve forest resiliency by reducing water stress, decreasing susceptibility to insect and disease mortality, and decreasing the likelihood of stand-replacing fires. Overall, this alternative would trend the landscape towards the 2015 Forest Plan desired species structure in old growth (FW-DC-VEG-03) and increase resistance and resilience to disturbances and stressors.

Patch Size

As discussed in the existing condition (and in more detail in the vegetation section), patch sizes have become smaller, more homogenous, and more fragmented. In regard to perpetuating old growth forests in dynamic landscapes, Salwasser (2009) states “Perpetuating some older forests will require a combination of conditions within stands that enhance resilience against low to moderate disturbances and redundancy of developmental states across landscapes so that when major stand-replacing disturbances do occur, there are forests moving into older stages somewhere else to replace the altered stands. Where fires have been suppressed for long periods of time, selective removal of some biomass followed by use of managed fire – perhaps harkening back to prehistorical land use practices- may be need to restore stand resilience.” By restoring structural diversity and heterogeneity both within and between patches, chances are increased that these stands will persist into the future and therefore increase patch size. This increase in patch size would decrease edges. The edges of units adjacent to old growth, where feasible, are intended to maintain the structural integrity of the edges and decrease the risk of windthrow, snow, and ice damage. Since all proposed treatments within old growth are intermediate harvests, the structural integrity of the edges will be maintained by the inherent nature of the prescription.

Snags and CWD

Effects to snags and CWD are the same across all proposed vegetation treatments and are discussed in detail in the vegetation section.

Roads

There are no changes proposed to the existing open road mileage; so there would remain 16 miles of open roads through old growth. On Yaak Mountain, Stimson Lumber Company has requested adding 0.16 miles onto an existing road. There is no old growth in the vicinity of this road, so

there would be no impact to old growth. No other road construction is proposed in old growth in any alternative, so there would be no impact to old growth.

Cumulative Effects Common to all Alternatives

Past Actions and their Effects on Current Conditions

Fire Suppression: Large portions of this region's pre-1900 timber cover were dominated by fire-adapted and/or fire-dependent conifers, including ponderosa pine, lodgepole pine, western larch, and western white pine. Many of the mature seral forests were well over 200 years old in the mid-1800s. Just prior to Euro-American settlement (1850 and later), fire-generated or fire-perpetuated forest types dominated vast acreages in the northern Rockies, especially in the warm/dry and warm/moist biophysical settings. Now those stands are densely stocked with Douglas-fir, grand fir, or subalpine fir regeneration. This condition applies to the units proposed in the OLY project.

Timber Harvest and Roads*:* Timber harvest occurring prior to the mid-1980s had little to no management direction for retaining old growth. In fact, it is likely that the direction at the time dictated treating old stands as a means to increase forest productivity. It is unknown how much old growth was harvested, but aerial photos and field observations indicate that in watersheds such as O'Brien Creek and Lower Yaak old trees were harvested. Old growth stands were likely harvested on private land in the valley bottoms as well.

The road system on the District expanded from the 1950s through the 1980s. This impacted old growth stands by harvest or loss of snags within 200 feet of open roads from firewood cutting. Management for the grizzly bear has restricted vehicle traffic on many roads since the 1990s. The District is nearing full compliance for meeting access management standards. The decrease in public motorized access has reduced the impacts on snags within old growth stands adjacent to open roads. Additionally, decommissioning or long-term storage of roads in the project area has allowed for regeneration the linear canopy openings. Over time, these roads lose the abrupt edge effect adjacent to mature forests.

Contrasting Effects of Proposed Actions with Past Actions

As contrasted with past timber harvest, where large old growth trees and other old growth attributes were lost, the OLY Project does not propose any treatments that would modify the characteristics of the stand to the extent the stand would no longer meet the Greene et al. definition of old growth. The objective of the proposed activities within old growth is to increase the resistance and resiliency of the stands to disturbances or stressors.

Effects of Ongoing and Reasonably Foreseeable Actions:

Refer to the list of the ongoing and reasonably foreseeable actions for the project area described earlier in Chapter 3. None of the activities are likely to have an impact on old growth. It is possible that private and corporate land could have harvest activities adjacent to KNF old growth, creating an edge effect (since there is no way to implement design features intended to maintain the structural integrity along the edge and reduce potential windthrow, ice, and snow damage on non-FS lands). However, the combination of very few old growth stands near non-Forest Service land ownership and the small impact of edge effect both have a minimal cumulative effect to old growth. Also, Stimson Lumber Company has requested access to their lands on Yaak Mountain. Approximately 0.16 miles of road would be added to an existing Stimson road. This will have no effect on old growth, since there is no old growth in the vicinity. Firewood cutting may continue

to impact some areas of old growth along open roads, but this is not correlated to the OLY project. Fire suppression will continue to contribute to increased fuel loadings and uncharacteristic conditions, especially in the WUI.

Combined Effects from Past, Proposed, Ongoing, and Foreseeable Actions:

The proposed activities would reduce surface and ladder fuels and canopy bulk densities in the project area. Cumulatively, the activities would incrementally improve the undesirable trends caused by fire exclusion. As the SIMPPLLE model predicts, there is likely going to be an increase in old growth stands in the next 50 years. The proposed harvest and fuels treatments would help restore historically fire maintained habitats within and adjacent to old growth on the landscape. By increasing the resistance and resiliency of these stands to disturbances, it is expected they will persist into the future.

Consistency with the 2015 Forest Plan and Other Management Direction

Land and Resource Management Plan

The 2015 Kootenai National Forest Land and Resource Management Plan provides desired conditions, objectives, standards, and guidelines for OLY. The following are applicable to the actions in this project:

Desired Conditions:

FW-DC-VEG-03 The amount of old growth increases at the forestwide scale. At the finer scale of the biophysical setting, old growth amounts increase for the Warm/Dry and Warm/Moist settings while staying close to the current level for the Subalpine setting. Relative to other tree species, there is a greater increase in old growth stands that contain substantial amounts (i.e., 30 percent or more of the total species composition) of one or more of the following tree species: ponderosa pine, western larch, western white pine, and whitebark pine. Old growth stands are more resistant and resilient to disturbances and stressors such as wildfires, droughts, insects and disease, and potential climate change effects. The size of old growth stands (or patches of multiple contiguous old growth stands) increase and they are well- distributed across the five Geographic Areas on the Forest.

> Under Alternative 1, old growth amounts are predicted to increase (see the introduction of this section), but none of the proposed units would be treated to increase their resistance and resilience to disturbances. Alternatives 2, 3, and 4 would all increase the resistance and resilience of the proposed 531 acres of old growth treatments and 198 acres of recruitment potential old growth treatments. Therefore, the OLY project would contribute to progress toward achieving this desired condition.

Standards:

FW-STD-VEG-01 Within old growth stands, timber harvest or other vegetation management activities shall not be authorized if the activities would likely modify the characteristics of the stand to the extent that the stand would no longer meet the definition of old growth (see glossary for old growth definition).

Alternative 1 does not purpose any treatment within old growth. Vegetation management in Alternatives 2, 3, and 4 would be designed to maintain the characteristics of the old growth stands so they would continue to meet the Greene et al. definition of old growth post treatment. All of the purposed units within old growth have pre-treatment exams, would have a silvicultural prescription written and would have post treatment monitoring scheduled to monitor the effects of the treatment and verify the old growth character. Stands identified as recruitment potential old growth would have post treatment monitoring scheduled as well and any future treatment would be designed to move stands towards reaching old growth. Therefore, the OLY project was designed in accordance with this standard.

Guidelines:

FW-GDL-VEG-01 Timber harvest or other vegetation management activities may be authorized in old growth stands if the activities are designed to increase the resistance and resiliency of the stand to disturbances or stressors, and if the activities are not likely to modify stand characteristics to the extent that the stand would no longer meet the definition of old growth (see the glossary for the definitions of resistance and resilience).

Under Alternative 1, old growth amounts are predicted to increase (see the introduction of this section), but none of the proposed units would be treated to increase their resistance and resilience to disturbances. Alternatives 2, 3, and 4 all propose to treat 531 acres in old growth and 198 acres in recruitment potential old growth in order to increase their resistance and resilience by modifying their structure and species composition. They have been designed to not modify the characteristics beyond meeting the Greene et al. definition of old growth. Therefore, the OLY project was designed in accordance with this guideline.

FW-GDL-VEG-02 Road construction (permanent or temporary) or other developments should generally be avoided in old growth stands unless access is needed to implement vegetation management activities for the purpose of increasing the resistance and resilience of the stands to disturbances.

None of the alternatives in the OLY project propose road construction or development in old growth. Therefore, the OLY project was designed in accordance with this guideline.

Management Area

MA2—no additional desired conditions are applicable to old growth for OLY.

MA6—no additional desired conditions are applicable to old growth for OLY.

Geographic Area

Bull Geographic Area - no additional desired conditions are applicable to old growth for OLY.

Libby Geographic Area - no additional desired conditions are applicable to old growth for OLY.

Yaak Geographic Area –GA-DC-YAK-02 Management of vegetation toward the desired vegetation condition provides habitat for moonworts and northern beechfern and increases in late succession and/or old growth vegetation.

As stated in the proposed, threatened, endangered, and sensitive plant report, surveys have been completed, and *Botrychium ascendens* (upward-lobed moonwort), *Botrychium crenulatum* (wavy moonwort), *Botrychium hesperium* (western moonwort), *Botrychium paradoxum* (peculiar moonwort), *Botrychium pedunculosum* (stalked moonwort), and *Phegopteris connectilis* (northern beech-fern) are not known to occur within the project area. Alternatives 1, 2, 3, and 4 would therefore have no impact and the OLY project would not cause any change toward this desired condition.

Proposed, Threatened, Endangered and Sensitive Plant Species

Introduction

Activities associated with timber harvesting, site preparation, fuels reduction, and prescribed burning have the potential to affect Proposed, Threatened, Endangered and Sensitive (PTES) plant populations.

The purpose of this analysis is to:

- Determine if the alternatives will adversely affect any of the PTES plant species that have potential to occur in the analysis area, and if so, list mitigation measures;
- Insure that the alternatives do not contribute to the loss of viability of any sensitive plant species or cause a trend toward Federal listing;
- Comply with USDA Forest Service Northern Region (R1) policy to insure that sensitive plant species receive full consideration in the decision-making process; and
- Comply with the Endangered Species Act (ESA).
- This analysis considers the short- and long-term management of the project area because management activities:
  - may affect existing and potential habitat,
  - may affect welfare of existing plants,
  - have potential for human disturbance, and/or
  - have potential cumulative effects.

Analysis Area

The analysis area for direct impacts to PTES plant populations is the Lower Yaak, O'Brien, Sheep (OLY) project area. The analysis area for species viability is range-wide for each PTES plant species.

Regulatory Framework

Table 94 shows the documents that guide the analysis of Proposed, Threatened, Endangered and Sensitive species of plants.

Table 94. PTES Guiding Documents

Guiding Document	Direction
1973 Endangered Species Act	Directs agencies to carry out specific actions for the conservation of endangered and threatened species of plants and animals.
2015 Kootenai National Forest Land Management Plan (2015 Forest Plan)	The 2015 Forest Plan details the direction for managing Forest land and resources on the Kootenai National Forest.

Guiding Document	Direction
1976 National Forest Management Act	Directs the Forest Service to "provide for diversity of plant and animal communities based on the suitability and capability of the specific land area in order to meet overall multiple-use objectives"

National Policy

The **Endangered Species Act (ESA) of 1973** declares that all Federal agencies "utilize their authorities in furtherance of the purposes of this Act by carrying out programs for the conservation of endangered species and threatened species listed pursuant to section 4 of this Act." The ESA requires Federal agencies to ensure that any agency action (any action authorized, funded, or carried out by the agency) is not likely to jeopardize the continued existence of any threatened, endangered, or proposed species. Agencies are further required to develop and carry out conservation programs for these species.

The **National Forest Management Act (NFMA)** directs the Forest Service to "provide for diversity of plant and animal communities based on the suitability and capability of the specific land area in order to meet overall multiple-use objectives."

Sensitive species are administratively designated by the Regional Forester (FSM 2670.5) and managed under the authority of the NFMA. FSM 2670.5 Section 19 defines sensitive species as "those plant and animal species identified by a Regional Forester for which population viability is a concern, as evidenced by:

- Significant current or predicted downward trends in population numbers or density.
- Significant current or predicted downward trends in habitat capability that would reduce a species' existing distribution."

2015 Forest Plan

The 2015 Forest Plan (USDA 2015) establishes forestwide goals, objectives, standards, guidelines, and monitoring requirements. The 2015 Forest Plan addresses sensitive species under its forestwide management direction.

FW-DC-VEG-09. Habitat for plant species listed under the Endangered Species Act (ESA) is maintained or restored on NFS lands, thus contributing to species recovery or delisting. Ecological conditions and processes that sustain the habitats currently or potentially occupied by sensitive plant species are retained or restored. The geographic distributions of sensitive plant species in the Forest Plan area are maintained.

The 2015 Forest Plan also supports the protection and maintenance of important riparian zone features, marshes, and water bodies, where sensitive plants often exist.

GOAL-RIP-01. Maintain or improve riparian areas in order to support the ecological functions.

FW-DC-RIP-01. Riparian Habitat Conservation Areas (RHCAs) have healthy, functioning riparian systems and associated habitats that support well-distributed native and desired non-native plant, vertebrate, and invertebrate communities.

FW-DC-RIP-04. Composition, structure, and function of riparian vegetation are appropriate for a given landscape and climatic setting. Riparian vegetation adjacent to larger streams with lower gradients and wide valley bottoms is dominated by conifer stands in late-seral stages. These stands have multiple canopy layers with shrub, forb, and ferns underneath stands dominated by large trees. Native hardwoods such as black cottonwood, paper birch, and/or quaking aspen are found in areas along these larger streams. The narrower riparian zones along smaller, higher gradient streams have vegetation with a wide diversity of seral stages present, from relatively young stands of trees to fairly old stands, with a greater composition of early-seral, shade-intolerant trees species present than found in larger, lower gradient rivers. Natural disturbance regimes occur at intervals that maintain these conditions.

FW-DC-RIP-05. Vegetation in RHCAs is characteristic of reference aquatic and riparian ecosystems and provides: amounts and distribution of large woody debris; vertical structure and habitat for riparian-associated bird, mammal, amphibian, fish, and invertebrate species; summer and winter thermal regulation; ground cover and bank stability to maintain natural rates of surface erosion, bank erosion, and channel migration characteristic of those under which aquatic and riparian ecosystems developed; the capture and storage of sediment; and for recovery of RHCAs after watershed disturbances.

No proposed, threatened, or endangered plant species are known to occur on the Kootenai National Forest (KNF). *Silene spaldingii* (Spalding's catchfly) is known to occur on private land in the Tobacco Valley near USDA Forest Service System lands. Spalding's catchfly, a threatened plant species, is suspected for the KNF. Note: "suspected" means that this species are believed to have potential to occur but, to date, have not been found on the KNF. One candidate plant species *Pinus albicaulis* (whitebark pine) is known to occur on the KNF.

Within the OLY project area, one candidate plant species is known to occur, one sensitive species is known to occur, and 12 additional sensitive species are believed to have moderate/high potential to occur. These 14 plant species, plus *Silene spaldingii*, are listed on PTES Table 95 (in the Ranks and Definitions Used by the Natural Heritage Program section of this analysis) and in the PTES Plant Species Biological Assessment/Evaluation at the end of the PTES analysis. *Silene spaldingii* is included because it is a listed threatened species.

Whitebark Pine (*Pinus albicaulis*)

Data Sources, Methods, Assumptions, Bounds of Analysis

The following methodology was taken to complete this analysis for whitebark pine:

- A map of areas providing probable habitat for whitebark pine (Shotzberger 2013) was overlaid on the OLY project area (for the PTES plant analysis, this area will be referred to as the analysis area). The map shows potential whitebark pine habitat at a large scale, and does not adequately map micro-sites that may also provide habitat (hence, it is not intended to replace field surveys). The map of probable habitat can be found in the project file.
- District records and Montana Natural Heritage Program data were then reviewed to determine if this species is already known to exist in the analysis area.
- Field surveys were completed in the proposed treatment units during the field season of 2014 and 2015. Surveys were also completed in some of the high elevation areas with

potential to provide habitat for whitebark pine outside of the proposed treatment areas. In general, these areas are over 6,000 feet in elevation. High elevation landscape features have more potential to provide habitat for whitebark pine than lower elevation landscape features, so these were emphasized during surveys.

- This analysis was completed using the maps, surveys completed to date, literature, experts, and personal knowledge about the requirements of whitebark pine.

Survey Results

Approximately 1,483 acres have been identified as potential or occupied whitebark pine habitat within the project area. No whitebark pine was discovered within any proposed activity areas. If any whitebark pine is found during the layout phase of the project, additional mitigation would be applied to protect any new occurrences that may be found. The known populations, and probable habitat, are included on the analysis map located in the project record. Areas of proposed activity were overlaid on this map to determine actions which had moderate to high potential to impact whitebark pine.

Affected Environment / Existing Condition

There are several scattered populations of *Pinus albicaulis* (whitebark pine) in the project area. Due to continued decline in its range, in July 2011, whitebark pine was determined to be warranted for protection under the Endangered Species Act by the U.S. Fish and Wildlife Service. Adding whitebark pine to the threatened species list is precluded by the need to address other listings of a higher priority, placing whitebark pine in “candidate status”. Therefore, in December 2011, the Forest Service Northern Region classified whitebark pine as a "sensitive" species for this area.

It has been estimated that the Kootenai National Forest has about 6,000 acres in the whitebark pine forest type (AMS 2003). As compared with areas on the Flathead National Forest or the Gallatin National Forest, whitebark pine presence on the KNF is quite limited. Nonetheless, throughout its natural range, concern about the species has arisen because whitebark pine populations have diminished as a result of mountain pine beetle mortality, blister rust infection, wildfires, replacement by shade tolerant species such as subalpine fir, and most recently, climate change. These threats also operate together, increasing the mortality rates in whitebark pine. Competition for light and moisture by encroaching mountain hemlock and subalpine fir can directly impact whitebark pine sustainability. In addition, to the competitive challenges of this in-growth, the dense multistoried condition also makes whitebark pine particularly vulnerable to the effects of wildfire. A century of fire exclusion is partially responsible for the increase in competitive species and stand density in whitebark pine habitat.

Environmental Consequences

Alternative 1 – Direct and Indirect Effects to Whitebark Pine

Alternative 1 is the No Action Alternative, under which no prescribed burning, timber harvesting, fuels reduction, or watershed improvement would take place. Only natural processes, and fire suppression, would occur within these stands.

The 2015 Forest Plan includes the desired condition that whitebark pine structure, composition, and function trend toward the desired vegetation condition within appropriate high elevation areas (GOAL-VEG-01, FW-DC-VEG-09, GA-DC-VEG-BUL-01 and GA-DC-VEG-YAK-02).

A portion of the Huson Peak Research Natural Area falls within the OLY project area. Most of the 1,715 acre Huson Peak RNA is outside of the project area, on the Libby Ranger District. However, 186 acres are within the OLY project area. This RNA was created to protect and study whitebark pine. The RNAs are cooperatively managed with the Rocky Mountain Research Station. Research Natural Areas are established to provide for the study and protection of a full range of habitat types identified in the "Research Natural Areas of the Northern Region: Status and Needs Assessment" (1996). These areas form a long-term network of ecological reserves established as baseline areas for non-manipulative research, education, and the maintenance of biodiversity. Most of these areas protect late-seral or climax vegetation conditions. These RNAs generally contain undisturbed conditions that are valuable in monitoring the effects of climate change to ecosystems in a late-seral or climax condition. Whitebark pine and all of the native vegetation of the KNF evolved with and are adapted to the climate, soils, and natural processes that took place prior to settlement of this area by Europeans. Any management (or lack thereof) that causes these natural processes to be altered may have a negative impact on native vegetation. An example of altered natural processes would be the removal of fire from the ecosystem. Under special circumstances, deliberate manipulation may be used to maintain or reestablish ecological processes within the RNA (if approved in the RNA management plan or Establishment Record). Planned ignitions or the use of natural, unplanned ignitions may only occur as identified in the RNA Establishment Record and/or if the approved RNA management plan indicates otherwise.

Whitebark pine forests are declining throughout their range in North America because of climate change, the combined effects of historical and current mountain pine beetle outbreaks, fire exclusion management policies, and the introduced pathogen *Cronartium ribicola*, which causes the disease white pine blister rust in five-needle white pines (Keane et al 2012). Blister rust kills trees faster than whitebark pine can regenerate.

Wildfire is an important vegetation recycling force in *Pinus albicaulis* (whitebark pine) stands, but there are usually long intervals between these events. These fires are often fueled by stands or trees killed by the mountain pine beetle. A major reduction in high-elevation fires since circa 1929 has led to the successional replacement of whitebark pine with subalpine fir on the more productive sites in some parts of its range. Whitebark pine will continue to decline as long as fire exclusion limits wildland fire from creating caching sites for the nutcracker in competition-free growing environments suitable for whitebark pine regeneration. Burning creates good caching habitat for Clark's nutcrackers by exposing the ground to create optimal growing conditions for whitebark pine regeneration by removing its competitors. Burning near areas with moderate to high levels of blister rust infection and mortality would favor natural selection of rust-resistant individuals because the surviving cone-bearing trees would likely contain rust-resistant genes unless nutcrackers reclaim most of their cached seed (Keane et al 2012).

Whitebark pine occurs mainly in post fire plant communities, and may be eliminated from ecosystems if fire intervals become too long. Surveys have discovered new whitebark pine individuals within the OLY project area during the 2014 field season. Generally, whitebark pines in the project area are found as widely scattered individuals. However, there are also some dense populations on Pulpit Mountain and the adjacent ridges, including some regeneration in the old burns, as well as some large cone bearing trees adjacent, and outside, the old fire edges. Approximately 1,483 acres of the project area has been identified as probable whitebark pine habitat. Approximately 307 acres (21 percent) of the probable whitebark pine habitat within the analysis area has been burned in wildfires in 1991, 1994, and 2000. Some of the whitebark pine may have been eliminated by the wildfires; however it is believed that the wildfires have also improved the potential habitat within the OLY project area.

Alternative 2, 3 and 4 - Direct and Indirect Effects

Alternative 2, 3, and 4 propose to conduct timber harvest and prescribed burning to accomplish the Purpose and Need described in Chapter 1. Approximately 1,483 acres of the project area has been identified as potential or occupied whitebark pine habitat. No timber harvest or prescribed fire would occur within potential or occupied habitat and no whitebark pine trees have been observed in harvest units. Therefore, this project would not improve habitat for whitebark pine within the project area, but it would also not impact any of the known populations in the project area.

Cumulative Effects to Whitebark Pine

Whitebark pine (*Pinus albicaulis*) forests are declining across most of its range in North America because of the combined effects of three factors (Keane and Parsons 2010). First, there have been several major mountain pine beetle (*Dendroctonus ponderosae*) outbreaks that have killed many cone-bearing whitebark pine trees over 20 centimeters in diameter at breast height. Secondly, the effects of an extensive and successful fire-exclusion management policy since the 1930s has also reduced the area burned in whitebark pine forests, resulting in a decrease of suitable conditions for whitebark pine regeneration. Finally, the introduction of the exotic fungus white pine blister rust (*Cronartium ribicola*) to the western United States circa 1910 has killed many five-needle pine trees. Whitebark pine is susceptible to this disease. The cumulative effects of these three agents have resulted in a rapid decrease in mature whitebark pine over the last 20 years, especially in the more mesic parts of its range (Keane and Arno 1993). Predicted changes in northern Rocky Mountain climate, brought about by global warming, could further exacerbate whitebark pine decline by increasing the frequency and duration of beetle epidemics, blister rust infections, and severe wildfires (Keane and Parsons 2010).

Statement of Findings

Based upon this evaluation and the available information on these species needs, the proposed project would have no impact on *Pinus albicaulis* (whitebark pine).

Other Sensitive Plant Species

Data Sources, Methods, Assumptions, Bounds of Analysis

The following steps were taken to complete this analysis for PTES plants:

- A map of areas with moderate to high potential for providing habitat for PTES plant species was completed for the OLY project area (for the PTES plant analysis, this area will be referred to as the analysis area). The map shows potential plant habitat at a large scale, and does not adequately map micro-sites that may also provide habitat (hence, it is not intended to replace field surveys). The map of potential habitat can be found in the project file.
- District records and Montana Natural Heritage Program data were then reviewed to determine species already known to exist in the analysis area. These populations are included on the analysis map located in the project record. Areas of proposed activity were overlaid on this map to determine actions with moderate to high potential to impact PTES plants.
- The next step was to complete field surveys for all proposed harvest units, burns, and temporary roads, with emphasis on areas with moderate to high potential to provide habitat for PTES plants. In general, these areas included streams, wetlands, riparian

zones, mesic coniferous forest with a component of mature western redcedar, moist cliffs, talus slopes, and dry meadows. Unique landscape features have more potential to provide habitat for rare plants than more common landscape features. These areas were emphasized during surveys. Surveys were completed in the proposed treatment units during the field season of 2014 and 2015 for the OLY project, as well as for past projects within this analysis area. When PTES plant species are discovered within any proposed activity areas, changes are made in the project design to protect the populations. Also, if any PTES populations are found during the layout phase of the project, additional mitigation measures would be applied to protect any new occurrences that may be found.

- This analysis was completed using the maps, surveys completed to date, literature, experts, and personal knowledge about the requirements of each suspected plant species of concern.

Affected Environment / Existing Condition

One candidate plant species *Pinus albicaulis* (whitebark pine) is known to occur within the project area, and has been analyzed in the previous section. Whitebark pine is also included on the Northern Region (R1) Sensitive Plant List. One other sensitive species *Lomatium geyeri* (Geyer's biscuit-root) is also known to occur, and twelve additional sensitive species are believed to have a moderate to high potential for occurrence in the analysis area. These fourteen plant species are listed in Table 95 in the PTES Plant Species Biological Assessment/Evaluation section.

There are many sub-populations of the sensitive plant species *Lomatium geyeri* (Geyer's biscuit-root) within the OLY project area. There is a subpopulation of *Lomatium geyeri* within one proposed burn unit but there are no known populations of sensitive plant species in any proposed harvest unit.

Environmental Consequences

Alternative 1 – Direct and Indirect Effects to Sensitive Plant Species

This alternative proposes no ground-disturbing activity. The response of each of the PTES plant species to management activity varies by species, and in some cases, is not fully known. These rare plants and all the native vegetation of the KNF evolved with are adapted to the climate, soils, and natural processes that took place prior to settlement of this area by Europeans. Any management (or lack thereof) that causes these natural processes to be altered may have a negative impact on native vegetation, including rare plants. An example of altered natural processes would be the removal of fire from the ecosystem. If the No Action Alternative is selected and fire is continuously excluded from the analysis area, there could be a negative impact on PTES plant species due to an unnatural build-up of fuels, increased wildfire intensities, a decrease in seral plant communities, increased canopy closure with a resulting decrease in light to the forest floor, and a decrease in naturally occurring open meadows.

Corydalis sempervirens (rock harlequin) has the potential to occur within the project area. This species occurs mainly in post fire plant communities, and may be eliminated from ecosystems if fire intervals become too long. This species flourishes following stand replacing fires, and appears for only a few years following the fire. There is a decrease in the number of plants as succession occurs, and seed are then banked in duff and soil until the next fire event, which may be hundreds of years later.

Alternative 2 -Direct and Indirect Effects to Sensitive Plant Species

Alternative 2, the Modified Proposed Action, proposes to treat approximately 4,843 acres to accomplish the Purpose and Need described in Chapter 1. This would include 3,127 acres of ground-based timber harvest and associated slash treatments, 111 acres of fuels treatments, and 1,605 acres of planned prescribed burning.

Several treatment areas have potential to provide habitat for rare plants based on the probability mapping done for the analysis area. New occurrences of *Lomatium geyeri* (Geyer's biscuitroot) have been discovered within the project area, and many populations have been found during past surveys in the project area. The 2015 Forest Plan desired condition for the Bull Geographic Area, which the OLY project area is a part, states that the south-facing slopes adjacent to the Kootenai River provide habitat for concentrations of Geyer's biscuitroot that have adapted to low-intensity, frequent fire disturbance (GA-DC-VEG-BUL-02).

Approximately 160 acres of probable habitat containing known populations of *Lomatium geyeri* are within prescribed ecosystem burn Unit F19. These populations were burned in the fall of 1987 in a prescribed burn proposed to stimulate forage for bighorn sheep. There is no data on these populations before the burn, however, it has been noted that these *Lomatium geyeri* plants were some of the most robust and healthy plants examined during the survey year of 1995 (Arvidson 1995). Infestations of *Centurea maculosa* (spotted knapweed) have been noted in, and adjacent to, Fuels Unit F19. Weed treatments are proposed in weed populations along road NFSR 4445, and opportunities to release bio-controls such as *Cyphocleonus achates* (knapweed root weevil) may also provide some long-term benefit.

Botrychium montanum (Mountain moonwort) is also known to occur within the project area, though no longer a sensitive species, it often occurs in genus communities with rare *Botrychium* species, and it can be utilized as an indicator for potential habitat for sensitive *Botrychium* species. The 2015 Forest Plan desired condition for the Yaak Geographic Area, which the OLY project area is a part, includes management of vegetation toward the desired vegetation condition provides habitat for moonworts and northern beechfern and increases in late succession and/or old growth vegetation **(**GA-DC-VEG-YAK-01). The action alternatives propose that old growth, which provides potential habitat for moonworts within the wetter habitat types, be reserved. Old growth treatments are proposed in the drier habitat types utilizing appropriate fuel treatments to prevent the old trees from being killed from wildfires or bark beetles.

Many rare *Botrychium* species including *Botrychium ascendens*, *Botrychium paradoxum*, *Botrychium crenulatum*, and *Botrychium pedunculosum*, occur in bottomland habitats with a riparian influence, as well as moist/mesic habitats and micro-sites with a high component of western redcedar (MNHP rare plant guide). All riparian areas associated with streams and wetlands would be buffered, avoiding potential impacts to riparian habitats that have potential for the occurrence of sensitive plant species.

Approximately 84 acres of proposed harvest treatments proposed under this alternative include a component of *Thuja plicata* (western redcedar) series habitat types (as described in Cooper et al. 1991). *Thuja* habitats have a moderate to high potential to provide habitat for sensitive *Botrychium* species. *Tsuga* series habitats with a high component of western redcedar can also provide low to moderate potential habitat for sensitive *Botrychium* species. These areas have the potential for the occurrence of *Botrychium ascendens*, *Botrychium crenulatum, Botrychium paradoxum*, and *Botrychium pedunculosum*.It should be noted that many stands of western

redcedar do not provide habitat for *Botrychium* species. These sites were surveyed in 2014 and 2015, and no populations were discovered.

The action alternatives have the potential to spread invasive plant species by increasing disturbed areas that are vulnerable to weed infestation, and through increased vehicle traffic. Recreational and logging traffic, equipment, contaminated gravel, livestock, and wildlife can transport weed seeds into non-infested areas. Invasive plant species have a detrimental effect on PTES plant species and other native vegetation by more effectively competing for soil moisture, sunlight, and nutrients.

Eliminating invasive plant species seed transport mechanisms into populations of PTES plants can reduce these impacts. Design features to reduce the spread of invasive plant species seeds are described in Chapter 2. A complete effects analysis for invasive plant species is located in Chapter 3.

Unique landscape features with potential to provide habitat for rare plants were surveyed in 2014 and 2015. No sensitive plants have been found within any of the harvest units. New populations of *Lomatium geyeri,* have been found within the project area, and have been excluded from the harvest treatment areas. These populations are included on the analysis map located in the project record.

Alternative 3 - Direct and Indirect Effects to Sensitive Plant Species

Approximately 4,812 acres are proposed for treatment in Alternative 3. This would include 3,069 acres of ground-based timber harvest and associated slash treatments, 142 acres of fuels treatments, and 1,601 acres of planned prescribed burning.

Alternative 3 has the same acres of potential and known biscuitroot habitat, and acres of potential moonwort habitat, within treatments as proposed in Alternative 2.

Unique landscape features with potential to provide habitat for rare plants were surveyed in 2014 and 2015. No sensitive plants have been found within any of the harvest units. New populations of *Lomatium geyeri* have been found within the project area, and have been excluded from the harvest treatment areas. These populations are included on the analysis map located in the project record.

Alternative 4 - Direct and Indirect Effects

Alternative 4 proposes treatment on approximately 2,822 acres. This would include 2,606 acres of ground-based timber harvest and associated slash treatments, 111 acres of fuels treatments, and 1,605 acres of planned prescribed burning.

Since Alternative 4 has the same acres of probable biscuitroot habitat within fuels treatments as proposed in Alternative 2, the rationale and details of effects will not be repeated here.

Approximately 45 acres of proposed harvest treatments under this alternative include a component of *Thuja plicata* (western redcedar) series habitat types (as described in Cooper et al. 1991).*Thuja* habitats have a moderate to high potential to provide habitat for sensitive *Botrychium* species. This alternative would impact 39 fewer acres of potential habitat for rare *Botrychium* species than the proposed action. *Tsuga* series habitats with a high component of western redcedar can also provide low to moderate potential habitat for sensitive *Botrychium* species. These areas have the potential for the occurrence of *Botrychium ascendens*, *Botrychium crenulatum,*

Botrychium paradoxum, and *Botrychium pedunculosum*.It should be noted that many stands of western redcedar do not provide habitat for *Botrychium* species. These sites have been surveyed and no *Botrychium* species were discovered.

Unique landscape features with potential to provide habitat for rare plants were surveyed in 2014 and 2015, No sensitive plants have been found within any of the harvest units. New populations of *Lomatium geyeri,* have been found within the project area, and have been excluded from the harvest treatment areas. These populations are included on the analysis map located in the project record.

Cumulative Effects to Sensitive Plants for Alternatives 2, 3 and 4

Past effects to sensitive plant species in the project area may have occurred due to soil disturbance, overstory removal, fire suppression, the introduction of white pine blister rust, and the recent introduction of noxious weeds.

There are no records of extirpations of any PTES plant species within the analysis area. Though no known PTES plant populations have been impacted by any of the past timber sale projects, there is potential that some populations that were undetected may have been inadvertently impacted. Past effects to sensitive plant species in the project area may have occurred due to wildfires within the project area. No known populations of sensitive plant species have been impacted by recent wildfires within the project area; however, such impacts are likely for undetected populations. Native plant species' distribution and ecology have developed with the influence of wildfires, and it is likely that fire suppression has been detrimental to some rare species in the lower 48 states. Fire line construction also has the potential to affect PTES plant populations, by both direct impacts, as well as by spreading non-native and invasive plant species.

There is evidence of trends indicating cumulative effects on some PTES plant species throughout their range. The Montana Natural Heritage Program (MTNHP) serves as the state's clearinghouse and principle information source on Species of Concern for plants and animals that are at risk or potentially at risk in Montana. The MTNHP 2014 "Plant Species of Concern Report" identifies 408 Species of Concern and 94 plant species of Potential Concern in the state, based on information gathered from field inventories, publications and reports, herbarium specimens, and the knowledge of Montana botanists.

The international network of Natural Heritage Programs employs a standardized ranking system to denote global (range-wide) and state status. Species are assigned numeric ranks ranging from 1 (high risk) to 5 (demonstrably secure), reflecting the relative degree of risk, based upon available information. A number of factors are considered in assigning ranks including the number, size, and distribution of known occurrences or populations, trends (if known), habitat sensitivity, and definable threats. Factors in a species' life history that make it especially vulnerable are also considered (e.g., dependence on a specific pollinator). Montana Plant Species of Concern are those with a state ranking of S1 through S2 (including S2S3) or SH (known only from historical records). Species ranked S3 (including S3S4), SU, SNR (not ranked) or other special rank designations are treated as Species of Potential Concern. Rank definitions are given below and reflect some updates in terminology in an attempt to avoid terms like "imperiled" that may be perceived as implying "endangered" or "threatened". The meaning and criteria for ranks remain unchanged, to maintain consistency with international standards.

Ranks and Definitions used by the Natural Heritage Program

Table 95 below shows the PTES plant species within the OLY project area.

G1/S1 - At very high risk of extinction or extirpation in the state due to extremely limited and/or rapidly declining population numbers, range, and/or habitat or extirpation in the state.

G2/S2 - At high risk of extinction or extirpation in the state due to very limited and/or declining population numbers, range, and/or habitat or extirpation in the state.

G3/S3 - At risk of extinction or extirpation in the state due to limited and/or declining numbers, range and/or habitat, even though it may be abundant in some areas.

G4/S4 - Apparently secure, though it may be quite rare in parts of its range, and/or suspected to be declining.

G5/S5 - Common, widespread, and abundant (although it may be rare in parts of its range). Not vulnerable in most of its range.

GX/SX - Presumed Extinct or Extirpated - Species is believed to be extinct throughout its range or extirpated in Montana. Not located, despite intensive searches of historical sites, and other appropriate habitat, and small likelihood that it will ever be rediscovered.

GH/SH - Historical, known only from records usually 40 or more years old; may be rediscovered.

GNR/SNR - Not Ranked as of yet.

GU/SU - Unrankable - Species currently unrankable due to lack of information or due to substantially conflicting information about status or trends.

Table 95. PTES Plant Species within the OLY Project Area

PTES Plant Species Known or with High / Moderate Potential to Occur within the OLY Project Area	Current Global and State Rankings (MTNHP Plant Field Guide 2015)
Botrychium ascendens (upward-lobed moonwort)	G3 – S3
Botrychium crenulatum (wavy moonwort)	G4 – S3
Botrychium hesperium (western moonwort)	G4 – S3
Botrychium paradoxum (peculiar moonwort)	G3/G4 – S3
Botrychium pedunculosum (stalked moonwort)	G2/G3 – S2
Clarkia rhomboidia	G5 – S3
Corydalis sempervirens (pink corydalis)	G4/G5 – S2
Heterocodon rariflorum (western pearl-flower)	G5 – S2
Lomatium geyeri (Geyer's biscuit-root)	G4 – S2
Lycopodium dendroideum (prickly tree clubmoss)	G5 – S2
*Mimulus ampliatus (*stalk-leaved monkeyflower)	G3 – S3
Mimulus breviflorus (short-flower monkeyflower)	G4 – S1/S2

PTES Plant Species Known or with High / Moderate Potential to Occur within the OLY Project Area	Current Global and State Rankings (MTNHP Plant Field Guide 2015)
Mimulus clivicola (bank monkeyflower)	G4 – S2?
Phegopteris connectilis (northern beech-fern)	G5 – S2/S3
Pinus albicaulis (whitebark pine)	G3/G4 – S3

G#G# or S#S#: Indicates a range of uncertainty about the status of the species (example - G1G3 = Global Rank Ranges between G1 and G3 inclusive)

?: Inexact Numeric Rank – denotes uncertainty

Ongoing activities within the project area include road maintenance, herbicide application, and fire suppression. These activities may impact rare plants through ground disturbance, toxicity, or removal of overstory canopy. Potential future impacts to PTES species include invasive plant species invasion. Weed treatments have occurred within the project area, and additional mitigation to prevent invasive plant invasion is included in the project design features. Therefore, this project would not contribute to cumulative effects from invasive plant species encroachment. All proposed future ground-disturbing activities would be evaluated through surveys and biological assessments/evaluations as to their impact on PTES plant species. Based on the above information it is believed that this project would not contribute to any negative cumulative effects to any PTES plant species.

PTES Plant Species Biological Assessment/Evaluation

Table 96 summarizes the biological assessment/evaluation for the plants considered in this analysis. The effects analysis provided in this document meet the requirements for a biological evaluation as outlined in FSM 2672.42.

Statement of Findings

Alternative 1 (the No Action Alternative) may impact individuals or habitat but would not likely contribute to a trend towards federal listing or cause a loss of viability to the population or species for *Lomatium geyeri* (Geyer's biscuitroot). Alternative 2, 3, and 4 may also impact individuals or habitat but would not likely contribute to a trend towards federal listing or cause a loss of viability to the population or species for *Lomatium geyeri*. However, it is believed that Alternatives 2, 3, and 4 would benefit Geyer's biscuit-root habitat by reversing a negative trend of vegetation encroachment created by the absence of fire. It is believed that the potential loss of a few individuals would be offset by the benefits of returning controlled fire to the project area.

Based upon this evaluation, and the available information on these species needs, the proposed project and associated activities would have no effect on *Silene spaldingii*. Activities may impact individuals or habitat but would not likely contribute to a trend towards federal listing or cause a loss of viability to the population or species for *Lomatium geyeri*. There would be no impact on the viability of any of the other known and suspected sensitive plant species of the KNF.

Consistency with the 2015 Forest Plan and Other Management Direction

2015 Forest Plan

All action alternatives would trend sensitive plant habitat towards the 2015 Forest Plan (FW-DC-VEG-09) desired condition: “Habitat for plant species listed under the Endangered Species Act (ESA) is maintained or restored on NFS lands, thus contributing to species recovery or delisting. Ecological conditions and processes that sustain the habitats currently or potentially occupied by sensitive plant species are retained or restored.” The geographic distributions of sensitive plant species in the 2015 Forest Plan would be maintained.

Forest Service and National Policy

All alternatives would comply with Forest Service policy on sensitive species (FSM 2670.32) and the ESA. Clause B(T) 6.25 - "Protection of Threatened, Endangered, and Sensitive Species", would be used in the timber sale contract to modify the action as necessary to protect PTES plant populations if missed by field surveys and found after the timber sale contract is awarded.

Table 96. PTES Plant Species Biological Evaluation Summary

Species	Habitat	Conclusion	Justification
Threatened, and Candidate Species			
Silene spaldingii (Spalding's catchfly)	Palouse Prairie grassland	No effect	Habitat absent from activity areas
Pinus albicaulis (whitebark pine)	High elevation forest sites near timberline	No impact	Surveys have been completed, and the project design would avoid the known populations
Sensitive Species			
Botrychium ascendens (upward-lobed moonwort)	Roadsides, riparian forests	No impact	Surveys have been completed, and this species is not known to occur within the project area
Botrychium crenulatum (wavy moonwort)	Riparian forests, open wet meadows, and roadsides	No impact	Surveys have been completed, and this species is not known to occur within the project area
Botrychium hesperium (western moonwort)	Snow fields, moist road ditches, meadows and grasslands in the montane zone	No impact	Surveys have been completed, and this species is not known to occur within the project area
Botrychium paradoxum (peculiar moonwort)	Mature western redcedar stands or grasslands and meadows	No impact	Surveys have been completed, and this species is not known to occur within the project area
Botrychium pedunculosum (stalked moonwort)	Old growth western redcedar in floodplains and meadows	No impact	Surveys have been completed, and this species is not known to occur within the project area
Corydalis sempervirens (pink corydalis)	Post fire plant communities and forest openings	No impact	Surveys have been completed, and this species is not known to occur within the project area
Heterocodon rariflorum (western pearl-flower)	Road shoulders, open soil areas near talus slopes, submaritime bedrock meadows	No impact	Surveys have been completed, and this species is not known to occur within the project area
Lomatium geyeri (Geyer's biscuitroot)	Rock outcrops, submaritime bedrock meadows	May impact individuals*	Surveys have been completed, and the project design would protect the known populations
Lycopodium dendroideum (prickly tree clubmoss)	Mesic coniferous valley bottoms	No impact	Surveys have been completed, and this species is not known to occur within the project area

Species	Habitat	Conclusion	Justification
Sensitive Species Continued			
Mimulus ampliatus (stalk-leaved monkeyflower)	Road shoulders, open soil areas near talus slopes, vernally moist submaritime bedrock meadows	No impact	Surveys have been completed, and this species is not known to occur within the project area
Mimulus breviflorus (short-flower monkeyflower)	Open soil areas near talus slopes, vernally moist submaritime bedrock meadows	No impact	Surveys have been completed, and this species is not known to occur within the project area
Mimulus clivicola (bank monkeyflower)	Open soil areas near talus slopes, vernally moist submaritime bedrock meadows	No impact	Surveys have been completed, and this species is not known to occur within the project area
Phegopteris connectilis (northern beech-fern)	Moist old growth, riparian areas, stream edges, and weeping walls	No impact	Surveys have been completed, and this species is not known to occur within the project area

***** May impact individuals or habitat but would not likely contribute to a trend towards Federal listing or cause a loss of viability to the population or species.

Recreation

Introduction

The OLY project area provides a variety of recreational opportunities for users through diverse settings. The project area offers several developed recreational opportunities such as Yaak Mountain Lookout rental, Yaak River, Kilbrennan Lake Campground, Troy Shooting Range and Alvord Lake day-use. The majority of use within the project area is in undeveloped recreation activities, including but not limited to hiking, gathering forest products (berries, firewood, mushrooms), hunting, fishing, viewing wildlife and scenery, driving for pleasure, mountain biking, snowmobiling, skiing and snowshoeing. This section analyzes the potential effects to the recreational resource from proposed activities. The project area includes several National Forest System Roads (NFSRs) that the public utilizes for the above mentioned activities. The project area is important due to the ease of access year-round for the community of Troy Montana.

Regulatory Framework

2015 Forest Plan

The 2015 Forest Plan provides overall guidance for the management of the lands on the Kootenai National Forest. It describes the goals, desired conditions, and objectives toward which the management of the land should be directed. And it establishes standards and guidelines to help achieve or maintain the desired condition or conditions, to avoid or mitigate undesirable effects, or to meet applicable legal requirements.

The 2015 Forest Plan components which provide specific recreation resource direction relevant to this project include:

- **Goal-AR-01.** Manage large areas on the Forest that accommodate opportunities for solitude, and self-reliance. Provide traditional recreational opportunities such as hunting, fishing, gathering products, and hiking. Water-based activities are provided at easily accessed destinations and accommodate concentrations of the day use as well as overnight camping opportunities. Maintain a road and trail system that provides access to the Kootenai National Forest.
- **FW-DC-AR-01**. Day use access is available for relaxation, viewing scenery and wildlife, and for water and snow-based play. Recreation rental cabins and lookouts provide safe, comfortable, overnight facilities that allow visitors to experience and learn about the rich history of the area. Dispersed camping opportunities are available for a wide variety of users while considering resource concerns, activity conflicts, or over-use.
- **FW-DC-AR-03.** Opportunities for outdoor recreation, such as hunting, fishing, wildlife viewing, berry picking, firewood gathering, and bird watching are available for a wide variety of users.
- **FW-DC-AR-04.** Provide year-round outdoor recreation opportunities and experiences in a range of settings as described by the recreation opportunity spectrum (ROS).
- **FW-DC-AR-05.** A variety of motorized and non-motorized winter and summer recreation opportunities are available. Well-designed and maintained trailheads exist and offer adequate parking and turnaround areas. Trails are designed and maintained for the given users (saddle stock, snowmobiles, OHV users, hikers, mountain bikers, etc.).

- **FW-DC-AR-06.** Solitude and non-motorized experiences are available in remote settings. Non-motorized areas are of sufficient size and configuration to minimize disturbance from other uses.
- **FW-DC-AR-08.** Motor vehicle use designations are complete, accurate signing is in place, and motorized vehicle use maps are available. User conflicts are reduced. Loop opportunities are a part of both the road and trail systems.
- **GA-DC-AR-BUL-01**. Improvements are made to maintain or increase recreational opportunities, including the establishment of winter non-motorized trails in lower elevations.
- **FW-OBJ-AR-01. Dispersed Recreation Sites**-Over the life of the Plan, the outcome is:

  Improve conditions at 50 to 75 dispersed sites. Improved conditions would mitigate critical recreation standards such as; visitor education, sanitation, define camping area impacting vegetation or stream banks, define parking area where site is expanding, or abate high-risk conditions such as bug killed trees.
- **FW-OBJ-AR-02. Developed Recreation Sites-**The outcome is:

  Over the life of the Plan, 5-10 percent reduction of deferred maintenance at cabin and lookout rental sites and at water-based sites.

The 2015 Forest Plan components which provide specific Scenic and Recreational River Corridor resource direction relevant to this project include:

- **MA2-DC-AR-01**. **Wild/Scenic/Recreational**. Eligible wild, scenic, or recreational rivers and their adjacent areas retain their free-flowing status and preliminary classification, and conserve or enhance their outstanding remarkable values.
- **MA2-GDL-AR-08. Senic.** Management activities should be consistent with the Scenic Integrity Objective of High in eligible scenic river segments.
- **MA2-DC-VEG-01. Wild/Scenic/Recreational.** Natural ecological processes (e.g., plant succession) and disturbances (e.g., floods, fire, insects, and disease) are the primary forces affecting the composition, structure, and pattern of vegetation.
- **MA2-GDL-AR-09. Recreational.** Management activities should be consistent with the Scenic Integrity Objective of Moderate to High in eligible recreational river segments.
- **MA2-GDL-TBR-02. Scenic/Recreational.** Timber harvest is allowed to maintain or restore the values for which the eligible scenic or recreational river was identified. Timber harvest is not scheduled and does not contribute towards the allowable sale quantity.
- **MA2-GDL-Fire-03. Scenic/Recreational.** Natural, unplanned ignitions, as well as planned ignitions, may be managed to meet resource objectives in eligible scenic and recreational river segments.

Forest Service Manual

Forest Service Manual 2300 provides the overall objectives and policies to be used with managing the variety of recreational opportunities on National Forest System (NFS) lands. It encourages the use of the Recreation Opportunity Spectrum (ROS) in identifying appropriate types of recreation opportunities on NFS lands.

Resource Indicators and Measures

The Recreation Opportunity Spectrum (ROS Primer and Field Guide, R6-REC-021-90, USDA Forest Service, April 1990) provides the framework to understand how resource management

affects settings, activities and ultimately the experience levels of recreationists. Experience levels are defined as highly probable outcomes of participating in recreation activities in specific recreation settings. The key to providing most experiences is the setting and how it is managed. As resource managers, the Forest Service (FS) can facilitate or hamper many desired experiences by the way setting indicators are managed. These indicators are: Access, Remoteness, Social Encounters, Visitor Management, Facilities and Site Management, Visitor Impacts, and Naturalness.

ROS Setting Characterizations

The proceeding ROS settings will continue to be maintained to the desired distribution of forestwide Recreation Opportunity Spectrum settings (See Table 7 on page 34 of the 2015 Forest Plan).

Primitive Setting - Area is characterized by essentially unmodified natural environment of fairly large size. Interaction between users is very low and evidence of other users is minimal. The area is managed to be essentially free from the evidence of human-induced restrictions and controls. Motorized use within the area is not permitted.

Semi-Primitive Non-Motorized Setting - Area is characterized by a predominantly natural or natural-appearing environment of moderate to large size. Interaction between users is low, but there is often evidence of other users. The area is managed, in such a way that minimum on-site controls and restrictions may be present but are subtle. Motorized use is not permitted.

Semi-Primitive Motorized Setting - Area is characterized by predominantly natural or natural-appearing environment of moderate to large size. Concentration of users is low, but there is often evidence of other users. The area is managed in such a way that minimum on-site controls and restrictions may be present, but is subtle. Motorized use is permitted.

Roadbed Natural Setting - Area is characterized by predominantly natural appearing environment with moderate evidence of the sights and sounds of man. Such evidence should harmonize with the natural environment. Interaction between users may be low to moderate, but with the evidence of other users prevalent. Resource modification and utilization practices are evident, but harmonize with the natural environment. Conventional motorized use is provided for in construction standards and design of facilities.

Rural Setting- Area is characterized by substantially modified natural environment. Resource modification and utilization practices are to enhance specific recreation activities and to maintain vegetative cover and soils. Sights and sounds of humans are readily evident, and the interaction between users is often moderate to high. A considerable number of facilities are designed for use by a large number of people. Facilities are often provided for special activities. Moderate densities are provided far away from developed sites. Facilities for intensified motorized use and parking are available.

Urban Setting- Area is characterized by a substantially urbanized environment, although the background may have natural appearing elements. Renewable resource modification and utilization practices are to enhance specific recreation activities. Vegetative cover is often exotic and manicured. Sights and sounds of humans, on site, are predominant. Large numbers of users can be expected, both on site and in nearby areas. Facilities for highly intensified motor use and parking are available with forms of mass transit often available to carry people throughout the site.

Impact Levels

Impacts would be high where actions would preclude existing or planned recreational uses after implementation or permanently, negatively affect recreation experiences.

Impacts would be moderate where actions would temporarily preclude existing recreation uses during peak use periods during implementation or temporarily, negatively affect recreation experiences.

Impacts would be low where actions would temporarily preclude existing recreation uses during non-peak user periods during implementation or temporarily, negatively affect recreation experiences.

Within the above framework, the inverse or positive impacts can also be forecasted as high, moderate or low as well.

Analysis Area

The Analysis area for recreation resources is the OLY project area (See vicinity map M-1)

Affected Environment

The OLY project area provides a variety of recreational opportunities for activities through an array of setting types. All settings defined in the ROS are found in the project area except the urban setting. Developed recreational sites\facilities are available in this area, and are considered to be in good condition. The public use of these sites\facilities is increasing or holding constant, conflicts among user groups is rare but exists. Vandalism is the exception rather than the rule but does occur at developed and dispersed sites as well as trailheads on an annual basis.

Recreational opportunities are almost unlimited in this area and include hiking, gathering forest products (berries, firewood, and mushrooms), hunting, fishing, mountain biking, viewing wildlife and scenery, driving for pleasure, snowmobiling, skiing and snowshoeing. Once every 5 years, each National Forest and Grassland has visitor use survey, the last KNF survey was in 2012. The most frequently reported primary activities are hiking/walking (20 percent), hunting (16 percent), and viewing natural features (14 percent). Over half of the visitors report participating in viewing scenery, and nearly 40 percent report viewing wildlife according to the Kootenai National Forest National Visitor Use Monitoring (NVUM results accessed 12/08/2015). All top activities are popular in the project area. The ease of access and close proximity makes the project area important to the community of Troy Montana where the area is utilized year-round. Over 50 miles of trail is available within the project area traveling through various setting types and accommodating various modes of travel.

Existing Condition of the OLY Project Area

The OLY project area is currently providing opportunities for recreation in a variety of settings, characterizations and experiences as defined in the ROS. All settings defined in the ROS are in the OLY project area with the exception of the urban setting.

Inventoried Roadless Areas (IRAs)-There are two Inventoried Roadless Areas (IRAs) in the analysis area: Saddle Mountain IRA #168 and Flagstaff IRA#690 (See the Roadless Resources section for more information).

Yaak and Kootenai Rivers- Segments of the Yaak River and Kootenai River within the OLY project area are in MA2, Eligible Wild and Scenic Rivers. FSH 1909.12-Land Management

Handbook Chapter 80-Wild and Scenic Rivers defines River Corridor as the geographic area generally encompassed within one-quarter mile on either side of a river studied for eligibility or suitability that contains the river and its outstanding remarkable values(ORV).

Eligibility for wild, scenic and recreational river is an evaluation of whether the river (or segment) is free flowing and possesses one or more outstandingly remarkable values (ORV) – a value which is unique, rare or significant. An illustrative list of possible ORVs includes: scenery, recreation, geology, fish populations, habitat, wildlife, prehistory, history, botany/rare plants and plant communities, and natural areas. The ORVs for the eligible Yaak River segments are botany, history, recreation and scenery; while the ORVs for the eligible Kootenai River segment are recreation, fisheries, wildlife and history.

MA2 applies to river segments that have been identified as eligible for inclusion as part of the Wild and Scenic Rivers System (WSR) under the authority granted by the Wild and Scenic Rivers Act of 1968, as amended. Congressional action designates these areas. As defined by the act, eligible rivers are classified as:

> **Scenic Rivers**: those rivers or sections of rivers that are free of impoundments, with shorelines or watersheds still largely primitive and shorelines largely undeveloped, but accessible in places by roads.
>
> **Recreational Rivers**: Those rivers or segments of rivers readily accessible by road or railroad that may have some development along their shorelines, and that may have undergone some impoundments or diversion in the past.

The segment of the Yaak River from the northernmost project boundary south to the Yaak Falls is classified as eligible Recreational River; the segment from the Yaak Falls south to the Kootenai River is classified as eligible Scenic River (Figure 6). The segment of the Kootenai River within the project boundary is classified as eligible Recreational River (Figure 6). No eligible Wild River segments occur within the project boundary (See the Errata for the Final Environmental Impact Statement for the Kootenai National Forest Land Management Plan (USDA-FS 2015a).

Yaak Mountain Lookout rests atop its namesake peak at an elevation of 4,977 feet. The tower has been used as an observation point spotting forest fires since 1958. The tower is now used as a lookout rental and is in the National Recreation Reservation Service available through recreation.gov. The tower is available for rent from June 15 through October 1 at $35 a night (2014) and is usually rented every night it is available.

Kilbrennan Lake Campground is located on the north end of Kilbrennan Lake and is open year round with no fee to the visitor. The campground has seven developed campsites with bear resistant food storage containers available. Visitors need to abide to the “Pack it in-Pack it out” camping etiquette. The site has two vault toilets available for overnight and day-use users. The lake has a primitive boat ramp and fishing\ice fishing is a very popular activity which makes for a popular year round destination. Montana Fish, Wildlife and Parks regularly stocks the lake predominately with rainbow trout. The lake is monitored as a “no wake” lake for boaters.

Yaak River Campground is located off U.S. Highway 2 west of Troy, Montana. The campground is located on the Kootenai River with the Yaak River dividing the campground into two halves. The campground that lies east of the Yaak River is located in the project area. The east half has 22 sites and a group area that are available for rent. The campground sites are available on a first come-first serve basis. There is a campground host, firewood service, water, and trash service at the site. The campground charges a $10 overnight fee and $30 fee for the day-

use group site. The campground is managed with a fee from Memorial Day through Labor Day and is open with no fee the rest of the year with a pack it in-pack it out policy.

Alvord Lake Day-Use Site is a popular day-use destination open all year to the public. The site has three sites available for day-use visitors equipped with picnic tables and fire rings. The site has a developed boat ramp for small boats and a vault toilet. A trail circles the lake and travels by an outdoor classroom (wood pavilion) that is available for educational\conservation events by local schools and clubs. There is a floating dock below the classroom as well. The lake primarily has warm water fish species available (perch, bass and pumpkinseeds) for fishing and currently Montana Fish, Wildlife and Parks does not stock the lake.

Sears Flat Cross-Country Ski Course is available to ski when adequate snow depth is reached. The trail system is comprised of three skiing loops for a total of about 3 miles. The ski course is groomed periodically by the Forest Service. The site is not very popular due to poor snow depth. The Forest Service will search for partners to continue grooming efforts in order to accommodate users.

Snowmobiling is very popular in the Pulpit\China Mountain areas. No trails are groomed in the OLY project area. Riding opportunities are available on the NFSRs and are widely used. NFSR 4445 travels around the "Kootenai Face" and offers riders great vistas of the Kootenai River, Kootenai Falls, Bull River Valley and north end of the Cabinet Mountain Wilderness. The area provides good loop rides on NFSRs 4429, 752, 331 and 4445. The Troy Snowmobile Club voiced their strong support to continue using the closed Lynx Creek NFSRs 4433 and 4433B to access popular riding areas.

National Recreation Trails (**NRT**) -Pulpit Mountain #366 and Skyline #706 are NRT trails. NRT is a designation given to existing trails that contribute to health, conservation, and recreation goals in the United States. Over 1,148 trails in all 50 states, available for public use and ranging from less than a mile to 485 miles (781 kilometers) in length, have been designated as NRTs on Federal, State, municipal, and privately owned lands. Trails may be nominated for designation as NRTs each year. The NRT online database includes information on most designated trails. NRTs are part of the National Trails System.

National Forest System Trails - Table 97 lists the NFS trails in the project area. These trails all offer hiking opportunities and the vast majority offer stock pack and saddle, mountain bike and over-snow vehicle opportunities.

Table 97. NFS Trails in the OLY Project Area

Trail Name	Trail Number	Length (miles)
Kedzie Creek	41	2.2
Pulpit Mountain NRT	366	5.7
Pulpit Ridge	709	4.7
Kootenai Creek	218	3.85
Alvord Lake	460	2
Skyline NRT	706	12
Prospect/Gunsight	705	6.8
Feeder Creek	517	2.25

Trail Name	Trail Number	Length (miles)
Feeder Mountain	520	4
Arbo Creek/Wee Lake	196	5.5
China Rim/Flagstaff	43	1.5*
	Total	**50.5**

* The China Rim/Flagstaff Trail is on the Three Rivers Ranger District from milepost 5.45 to 6.95.

Outfitter and Guide Use in OLY project area- There are three outfitters permitted in the OLY project area for hunting at this time. One outfitter is permitted for mountain lion and wolf and two outfitters for just wolf. Due to the proximity of the area to the town of Troy, Three Rivers Ranger District doesn't permit use during the general big game season. Rather the area is available for mountain lion hunting and wolf hunting which generally take place after the big game season. Three different outfitters are permitted to fish\float the Kootenai River and Yaak River. These Rivers comprise the north and south boundaries of the OLY project area. Opportunities change over time with permit renewals, annual operating plan requests and changing outfitters.

Dispersed Recreation occurs on areas of the Forest outside of developed sites in general forest areas where recreation facilities, if present, are primarily for resource protection. The open or closed NFSRs provide access for individuals performing dispersed recreational activities. Dispersed sites have little to no investment, with rustic or rudimentary improvements (barriers, signs or vault toilets) provided for resource protection. Dispersed recreation sites include many user-created sites. In 2011 the Kootenai National Forest embarked on an ongoing dispersed recreation site inventory program. Hundreds of sites have been inventoried on the Kootenai these sites include: camping areas, day-use areas, rock climbing areas, boating\fishing areas, observation points and trailheads. The OLY project area has nearly 40 dispersed sites inventoried.

Troy Shooting Range- In 2004, in response to the increased need for a designated shooting area, the Kootenai National Forest and Lincoln County worked in partnership to create a proposal that would allow the development and operation of a shooting range. Lincoln County proposed/requested a special use authorization to develop, operate and maintain a public shooting facility. The range currently includes: 2 pistol bays, 400-yard shooting range, skeet and trap, archery range, club house and vault toilet. The shooting range is under a special use permit to Lincoln County and is managed by the Troy Shooting Club and Troy Archery Club.

Kootenai Falls and Swinging Bridge-Kootenai Falls is a one of the most popular tourist destinations on the Forest. The Forest Service manages the Swinging Bridge that crosses the Kootenai River. Kootenai Falls is one of the largest free flowing waterfalls in the northwest. The falls area was once inhabited by the Kootenai Indians and they frequent the area regularly today. In the early 1800s, David Thompson, a Canadian explorer and employee of the Northwest Company, travelled into the Kootenai river area and used the Kootenai River as a navigational guide through the area following Native American Indian and game trails. He portaged around the falls, following cairns — piles of rocks marking the trail — built by the Kootenai Indians. Bighorn sheep have been transplanted in the area and are frequently seen.

Access and Recreation-Access, using NFSRs, is associated with virtually every activity that takes place on the Kootenai National Forest. Roads accommodate many purposes such as: outdoor recreation, fire suppression, livestock and wildlife management, transport of natural resources such as logs and minerals, firewood\mushroom\berry gathering, private in-holding access, electronic site and utility corridor maintenance, and managing and monitoring forest

resources. Modes of travel on the Forest include: large commercial trucks, cars, pickups, four-wheel drive vehicles, over-snow vehicles, off-road vehicles (e.g. motorcycles, ATVs, UTVs), and mountain bikes. Other non-vehicle travel includes cross-country/back-country skiing, dog sledding, horseback riding and hiking. These various forms occur on open and closed roads (motorized and non-motorized dependent on legal orders) and on paved, aggregate or native surfaces. In the OLY project area there are approximately 222 miles of NFSRs. Of the 222 miles:

- 71 miles (32 percent) allow year round motor vehicle use
- 25 miles (11 percent) are gated and allow over-snow motor vehicle use December 1 to April 30.
- 126 miles (57 percent) are bermed /impassable and allow over-snow motor vehicle use December 1 to April 30.

Environmental Consequences

Alternative 1-Direct and Indirect Effects

In Alternative 1, the No Action Alternative, the OLY project area would continue to provide a variety of recreational opportunities in a variety of settings. . Cold wet summers lower use in developed sites and summer based activities. Heavy snow winters show visitor increase in snowmobiling and other winter activities-consequently the opposite is true for both seasons. Overall, recreational use is increasing and is expected to continue in this area.

Developed sites will continue to be maintained within budget limits. The trails systems will continue to be maintained within budget limits. Other recreational activities would continue to be dispersed and varied across the area.

Access on existing NFSRs and trails will continue to offer hikers, mountain bikers, horseback-riders, snowmobilers, skiers, motorized-users (motorcycle, UTV, ATV, passenger car\truck, etc.) outdoor experiences. NFSRs in the project area that are currently restricted for motorized use would continue to see vegetation encroach upon the road (trail) prism and over time this may limit access by hikers, horseback, bicyclists and other non-motorized users.

Driving for pleasure and viewing wildlife\scenery are extremely popular activities in the project area. However, vegetation growth will diminish viewing opportunities over time. Open areas popular to over-snow vehicles created by past wildfire or timber removal practices will continue to grow in blocking riding access opportunities. Opportunities for gathering forest products including huckleberries, mushrooms and firewood would continue to be dependent on weather and other natural forces. Vegetation would continue to encroach upon existing openings and are expected to limit forage for wildlife and berry production over time in areas that are currently providing forage and berry production. This trend is also expected to continue on the ridges and openings that occur in the two IRAs, as vegetation and trees encroach upon natural openings in the absence of a fire event.

Alternative 2, 3 and 4-Direct and Indirect Effects

Alternative 2, 3, and 4 would have very similar effects to recreational resources and will be discussed together for the purpose of this analysis.

The following improvements in the proposed action are consistent through Alternatives 2, 3 and 4 as a result of the implementation of this project. The proceeding improvements are subject to additional funding and potential partners:

- The implementation of a boat ramp at Kilbrennan Lake Campground. The new ramp would replace the native ramp with concrete or other contemporary design. The new ramp will provide easier access boat launching. The current ramp provides difficult access during muddy/snow times. Lake users may experience a ramp closure while the new ramp is implemented. Several road pullouts will be improved to provide better parking for lake users – as fishermen/early season (before the campground is free from snow) day users park as best they can along the road, but end up blocking the road.
- Upgrading a portion of the Alvord Lake Trail to be accessible to all under FSTAG (Forest Service Accessibility Guidelines) standards, including construction of a paved trail to the Outdoor Classroom located on the northwest side of the lake. The new trail will help individuals with a disability to access the Outdoor Classroom, where before it was very difficult.
- Improvements to a portion of the tread and one stream crossing of Trail 196 in Arbo Creek for recreation and watershed improvement. Mountain bikers and stock users will benefit the most from new tread construction through the area.
- A parking area at the bottom of NFSR 4445 Lynx Creek Road, to facilitate existing snowmobile use on NFS lands. The parking area that is currently used is on private property. Constructing a new parking area will accommodate users when current parking is no longer allowed.
- Improvements to portions of NFSR 4429 Pulpit Jeep Road to improve drainage, brushing, and construction of turnouts. These improvements will provide easier access to trails 366 and 706 as well dispersed camping sites. NFSR 4429 is utilized for consumptive and non-consumptive activities i.e. hunting and driving for pleasure-improving the road condition will benefit users allowing for a better recreational experience.
- Parking area improvements, potentially including widening, at trailheads to the following trails: #43 China Rim, #366 Pulpit Mountain National Recreation Trail, #709 Pulpit Ridge, and #706 Skyline Ridge. Providing a better improved trailhead will accommodate more parking and makes the trailhead easier to find.

Effects of Vegetation Management Activities

The proximity of the project area to the community of Troy offers numerous developed and dispersed recreation opportunities. All alternatives will have some effects on these activities. The direct effects to recreational opportunities from timber harvest activities would include the sights and sounds of timber harvest practices, increased traffic in areas where harvest activities were occurring and temporary displacement of some recreational users in those areas where harvest or burning would occur. Several timber harvest and burning activities are planned directly adjacent to developed sites.

Common to Alternatives 2, 3, and 4 is the loop road infrastructure that can mitigate harvest or burning displacement. Throughout the project area there are several loop NFSRs that will enable recreation users to still utilize specific destinations. The following roads may be utilized to access most destinations: 4445 Kootenai Mtn. AKA Kootenai Face, 752 O'Brien Creek, 4429 O'Brien\Lynx Creek AKA Jeep Road, 331 Rabbit\O'Brien, East Side County Road, Kilbrennan Lake County Road, and Rabbit Creek County Road.

The trail closures and user displacement would be short in nature. Several trailhead access destinations may be affected throughout the cycle of harvest activities and burning in the project area. Recreational users of these trails would be temporarily displaced; this will be common to

Alternatives 2, 3, and 4. Timber harvest and prescribed burning will have no effect directly to the following trails and will not change the recreational activities related to the trails themselves.

Project effects by trail are shown in Table 98.

Table 98. Project Effects by NFS Trail

Trail Name	Trail Number	Length (miles)	Project Effect
Kedzie Creek	41	2.2	May encounter logging traffic depending on access point.
Pulpit Mountain NRT	366	5.7	May encounter logging traffic depending on access point.
Kootenai Creek	218	3.85	Skyline and fuels units will close access at the north termini off NFSR 4445 - The south termini, at the swinging bridge off US Highway 2 near the Kootenai Falls would be unaffected.
Alvord Lake	460	2	Fuels Unit F15 will close area during burning.
Skyline NRT	706	12	Fuels Unit F1 near Saddle Mountain may displace users on the trail.
Prospect\Gunsight	705	6.8	May encounter logging traffic to trailhead.
Feeder Creek	517	2.25	Fuels Unit F5 and F6 will displace users during burning activities.
Feeder Mountain	520	4	May encounter logging traffic to trailhead.
Arbo Creek\Wee Lake	196	5.5	May encounter logging traffic to trailhead.
China Rim\Flagstaff	43	1.5*	May encounter logging traffic depending on access point.
Pulpit Ridge	709	4.7	May encounter logging traffic depending on access point.

* The China Rim\Flagstaff Trail is only on the Three Rivers Ranger District from milepost 5.45 to 6.95.

Common to Alternatives 2, 3, and 4 is a closure of the Troy Shooting Range. It may be necessary to implement a temporary closure on the Troy Shooting Range during logging and fuel reduction operations for the safety of the operators. Closures due to harvest activities will occur in summer or winter and will not effected during general big game hunting season. The range is open to the public all year round.

Common to Alternatives 2, 3, and 4 is the temporary closure of the Yaak Mountain Lookout Rental. The rental window is typically from late May through September. Rental opportunities will be suspended for public safety. Yaak Mountain Lookout is on the NRRS (National Recreation Rental System) and the booking window will be marked as unavailable. However, Yaak Mountain is a very popular rental and when harvest is complete the district will open the rental. It is anticipated that there will be some lost rental revenue due to safety closures during harvest operations. The Yaak Mountain Lookout generates approximately $4,000 in rental revenue. The District receives 95 percent back from revenue made the year prior for REA (Recreation Enhancement Act) funds.

Common to Alternatives 2, 3, and 4 is the temporary closure for Kilbrennan Lake Campground and boat launch due to prescribed burning. Fuels Units F5 and F6 are located adjacent to the site and are scheduled for a spring or fall burn. The closure would be during the time of burning operation and would be expected to occur in April-May in the spring and September-October in the fall.

Common to Alternatives 2, 3, and 4 are the winter harvest activities and the effects to snowmobiling. There are no groomed routes in the project area; however snowmobiling still occurs on NSFRs within the project area. Winter harvest would require temporary restrictions to snowmobiling during harvest and hauling activities to provide for public safety.

Common to Alternatives 2, 3, and 4 is the harvest\burning activities that will take place near the Sears Flat Cross-Country Ski Course. Harvest Units 33 and 34 will be winter tractor logged which will displace cross-country skiing opportunities. The course is located at a low elevation and currently receives very little use mainly due to inadequate snow depth. The harvest activities that take place within the course will be beneficial for future trail grooming practices. Removing portions of the tree canopy helps the groomed trial hold its snow structure. Displaced skiers may utilize the Cougar Ridge Course located approximately 6 miles north. The ski course trail system also accommodates hikers and stock users from the spring through fall. Fuels unit F11 may displace some users to the trail system but it would be short in nature. Harvest Units 35, 35B, 36, and 41B in Alternatives 2 and 4 will become Fuels Units F33, F34, F35, F36 and F32 respectively in Alternative 3 but should have no effect to users.

Common to Alternatives 2, 3, and 4 is the effect on consumptive outfitting and guide operations. Within the project area guiding for mountain lion and wolf is permitted. There should be temporary displacement on these activities; however taking into account the expanse of their operating range the effect would be minimal during the time of timber harvest operations.

Common to Alternatives 2, 3, and 4 is NFSRs 4433, 4433A and 4433B (Lynx Creek) will be treated to ensure hydrologic stability before being closed to non-winter motorized access. The NFSRs will be decommissioned but will be in a condition to allow continued snowmobile access to riding destinations on Pulpit Mountain.

Common to Alternatives 2, 3, and 4 is the effect of timber harvest and prescribed burning on the landscape. These actions may improve habitat, reduce fuels, restore natural processes and promote wildlife forage, including huckleberry production. Recreational opportunities can be improved for hunting, wildlife viewing, access, and gathering forest products. Alternative 2 would have the most long term effect on recreation followed by Alternative 3 then 4 (See Table 99).

Table 99. Timber Harvest and Prescribed Fire Activity by Action Alternative

Alternative	Timber Harvest (acres)	Prescribed Fire (acres)
Alternative 2	3,127	1,716
Alternative 3	3,069	1,743
Alternative 4	2,606	1,731

Common to Alternatives 2, 3, and 4 is the reconstruction and reconditioning work to forest access. Improvements may include the installation of drain dips and culverts, constructing or cleaning of catch basins and ditches, dust abatement, buttressing cut slopes and fill slopes and resurfacing and would improve user experience in some locations. Recreationists use NFSRs to access trailheads, closed roads, fishing, hunting and gathering activities, as well to view scenery and wildlife.

Common to Alternatives 2, 3, and 4 is the intermittent stored NFSRs, decommissioned NFSRs, and undetermined roads added NFSRs:

- Approximately 11.1 miles of intermittent road that is currently closed to motorized use are proposed to be actively treated. Stabilization work would include but not limited to removing undersized culverts or provide armored overflows, recontouring unstable sections of road, water barring, scarifying the road surface, and seeding. These actions will be beneficial to recreational users in the short term because of the improved foot access as a result of vegetation removal during the stabilization activities.
- The OLY project identifies 9.7 miles of road decommissioning. All NFSRs proposed for decommissioning are currently brushed in and are closed to public motorized use and motorized administrative use. Passive Decommissioning is the decision to no longer manage and therefore removes a road from the road system. Approximately 1.6 miles of road would be actively decommissioned (physical work is done on the ground) and 8.1 miles would be passively decommissioned. The opportunity to the recreational user would not change on the 8.1 miles of passive decommissioning. However, these NFSRs will continue to vegetate making access more difficult.
- Approximately 5.7 miles of undetermined road segments are proposed to be added to the National Forest System. Motorized access to the public would not change as they are currently non-motorized and would remain that way at this time. Opportunities for recreational users would improve as a result. These NFSRs would accommodate stock users, hikers, and mountain bike users in the near term.

Prescribed Burning in MA2

Chapter 2 explains four objectives (A,B,C, and D) to be obtained while burning in MA2 that applies to the guideline MA2-GDL-Fire-01. Table 100 shows the proposed fuels units by objective under the action alternatives. Planned ignitions within fuels units are designed to mimic natural fire and would be used as a tool for ecosystem restoration (MA2-GDL-FIRE-02). Depending on the action alternative (listed below), fuels units would range from about 107 acres to about 172 acres within MA2 whose purpose would be to move those stands toward the desired condition where fire plays an increased role as a natural disturbance agent (MA2-DC-FIRE-01) and to maintain the ORV in the scenic and recreational segments (MA2-GDL-TBR-02), by manipulating the vegetation to mimic natural processes.

- 107 acres of fuels units in Alternative 2
- 133 acres of fuels units in Alternative 3
- 172 acres of fuels units in Alternative 4

Objective A and C weren't utilized in MA2. Objective A: Reintroduce fire on the landscape, maintain existing open conditions, and stimulate forage/browse reproduction for big game and other wildlife species and objective C: Stimulate fire's role on the landscape by thinning encroaching conifers.

Objective B: Reintroduce fire on the landscape, thin encroaching confers with fuel augmentation (slashing) where needed, promote ponderosa pine restoration and prove future suitability for flammulated owl use. Promote growing conditions that maintain or encourage the development of old growth characteristics, improve browse and forage availability in big game winter ranges and spring foraging habitat for grizzly bear.

Objective D: Reducing and/or maintaining low fuel conditions in the wildland urban interface. Increasing defensible space around private property and improving accessibility for emergency responders and public in the event of a wildfire.

Table 100. Fuels Units by Treatment Objectives in MA2 under the Action Alternatives

Alternatives	Objective B	Objective D
2, 3, and 4	F2, F3, F11	
2 and 3		F16, F17, F18
3 and 4		F32
4		F33, F34, F35, F36

Silvicultural Prescriptions in MA2

Ponderosa pine is a desired scenic quality on the landscape.

The proceeding timber harvest units in MA2 are identified below Table 101. Specific definitions of silvicultural prescriptions may be found in Chapter 2. The prescriptions below apply to guideline MA2-GDL-TBR-02. Approximately 328 acres of harvest units (295 acres regeneration harvest and 33 acres of improvement harvest) would occur along the Yaak and Kootenai river segments within MA2 in Alternative 2; Alternatives 3 and 4 would each propose about 290 acres of harvest units. The purpose of these harvest units is to:

- thin encroaching confers with fuel augmentation (slashing) where needed;
- promote ponderosa pine restoration and provide future suitability for flammulated owl use;
- reintroduce fire on the landscape through prescribed fire fuels treatment;
- promote growing conditions that maintain or encourage the development of old growth characteristics;
- improve browse and forage availability in big game winter ranges and spring foraging habitat for grizzly bear.

Harvest units account for less than 13 percent of the total of MA2 in the project area, leaving natural ecological processes as the primary force within most of this MA. In addition, proposed treatments are designed to mimic ecological processes (Refer to the Vegetation Section for a complete discussion of the effects of vegetation treatments that restore/mimic ecological processes MA2-DC-VEG-01).

Proposed timber harvests in MA2 will meet forest plan desired conditions and guidelines listed above (Refer to the Vegetation Section for a complete discussion of the effects of vegetation treatments that restore/mimic ecological processes MA2-DC-VEG-01).

None of the proposed treatments in the project will be able to be seen from the rivers.

Table 101. Silvicultural Prescriptions under the Action Alternatives within MA2

Alternative	Improvement Cut	Clearcut with Reserves*	Shelterwood with Reserves	Seed Tree\Reserves
2	32, 35B, 55A	33, 35A, 61, 61A	55B,	35, 36, 40, 41B, 42, 52B, 56, 58, 59, 60, 62
3	32, 55A,	33, 61, 61A	55B	40, 42, 52B, 56, 58, 59, 60, 62
4	32, 35B, 55A,	33, 35A, 61, 61A, 61B	55B	35, 36, 40, 40A, 42, 42A, 52B, 56, 58, 59, 60, 62

* Only portions of units

Alternative 2, 3, and 4 – Cumulative effects

The cumulative effects of Alternative 2, 3, and 4 will be similar in nature and are described below.

Past Actions and their Effects on Current Conditions

Many of the past actions in this area have had an effect on recreation. The NFSRs built for timber harvest have provided access to National Forest Lands for recreationists and for gathering forest products (firewood, huckleberries). Timber harvest, prescribed burning and other vegetation activities historically provided opportunities for hunting, viewing wildlife, firewood gathering and other activities. Many of the harvest units in this area are growing in and no longer provide the openings and forage they once did. These areas may still provide recreational opportunities but in a different setting. Many of the NFSRs in this area are now closed to non-winter motor vehicle use or all motor vehicle use, motorized use and many have become impassable due to vegetation growth.

Similar Effects of Proposed Actions with Past Actions

Past actions in the OLY area have included timber harvest, prescribed burning, road and trails maintenance and other similar projects. The proposed actions would be similar to past actions and provide opportunities for recreationists. Harvest and burning improve habitat for a variety of wildlife and can improve opportunities for hunting, wildlife viewing, access, and gathering forest products (firewood, mushrooms, huckleberries). The opportunities created by harvesting and prescribed burning have a timeline of initial opportunities when the activity occurs, the duration of opportunity that occurs from the initial activity and then a slow change in opportunity over time as the effects from the harvest and burning are reduced from re-vegetation.

Revegetation in old harvest areas is providing fewer openings, many NFSRs in the area have been closed to motorized activity and many are becoming impassable even for hikers due to vegetation. This can reduce recreational opportunities in these areas over time as access is reduced and habitats change providing less opportunity for berry picking, mushroom gathering and less productive habitat for big game.

Effects of Ongoing and Reasonably Foreseeable Actions

Access and opportunities for recreationists using NFSRs and trails will continue to be provided through road maintenance (brushing, blading, drainage repairs) and trails maintenance (clearing, tread work and drainage work) as budgets and funding allow. Other activities may occur in the area also if funding is available, these include watershed work on existing NFSRs, thinning and fuels reduction projects, wildlife habitat burning and recreation projects identified.

Combined Effects from Past, Proposed and Foreseeable Actions

Recreation will continue to be an important component of this area and opportunities will also continue to be varied across the planning area. Effects to recreation opportunities will continue to change with the landscape over time, some areas will become thicker and more timbered, other openings and clearing will be created. Access to some areas may become more restricted due to brush, while new areas will be opened. Overall the opportunities for recreation will remain good in this area for the foreseeable future.

Regulatory Framework Findings

The environmental consequences of the action alternatives on recreation settings, activities, and experiences would be consistent with goals, objectives, desired conditions, and of the 2015 Forest Plan listed at the beginning of the recreation analysis.

Alternatives follow the guidance provided in the Forest Service Manual 2300 for recreational resources. Trails will be managed to provide forest visitors access to the forest and Inventoried Roadless Areas in a way that prevents resource damage.

2015 Forest Plan

FW-DC-AR-01. Quality, well-maintained recreation facilities exist at key locations to accommodate concentrations of use, enhance the visitor's experience, and protect the natural resources of the area. Day use access is available for relaxation, viewing scenery and wildlife, and for water and snow-based play. Recreation rental cabins and lookouts provide safe, comfortable, overnight facilities that allow visitors to experience and learn about the rich history of the area. Dispersed camping opportunities are available for a wide variety of users while considering resource concerns, activity conflicts, or over-use. Food and garbage storage do not contribute to conflicts between recreation users and wildlife.

> Alternatives move towards FW-DC-AR-01 by providing dispersed camping opportunities while considering resource concerns.
>
> With the proposed changes in the access to dispersed sites and the Emma Creek trailhead, resource concerns are being addressed while improving conditions of the recreational opportunities for forest visitors.

FW-DC-AR-03. Opportunities for outdoor recreation, such as hunting, fishing, wildlife viewing, berry picking, firewood gathering, and bird watching are available for a wide variety of users. Interpretation and education opportunities enrich the visitors experience and promote a land ethic that preserves the cultural and natural resources of the Forest for future generations.

> The opportunities for recreation will continue to be available in the range of opportunity spectrums that exist in the project area.

MA2-GDL-TBR-02. Scenic/Recreational. Timber harvest is allowed to maintain or restore the values for which the eligible scenic or recreational river was identified. Timber harvest is not scheduled and does not contribute towards the allowable sale quantity.

> Alternatives are consistent with the 2015 Forest Plan MA2-GDL-TBR-02**.**
>
> Timber harvest ranging from approximately 2,600 acres to 3,100 acres, depending on the action alternative, will maintain or restore the values of scenic qualities, including maintaining large ponderosa pine landscapes. Timber harvest is not scheduled and does not contribute towards the allowable sale quantity.

Scenic Resources

Introduction

The Kootenai National Forest manages scenic resources applying the Scenery Management system (SMS). This section will also disclose whether or not the alternatives would meet the Scenic Integrity Objectives (SIOs) as set forth in the 2015 Kootenai National Forest Land Management Plan (2015 Forest Plan).

Landscape character, scenic integrity, and constituent preferences are the key aesthetic considerations to be integrated into the analysis, planning, and implementation stages of ecosystem management in consideration of scenic resources.

Analysis Area

The analysis area for scenic resources is the OLY project area (see the OLY Vicinity Map M-1). This area includes viewing opportunities in and outside the project area: O'Brien Creek, Rabbit Creek, Lynx Creek, Yaak River, Kootenai River, Kootenai Falls, Troy Shooting Range, Skyline National Recreation Trail #706, Pulpit Ridge National Recreation Trail #366, Pacific Northwest National Scenic Trail, U.S. Highway 2, Montana Highway 56, and Montana Highway 508.

Regulatory Framework

2015 Forest Plan

The 2015 Forest Plan provides overall guidance for the management of the lands on the KNF. It describes the desired conditions toward which the management of the land should be directed. The plan establishes standards and guidelines to help achieve or maintain the desired condition or conditions, to avoid or mitigate undesirable effects, or to meet applicable legal requirements.

The plan components which provide specific scenic resource direction relevant to this project include:

- **FW-DC-AR-02**. The scenic resources of the KNF compliment the recreation settings and experiences while reflecting healthy and sustainable ecosystem conditions.
- **FW-GDL-AR-01.** Management activities should be consistent with the mapped scenic integrity objective, see Plan set of documents. The scenic integrity objective is High to Very High for scenic travel routes, including the Pacific Northwest National Scenic Trail, designated Scenic Byways, and National Recreation Trails.
- **MA2-GDL-AR-08. Scenic**. Management activities should be consistent with the Scenic Integrity Objective of High in eligible scenic river segments.
- **MA2-GDL-AR-09. Recreational**. Management activities should be consistent with the Scenic Integrity Objective of Moderate to High in eligible recreational river segments.
- **MA5a,b,c-GDL-AR-06.** Management activities should be consistent with the Scenic Integrity objective of Moderate to High.
- **MA6-GDL-AR-05.** Management activities should be consistent with the Scenic integrity Objective of Low to High.

USDA Agriculture Handbook

The U.S. Department of Agriculture developed Agriculture Handbook 701: Landscape Aesthetics: A Handbook for Scenery Management in 1995 to guide the analysis and management of scenic resources on National Forest System (NFS) lands under the Scenery Management System (SMS). It identifies the terminology, procedures, and standards that have been used in this report to analyze impacts to scenic resources.

Analysis Methods

Scenery Management System (SMS)

SMS has evolved from and replaces the Visual Management System (VMS) defined in the Agricultural Handbook #462 (FSM 2380). The SMS provides for improved integration of aesthetics with other biological, physical, and social/cultural resources in the planning process. SMS recognizes that scenery is not static and that natural systems and processes change the landscape over time.

In many landscapes, temporal, variable, cultural, and other visual elements that may change in appearance over time are scenic attributes that often contribute significantly to, or even dominate the scenic quality and character of the landscape. Though the visual character and scenic value of these elements may vary through time, the change is usually slow and not detectable for several planning cycles or even human life spans, unless manipulated. It is often places that possess high quality temporal or culturally influenced scenic attributes, that visitors consider "Special Places". It is primarily through influence on the management and manipulation of these elements that SMS attempts to protect, conserve, and enhance the scenic resource. These elements may be rated at various levels of scenic value or attractiveness.

The SMS identifies several components which are used together to define the value of scenery. These include: **Landscape Character, Scenic Attractiveness, and Landscape Visibility** which describe the landscape potential and establish a baseline from which to measure **Scenic Integrity**. These components are described in the following paragraphs.

Landscape Character

Landscape Character is defined as “an overall visual and cultural impression of landscape attributes-the physical appearance and cultural context of a landscape that gives it an identity and “sense of place” (USDA 701 Handbook 1995).

Scenic Attractiveness

The combination of valued landscape elements such as landform, water characteristics, vegetation, and cultural features, is used in determining the measure of Scenic Attractiveness (USDA 701 Handbook 1995).

- **Landform Patterns and Features**: Includes characteristic landforms, rock features, and their juxtaposition to one another.
- **Surface Water Characteristics**: The relative occurrence and distinguishing characteristics of rivers, streams, lakes, and wetlands. This includes features such as waterfalls and coastal areas.
- **Vegetation Patterns**: Relative occurrence and distinguishing characteristics of vegetative communities and the patterns formed by them.

- **Land Use Patterns and Cultural Features**: Visible elements of historic and present land use which contribute to the image and sense of place.

Scenic attractiveness categorizes each Landscape Character unit into varying degrees of scenic variety (USDA 701 Handbook 1995).

- **Class A-Distinctive** -Areas where landform, vegetation patterns, water characteristics, and cultural features combine to provide unusual, unique, or outstanding scenic quality. These landscapes have strong positive attributes of variety, unity, vividness, mystery, intactness, order, harmony, uniqueness, pattern, and balance.
- **Class B-Typical -**Areas where landform, vegetation patterns, water characteristics, and cultural features use combine to provide ordinary or common scenic quality. These landscapes have generally positive, yet common, attributes of variety, unity, vividness, mystery, intactness, order, harmony, uniqueness, pattern, and balance. Normally they would form the basic matrix within the ecological unit.
- **Class C-Indistinctive**- Areas where landform, vegetation patterns, water characteristics, and cultural land use have low scenic quality. Often water and rock form of any consequence are missing in class C landscapes. These landscapes have weak or missing attributes of variety, unity, vividness, mystery, intactness, order, -harmony, uniqueness, and balance.

Landscape Visibility Components

Landscape Visibility addresses "the relative importance and sensitivity of what is seen and perceived in the landscape" (USDA 701 Handbook 1995). Landscape visibility is affected by a number of factors including context of viewers; duration of view; degree of discernable detail; and number of viewers (USDA Forest Service 701 Handbook 4-2 1995). In general, the greater the number of people likely to view a landscape and the longer the duration, the more sensitive the landscape is to modification. The proximity of the viewer to the particular landscape affects the visibility and sensitivity; viewing distances for this analysis are:

- Immediate foreground (0 to300 feet)
- Foreground (300 feet to one-half mile)
- Middleground (one-half mile to 4 miles)
- Background (4 miles and greater)

Landscapes are viewed to varying degrees from different locations and subsequently differ in their importance. To assist scenic inventory and analysis, this importance can be ranked by concern levels (USDA 701 Handbook 1995).

- **Concern Level 1** routes and sites are those that are nationally or regionally important locations associated with recreation and tourism use, where there is high interest in scenic resources such as: U.S. Highway 2, Highway 508, Highway 56, National Recreation Trails #366 and #706, and the Pacific Northwest National Scenic Trail.
- **Concern Level 2** routes and sites are those that are locally important and are associated with recreation, where there is high to moderate interest in scenic resources such as: Troy Shooting Range, Kilbrennan Lake Campground, NFSRs 752 (O'Brien Creek), 4445 (Kootenai Mountain), 4429 (O'Brien Lynx Creek), and 331 (Rabbit O'Brien).

Scenic integrity objective (SIO)

The Scenic Integrity Objectives serve as the desired conditions for the scenic resources and represent the degree of intactness of positive landscape attributes. SIOs are categorized into five levels (the Forest Plan does not utilize Very Low). The highest scenic integrity ratings are given to those landscapes where valued landscape attributes will appear complete with little or no visible deviations evident. Lower SIOs are given to those landscapes where modifications to the landscape will be more evident. Each of the SIOs is defined as follows. The analysis looks at the existing scenic integrity for the portions of the project area with proposed management activities to determine whether or not the existing condition meets SIO (2015 Forest Plan). It then addresses how the action would modify the scenic condition and whether or not the resulting landscape would meet the SIO for the same area. The criteria used to evaluate each alternative were the KNF SIO definitions and objectives (See Table 102).

Table 102. Scenic Integrity Objectives and Descriptions

Scenic Integrity Objectives	Description
Very High	Landscape is intact with changes resulting primarily through natural processes and disturbance regimes.
High	Management activities are unnoticed and the landscape character appears unaltered.
Moderate	Management activities are noticeable but are subordinate to the landscape character. The landscape appears slightly altered.
Low	Management activities are evident and sometimes dominate the landscape but are designed to blend with surroundings by repeating line, form, color, and texture of valued landscape character attributes. The landscape appears altered.
Very Low	(not an SIO in the 2015 Forest Plan) – Human activities of vegetative and landform alterations may dominate the original, natural landscape character but should appear as natural occurrences when viewed at back-ground distances.

Affected Environment

Existing Condition

The project area is located directly adjacent and northeast of Troy, Montana. The project area encompasses approximately 67,500 acres, with 9,628 acres within two Inventoried Roadless Areas (Flagstaff and Saddle Mountain). The area's boundary is near U.S. Highway 2 (Kootenai River), Yaak Highway 508 (Yaak River), and Skyline National Recreation Trail #706. The analysis area for scenic resources includes the project area as well as lands outside the project area that are visible at varying distances from viewpoints on NFS and other lands including travel routes, communities, and recreation sites. Forest scenery is an integral part of the landscape and way of life and provides a scenic backdrop for travel, work, play, and daily life.

Landscape Character

Within the project area are recreational sites\activities such as: developed campgrounds, lookout tower rentals, day-use sites, NFS access on numerous trails and roads, cross-country skiing\snowmobiling opportunities, hunting\fishing opportunities, scenic driving\wildlife viewing, outfitter and guide use, and a shooting range.

Scenic Attractiveness

The project area includes some of the lowest elevation, warm habitats found on the Three Rivers Ranger District. Warm/moist habitat types are abundant, as well as some higher elevation subalpine fir/mixed conifer areas along the eastern boundary of the project area. Streams and creeks in the project area empty into the Kootenai and Yaak rivers. Kilbrennan and Alvord Lakes provide several recreation opportunities. The project area is in close proximity to the town of Troy, Montana. Evidence of past management activities (public and private land) is present including historic activities going back to the settlement of Troy in 1892. Past timber management practices and wildfires create contrasting vegetation mosaics across the landscape. Isolated areas of rock outcroppings exist on some mountain peaks and creek drainages. The project area has varying degrees of distinctive, typical, and indistinctive landform patterns.

Landscape Visibility

The project area is visible from the surrounding area, in all viewing distances. Within the project area there are 50.5 miles of trails and 222 miles of road (71 miles open, 25 miles gated, and 126 miles bermed/impassable).

- **Concern Level 1**: U.S. Highway 2, Yaak Highway 508, Highway 56, sections of the Pacific Northwest National Scenic Trail, Pulpit Ridge National Recreation Trail #366, Skyline National Recreation Trail #706, Yaak Falls, Kootenai Falls, and Yaak Lookout.
- **Concern Level 2**: Kilbrennan Lake Campground, Troy Walking Path\Troy Airport, Alvord Lake, Troy Shooting Range, NFSR 4445 Kootenai Mountain, NFSR 752 O'Brien Creek, NFSR 4429 O'Brien\Lynx Creek, NFSR 331 Rabbit\O'Brien, East Side County Road, Kilbrennan Lake County Road, and Rabbit Creek County Road. Several mountain summits and NFS trails are also within the project area.

Existing Scenic Integrity

Existing Scenic Integrity (ESI) is the current state of the landscape considering previous human alterations. Although it is not an essential to the mapping of the final scenic class assignments, it serves multiple purposes in forest planning and provides important benchmarks for decision making monitoring. Geographic information system (GIS) was utilized to develop criteria to map ESI based on the direction of the current forest plan. The Forest wide mapped SIOs are broad scale; the existing scenic integrity should be reviewed at the project level.

Environmental Consequences

Alternative 1-Direct and Indirect Effects

Alternative 1 is the No action Alternative and would not alter the existing condition for visual quality through management actions. The visual conditions of the area would generally keep evolving with vegetation growth across the landscape. Natural processes such as fire, insects and disease mortality would contribute to the visual landscape. The severity of a fire event would be dependent upon other natural processes such as wind, weather, insects, and disease because, with no harvest, the fuel loading in the analysis area would, at the least, remain the same and most likely increase. The increase in fuel loading equates to an increase in potential fire severity. This increase in severity could result in a greater visual change than the proposed units themselves. Root disease and mountain pine beetle would also begin to make a bigger impact on the landscape due to the high density of susceptible species like Douglas-fir and lodgepole pine as well as ponderosa pine.

Alternatives 2, 3, and 4-Direct and Indirect Effects (General)

Watershed Improvement: The watershed improvement planned for this project area would have a minor effect upon the overall visual quality of the area. This limited effect is because of the small size of the projects and low impacts, which are not readily seen from any major viewpoints.

Silvicultural Prescriptions/Vegetation Management: Within the areas proposed for treatment through the alternatives, planting would supplement the natural regeneration anticipated. Planted conifer seedlings would enhance species diversity, assure timely reforestation, and contribute towards long-term desired conditions. Natural reforestation of harvest areas would be designed to achieve a mix of native tree species appropriate to the specific site. The landscape character would evolve naturally on harvested landscapes, and would reflect the evolution of biophysical features and processes as seen in the regeneration harvest prescriptions: seed tree cut, shelterwood cut, clearcut with reserves, and the intermediate harvest prescription of improvement cut (See the Harvest Unit Summary Tables in Chapter 2).

Seed Tree Cut

These units have 10-25 quality trees per acre that would remain after harvest in an uneven arrangement of individuals, small groups and clumps. Seed from these leave trees would naturally regenerate most of these units along with supplemental planting of species such as western larch and rust resistant western white pine. Units that are excavator piled would likely be planted to assure adequate desirable stocking.

Shelterwood Cut

These units have 15-35 quality trees per acre that would remain after harvest in an uneven arrangement of individuals, small groups and clumps. Seed from these leave trees would naturally regenerate the unit along with supplemental planting of species such as western larch and rust resistant western white pine. Units that are excavator piled would likely be planted to assure adequate, desirable stocking. This type of harvest is used when additional leave trees are needed to protect the site and to protect scenic values.

Clearcut with Reserves

These units have 5-20 trees per acre that would remain after harvest in an uneven arrangement of individuals, small groups and clumps. These stands are in such poor condition that few quality trees and very few of the desirable species are available. These units would be planted to assure adequate, desirable stocking.

Stand Improvement

Stand improvement (thinning) is used to improve the composition and quality of forest stands by reducing the density of the trees and promoting more open stand structure. Enough healthy desirable species are present to allow for thinning which will increase vigor and growth in the leave trees that will remain to occupy the site for many more years.

In addition, the proposed harvest would increase sunlight and water availability on the forest floor allowing the existing understory plants (grasses, forbs, browse, and shrubs) to increase in abundance as well as extent within 3 to 5 years. Most of the regeneration harvest units have few understory plants due to the dense canopy cover with the understory plants growing only in areas where there are gaps in the canopy. These units would see a large increase in plant abundance.

Prescribed Burning: Prescribed burning is utilized to reduce fuels, restore natural processes and promote wildlife forage. In the first season some tree trunks (boles) would be blackened and some needle mortality would be evident. However, in 1 to 3 years regrowth of shrubs, forbs, and grasses would buffer any noticeable effect. The succession of biophysical features and processes would evolve naturally on the landscape over time. Post-harvest fuels treatments include: slash and grapple pile and slash and underburn. (See the Fuels Treatment Summary Tables in Chapter 2)

Machine Piling/Pile Burning: This activity would create ground disturbances that would reduce understory vegetation and accentuate bare soil. Pile burning would leave scattered residual tree trunks (boles) blackened, scorch the soil, and result in needle mortality. However, in 1 to 3 years regrowth from shrubs, forbs, and grasses would buffer any noticeable effects. (See the Harvest Unit Summary Tables in Chapter 2.)

Yaak River Corridor: Several harvest units are located in MA2 Eligible Wild and Scenic Rivers – scenic classification with an SIO of high however, most of these units can't be seen from the river corridor because of vegetation growth and topographical breaks and weren't further analyzed from Highway 508. The Eastside County Road (Concern level 2) would have units visible within the high SIO of MA2. Initially, these units would be apparent to visitors, and may present short-term visual effects, and would take 1 to 3 years after slashing and underburning to meet the designated SIO. Harvest unit design would utilize naturally established form, line, color, and texture to soften edges which would create more of a blended mosaic rather than a patchwork of straight edges, which would be consistent with the SIO of high in eligible scenic river segments. Management activities after 5 years would not be apparent.

Direct and Indirect Effects from Critical Viewpoints

The activities proposed in the project area are viewable from 15 concern level destinations. The proceeding five viewpoints have been analyzed for their scenic integrity values. The ten viewpoints not submitted may be found in the project file. The analyzed viewpoints were documented using a digital camera, Avenza-PDF Maps\Three Rivers Ranger District Map on a smart phone, and Google Earth with the OLY shapes files loaded, Garmin GPS, and the MA map. The project file includes the remaining ten viewpoints that were analyzed, including the Pacific Northwest Scenic Trail and two National Recreation Trails for compliance with FW-GDL-AR-01 of the 2015 Forest Plan. The ten viewpoints not included in the analysis were concluded to have "no effect" on the visual resource and they were initially analyzed for their concern level rating. Figure 34 shows the viewpoints in relation to the OLY project area.

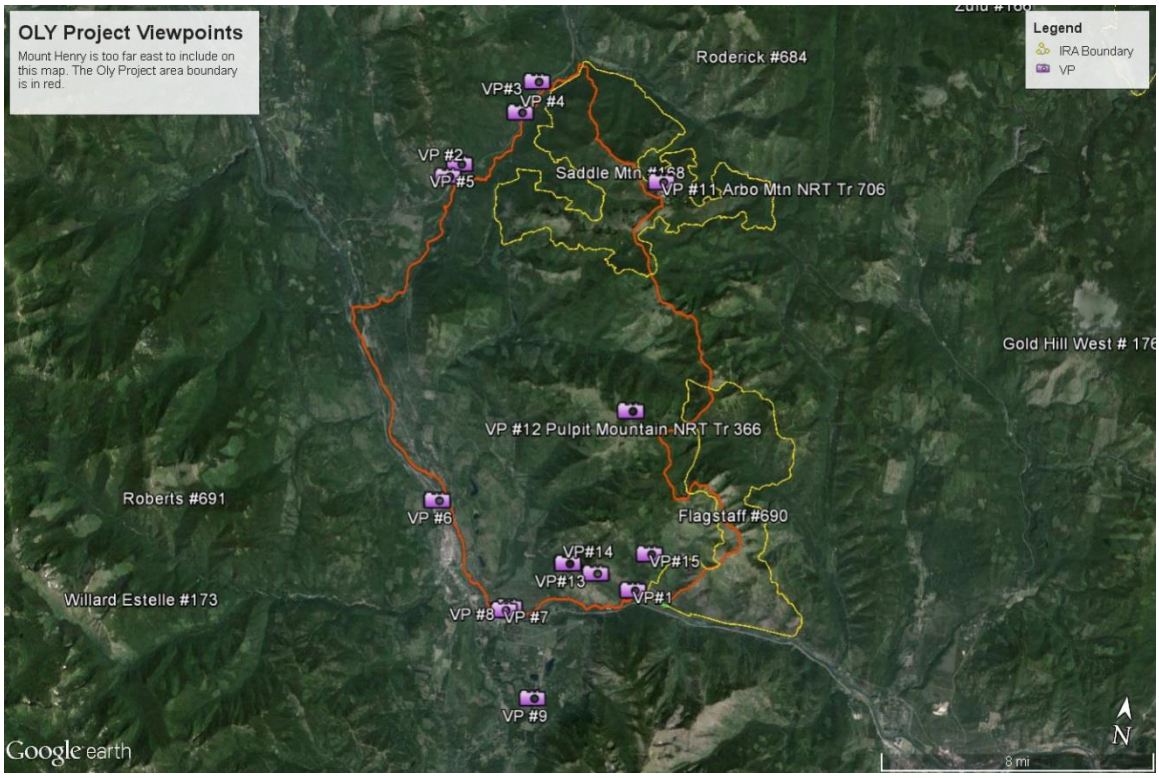


Figure 34. Viewpoint Locations in Relation to OLY Project Area

Viewpoint 1: Swinging Bridge\Kootenai Falls parking lot off U.S. Highway 2 (Figure 35, Figure 36, and Table 103)

Latitude\Longitude: N 48 degrees 27.159 minutes \ W 115 degrees 46.207 minutes

Elevation: 2,074 feet

Concern Level: 1

Landscape Visibility: Middleground at approximately 1.5 miles to the unit. The view is northerly.

Figure 35. Existing Condition of Viewpoint 1

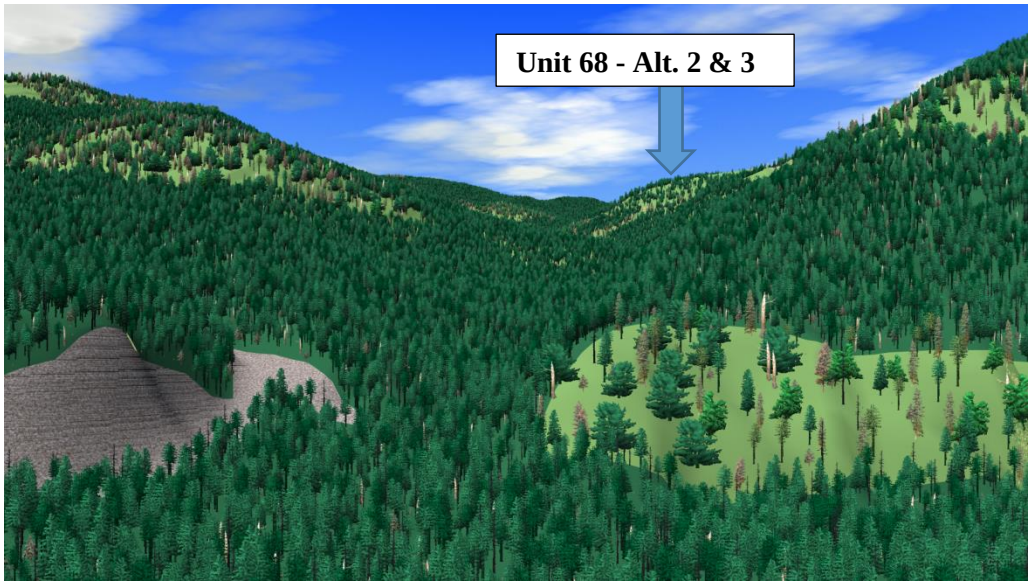


Figure 36. Simulation of Harvest Unit 68 for Alternative 2 and 3 from Viewpoint 1

Table 103. Harvest Units from Viewpoint 1

Unit	Acres	MA	SIO	Prescription
68 Alt. 2 and 3	65	6	M\H	Shelterwood\Reserves Slash\Underburn
68* Alt. 4	27	6	M\H	Shelterwood\Reserves Slash\Underburn
68A* Alt.4	25	6	H	Shelterwood\Reserves Slash\Underburn

SIO = Scenic Integrity Objectives: MA= Management Area

*Harvest Unit 68 becomes Harvest Unit 68 and Harvest Unit 68A in Alternative 4

Viewpoint 1 was chosen for its popularity of the scenic destination of Kootenai Falls and the Swinging Bridge. Shelterwood harvests are used when additional leave trees are needed to protect the site and scenic values. Harvest Unit 68A in Alternative 4 would not be visible from this viewpoint and have no visual effect. Initially after slashing and underburning of Harvest Unit 68 there may be black areas within the burn and trees with red needles. However, the unit would revegetate within 1 to 3 years with natural grasses, forbs, shrubs and trees. The created open landscape would blend in with adjacent natural openings and would meet the SIO for the area. In conclusion, although there are short-term impacts to visual resources in the form of burned trees with red needles, vegetation growth would overcome the effects of timber harvest and prescribed burning within 3 years. Combined with unit design, the long-term effects of the vegetation management treatment would contribute to the desired conditions for landscape composition, structure, and pattern and would be consistent with the forest plan SIOs of high. The viewing opportunity from this viewpoint would not be impacted by future vegetation growth in the foreground.

Viewpoint 2: Yaak Highway 508, mile post 3.5 north bound parking pullout (Figure 37, Figure 38, and Table 104)

Latitude\Longitude: N 48 degrees 36.933 minutes \ W 115 degrees 55.723 minutes

Elevation: 2,571 feet

Concern Level: 1

Traveling Window: 15 seconds at 65 miles per hour

Landscape Visibility: Middleground 0.6 miles to 1.5 miles viewing; the view is mainly east/ northeasterly.

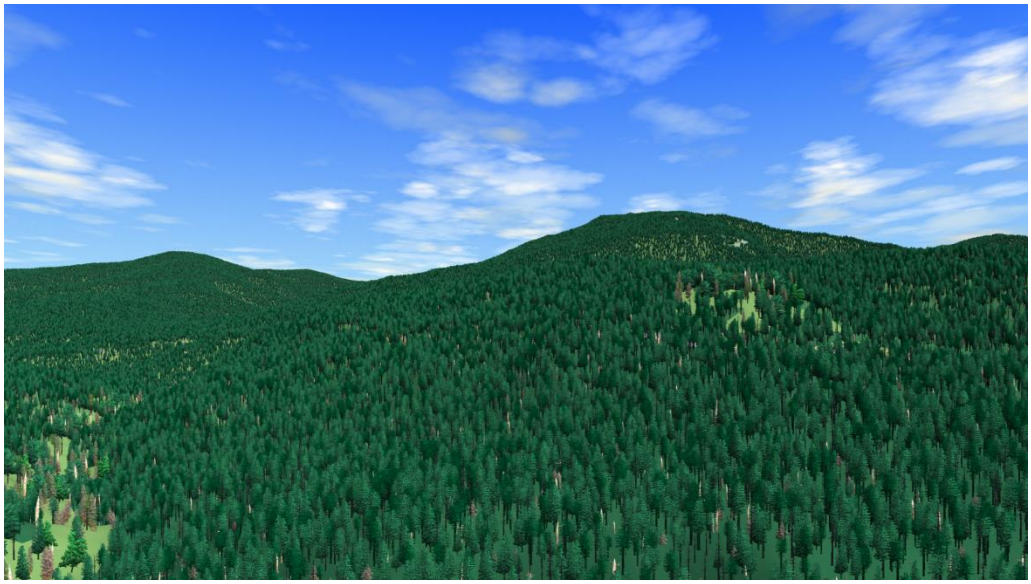


Figure 37. Existing Condition of Viewpoint 2

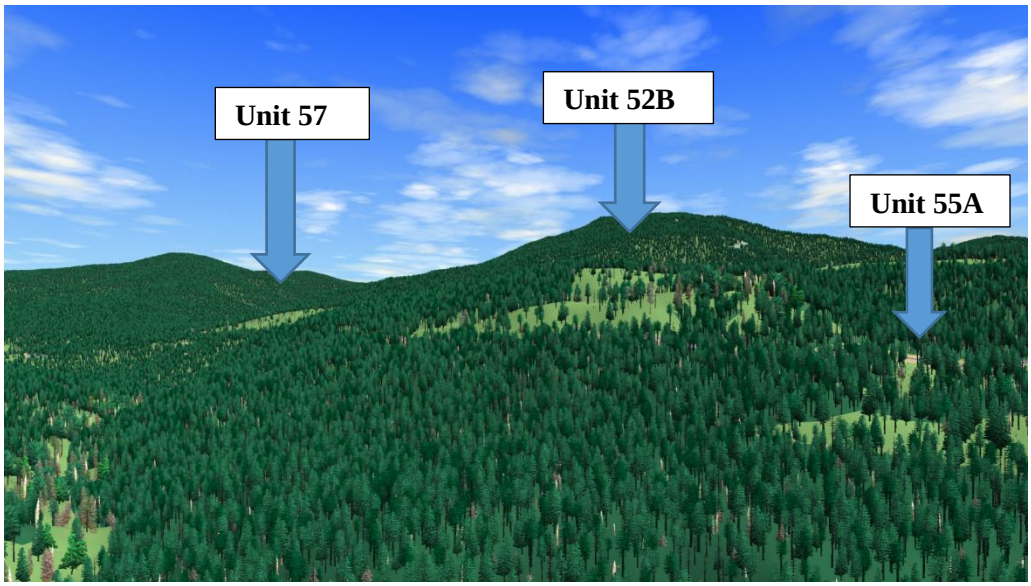


Figure 38. Simulation of Harvest Units 52B, 55A, and 57 in Alternatives 2 and 3 from Viewpoint 2

Table 104. Harvest Units from Viewpoint 2

Unit	Acres	MA	SIO	Prescription
52B Alt. 2 &3	65	6	M\H	Seed Tree\Reserves Slash\Underburn
55A Alt. 2&3	18	2/6	M\H	Shelterwood\Reserves Slash\Underburn
57 Alt. 2&3	68	6	M	Seed Tree\Reserves Slash\Underburn

Unit	Acres	MA	SIO	Prescription
52B* Alt. 4	26	6	M\H	Seed Tree\Reserves Slash\Underburn
52E* Alt. 4	16	6	M	Clearcut\Reserves Slash\Grapple pile
57[1] Alt. 4	30	6	M	Seed Tree\Reserves Slash\Underburn
57A[1] Alt. 4	18	6	M	Seed Tree\Reserves Slash\Underburn

SIO = Scenic Integrity Objectives: MA= Management Area

*Harvest Unit 52B becomes Harvest Unit 52B and Harvest Unit 52E in Alternative 4.

[1] Harvest Unit 57 was split into Harvest Unit 57 and Harvest Unit 57A in Alternative 4

Viewpoint 2 has areas of MA2 Scenic Rivers (Yaak River) with a High SIO. The units would have no visual effect from the river and would be consistent with the forest plan SIO. However, Harvest Unit 55A would be visible from Viewpoint 2 and predicted impacts to the scenic resource are negative in short term, but positive in long term considering a SIO of High. However, in 1 to 3 years, regrowth of shrubs, forbs, and grasses would buffer any noticeable effects. Harvest Unit 55A is a shelterwood cut with reserves with design criteria to protect scenic resources. Once the slashing and underburning have been completed, vegetation growth together with the unit layout design (irregular design and tree reserves) would result in conditions consistent with the SIO of high. Several past wildfires and harvest units have created a visual mosaic of the viewable landscape. Wildfires as recent as 1994 and 2000 are visible. The non-treatment area between units (over 40 acres), Harvest Units 57 and 52, would be hard to detect due to topography and vegetation in Alternatives 2, 3, and 4. For Alternative 4 Unit 55A would not be noticeably detectable. The shapes of these openings would mimic the natural ridgelines and natural openings already present on the landscape. By tying into existing openings and topographical breaks, the edges of the openings would be less noticeable. Harvest unit design would utilize naturally established form, line, color, and texture to soften edges which would create more of a blended mosaic rather than a patchwork of straight edges. In conclusion, the viewing landscape falls into a medium SIO where management activities are noticeable but are subordinate to the landscape character. Newly created openings would blend in with openings currently on the landscape. Post-harvest slash and effects from prescribed burning would affect the landscape in the short term. However, the units would revegetate within 1 to 3 years with natural grasses, forbs, shrubs, and trees. The proposed treatments meet this SIO. Current vegetation growth in the foreground near Highway 508 would eventually screen the viewing window of viewpoint 2.

Viewpoint 6: US Highway 2 Troy Airport parking lot\vault toilet\Walking Track (Figure 39, Figure 40, and Table 105)

Latitude\Longitude: N 48 degrees 28.670 minutes \ W 115 degrees 54.251 minutes

Elevation: 1,998 feet

Concern Level: 1

Traveling Window: 21 seconds at 65 miles per hour

Landscape Visibility: Background view of a distance of 5.8 miles to unit; the view is northerly.

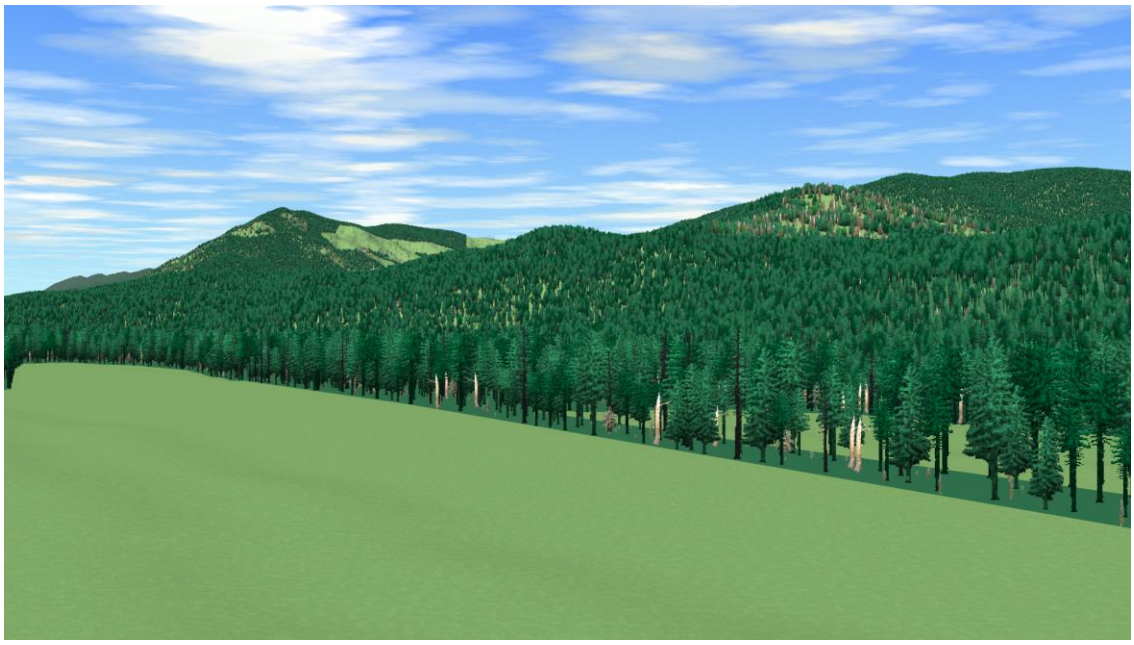


Figure 39. Existing Condition of Viewpoint 6

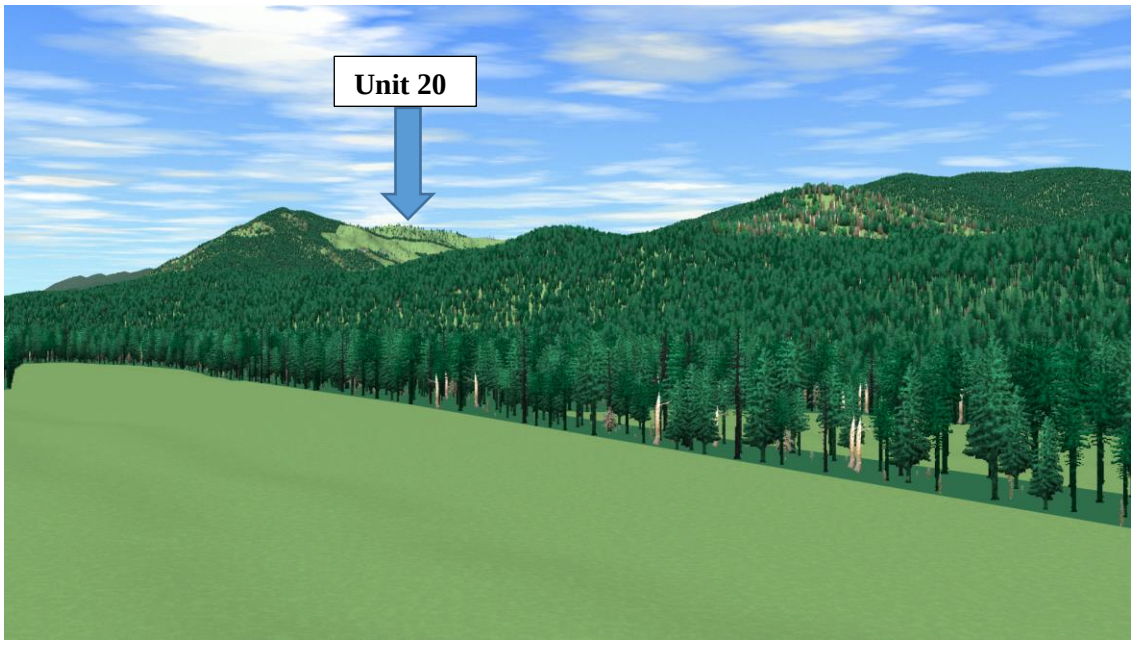


Figure 40. Simulation of Harvest Unit 20 under all Action Alternatives from Viewpoint 6

Table 105. Harvest units from Viewpoint 6

Unit	Acres	MA	SIO	RX
20 Alt. 2 and 3	109	6	M	Seed tree\Reserves Slash\Underburn
20 Alt. 4	37	6	M	Seed tree\Reserves Slash\Underburn

SIO = Scenic Integrity Objectives: MA= Management Area

Viewpoint 6 is viewable from U.S. Highway 2, Troy Airport and Troy Walking Path. Stimson Lumber Company has logged their property south and east of proposed Harvest Unit 20. This logging is clearly visible in the existing condition simulation. Currently, the hard lines and lack of timber on the Stimson land contrast with the continuous vegetation on surrounding National Forest System land. The harvest management practices of Harvest Unit 20 through all action alternatives would help this unit blend into the landscape and show less of a hard contrast between the unit and the adjacent Stimson land. Alternative 4 Unit 20 with 37 acres would create more contrast on the landscape but not enough to change the desired SIO. The characteristic patches created with Alternatives 2 and 3 would trend the project area landscape towards a more natural appearing and functioning landscape. The viewing area is located approximately 5.8 miles in the background from the viewpoint. Texture disappears and colors flatten in the background. The proposed treatments would be noticeable, but would be subordinate to the landscape character. Therefore, for the vegetation management associated with Harvest Unit 20 would be consistent with the forest plan SIO of moderate for this unit.

Viewpoint 8: US Highway 2- mile post 17.2 east bound pull out (Figure 41, Figure 42, and Table 106)

Latitude\Longitude: N 48 degrees 26.287 minutes \ W 115 degrees 50.839 minutes

Elevation: 2,152 feet

Concern Level: 1

Traveling Window: 20 seconds at 65 miles per hour

Landscape Visibility: Middleground view of approximately 2.2 miles, the view is north easterly.

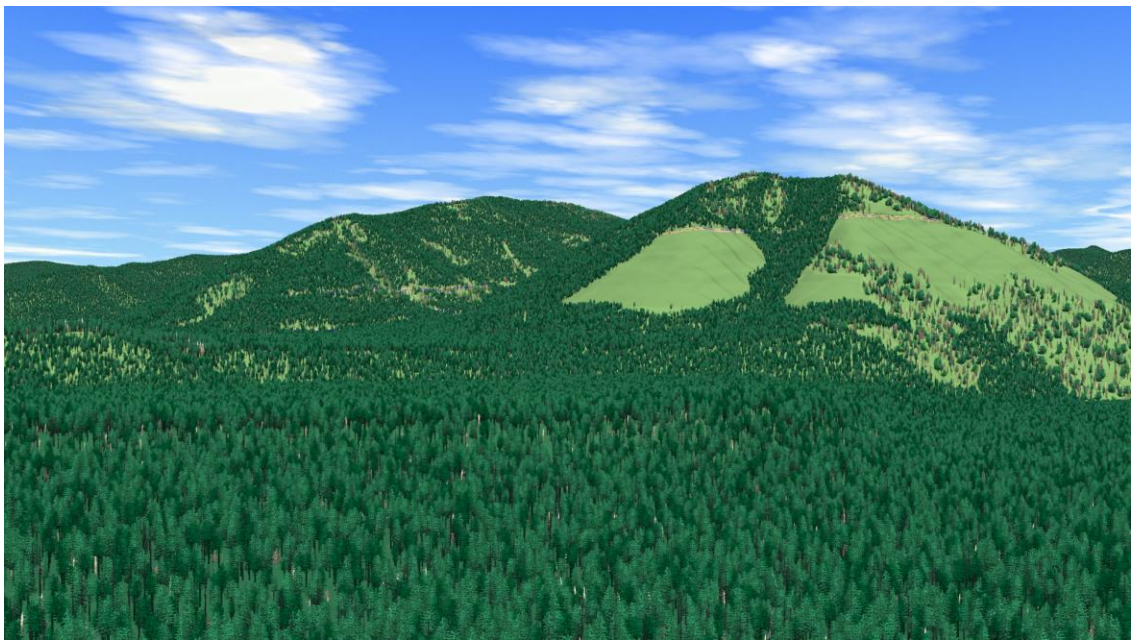


Figure 41. Existing Condition of Viewpoint 8

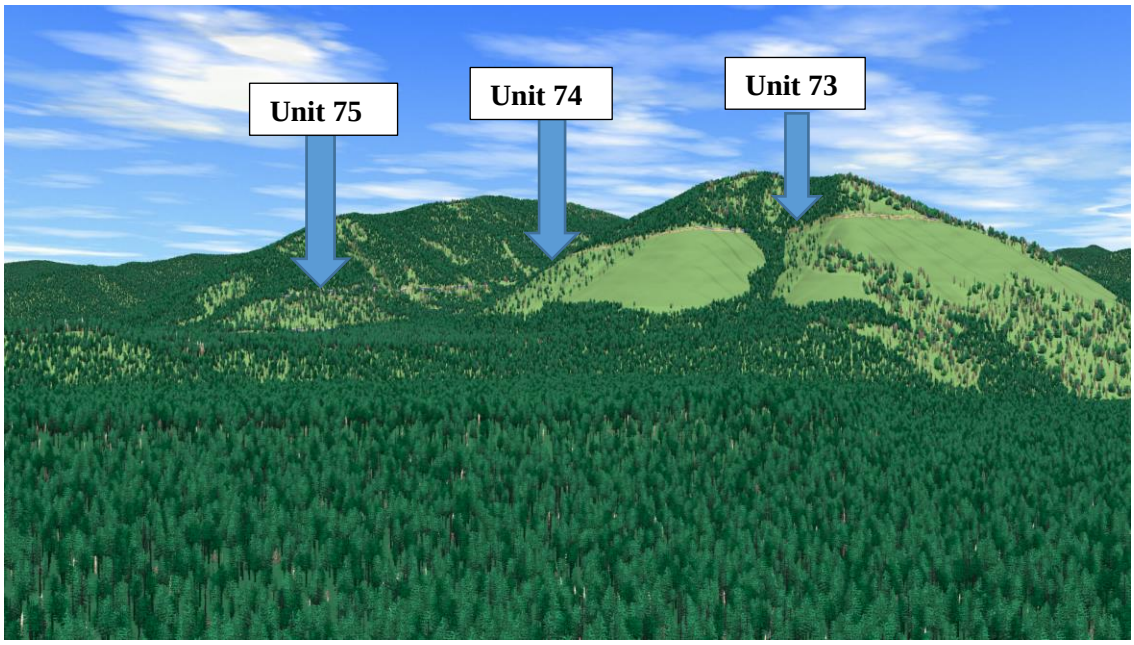


Figure 42. Simulation of Harvest Units 73, 74, and 75 under all Action Alternatives from Viewpoint 8

Viewpoint 8 is a view of the south southwest slope of Kootenai Mountain. Units 74 and 73 would feather into large prescribed burns completed in 1988. The prescribed burns were implemented to increase habitat quality for bighorn sheep. Currently portions of NFSR 4445 Kootenai Mountain Road are visible from Viewpoint 8. The effects of harvest units 73 and 74 would possibly reveal more portions of NFSR 4445 and would not initially meet the current SIO of High. However, seed tree growth with reserves would fill in these portions of exposed NFSR 4445 within 3 to5 years. Initially after slashing and underburning of units there may be black areas within the burn and trees with red needles, but this visual effect would be of short-term duration. In Alternative 4, Harvest Units 74 and 74A would present no visual difference from Alternatives 2 and 3 from Viewpoint 8. This is due to the fact that Harvest Unit 74 is located on a roll of a ridge with the remainder of the unit not visible from the viewpoint. Harvest unit design would utilize naturally established form, line, color, and texture to soften edges which would create more of a blended mosaic rather than a patchwork of straight edges. The roll of the ridge would conceal half of Unit 74 for Alternative 2 and 3, and would conceal Unit 74A for Alternative 4. Unit 75 through all action alternatives would be a 50-acre improvement cut and would blend into the adjacent landscape and would be consistent with the forest plan SIO. Improvement cuts are thinning of forest stands to increase vigor and growth in the leave trees. Screening for foreground vegetation growth would slowly impede the viewing window over time. The current landscape on the south side of the Kootenai Mountain landscape has numerous tree islands left from the large prescribed burn of 1988. The proposed harvest units would blend well into the existing landscape.

Table 106. Harvest Units from Viewpoint 8

Unit	Acres	MA	SIO	Prescription
73 Alt. 2 and 3	18	6	H	Seed tree\Reserves Slash\Underburn
74 Alt. 2 and 3	100	6	H	Seed tree\Reserves Slash\Underburn

Unit	Acres	MA	SIO	Prescription
75 Alt.2 and 3	50	6	L & H	Improvement cut\Openings Slash\Underburn
74* Alt. 4	32	6	H	Seed tree\Reserves Slash\Underburn
74A* Alt. 4	40	6	H	Seed tree\Reserves Slash\Underburn

SIO = Scenic Integrity Objectives: MA= Management Area

*Harvest Unit 74 becomes Harvest Unit 74 and Harvest Unit 74A in Alternative 4.

Viewpoint 13: Kootenai Mountain Road 4445 mile post 5.3 (see Figure 43, Figure 44, and Table 107)

Latitude\Longitude: N 48 degrees 27.686 minutes \ W 115 degrees 48.900 minutes

Elevation: 3,777 feet

Concern Level: 2

Landscape Visibility: Middleground view of approximately 0.6 miles to 1.5 miles; view is westerly.

Figure 43. Viewpoint 13 -Existing Condition

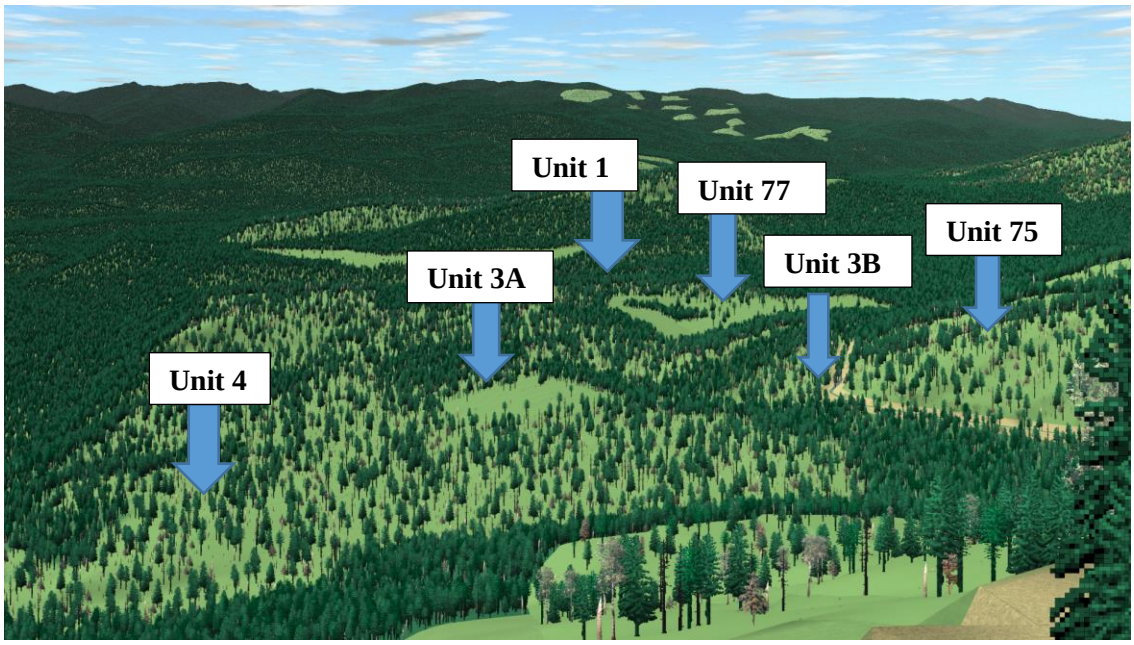


Figure 44. Simulation of Harvest Units 1, 3A, 3B, 4, 75, and 77 under all Action Alternatives from Viewpoint 13

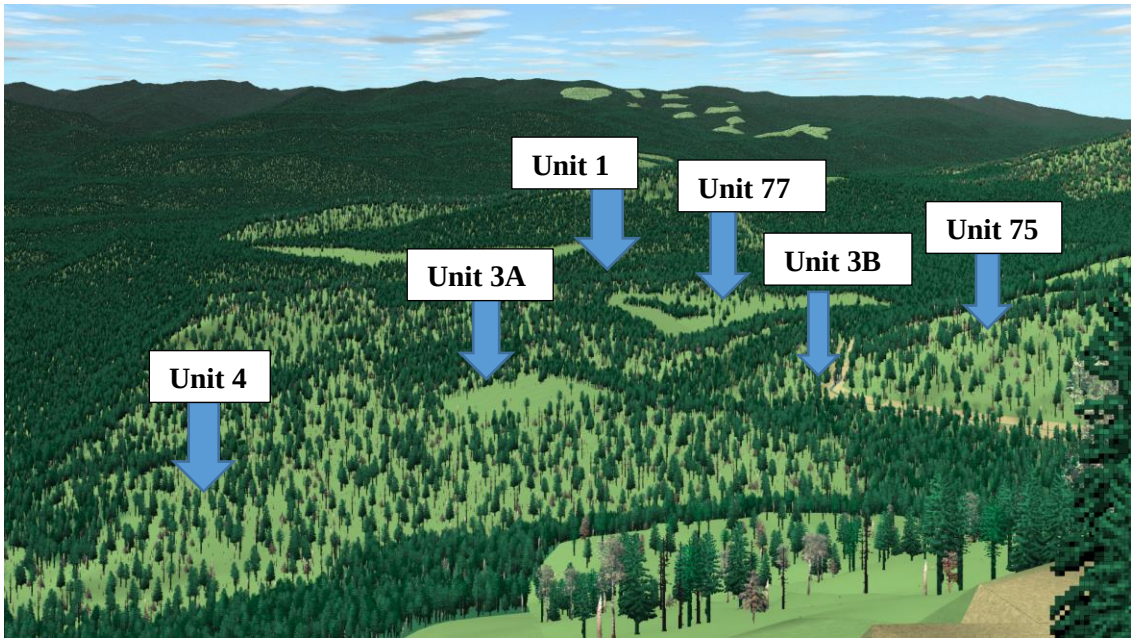


Figure 45. Simulation of Harvest Units 1, 3A, 3B, 4, 75, and 77 under all Action Alternatives from Viewpoint 13

Table 107. Harvest Units from Viewpoint 13

Unit	Acres	MA	SIO	Prescription
1 Alt. 2 and 3	54	6	M	Improvement cut\Openings Slash\underburn

Unit	Acres	MA	SIO	Prescription
3A Alt. 2 and 3	12	6	L	Clearcut\Reserves Grapple Pile
4 Alt. 2 and 3	176	6	L\M	Improvement cut Slash\Underburn
75 Alt. 2 and 3	50	6	M\H	Improvement cut\Openings Slash\Underburn
77 Alt. 2 and 3	41	6	L\M	Clearcut\Reserves Slash\Underburn
77 Alt. 4	25	6	L\M	Clearcut\Reserves Slash\Underburn

SIO = Scenic Integrity Objectives: MA= Management Area

Viewpoint 13 off NFSR 4445 offers dominant views of the Selkirk Mountains, West Cabinet Mountains, Cabinet Mountains, Bull River Valley, and the Kootenai River in the background. Proposed middleground effects from timber harvest and prescribed burning would be consistent with the forest plan SIO through all alternatives. These areas analyzed would be subordinate to the dominant views listed above. Harvest unit design would utilize naturally established form, line, color, and texture to soften edges which would create more of a blended mosaic rather than a patchwork of straight edges. Harvest Unit 77 would go from 41 acres to 25 acres in Alternative 4 and would be absorbed in the expanse of the landscape. The project area would blend more with the largely harvested Stimson Lumber Company land to the south, and the hard contrast lines would blend in with the adjacent landscape. The top portion of Harvest Unit 75 is within an area with a high SIO. This unit would be an improvement cut and initial signs of harvest activity (slash piles, etc.) will have a short-term visual effect. Improvement cuts are thinning of forest stands to increase vigor and growth in the leave trees. The understory vegetation would be stimulated by the underburning practices and within a few years new growth would recover in the burned areas. The proposed harvest\burn area would help blend the far existing background units and lessen the existing contrast of these units by spreading the openings across the landscape.

Harvest Unit Consistency with Scenic Integrity Objectives

Each harvest unit was analyzed for its consistency with the Scenic Integrity Objectives for the area in which it is located (see Table 108).

Table 108. Scenic Integrity Objective Consistency for All Harvest Units

Unit #	Acres	SIO	Rx	SIO Consistency
1	54	M	IC\S	Yes, see Viewpoint #13 in Scenic Resources Report-CL 2 from NFSR 4445 (Kootenai Mountain Road) MP 5.3.
3A	12	L	C\R	Yes, see Viewpoint #13 in Scenic Resources Report-CL 2 from NFSR 4445 (Kootenai Mountain Road) MP 5.3.
3B	13	L	ST\R	Yes, see Viewpoint #13 in Scenic Resources Report-CL 2 from NFSR 4445 (Kootenai Mountain Road) MP 5.3.
4	176	L\M	IC	Yes, see Viewpoint #13 in Scenic Resources Report-CL 2 from NFSR 4445 (Kootenai Mountain Road) MP 5.3.

Unit #	Acres	SIO	Rx	SIO Consistency
5	8	M	ST\R	Yes, MA6 (General Forest) Foreground viewing off CL 2 Kilbrennan Lake Road. Mechanical treatment effects may be negative in short term (stumps, slash, disturbed soil and understory vegetation, etc.) Immediately upon project completion and, depending on site conditions, for the first few years. Longer term, these effects may diminish (when properly designed) result in positive effects such as: a natural appearing mosaic of vegetation; diversity in the species, composition, age classes, and structure vegetation; and a landscape that is more resilient to predicted catastrophic disturbances. Typically, at a foreground distance, people can distinguish more individual forms and sensory messages: clumps of wildflowers, birds singing, small\medium sized wildlife, detailed texture in boughs, branches and tree trunks etc.
6	42	M	IC\S	Yes, MA6 (General Forest) Foreground viewing off CL 2 Kilbrennan Lake Road. See Unit #5 write up.
7	8	M	ST\R	Yes, MA6 (General Forest) Foreground viewing off CL 2 Kilbrennan Lake Road. See Unit #5 write up.
8	66	M	IC	Yes, MA6 (General Forest) this unit is located on a ridge top between the Kilbrennan Lake road and NFSR 4612.
8A	4	M	IC	Yes, MA6 (General Forest) Foreground viewing off CL 2 Kilbrennan Lake Road. See Unit #5 write up.
9	16	M	ST\R	Yes, MA6 (General Forest) Unit 9 is located off Kilbrennan Lake Road and is not easily visible. The Seed Tree\Reserves RX will blend with the more heavily treated private land to the east and south.
11	11	M	ST\R	Yes, MA6 (General Forest) Foreground viewing off CL 2 NFSR 4612. See foreground viewing write up on Unit 5.
12	25	M	ST\R	Yes, MA6 (General Forest) Foreground viewing off CL 2 NFSR 4612. See foreground viewing write up on Unit 5.
14	70	M	C\R	Yes, MA6 (General Forest) Foreground viewing off CL 2 NFSR 4612. See foreground viewing write up on Unit 5.
15	27	M	ST\R	Yes, MA6 (General Forest) Foreground viewing off CL 2 Kilbrennan Lake Road. See Unit #5 write up.
16	6	M	IC	Yes, MA6 (General Forest) Foreground viewing off CL 2 Kilbrennan Lake Road. See Unit #5 write up.
18	81	M	C\R	Yes, MA6 (General Forest) Unit 18 is located off NFSR 4407. 4407 is only accessed by individuals who've rented the Yaak Mountain Lookout Tower. The viewing for these visitors is foreground viewing. See foreground viewing write up on Unit 5.
20	109	M	ST\R	Yes, see Viewpoint #6 in Scenic Resources Report-CL 1 from Us Highway 2 Troy Airport parking lot.
21	129	M	IC	Yes, MA6 (General Forest) Foreground viewing off CL 2 Kilbrennan Lake Road. See Unit #5 write up.
23	24	M	IC\S	Yes, MA6 (General Forest) Foreground viewing off CL 2 East Side Road. See Unit #5 write up.
24	25	M	IC\R	Yes, MA6 (General Forest) Foreground viewing off CL 2 East Side Road. See Unit #5 write up.
25	65	M	C\R	Yes, MA6 (General Forest) Foreground viewing off CL 2 East Side Road. See Unit #5 write up.

Unit #	Acres	SIO	Rx	SIO Consistency
27	11	M	IC	Yes, MA6 (General Forest) Foreground viewing off CL 2 East Side Road. See Unit #5 write up.
28	80	M	IC	Yes, MA6 (General Forest) Foreground viewing off CL 2 East Side Road. See Unit #5 write up.
29	25	M	ST\R	Yes, MA6 (General Forest) Foreground viewing off CL 2 NFSR 4445. Unit 29 borders private land on the west side. See Unit 5 write up.
30	37	M	SW\R	Yes, MA6 (General Forest) Unit 30 has a string of timber between its northern boundary to NFSR 4445. The southern boundary should blend in well with the private ground it borders. Unit 30 is a shelterwood unit.
31B	60	M	C \R	Yes, MA6 (General Forest) is Foreground viewing off NFSR 752 (CL2) See Unit 5 write up.
32	34	H	IC	Yes, Unit 32 is not viewable from Highway 2 a CL 1. Unit 32 is located on a low lying ridge and its RX will blend well the private harvest land located to the west. Its low elevation plus exposure will enhance vegetation growth to a healthy vigorous stand.
33	30	H	C\R	Yes, has low rolling topography and is not viewable from a Highway 2 (CL 1). Timbered corridors are positioned between 32 to 33 and from 33 to 34 which helps create a mosaic across the landscape.
34	40	M\H	ST\R	Yes, Unit 34 is located on a flat between a powerline and Highway 2. The unit is not viewable from Highway 2. Unit 32, 33 and 34 are all similar to the end result.
37	68	M\H	ST\R	Yes, The portion of this unit that is rated a high SIO blends into private agriculture field with structures. The vast majority is Medium SIO-General Forest.
37A	34	M\H	IC	Yes, is a long narrow unit connecting with private agriculture land and is very similar to Unit 39 for meeting its SIO.
38A	6	M	C\R	Yes, General Forest out of view of either CL1 or CL2.
38	71	M	IC\S	Yes, General Forest out of view of either CL1 or CL2.
39	52	M\H	ST\R	Yes, The small acreage portion of this unit that is rated a high SIO blends into private agriculture field with structures. The vast majority is Medium SIO-General Forest. Unit 39 incorporates three tree islands to break up the unit and provides for a mosaic across the landscape.
40	109	M\H	ST\R	Yes, The portion of this unit that is rated a high SIO which is nearly half the unit acreage blends into private agriculture field with structures. The portion of MA2 has a couple tree islands in the RX providing a mosaic on the landscape. Unit 40 is not visible from a CL1 or CL2.
42	85	M\H	ST\R	Yes, 42 is located off the East Side Road (CL2)-it's not visible from a CL1. The private land that has been actively managed prior to Unit 42 is a good indication of how 42 will present itself to the landscape from CL2. The private land opens up the road to see the adjacent mountains and stretches of the Yaak River-42 would benefit the scenery off the East Side Road, The topography is fairly steep in this MA2 area.
43	48	M	ST\R	Yes MA6 (General Forest) borders NFSR 14315 (CL2) -Foreground viewing. (see Unit 5 write up for foreground viewing)

Unit #	Acres	SIO	Rx	SIO Consistency
44	20	M	ST\R	Yes, MA6 (General Forest) Foreground viewing off the East Side Road (CL2). See Unit 5 for foreground viewing.
45	33	M	C\R	Yes, MA6 (General Forest) is positioned on a north to south running ridge between the East Side Road and the Kilbrennan Lake Rd.(both CL2s)-the unit is not visible from either CL2s.
45A	63	M	ST\R	Yes, MA6 (General Forest) Foreground viewing off the NFSR 14315 (CL2). See Unit 5 for foreground viewing.
45B	26	M	IC	Yes, MA6 (General Forest) is located a stretch of timber between its western boundary and the East Side Road not readily visible to viewers.
45C	35	M	ST\R	Yes, MA6 (General Forest) is positioned on a north to south running ridge between the East Side Road and the Kilbrennan Lake Rd.(both CL2s)-the unit is not visible from either CL2s.
46	16	M	IC	Yes, MA6 (General Forest) Foreground viewing off the East Side Road (CL2). See Unit 5 for foreground viewing.
47	17	M	C\R	Yes, MA6 (General Forest) is positioned on a north to south running ridge between the East Side Road and the Kilbrennan Lake Rd.(both CL2s)-the unit is not visible from either CL2s.
48	23	M	C\R	Yes, MA6 (General Forest) is positioned on a north to south running ridge between the East Side Road and the Kilbrennan Lake Rd.(both CL2s)-the unit is not visible from either CL2s.
49	6	M	C\R	Yes, MA6 (General Forest) is positioned on a north to south running ridge between the East Side Road and the Kilbrennan Lake Rd.(both CL2s)-the unit is not visible from either CL2s.
50	21	M	IC	Yes, MA6 (General Forest) Foreground viewing off the East Side Road (CL2). See Unit 5 for foreground viewing.
51	36	M\H	C\R	Yes, Same as Unit 53.
52	56	M	IC\S	Yes, MA6 (General Forest) is positioned on a north to south running ridge between the East Side Road and the Kilbrennan Lake Rd.(both CL2s)-the unit is not visible from either CL2s.
52A	39	M	C\R	Yes, MA6 (General Forest) is positioned on a north to south running ridge between the East Side Road and the Kilbrennan Lake Rd.(both CL2s)-the unit is not visible from either CL2s.
52B	65	M	ST\R	Yes, see Viewpoint #2 in Scenic Resources Report -CL 1 from Yaak Highway 508 MP 3.5 (also, see VP #5 following this table)
52C	31	M	IC\S	Yes, MA6 (General Forest) is positioned on a north to south running ridge between the East Side Road and the Kilbrennan Lake Rd.(both CL2s)-the unit is not visible from either CL2s.
52D	14	M	C\R	Yes, MA6 (General Forest) is positioned on a north to south running ridge between the East Side Road and the Kilbrennan Lake Rd.(both CL2s)-the unit is not visible from either CL2s.
53	49	M\H	C\R	Yes, MA2 not visible from East Side Road or Kilbrennan Lake Road topography is too steep.
54	24	M	C\R	Yes, MA6 (General Forest) is positioned on a north to south running ridge between the East Side Road and the Kilbrennan Lake Rd.(both CL2s)-the unit is not visible from either CL2s.

Unit #	Acres	SIO	Rx	SIO Consistency
55	31	M	IC\S	Yes, MA6 (General Forest) Foreground viewing off the East Side Road (CL2). See Unit 5 for foreground viewing.
55A	10	M\H	IC	Yes, see Viewpoint #2 in Scenic Resources Report-CL 1 from Yaak Highway 508 MP 3.5
55B	18	H	SW\R	Yes, MA2 (is not visible from VP #2 or yak River corridor) Fuels unit F2 is located between Unit 55B and East Side Road So the unit is not readily visible to viewers.
56	29	H	ST\R	Yes, MA2 is located in the foreground (see Unit #5 description) off the East Side Road and near the junction of the Kilbrennan lake Road the steep topography makes the unit not visible to viewers traveling the East Side Rd.
57	68	M	ST\R	Yes, see Viewpoint #2 in Scenic Resources Report-CL 1 from Yaak Highway 508 MP 3.5
58	15	H	ST\R	Yes, MA2 (See VP #4 for analysis from CL 1 from Yaak Hwy\Yaak Falls following this table) is also located off CL2 East Side Road. This portion of road is very densely timbered, this is a foreground view not viewable from the Yaak River itself. See Unit #5 write up for foreground viewing. The SIO of high will be consistent from the CL1 viewing area long before the CL2 viewing area will meet SIO high consistency due to its proximity to the viewer.
59	11	H	ST\R	Yes, MA2 (See VP #4 for analysis from CL 1 from Yaak Hwy\Yaak Falls following this table) is also located off CL2 East Side Road. This portion of road is very densely timbered, this is a foreground view not viewable from the Yaak River itself. See Unit #5 write up for foreground viewing. The SIO of high will be consistent from the CL1 viewing area long before the CL2 viewing area will meet SIO high consistency due to its proximity to the viewer.
60	24	H	ST\R	Yes, MA2 (See VP #4 for analysis from CL 1 from Yaak Hwy\Yaak Falls following this table) is also located off CL2 East Side Road. This portion of road is very densely timbered, this is a foreground view not viewable from the Yaak River itself. See Unit #5 write up for foreground viewing. The SIO of high will be consistent from the CL1 viewing area long before the CL2 viewing area will meet SIO high consistency due to its proximity to the viewer.
61	51	H	C\R	Yes, MA2 (See VP #3 and VP #4 for analysis from CL 1 from Yaak Highway 508-following this table) is also located off CL2 East Side Road. This portion of road is very densely timbered, this is a foreground view not viewable from the Yaak River itself. See Unit #5 write up for foreground viewing. The SIO of high will be consistent from the CL1 viewing area long before the CL2 viewing area will meet SIO high consistency due to its proximity to the viewer.
61A	34	H	C\R	Yes, MA2 (See VP #3 for analysis from CL 1 from Yaak Highway 508 following this table) is also located off CL2 East Side Road. This portion of road is very densely timbered, this is a foreground view not viewable from the Yaak River itself. See Unit #5 write up for foreground viewing. The SIO of high will be consistent from the CL1 viewing area long before the CL2 viewing area will meet SIO high consistency due to its proximity to the viewer.

Unit #	Acres	SIO	Rx	SIO Consistency
62	24	M\H	ST\R	Yes, MA2 (See VP #3 for analysis from CL 1 from Yaak Highway 508) is also located off CL2 East Side Road. This portion of road is very densely timbered, this is a foreground view not viewable from the Yaak River itself. See Unit #5 write up for foreground viewing. The SIO of high will be consistent from the CL1 viewing area long before the CL2 viewing area will meet SIO high consistency due to its proximity to the viewer.
63	10	M	IC	Yes, MA6 (General Forest) is Foreground viewing off CL 2 NFSR 4445. It's a shelterwood unit. See Unit #5 write up.
68	70	M\H	SW\R	Yes, see Viewpoint #1 in Scenic Resources Report-CL 1 from US Highway 2, Swinging Bridge-Kootenai Falls Parking Lot
69	27	L\M	ST\R	Yes, MA6 (General Forest) Unit 69 has NFSR roads below, above and through the middle of the unit.
70	67	L\M	ST\R	Yes, MA6 (General Forest) Foreground viewing from NFSR 4445 (CL2) See Unit #5 write up.
71	39	L\M\H	ST\R	Yes, MA6 (see VP #15 following this table)
73	18	H	ST\R	Yes, see Viewpoint #8 in Scenic Resources Report-CL 1 from US Highway 2 MP 17.2 eastbound.
74	100	H	ST\R	Yes, see Viewpoint #8 in Scenic Resources Report-CL 1 from US Highway 2 MP 17.2 eastbound.
75	50	L\H	IC\S	Yes, see Viewpoint #8 in Scenic Resources Report-CL 1 from US Highway 2 MP 17.2 eastbound. Also, see Viewpoint #13 in Scenic Resources Report-CL 2 from NFSR 4445 (Kootenai Mountain Road) MP 5.3.
77	41	L\M	C\R	Yes, see Viewpoint #13 in Scenic Resources Report-CL 2 from NFSR 4445 (Kootenai Mountain Road) MP 5.3.

MP = mile post

Cumulative Effects for Alternatives 2, 3, and 4

Effects of timber harvest, prescribed burning, and road building from the past are still visible on the landscape within the OLY project area. Harvest activities on private lands can be expected to continue in the future. These impacts, and the impacts from the proposed activities, would have a cumulative effect on the scenic resource in the short term, but in the long term will achieve the desired SIOs. With time, the units from the proposed harvest would blend into the surrounding landscape and compliment the scenic values. With existing openings and diversity of landscape the proposed treatments would be subordinate to the existing landscape. It is expected that people traveling along concern level 1 and 2 viewing platforms and travel corridors would view this as well as activities on private and public lands in sequence.

2015 Forest Plan Consistency

FW-DC-AR-02 describes the desired condition for scenic resources on the KNF to compliment the recreation settings and activities while reflecting healthy and sustainable ecosystem conditions. Forestwide and management area guidelines for scenic resources require management activities to be consistent with assigned SIOs (FW-GDL-AR-01, MA2-GDL-AR-07, MA6-GDL-AR-05,MA5a,b,c-GDL-AR-06.).

The intent of the project is to put vegetation on track to be healthier, more vigorous and resilient through harvest and prescribed burning. As disclosed in this analysis, harvest units and prescribed burning would have short-term (1 to 3 year) effects on scenic resources, but the harvest unit layout design criteria and project contribution to trending the landscape toward desired conditions for forest composition, structure, and pattern (See Forest Vegetation Section) would be consistent with all forest plan SIOs. This contributes to progress toward achieving the FW-DC-AR-02 and meets the intent of guidelines: FW-GDL-AR-01, MA2-GDL-AR-07, MA6-GDL-AR-05, MA5a,b,c-GDL-AR-06.

Soils

Introduction

This section discloses the results of the soils resource analysis in the OLY project area on soil productivity. Field surveys for this project were conducted in 2014 using the Northern Region (R1) Soils Protocol (USDA FS 2011a).

Regulatory Framework

The regulatory framework pertaining to soils is summarized below. For additional information, please refer to the Soil and Water Regulatory Framework in the Soil and Water Project File.

State and Federal Laws and Regulations

The regulatory framework providing direction for protecting a site's inherent capacity to grow vegetation comes from the following principle sources:

- The Multiple Use-Sustained Yield Act of 1960 – Federal law
- The National Forest Management Act of 1976 (NFMA)- Federal law
- Regional Soil Quality standards (2554.03-R1 Supplement 2500-2014-1)
- Soil and Water Conservation Practices Handbook (FSH 2509.22 R-1/R-4 Amendment No. 1 Effective 5/88)
- The 2015 Kootenai National Forest Land Management Plan (USDA FS 2015a, 2015b)

The Multiple Use-Sustained Yield Act of 1960 directs the Forest Service to achieve and maintain outputs of various renewable resources in perpetuity without permanent impairment of the land's productivity.

Section 6 of the National Forest Management Act of 1976 (NFMA) – Section 6(g)(3) states that harvest shall be “carried out in a manner that is consistent with the protection of soil resources” and that “soil, slope, or other watershed conditions will not be irreversibly damaged”. To comply with NFMA, the Chief of the Forest Service has charged each Forest Service Region with developing soil quality standards for detecting soil disturbance and indicating a loss in long-term soil productivity potential.

The Regional Soil Quality Standards (Northern Region (R1) Supplement 2500-2014-1) provides soil quality standards to assure the statutory requirements of NFMA are met. Manual direction recommends maintaining 85 percent of an activity area’s soil at an acceptable productivity potential with respect to detrimental impacts, including the effects of compaction, displacement, rutting, severe burning, surface erosion, loss of surface organic matter, and soil mass movement. This recommendation is based on research indicating that a decline in productivity would have to be at least 15 percent to be detectable (Powers 1990). In areas where more than 15 percent detrimental soil disturbance exists from prior activities, the cumulative detrimental effects from project implementation and restoration should not exceed the conditions prior to the planned activity and should move toward a net improvement in soil quality. These standards do not apply to intensively developed sites such as permanent roads/landings, mines, developed recreation and administrative sites because they have been removed from the productive land base.

The 2015 Forest Plan states that project-specific best management practices (BMPs) will be incorporated into all land use and project plans as a principle mechanism for controlling non-point pollution sources. Best management practices are outlined in the Water Conservation

Practices Handbook R-1/R-4 Amendment No. 1 (FSH 2509.22) and National Core BMP direction and consist of state-of-the art practices that fulfill the 2015 Forest Plan objectives and are designated to minimize soil disturbance during harvest and road construction activities.

Table 109 below displays the 2015 Forest Plan goals, desired conditions, objectives, and guidelines for the soil resource applicable to the OLY project area.

Table 109. Resource Indicators and Measures for Assessing Effects (USDA-FS 2015b)

Resource Elements	Resource Indicator	Measure	Used to Address Purpose and Need or Key Issue?	Source
Sensitive Soils	Areas with sensitive and highly erodible soils or landtypes with mass failure potential are not destabilized as a result of management activities	Acres of activity on sensitive soils Acres of treatment on low productivity landtypes by alternative	Yes	2015 Forest Plan: GOAL-SOIL-01 FW-DC-SOIL-02 FW-GDL-SOIL-04
Soil productivity	Volcanic ash-influenced soils retain unique properties, such as low bulk density and high water holding capacity, to support desired vegetative growth	Detrimental soil disturbance values by treatment unit	Yes	2015 Forest Plan GOAL-SOIL-01 FW-DC-SOIL-03 FW-DC-SOIL-04 R-1 Supplement No. 2500-2014-1 to FSM 2550
Soil Productivity	The potential for fire to remove nutrient recuritment or overheat soils	Acres of prescribed fire by treatment type	No	2015 Forest Plan: GOAL-SOIL-01 FW-DC-SOIL-01
Soil Productivity	Coarse woody debris as the organic matter source for nutrient cycling	Post-harvest CWD tons per acre by biophysical setting	No	2015 Forest Plan: FW-GDL-SOIL-02 FW-DC-SOIL-04 FW-GDL-VEG-08

Analysis Area and Methods

Soils Analysis Area

Soils are the basic support system of forest ecosystems, providing nutrients, water, oxygen, heat, and mechanical support to vegetation. Any environmental stressor that alters the natural function of the soil has the potential to influence the productivity, species composition, and hydrology of forest systems. Maintenance of soil quality is dependent upon the protection of surface layers from erosion, displacement, and compaction, as well as maintenance of the continual cycling of nutrients and organic material. Soil quality refers to the capacity of a soil to function within ecosystem and land use boundaries, to sustain biological productivity, maintain environmental quality, and promote plant and animal health. Various factors influence soil quality. Although management activities do not affect factors such as climate and soil parent material, they can affect physical, chemical, biologic, and hydrologic soil properties.

The direct and indirect effects of the alternatives will focus on individual soils analysis which equates to activity area as defined by the Forest Service Manual (R-1 Supplement No. 2500-2014-1):

> "**Activity Area:** A land area affected by a management activity to which soil quality standards are applied. Activity areas must be feasible to monitor and include harvest units within timber sale areas, prescribed burn areas, and grazing areas or pastures within range allotments, riparian areas, recreation areas, and alpine areas. All temporary roads, skid trails, and landings are considered to be part of an activity area."

The soil activity area (analysis area) is limited to the unit and temporary roads. The proposed soil analysis area for this project involves timber harvest, piling, fuel treatments, fire line construction, skid trails, landings, both new and temporary road construction, and road decommissioning and storage, and post-harvest activities. System roads, and newly constructed roads that would become National Forest System roads, are not a part of the soils analysis areas because they have been removed from production. Similarly, system trails have been removed from the productive land base as well.

Analysis Methods

Existing Condition

Existing condition for the soils resource were determined using timber stand records, GIS data, and on-the ground visits. Landtypes and hazard ratings were gathered from landtype descriptions and characteristics found in the Soil Survey of Kootenai National Forest Area, Montana and Idaho (Kuennen and Gerhardt 1995).

All units containing evidence of existing soil disturbance related to past management activities received a full qualitative field survey using Northern Region (R1) Soil Survey Procedures. Field soil surveys consisted of random stratified transect/sample point methods with confidence intervals at or above 80 percent ± 5 percent with the majority of surveys being 95 percent ± 5 percent. Completed soil surveys can be found in the Soil Project File. Existing detrimental soil disturbance numbers are a result of all currently measureable effects of past actions in each activity area, including but not limited to: timber harvest (trails and landings), temporary road construction, management related burns, off highway vehicles, natural disturbances, firewood gathering, etc. These methods provide data used in the analysis to determine if the 2015 Forest Plan and Regional Soil Quality Standards would be met.

Field Sampling Procedure

In order to determine the severity and aerial extent of existing soil disturbance from previous forest management activities, randomly selected soil transects were conducted across representative portions of the proposed activity areas (proposed harvest polygons, temporary roads, and landings). Sample locations are at equal intervals along the transect and sampled using common tile spade shovel to determine the resistance of penetrating into the soil (USDA Forest Service 2011a). Physical resistance to penetration was found to correlate well with altered soil conditions related with past management activity (Page-Dumroese et al. 2009 and KNF Soil Disturbance Analysis 2000 unpublished). In areas with the greatest soil compaction due to past management activities the shovel blade is only capable of penetrating a short distance into the soil and with great effort.

Field sampled transect points were placed in one of three categories: 1) no disturbance; 2) disturbance present but not detrimental; and 3) detrimental soil disturbance (DSD). Percent detrimental soil disturbance is defined by agency directives for Soil Quality Monitoring found in Forest Service Manual Northern Region (Region 1) Supplement No. 2500-2014-1. As a result, DSD is defined as the proportion of an activity area that may be subject to displacement, compaction, rutting, erosion, or severe burning due to past management activity (such as harvest, fuels treatment, grazing, or temporary road construction), exclusive of dedicated resources (such as system roads).

Detrimental Soil Disturbance (DSD)

The soils in an activity area are considered detrimentally disturbed at a given sample point when one or a combination of any of the attributes listed below is present due to past Forest management activities:

- **Compaction**: a 15 percent increase in natural bulk density. Soil compaction reduces the supply of air, water, and nutrients to plants. Roading, ground based yarding, dozer, and grapple piling activities are the major contributors to compaction.
- **Soil ruts**: Machine-generated soil displacement having smeared the soil surface in a rut. Wheel ruts at least 2 inches deep in wet soils.
- **Displacement**: removal of one inch or more surface soil continuous area greater than 100 square feet which often consists of the O and A soil horizons. Displacement removes the most productive part of the soil resource. Temporary roads, skid trails, ground-based yarding, dozer piling, and cable corridors are the major contributors to displacement.
- **Surface erosion**: Indicated by rills, gullies, pedestals, and localized soil deposition.
- **Severely burned soils**: Physical and biological changes to the soil resulting from high-intensity burns of long duration as described in the Burned Area Emergency Rehabilitation Handbook (FSH 2509.13).
- **Soil mass movement:** any soil mass movement caused by management activity.

Direct and Indirect Effects

The DSD percentages utilized to predict the OLY project effects were developed using the average soil disturbance level equated to harvest equipment type, fuel treatment methods, and season of operation as calculated from soil monitoring data collected from 2000 to 2005 (Kuennen 2006a). The monitoring data was gathered through measurement of post-harvest field surveys. Timber removal and fuels treatment always occur prior to the post-harvest field surveys and includes effects from mechanical fuel abatement activities such as excavator piling activity if present. The end DSD figure is a compilation of all measured disturbance values and does not separate each category of disturbance where present within a unit. Thus, the value of 8 percent DSD for summer tractor is a “statistical summary” which takes into account not only the skid trails but temporary roads, mechanized piling, and fire lines if present within the units being surveyed at that time and date. New temporary roads are considered detrimentally disturbed through removal of organic matter, displacement, and/or compaction. Re-opening of an existing temporary road prism is considered to have 0 percent additional detrimental disturbance as as the site is already considered detrimentally disturbed. New temporary roads yield an average of 2 acres of DSD per mile of road. Table 110 displays the predicted detrimental soil disturbance (DSD) values based on a summation of past monitoring of soil productivity for the Kootenai National Forest from 1988-2005 (Kuennen 2006a).

Table 110. Monitoring Results of Detrimental Soil Disturbance from Management Activities on the Kootenai National Forest (Kuennen 2006a)

Category	Season of Operation	Detrimental Disturbance Coefficients (%)[2]
Skyline without Feller Buncher	Not Applicable[5]	3
Skyline with Feller Buncher	Not Applicable[5]	5
Tractor	Summer	8
Tractor	Winter	4
Forwarder	Summer	4
Forwarder	Winter	2
Feller Buncher	Not Applicable[5]	2
Helicopter	Not Applicable[5]	0
Excavator Piling[1]	Not Applicable[5]	2
Fire line Construction[1 and 3]	Not Applicable[5]	1
Grazing[1]	Not Applicable[5]	2
Tractor secondary entry	Summer	4[4]
Tractor secondary entry	Winter	2[4]
Forwarder secondary entry	Summer	2[4]
Forwarder secondary entry	Winter	1[4]

[1] DSD percent for this activity is not necessarily additive to other activities. This is because the percentages presented for each management activity included some units with excavator piling, fire line construction, and/or grazing in the data set. In addition, disturbance from these activities within harvest units usually overlaps at least a portion of the skidding disturbance.

[2] Kuennen (2006a) monitored detrimental soil disturbance from 1988-2005. He presented his data as an 18-year average, an average from the last 10 years of the study, and an average from the last 5 years of the study. The Detrimental Disturbance Coefficient values within this table (presented as DSD percentages in this document) were based on summary data percentages from the last 5 years of Kuennen's (2006a) study. Typically the larger data set is more accurate, but because the 18-year data set included practices no longer used (i.e. dozer piling) it was deemed more appropriate to use the more accurate information pertaining to modern harvest and slash disposal methods.

[3] Fire line construction prior to 1995 included dozer activity while data collected following 1995 generally included handline construction or excavator bucket-width activity. As a result there has been a significant reduction of fire line disturbance in a given unit.

[4] In proposed secondary entry harvest units which currently are equivalent or exceed 8 percent current DSD, the proposed ground based harvest activities are proposed as having approximately a 50 percent disturbance value compared to similar harvest activities in currently undisturbed soils (Louis Kuennen pers. comm. 2011). This reduction in the anticipated DSD values only applies to ground based harvest operations. It is assumed that units containing less than 8 percent DSD are more historic in nature and are on a recovery trend as displayed by revegetation of historic skid trails and second-growth stand conditions. As a result the reduction in secondary entry values will not apply to such stands.

[5] Not applicable either because percent ground disturbance does not change winter or summer, or because that activity only takes place in the non-winter season.

Generally, detrimental impacts on soils are not permanent and depend primarily on soil texture, parent material, aspect, and level of disturbance (compaction). Soil recovery begins once activities cease on the site (Kuennen 2006b). However, vegetative recovery time may take approximately 30 to 70 years as the second growth timber becomes established in and around the

disturbed areas (Dykstra and Curran 2002, Froehlich and McNabb 1983, Froehlich and others 1983 and 1985). In areas where soil displacement mixes or moves the volcanic ash surface layer and reduces moisture holding capacity, productivity may continue to be impacted beyond the 70-year timeframe.

Indirect effects may include the reduction of site productivity due to the removal of vegetation and nutrients. Large woody debris (woody residue greater than 3-inch diameter) and finer organic material are essential for maintenance of sufficient microorganism populations and long-term site productivity. Design features are incorporated into the activities to manage large woody debris and organic matter as detailed in the research guidelines contained in Graham and others (1994). Where feasible, smaller woody material such as tree tops, foliage, and branches would be left to over-winter before fuels treatment, which allows nutrients to leach out of these materials and into the soil.

Cumulative Effects

Cumulative effects include the combination of direct and indirect effects from past, present, and reasonably foreseeable activities. Direct, indirect, and cumulative effects on soils are measured within each activity area. Existing National Forest System roads are considered dedicated lands and are not part of the cumulative effects for soils.

Assumptions and Limitations

The potential detrimental disturbance numbers for each proposed harvest unit are based on coefficients that were obtained and averaged from numerous monitored sites throughout the Kootenai National Forest (Kuennen 2006a). The assumptions are limited to the harvest and slash disposal methods for which coefficients have been determined, and its coefficients assume that Best Management Practices (BMPs) would be implemented. The predicted values do not account for changes in soil type, the recovery of soils over time, or existing conditions.

Evaluation of cumulative effects to soil productivity are analyzed for activity areas as opposed to the integrated “watershed scale” because that is not considered an appropriate geographic area. Soil conditions are site-specific. Loss of soil productivity in one treatment unit will not lead to a loss in soil productivity in an adjacent stand. Soil productivity can vary from one square foot to the next with each area functioning independently. Thus, the highly variable and independent nature of soil productivity requires site-specific analyses to maintain the proper context. Assessments of cumulative effects on soil productivity is retained at the site-specific boundary scale since analysis at the watershed scale for soils misrepresent management activity effects by masking and/or diluting site-specific effects across a larger area. In contrast, soil processes such as erosion regime and hydrologic functions occur at a watershed scale and can be analyzed as such in Water Resource Reports.

Limitations and Scientific Uncertainty

Soil productivity relies on complex chemical, physical, and climatic factors that interact within a biological framework. For any given site and soil, a change in a key soil variable (i.e. bulk density, soil loss, nutrient availability, etc.) can lead to changes in potential soil productivity. The intent is to prevent extensive detrimental soil disturbance that would result in a measurable decline in timber productivity for a site. The Northern Region (R1) Supplement 2500-2014-1 requires that detrimental soil disturbance should be limited to 15 percent of an activity area. The 15 percent value is based on the assumption that soil quality and productivity will be maintained if less than 15 percent of an activity area is detrimentally impacted after disturbance (Page-Dumroese et al. 2000).

Currently the long-term effects of soil disturbance on soil quality are being studied across North America by a cooperative research project called the North American Long-Term Soil Productivity Study (LTSP). The study began in 1990 and is currently ongoing in order to provide the best available science to forest managers. Results from the first decade indicate that there is little evidence of adverse effects of surface organic matter removal or soil compaction on productivity as measured by total biomass production, and the growth and vigor of planted trees (Powers et al. 2004).

The National Forest Management Act requires the Forest Service to "insure that timber will be harvested from NFS lands only where soil, slope, or other watershed conditions will not be irreversibly damaged." The detrimental soil disturbance described in this analysis does not necessarily result in permanent or irreversible damage. Detrimental soil damage is reversible if the components, such as organic matter, moisture, top soil retention, soil organisms, are in place and time is allowed for recovery.

Affected Environment

Soil Reference Conditions

The bedrock underlying the project area is composed mostly of metamorphosed sediments of ancient sea beds from the Precambrian era (0.8-1.4 billion years before present), referred to as the Belt Supergroup. The major structural feature is related to historic glaciation during the Cordilleran Ice Age. These glacial activities formed both the Yaak River drainage and Kootenai River drainage.

Glacial activities resulted in considerable scouring and filling, creating a more subdued landscape than would have existed prior to historic glacial activities. Generally, major ridge divides and smaller ridge tops were scoured leaving exposed, scraped rock. The scoured soil material tended to deposit in topographic lows (drainage bottoms, etc.). The scouring of the ridge tops and filling of drainage bottoms gave the landscape a rounded appearance. Soils formed during this procedure are referred to as glacial till soils and have fine sand/silt particle size with 30 to 45 percent sub-rounded rock material.

Glacial ice generally retreated from the area 12,000 to 15,000 years ago. The soil material left in place was composed of silts, fine sands, and rounded gravels and boulders. As ice melted more landforms were created, existing as outwash terraces, eskers, kames, and lacustrine terraces. Most of these landforms were created in and/or adjacent to drainage bottoms.

Those areas not affected by glaciation and/or scoured ridge tops consist of soils that are weathered "in place" and are referred to as residual soils. The amount of rock present in residual soils is much higher than that associated with glacial till soil and rock shape is strongly angular.

Approximately 7,700 years ago (Zdanowicz and others 1999) Mount Mazama erupted in southwest Oregon and deposited a layer of volcanic ash-influenced loess over northwestern Montana forming a topsoil horizon in many local areas. This layer is present on all northerly and easterly aspects and the higher elevations of the southerly and westerly aspects and is important since it increases soil productivity and provides the best rooting environment within the soil profile. The ash cap is lightweight and feathery and has a yellowish to reddish brown color ranging from 4 to 14 inches thick. The uppermost ash is usually enriched with organic matter and has been incorporated into the local soil system. These ash cap soils have a high water-nutrient holding capacity and are important for soil productivity. Volcanic derived soils have undeveloped crystalline structure and weather rapidly in humid environments, producing soils characterized by

high water-holding capacity and ability to stabilize soil organic matter (Bulmer et al. 2007). Generally speaking the sub-soil horizons are not nearly as fertile as the surface horizons. This soil type is often referred to as volcanic ash loess.

Between the eruptions of Mount Mazama to the early 1900s, the soils were relatively undisturbed. Naturally occurring surface erosion and small-scale landslides probably occurred on occasion, but the overall magnitude would have been insignificant in terms of long-term soil productivity. Soil recovery in such areas was attained when the slope reached a stable angle and/or the area was vegetated. Soil productivity was maintained over the long-term as vegetative matter slowly decomposed or burned in low-intensity natural wildfires.

Historically, the most prevalent large-scale disturbance in the project area was wildfire. Stand replacing fires varied in frequency from 50 to 350 years, depending on vegetation type and location. Once fire passed through an area, erosion increased, especially on steep slopes and in headwater swales where most vegetation was removed, until sufficient forest floor and canopy vegetation had recovered. More frequent, low-intensity under burns likely had little effect on soils due to the short contact time and lower temperatures associated with these fires.

Site Conditions in the Activity Areas

Site conditions are considered for each activity area in the effects analysis portion of this assessment. Past activities affecting soils include, but are not limited to, road construction, timber harvest (including skid trails and landings), prescribed or natural fire, firewood gathering, and off-road vehicle use. The following are the categories of soil disturbance: Compaction, Rutting, Displacement, Surface Erosion, Severely Burned Soils, and Mass Movement (Landslides). All types of detrimental soil disturbance will be considered in the examination of the existing condition and analysis of the environmental effects.

The three factors which have created the most impacts to soil conditions associated with the analysis area are:

- Temporary Road construction
- Timber harvest
- Fire

Temporary Road Construction

Proposed temporary roads, excavated skid trails, landings, and undetermined routes contribute toward the 15 percent DSD standard.

Common impacts to soils from road construction are displacement, compaction, and erosion (road-related runoff). Road construction affects soils by displacing topsoil layers from the road prism and compacting the road surface and shoulders. The road surface will not support trees and other forest vegetation as long as the road is used and maintained. Trees and shrubs will grow along the road bank, but site productivity is less than in unaffected soils in similar productivity zones.

Roads also disrupt hydrologic processes that occur within the soil profile. The cut slope intercepts subsurface flow and the compacted road surface reduces precipitation infiltration. As long as roads remain on the landscape, the impacts to soils persist. When road use ceases, soils gradually begin to recover. Implementation of BMPs reduces erosion and the rerouting of water associated with roads.

Timber Harvest

Harvest activities in the 1980s on National Forest System lands included hand-fall and dozer skidding in lower relief land areas. Around the early to mid-1990s harvest activities were altered to skyline and rubber tire skidders and handfall/clipper cutting.

Soil disturbance as a result of timber harvest and fuels reduction is usually associated with mechanized activity (Kuennen 2007a). Two of the more important impacts to soils are detrimental soil disturbance (compaction, displacement, rutting, etc.) and removal of organic matter. Soil compaction impacts recover over time due to freeze/thaw activity, burrowing by animals, plant root growth, wetting/drying, and the action of soil microbes. Soil erosion and displacement are impacts that require a longer timeframe to recover since the rate of soil formation is very slow. Long-term soil processes are influenced by fire, mass wasting, wind-deposition, and weathering of parent material at the rate of one inch of topsoil formed every 300 to 1,000 years (Thurow 1991).

To date a total of 35,242 acres of regeneration harvest; 6,145 acres of liberation harvest; 5,744 acres of intermediate harvest; 6,224 acres of pre-commercial thinning; and 593 acres of permanent land clearing (mainly on private lands) has occurred and affected 88 percent of the OLY project area.

Fire

Only smaller portions of the OLY project area are estimated to have burned in the fire of 1910 as a result of lightning strikes and high winds. However, there were a number of significant fires which occurred from the early 1980s to current date for a total of 23,761 acres (35 percent) of the entire project area. Some of these fires and the related year of occurrence are: Arbo (1991); China Basin (1994); Pulpit (1994); Studebaker (1994); Feeder Mountain 2 (2000); Pulpit Mountain (2000); O'Brien (2000); Noseeum Creek (2000); Prospect (2000); Studebaker Draw (2000); and Pulpit Mountain (2008). Between 1986 and 2014 there were 192 fire ignition occurrences ranging in size between 0.25 to 5 acres. These smaller spot fires impacted relatively small areas of land upon occurrence. Prior to early 1980s fires were not as actively tracked as they are to date.

Within the harvest and fuel treatment units, negative fire effects to soils have not been observed. Additionally, within the project area, despite an extensive fire history, no negative soil effects have been noted and many positive resource effects are present. Many fire effects on soil are not observable with the naked eye (Parsons et al. 2010). Severe deteriorating effects that wildfires have on soils include loss of organics and nutrients and a reduction of water infiltration (Wells et al. 1979). Burns that create very high soil surface temperatures, particularly when soil moisture content is low, may result in an almost complete loss of soil microbial populations, woody debris, and the protective duff and litter layer over mineral soil. Since erosion increases following fire activity are often directly proportional to fire intensity (Megahan 1990), the removal of ash-capped surface soils as related to soil disturbance could reduce soil productivity. As a result, many of the nutrients present in surface organics and large woody debris can also be lost to the atmosphere through volatilization and removed from the site in ash-fly (DeBano 1991; Amaranthus 1989).

Depending on fire severity and activity characteristics, many plants will survive and re-initiate growth soon after a fire. However, the ability of surviving plants to reestablish, thrive, and reseed in subsequent years is greatly affected by the presence of invasive plants and weeds (Goodwin and Sheley 2001). Burned areas can contain high initial nutrient levels, exposed ground surfaces, and low shade with high light conditions, which all directly favor colonization of invasive plant species. Invasive plant survival coupled with fire disturbance can cause rapid expansion of

invasive plant growth. As a result, values such as wildlife habitat, watershed stability, and water quality often deteriorate.

A wildfire occurring on sites with accumulated fuels could result in areas of high burn severity and hydrophobicity (water repellant soils). This impact is greatly amplified by increased burn severity (Huffman et al. 2001). The heat of a fire vaporizes hydrophobic compounds in the organic matter and moves them into the soil layer where they condense and form a water repellant coating on the soil particles. Soil hydrophobicity usually returns to pre-burn conditions in no more than 6 years (DeBano 1981; Dyrness 1976). Other studies have documented a much more rapid recovery of 1 to 3 years (Huffman et al. 2001). However, before water infiltration rates improve, increased overland runoff and sediment movement may occur. The primary risks for erosion and mass failure during this timeframe is related to roads, especially where stream crossings are located. It should be noted that soils within the soils analysis area currently do not display hydrophobic concerns.

Existing Condition

The existing condition is the result of the past management activities (temporary road construction, timber harvest, prescribed burning, etc.) and natural events (wildfire, floods, landslides, etc.) that occurred in the project area. These activities and events provide baseline conditions for the affected environment in the soils analysis area.

Three criteria were used to assess existing condition in the analysis area for soil resources:

- Kootenai National Forest Landtypes;
- Identification of Sensitive Soils; and
- Coarse Woody Debris

Landtypes

There are 50 recognized landtypes on the KNF. This classification of landtypes is based on: **landforms, geology, soils, vegetation, climate,** and **drainage type**. They describe inherent conditions and do not change as a result of management. The landtypes were compiled in Kuennen and Nielson-Gerhardt (1984), and published in Soil Survey of Kootenai National Forest Area, Montana and Idaho (Kuennen and Nielson-Gerhardt 1995). Landtype classification helps determine suitability, equipment operating limitations, and the production potential of the landscape. It is an important tool for protecting soils during resource management activities. Figure 46 displays landtypes in the OLY project area (also see Map M-21). The landtype map is generally quite accurate; however, field verification may indicate some site variability. The landtypes were broken down into five generalized groupings or series which include the following:

- **Water influenced Landtypes (100 Series):** Such landtypes are located in very low relief topography, which is highly water influenced.
- **Steep topography Landtypes (200 Series):** These landtypes exist in very steep topographic lands (60 percent plus). Such landform areas are usually rocky slopes and may be convex or linear in shape.
- **Glaciated Landtypes (300 Series):** These landtypes are located in areas of past glacial deposits and shaped through time by several glacial advances that occurred throughout the Kootenai National Forest. The most recent, the Cordilleran Ice Sheet retreated from

the area several thousand years before present. These landtypes included glaciated slopes, drumlins, and moraines.

- **Alpine till Landtypes (400 Series):** These landtypes exist in very steep alpine or subalpine locations and consist of glacial cirque headwalls and trough walls.
- **Mid-elevation Landtypes (500 series):** These landtypes are residual in nature and developed on site and are typically mid-slope in elevation.

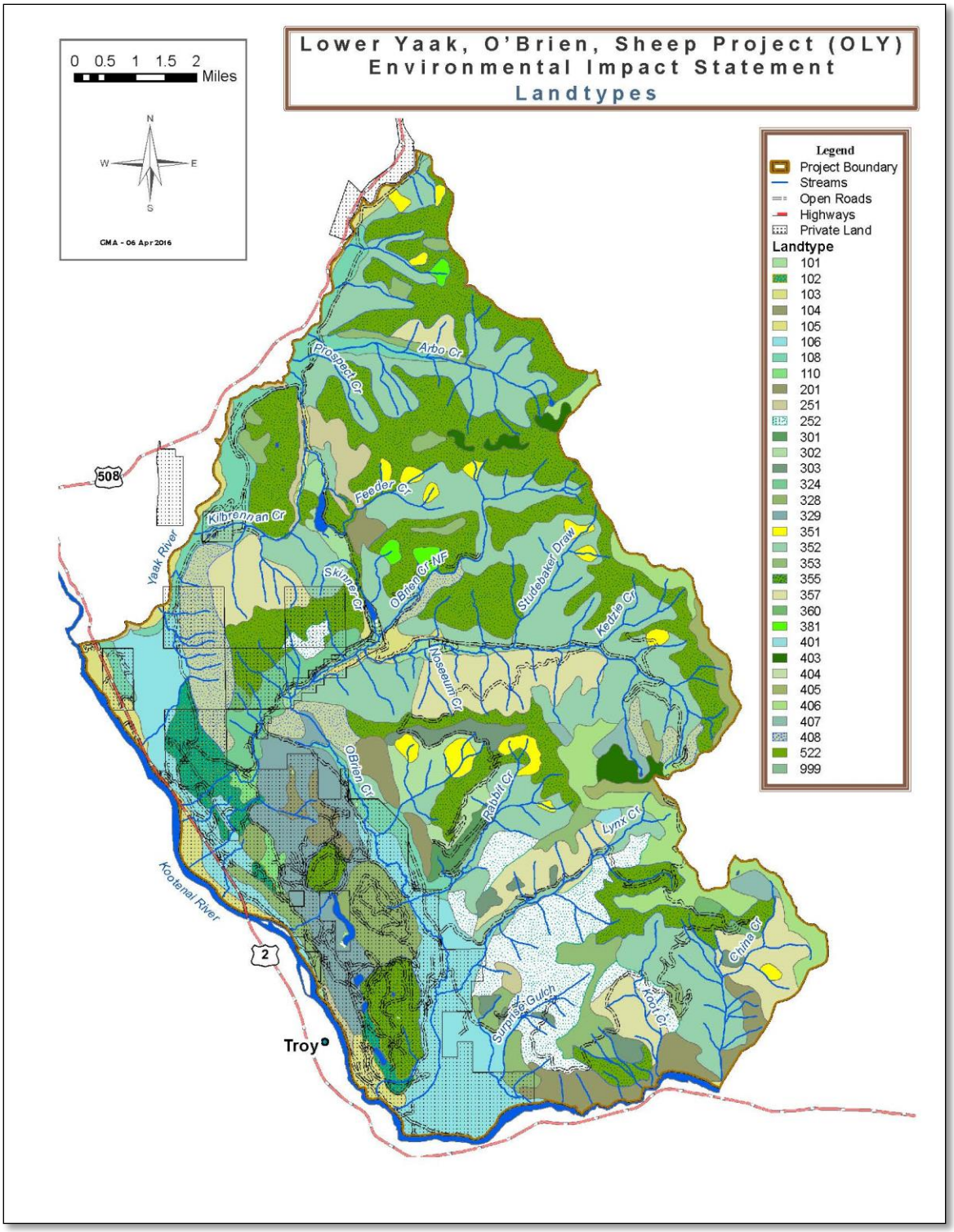


Figure 46. Landtypes of the Lower Yaak, O'Brien, Sheep (OLY) Project Area

Of the 50 recognized landtypes on the Kootenai National Forest, 30 are found in the OLY project area (Figure 46, Table 111). Nineteen landtypes have proposed harvest and/or fuel activities under at least one of the action alternatives. Management activities on each landtype are designed to be

comparable to the risk associated with the landtype. The landtypes in the project area and their implications are displayed in Table 111. The following information provides a general description of all landtypes found in the OLY project area and the associated risks of management activities.

Table 111. Landtypes in the Project Area (Kuennen and Gerhardt 1995) and Associated Risks of Various Land Management Activities

Landtype	Total Landtype Acres in Project Area	Potential Risks of Timber Management		Potential Risks of Road Construction/Maintenance		
		Limitations of Tractor Operations	Sediment Hazard	Limitations to Maintenance of Cut and Fill Slopes	Limitations of Fill Material Used for Surfacing	Sediment Hazard
101[2]	698	Soil Damage	Severe	None	Tread Erosion	Severe
102[2, 3]	1,201	Soil Damage	Moderate	None	Rutting	Severe
103[2]	1,766	Soil Damage	Severe	None	Tread Erosion	Severe
104	380	Soil Damage	Moderate	Cutbank Sloughing	Tread Erosion	Moderate
105[1]	98	Not Applicable	Not Applicable	None	No Limitation	Moderate
106[2]	5,350	Soil Damage	Moderate	None	No Limitation	Moderate
108[2]	2,466	Soil Damage	Moderate	None	Rutting	Severe
110[2]	261	Soil Damage	Moderate	None	Rutting	Severe
201[1, 2]	1,839	Not Applicable	Not Applicable	None	Large Stone Rock Fall	Moderate
251[2]	904	Slope, Rock	Severe	None	Large Stone Rock Fall	Moderate
252[2]	3,361	Slope	Severe	None	Rock Fall	Moderate
301	296	No Limitations	Moderate	Cutbank Sloughing	Tread Erosion	Moderate
302[2]	687	Slope	Moderate	Cutbank Sloughing	Tread Erosion	Moderate
303[2]	738	Rock Outcrop	Moderate	None	Large Stones	Slight
324[2]	897	No Limitations	Moderate	Cutbank Sloughing	Tread Erosion	Moderate
328	1,095	Soil Damage	Moderate	Cutbank Sloughing	Tread Erosion	Moderate
329[2]	2,502	Soil Damage	Moderate	Cutbank Sloughing	Tread Erosion	Moderate
351[3]	932	Slope	Severe	Landslides, Cutbank Sloughing	Tread Erosion	Severe
352[2]	13,802	Complex Slope	Moderate	Cutbank Sloughing	Tread Erosion	Moderate

Landtype	Total Landtype Acres in Project Area	Potential Risks of Timber Management		Potential Risks of Road Construction/Maintenance		
		Limitations of Tractor Operations	Sediment Hazard	Limitations to Maintenance of Cut and Fill Slopes	Limitations of Fill Material Used for Surfacing	Sediment Hazard
353[2]	2,178	Rock Outcrop	Moderate	None	Large Stones	Slight
355[2]	14,363	Rock Outcrop	Moderate	None	Large Stones	Moderate
357[2]	5,041	Slope	Severe	Landslides	Large Stones	Severe
360[1, 2]	208	Rock	Slight	None	Large Stones	Slight
381	223	Slope	Severe	Landslides, Cutbank Slough	Erosion	Severe
401[1]	78	Not Applicable	Not Applicable	Avalanches	Large Stones, Rock Fall	Moderate
403[1]	519	Not Applicable	Not Applicable	Avalanches	Large Stones, Rock Fall	Moderate
405[1]	604	Complex Slope, Rock Outcrop	Moderate	None	Large Stone	Slight
406	2,315	Complex Slope, Soil Damage	Moderate	Cutbank Ravel	None	Slight
407	426	Soil Damage	Severe	Cutbank Ravel	Tread Erosion, Large Stones	Severe
408[2]	2,091	Slope, Rock Outcrop	Severe	None	Large Stones, Rock Fall	Moderate
999	185	Not Applicable	Not Applicable	Not Applicable	Not Applicable	Not Applicable
Total Acres	**67,500**					

[1] Not applicable because landtype has only scattered stands of trees.

[2] Landtypes present within proposed harvest units.

[3] Landtypes of concern.

Landslide History in the OLY Project Area

Proposed Harvest Units 18, 19, 20, and 21 are located near past landslide activity. Although the associated landtypes are generally not a high risk for landslides, the units were given careful review for soil stability in consideration of the area's history. No in-unit concerns were noted outside of the deeply incised riparian areas. RHCA buffers and design criteria to exclude any additional landslide prone areas identified during sale layout would be implemented in all alternatives to minimize the potential for harvest-related mass soil movement.

In 2007, a landslide originated on Stimson Lumber Company lands in the O'Brien Creek drainage during a spring rain-on-snow event. The landslide developed near the center of the section on steep terrain developed from glacial till deposits overlying Belt series metamorphic bedrock. The main form of this landslide is generally referred to as a debris torrent. Debris torrents are highly liquid forms of failure that often travel down steep stream channels, as was the case here. This particular landslide scoured approximately 4,000 linear feet of stream channel and crossed six roads before depositing over the course of an additional approximately 500 feet of gentle slope (Western Watershed Analysts 2007) (see also the watershed section of this document). Additional, smaller debris torrents were noted during the OLY project field review at the northwest side of Harvest Unit 21, originating at the southeast side of Unit 20, with approximate dates of origin between 1985 and 1995.

The Stimson slide occurred on landtypes 355 which is generally not considered a landtype with a high risk of landslide, although there are occasional inclusions of less stable soil types across the broadly mapped landtypes. The Geological Technical Report (Western Watershed Analysts 2007) issued after the slide found the key factors contributing to the occurrence of the slope failures were steep slopes, heavy precipitation and snowmelt, groundwater emergence, naturally unstable glacial terrace deposits, convergent topography, and poor road location. Similarly, the 20 to 30-year old slides in Unit 21 occurred on landtypes 324 and 325, neither of which are generally considered to be at high risk of landslides.

Proposed harvest units in this area (Harvest Units 18, 19, 20, and 21), and roads 4407 and 9905 (see both soils and watershed analyses project records), were carefully reviewed during the OLY project development to determine soil and road stability in light of the landslide history.

Sensitive Soils

Sensitive soils are identified based on one of three characteristics: 1) landtypes of concern, 2) riparian/wetland areas; and 3) low productivity soils. Sensitive soils comprise 413 acres or 5 percent of the entire project area. Sensitive soils are best addressed through avoidance, BMPs, buffers, and/or through design criteria.

Landtypes of Concern

There are seven designated "landtypes of concern" on the KNF that should be given additional consideration prior to the introduction of management activities. These are landtypes 102, 112, 325, 351, 365, 370, and 520 (Kuennen 2006c). When viewed at the analysis area level only two landtypes of concern (102 and 351) are present and consist of 2,133 acres or 3 percent of the entire project area acreage (FW-DC-SOIL-02).

Riparian/Wetland Areas

There are scattered riparian corridors and small patches of wetland areas in the project area. Riparian and wetland soils are considered sensitive because their moisture levels are high during

all or most of the year, and moist soils are more prone to compaction, displacement, rutting, and puddling. Harvest and road construction activities would avoid timber activity in wetland areas (FW-GDL-RIP-05).

Low Productivity Soils

Soil productivity as defined by Brady and Weil (2002) is "the capacity of a soil for producing a specific plant or sequence of plants under a specified system of management." The most productive part of the soil occurs near the surface, at the contact between the forest litter and the mineral soil. Here the litter has been decomposed into an organic rich layer containing most of the soil nitrogen, potassium, and mycorrhizae that must be present for a site to be productive. However, this is also the part of the soil that is easiest to disturb by management activities.

Soil productivity levels for each landtype on the Kootenai National Forest are classified as low, moderate, or high in Kuennen and Gerhardt (1995). It is important to look at soil productivity to properly assess the effects of potential actions on a specific area. For instance, if timber harvest is proposed on a given area of land that was considered as having low soil productivity, additional actions may need to be taken to insure a fully stocked stand after harvest. Table 112 displays the soil productivity by landtype in the OLY project area.

Table 112. Soil Productivity in the OLY Project Area (Kuennen and Gerhardt 1984)

Landtype	Acres	Forest Vegetation Group	Relative Productivity
101[2]	698	Moist, Mixed Forest	High
102[2]	1,201	Dry to Moist Mixed Forest	High
103[2]	1,766	Moist, Mixed Forest	High
104	380	Moist, Mixed Forest	High
105	95	Non-Forested	Not Applicable[1]
106[2]	5,350	Moist, Mixed	High
108[2]	2,466	Moist, Mixed	Moderate
110[2]	261	Moist, Mixed	High
201[2]	1,839	Rocky Subalpine to Dry Mixed Forest	Low
251[2]	904	Open-grown Forest	Moderate
252[2]	3,361	Moist, Mixed Forest	Moderate
301	296	Dry, Mixed Forest	Moderate
302[2]	687	Dry, Mixed Forest	Moderate
303[2]	738	Open-grown Forest	Low
324[2]	897	Dry, Mixed Forest	Moderate
328	1,095	Subalpine Forest	Moderate
329[2]	2,502	Dry, Mixed Forest	Moderate
351	932	Moist, Mixed Forest	High
352[2]	13,802	Moist, Mixed Forest	High
353[2]	2,178	Rocky Subalpine to Moist, Mixed Forest	Low
355[2]	14,363	Moist, Mixed Forest	Moderate

Landtype	Acres	Forest Vegetation Group	Relative Productivity
357[2]	5,041	Moist, Mixed Forest	High
360[1, 2]	208	Subalpine Forest	Low
381	223	Subalpine Forest	Low
401	78	Open-grown Forest	Not Applicable[1]
403	519	Subalpine Forest	Not Applicable[1]
405[1]	604	Subalpine Forest	Low
406	2,315	Subalpine Forest	Moderate
407	426	Subalpine Forest	Moderate
408[2]	2,091	Subalpine Forest	High
999	185	Not Applicable[3]	Null[4]
Total	**67,500**		

[1] Not applicable due to landtypes having only scattered stands of trees.

[2] Landtypes present in the Soils analysis area scale (which is the harvest or fuels unit activity area).

[3] Not applicable due to landtype 999 being water.

[4] Null due to landtype 999 being water.

Of the 30 landtypes within the project area, 19 have proposed harvest and/or prescribed burn activities under at least one of the action alternatives and are thus included as being in the soils analysis area. These are landtypes 101, 102, 103, 106, 108, 110, 201, 251, 252, 302, 303, 324, 329, 352, 353, 355, 357, 360, and 408.

The majority of the project area has moderate to high soil productivity. Landtypes 201, 303, 353, 360, and 381, rated as having low soil productivity, are located in the project area. This equates to 5,186 acres or about 8 percent of the project area having low productivity. Only landtypes 201, 303, and 353 are present within proposed harvest units. Application of project specific (BMPs) (FW-GDL-SOIL-05) such as avoiding timber harvest in wet seasons and skidding over snow or frozen ground will decrease the potential negative impacts to soil productivity regardless of landtype conditions.

Environmental Consequences

Direct and Indirect Effects

No soils issues were identified by the public for soil resources during the scoping process. However, field review of several proposed units found an issue to be present where proposed harvest activities at the individual unit level either approached 15 percent DSD or was predicted to exceed 15 percent.

Measurement Indicators

Effects of the alternatives on soil resources will be analyzed in terms of:

1. Activities on sensitive soils;
2. Detrimental Soil Disturbance and the 15 percent standard and;
3. Nutrient cycling and post-harvest CWD tons per acre by biophysical setting.

Sensitive Soils

Table 113 displays the acres of management activities on sensitive soils by alternative.

Table 113. Treatment Acres on Sensitive Soils

Activities on Sensitive Soils	Alt 1	Alt 2	Alt 3	Alt 4
Total Acres of Proposed Harvest Units (irrespective of sensitive soils)	**0**	**3,127**	**3,069**	**2,606**
Proposed Harvest Acres on Landtypes of Concern (102)	0	76	76	70
Percent of Proposed Harvest on Landtypes of Concern (102)	(0%)	(2%)	(2%)	(2%)
Proposed Harvest Acres on Low Productivity Soils (201, 303, and 353)	0	186	186	148
Percent of Proposed Harvest Activities on Low Productivity Landtypes (201, 303, and 353)	0%	6%	6%	6%
Total Acres of Proposed Non-Harvest Fuels Units (irrespective of sensitive soils)	**0**	**1,716**	**1,744**	**1,731**
Total Acres Proposed Fuel Treatments on Landtypes of Concern	0	0	0	0
Percent of Proposed Fuel Treatment Acres on Landtypes of Concern	0%	0%	0%	0%
Total Acres of Proposed Fuel Treatments on Low Productivity Soils (Landtype 201, 303, and 353)	0	391	391	391
Percent of Proposed Fuel Treatment Units on Low Productivity Soils (Landtype 201, 303, and 353)	0%	23%	22%	23%

Effects of the No Action Alternative - Sensitive Soils

Alternative 1 (No Action) does not propose any new management activities on sensitive soils. Therefore, no direct, indirect, effects to sensitive soils would result from Alternative 1. The no action alternative would not contribute to any cumulative effects on sensitive soils.

Direct and Indirect Effects of the Action Alternatives – Sensitive Soils

Landtypes 102, 112, 325, 351, 365, 370, and 520 are considered landtypes of concern (Kuennen 2006c). Such soils are those thought to contain a “mix of management issues” that may be landslide prone under certain physical conditions. Landtype 102 is found to be present in proposed Harvest Units 5, 6, 23, 24, and 25. Under Alternatives 2 and 3 it is estimated that 76 acres of harvest would occur on landtype 102 while Alternative 4 proposes to harvest 70 acres. This value equates to approximately 2 percent of the total harvest in proposed Alternatives 2, 3, and 4.

Based on unit design and logging systems, including skyline systems on steep slopes, activities on landtype 102 are not expected to be a concern.

Landtypes 201, 303, 353, 360, and 381 are all considered low productivity soils. Of these, landtypes 201, 303, and 353 are present in the OLY project area.

Landtypes 201, 303, and 353 in Harvest Units

Landtype 201:

Six acres of landtype 201 are located in proposed Harvest Unit 73. This would equate to less than 1 percent of the proposed activities occurring on sensitive landtype 201.

Landtype 303:

Eight acres located in proposed skyline Harvest Unit 75 are within landtype 303 under all action alternatives.

Landtype 353:

A total of 172 acres in proposed Harvest Units 3B, 4, 52, 52B, 54, 68, 74, and 75 are within landtype 353 under Alternatives 2 and 3. This involves 3 acres in Unit 3B, 13 acres in Unit 4, 25 acres in Unit 52, 24 acres in Unit 52B, 4 acres in Unit 54, 26 acres in Unit 68, 37 acres in Unit 74, and 40 acres in Unit 75.

Under Alternative 4 a total of 134 acres of the proposed harvest acres contains landtype 353. This involves 3 acres in Unit 3B, 13 acres in Unit 4, 25 acres in Unit 52, 4 acres in Unit 54, 26 acres in Unit 68, 4 acres in Unit 74, 19 acres in Unit 74A, and 40 acres in Unit 75.

Both Alternatives 2 and 3 would affect 186 acres of low productivity soils, while Alternative 4 would affect a total of 148 acres low productivity soils. When compared these values total 6 percent, 6 percent, and 6 percent respectively for the proposed harvest treatment acres for Alternatives 2, 3, and 4 within the OLY project area (Table 113). As a result only a small portion of the proposed harvest activities is on sensitive soils. While riparian and wetland areas are included in areas of sensitive soils, these areas are protected by riparian habitat conservation areas (RHCAs).

Landtypes 201, 303, and 353 in Fuels Units

Fuels units are found in landtypes 201, 303, and 353 in Units F03, F04, F06, F13, F16, F17, and F19 making up a total of 391 acres.

Landtype 201:

There are 40 acres of landtype 201 in proposed Fuels Unit F06 in all the action alternatives.

Landtype 303:

There are 72 acres of landtype 303 in Fuels Units F13 and F19 in the action alternatives.

Landtype 353:

There are 69 acres of landtype 353 in Fuels Unit F03, 2 acres in Fuels Unit 04, 5 acres in F16, 11 acres in F17, and 192 acres in F19. When combined these values total 22 percent, 22 percent, and 22 percent respectively for the proposed fuel treatment acres for Alternatives 2, 3, and 4 within the OLY project area (Table 114).

The 2015 Forest Plan Timber Suitability Guidance lists certain landtypes as having potential irreversible damage following timber harvest operations due to factors such as site harshness. These landtypes include 201, 251, 303, 360, 401, 403, 405, and 503. Six acres of Harvest Unit 73 are found in landtype 201. This unit would use a skyline logging system. The unit is located on a relatively steep south facing aspect.

Fuels Unit F06 is located in landtype 201. The proposed treatment is an ecosystem burn which will retain forest cover while reducing canopy and understory density. This treatment is not a timber harvest and would be burned such that soil damage would not occur.

Portions of Harvest Unit 75, Fuels Unit F13, and F19 occur on landtype 303. Harvest Unit 75 uses a skyline logging system to protect soils. Fuels Units F13 and F19 are ecosystem burns which will retain forest canopy and be burned while soil moisture is high enough to protect these sites.

Potential indirect effects of proposed burn units and harvest on low productivity soils may include a slower vegetative return associated with reductions in nutrient cycling capabilities (discussed in more detail later in this document). Low productivity soils are not necessarily the same as nutrient limited soils however. The 2015 Forest Plan includes FW-GDL-SOIL-03, on nutrient-limited landtypes, tree limbs and tops should remain on site for at least 6 months or over a winter season to allow foliage nutrients to leach into the soil, except where site-specific analysis indicates the fuels would present unacceptable hazard. The plan does not identify landtypes that are nutrient deficient for the Kootenai National Forest, and ground reconnaissance has not identified areas of nutrient limited soils. While some landtypes are identified as having low productivity, the productivity of these landtypes is often the product of steep slopes, harsh aspects (south or west), high elevations, or other factors that limit tree growth. Additionally fuels treatment units retain a forested canopy which would continue to deliver nutrients to soils through deposition of needles and litter.

No harvest activities are proposed in riparian areas or wetlands with Alternatives 2, 3, and 4. Riparian and wetland areas are protected with Riparian Habitat Conservation Areas (RHCA) (FW-STD-RIP-03).

Detrimental Soils Disturbance (DSD)

Management activities including, but not limited to, road construction, timber harvest (trails and landings), and mechanical fuel treatments, are considered to be potential sources of detrimental soil disturbance. Refer to the Soil Project File for spatial representation of past harvests.

Table 114 displays existing, predicted, and cumulative DSD for each activity area. It also displays predicted DSD after soil decompaction for harvest units 28, 45B, 48, 51, 63 and 77. Soil decompaction would not mix soil horizons. Soil restoration treatments are not expected to immediately restore detrimental soil conditions to pre-disturbance levels. However, by breaking up subsurface compaction, natural processes (such as root penetration, soil microbial activity, water infiltration, and freeze-thaw cycles) would be accelerated and would be more capable of returning the soil to a pre-disturbance condition and trend towards a desired condition.

Existing disturbance is based on field surveys. The OLY soil surveys were conducted using the Northern Region (R1) Soil Sampling Protocol located in the project file. Complete soils survey data can be found in the Soil Project File at the Troy Ranger District. Completed field forms are present at the Troy Ranger District files. Predicted DSD has been calculated based on historical soil monitoring data collected in the field in post-harvest timber sale units (Kuennen 2006a). In units with combined tractor/skyline harvest activity the anticipated DSD was calculated as related to the overall acreage of potential disturbance by harvest activity.

Table 114. Detrimental Soil Disturbance (DSD) for Proposed Harvest Units under Alternatives 2, 3, and 4

Harvest Unit Number	Activity Area (acres) Alts 2/3/4	Existing DSD%	Predicted Harvest DSD% Alts 2/3/4	Cumulative Post-Harvest DSD% Alts 2/3/4	Predicted DSD% After Soil Restoration***	Logging System and Season	Post-Harvest Soil Monitoring Required Followed by Decompaction if Exceeding R1 Soil Quality Standards. Also monitor units utilizing reduced DSD value for secondary entry.
1	54/54/54	4	8/8/8	12/12/12	Not applicable	T/T/T	
3A	12/12/12	7	8/8/8	15/15/15	Not applicable	T/T/T	
3B	13/13/13	7	8/8/8	15/15/15	Not applicable	T/T/T	
4	176/176/176	10	4/4/4	14/14/14	Not applicable	T/T/T	Monitor
5	8/8/8	7	8/8/8	15/15/15	Not applicable	T/T/T	
6	42/42/42	10	4/4/4	14/14/14	Not applicable	T/T/T	Monitor
7	8/8/8	10	4/4/4	14/14/14	Not applicable	T/T/T	Monitor
8	66/66/66	10	4/4/4	14/14/14	Not applicable	T/T/T	Monitor
8A	4/4/4	10	4/4/4	14/14/14	Not applicable	T/T/T	Monitor
9	16/16/16	7	8/8/8	15/15/15	Not applicable	T/T/T	
11	11/11/11	7	8/8/8	15/15/15	Not applicable	T/T/T	
12	25/25/25	4	8/8/8	12/12/12	Not applicable	T/T/T	
14	70/70/24	5	4/4/4	9/9/9	Not applicable	WT/WT/WT	
14A	0/0/23	5	0/0/4	5/5/9	Not applicable	NT/NT/WT	
15	27/27/27	11	4/4/4	15/15/15	Not applicable	T/T/T	Monitor
16	6/6/6	3	8/8/8	11/11/11	Not applicable	T/T/T	
18	81/81/40	6	8/8/8	14/14/14	Not applicable	T/T/T	
20	109/109/37	7	3/3/3	10/10/10	Not applicable	S/S/S	
21	129/129/129	6	3/3/3	9/9/9	Not applicable	S/S/S	
23	24/24/24	11	4/4/4	15/15/15	Not applicable	T/T/T	Monitor

Harvest Unit Number	Activity Area (acres) Alts 2/3/4	Existing DSD%	Predicted Harvest DSD% Alts 2/3/4	Cumulative Post-Harvest DSD% Alts 2/3/4	Predicted DSD% After Soil Restoration***	Logging System and Season	Post-Harvest Soil Monitoring Required Followed by Decompaction if Exceeding R1 Soil Quality Standards. Also monitor units utilizing reduced DSD value for secondary entry.
24	25/25/25	2	3/3/3	5/5/5	Not applicable	S/S/S	
25	65/65/10	7	8/8/8	15/15/15	Not applicable	T/T/T	
25A	0/0/20	7	0/0/8	7/7/15	Not applicable	NT/NT/T	
25B	0/0/11	7	0/0/8	7/7/15	Not applicable	NT/NT/T	
27	11/11/11	6	3/3/3	9/9/9	Not applicable	S/S/S	
28	80/80/80	12	4/4/4	16/16/16	**< 15/< 15/< 15**	T/T/T	Monitor and Soil Decompaction
29	25/25/25	4	8/8/8	12/12/12	Not applicable	T/T/T	
30	37/37/37	6	8/8/8	14/14/14	Not applicable	T/T/T	
31A	0/0/26	8	4/4/4	12/12/12	Not applicable	T/T/T	Monitor
31B	60/60/33	8	4/4/4	12/12/12	Not applicable	T/T/T	Monitor
32	34/34/34	5	8/8/8	13/13/13	Not applicable	T/T/T	
33	30/30/30	5	4/4/4	9/9/9	Not applicable	WT/WT/WT	
34	56/40/40	12	2/2/2	14/14/14	Not applicable	WT/WT/WT	Monitor
35	12/0/10	5	4/0/4	9/5/9	Not applicable	WT/NT/WT	
35A	2/0/2	2	4/0/4	6/2/6	Not applicable	WT/NT/WT	
35B	3/0/3	15	2/0/2	17/15/17	Not applicable	WT/NT/WT	Monitor and **No Soil Decompaction allowed** – Due to Historic Properties
36	4/0/4	9	2/0/2	11/9/11	Not applicable	WT/NT/WT	Monitor
37	73/68/40	8	4/4/4**	12/12/12	Not applicable	WT/WT/WT	Monitor
37A	34/34/34	less than 1	3/3/3	less than 3/3/3	Not applicable	S/S/S	
37C	0/0/9	7	0/0/8	7/7/15	Not applicable	NT/NT/T	

Harvest Unit Number	Activity Area (acres) Alts 2/3/4	Existing DSD%	Predicted Harvest DSD% Alts 2/3/4	Cumulative Post-Harvest DSD% Alts 2/3/4	Predicted DSD% After Soil Restoration***	Logging System and Season	Post-Harvest Soil Monitoring Required Followed by Decompaction if Exceeding R1 Soil Quality Standards. Also monitor units utilizing reduced DSD value for secondary entry.
38	71/71/71	10	4/4/4	14/14/14	Not applicable	T/T/T	Monitor
38A	6/6/0	9	4/4/0	13/13/9	Not applicable	T/T/NT	Monitor
39	52/52/41	1	8/8/8	9/9/9	Not applicable	T/T/T	
40	109/109/41	0	8/8/8	8/8/8	Not applicable	T/T/T	
40A	0/0/40	0	0/0/8	0/0/8	Not applicable	NT/NT/T	
41B	15/0/0	34	2/0/0	36/34/34	Not applicable	WT/NT/NT	Monitor and **No Soil Decompaction** – Due to Historic Properties
42	85/85/35	7	3/3/3	10/10/10	Not applicable	S/S/S	
42A	0/0/28	7	0/0/3	7/7/10	Not applicable	NT/NT/S	
43	48/48/40	9	4/4/4	13/13/13	Not applicable	T/T/T	Monitor
44	20/20/20	7	8/8/8	15/15/15	Not applicable	T/T/T	
45	33/33/18	5	8/8/8	13/13/13	Not applicable	T/T/T	
45A	63/63/40	10	4/4/4	14/14/14	Not applicable	T/T/T	Monitor
45B	26/26/26	12	4/4/4	16/16/16	**< 15/< 15/< 15**	T/T/T	Monitor and Soil Decompaction
45C	35/35/8	11	2/2/2	13/13/13	Not applicable	WT/WT/WT	Monitor
46	16/16/16	12	2/2/2	14/14/14	Not applicable	WT/WT/WT	Monitor
47	17/17/17	8	4/4/4	12/12/12	Not applicable	T/T/T	Monitor
48	23/23/23	14	2/2/2	16/16/16	**< 15/< 15/< 15**	WT/WT/WT	Monitor and Soil Decompaction
49	6/6/0	8	4/4/0	12/12/8	Not applicable	T/T/NT	Monitor
50	21/21/21	9	4/4/4	13/13/13	Not applicable	T/T/T	Monitor
51	36/36/36	17	2/2/2	19/19/19	**≤ 17/≤ 17/≤ 17**	WT/WT/WT	Monitor and Soil Decompaction

Harvest Unit Number	Activity Area (acres) Alts 2/3/4	Existing DSD%	Predicted Harvest DSD% Alts 2/3/4	Cumulative Post-Harvest DSD% Alts 2/3/4	Predicted DSD% After Soil Restoration***	Logging System and Season	Post-Harvest Soil Monitoring Required Followed by Decompaction if Exceeding R1 Soil Quality Standards. Also monitor units utilizing reduced DSD value for secondary entry.
52	56/56/56	9	4/4/4	13/13/13	Not applicable	T/T/T	Monitor
52A	39/39/39	5	8/8/8	13/13/13	Not applicable	T/T/T	
52B	65/65/26	10	4/4/4**	14/14/14	Not applicable	WT/WT/WT	Monitor
52C	31/31/31	12	2/2/2	14/14/14	Not applicable	WT/WT/WT	Monitor
52D	14/14/0	10	4/4/0**	14/14/10	Not applicable	WT/WT/NT	Monitor
52E	0/0/16	9	0/0/4**	9/9/13	Not applicable	NT/NT/WT	Monitor
53	49/49/25	4	8/8/8	12/12/12	Not applicable	T/T/T	
53A	0/0/17	4	0/0/8	4/4/12	Not applicable	NT/NT/T	
54	24/24/24	3	8/8/8	11/11/11	Not applicable	T/T/T	
55	31/31/31	7	8/8/8	15/15/15	Not applicable	T/T/T	
55A	10/10/10	7	8/8/8	15/15/15	Not applicable	T/T/T	
55B	18/18/18	4	8/8/8	12/12/12	Not applicable	T/T/T	
56	29/29/29	7	8/8/8	15/15/15	Not applicable	T/T/T	
57	68/68/30	10	4/4/4**	14/14/14	Not applicable	WT/WT/WT	Monitor
57A	0/0/18	10	0/0/4**	10/10/14	Not applicable	NT/NT/WT	Monitor
58	15/15/15	8	4/4/4	12/12/12	Not applicable	T/T/T	Monitor
59	11/11/11	6	8/8/8	14/14/14	Not applicable	T/T/T	
60	24/24/24	10	2/2/2	12/12/12	Not applicable	WT/WT/WT	Monitor
61	51/51/25	10	4/4/4**	14/14/14	Not applicable	WT/WT/WT	Monitor
61A	34/34/34	10	4/4/4	14/14/14	Not applicable	T/T/T	Monitor
61B	0/0/15	10	0/0/4**	10/10/14	Not applicable	NT/NT/WT	Monitor

Harvest Unit Number	Activity Area (acres) Alts 2/3/4	Existing DSD%	Predicted Harvest DSD% Alts 2/3/4	Cumulative Post-Harvest DSD% Alts 2/3/4	Predicted DSD% After Soil Restoration***	Logging System and Season	Post-Harvest Soil Monitoring Required Followed by Decompaction if Exceeding R1 Soil Quality Standards. Also monitor units utilizing reduced DSD value for secondary entry.
62	24/24/24	10	4/4/4	14/14/14	Not applicable	T/T/T	Monitor
63	10/10/10	21	2/2/2	23/23/23	**≤ 21/≤ 21/≤ 21**	WT/WT/WT	Monitor and Soil Decompaction
68	70/70/27	0	3/3/3	3/3/3	Not applicable	S/S/S	
68A	0/0/25	0	0/0/3	0/0/3	Not applicable	NT/NT/S	
69	27/27/27	0	3/3/3	3/3/3	Not applicable	S/S/S	
70	67/67/25	0	3/3/3	3/3/3	Not applicable	S/S/S	
70A	0/0/23	0	0/0/3	0/0/3	Not applicable	NT/NT/S	
71	39/39/39	3	3/3/3	6/6/6	Not applicable	S/S/S	
73	18/18/18	0	3/3/3	3/3/3	Not applicable	S/S/S	
74	100/100/32	0	3/3/3	3/3/3	Not applicable	S/S/S	
74A	0/0/40	0	0/0/3	0/0/3	Not applicable	NT/NT/S	
75	50/50/50	0	3/3/3	3/3/3	Not applicable	S/S/S	
77	41/41/25	13	4/4/4	17/17/17	**< 15/< 15/< 15**	T/T/T	Monitor and Soil Decompaction

Table Symbols:
NT Not Treatment
S Skyline
T Tractor
WT Winter/Tractor
** Skid trails in Harvest Units 37, 52B, 52D, 52E, 57, 57A, 61, and 61B cannot be reused due to pattern or location of existing trails. Therefore, the full predicted DSD values were used rather than the 50 percent reduced DSD assumption for second entry.
*** Soil restoration treatments are not expected to immediately restore detrimental soil conditions to pre-disturbance levels. However, by breaking up subsurface compaction, natural processes (such as root penetration, soil microbial activity, water infiltration, and freeze-thaw cycles) would be accelerated and would be more capable of returning the soil to a pre-disturbance condition and trend towards a desired condition.
As stated in R1 Supplement (2014) within section 2554.03 Policy: "Design new activities that do not create detrimental soil conditions on more than 15 percent of an activity area. In areas where less than 15 percent detrimental soil conditions exist from prior activities, the cumulative detrimental effect of the current activity following project implementation and rehabilitation must not exceed 15 percent. In areas where more than 15 percent detrimental soil conditions exist from prior activities, the cumulative detrimental effects from project implementation and rehabilitation should not exceed the conditions prior to the planned activity and should move toward a net improvement in soil quality."

For temporary road soil disturbance, an average width of 12 feet has been applied to calculate the area of DSD. Following harvest one temporary road and all landings used for harvest activities would be decompacted or recontoured. Only proposed Harvest Unit 52 would contain approximately 0.2 miles of proposed temporary road, which would be less than 1 percent DSD (see Table 114).

Predicting detrimental and foreseeable activity disturbance is based on information from Kuennen 2003; 2006d; 2006e; USDA Forest Service 2011b; and Gier et al. 2013, which includes a summary of all Kootenai Forest Soils Monitoring to date with recommendations for analysis based on field results. The cumulative percent is derived by adding the percentage of disturbance expected from proposed activities and reasonably foreseeable activities to the existing disturbance percentage. All harvest activities, prescribed burning, skid trails, landings, fire lines, excavator piling, and temporary roads are included in this analysis. Montana Best Management Practices state to avoid skidding on unstable slopes and slopes that exceed 40 percent unless not causing excessive erosion (State of Montana BMPS Section IV.B). Best Management Practices (BMPs) would be followed (Appendix B), and additional design criteria have been specified in order to minimize disturbance (refer to the Design Features in Chapter 2 and BMP Appendix B).

Harvest Entry effect on DSD:

Regeneration harvest activities would not result in multiple entries to reach the desired silvicultural objectives. Related post-harvest unit entry over time would be for thinning and scheduled to occur several decades later and would require additional analysis.

Units proposed with intermediate harvest prescription such as stand improvement operations are potentially subject to higher detrimental soil disturbance than that of regeneration prescriptions due to multiple entries by harvest equipment over the same piece of ground.

Chapter 2 displays the proposed vegetation and fuels treatments for harvest units under the three action alternatives. Vegetation treatments include improvement cut, clearcut with reserves, seed tree cut, and shelterwood with reserves. Fuels treatments include slash and grapple pile, and slash and underburn. Refer to Table 3, Table 7, and Table 11 in Chapter 2.

Reduced DSD assumption:

For proposed harvest units currently equal to or exceeding 8 percent DSD (Table 114), the analysis of this project assumes a 50 percent disturbance value for proposed activities compared to similar harvest activities on undisturbed soils (Louis Kuennen pers. comm. 2011). This value presumes that secondary entry harvest activities would be re-using approximately 50 percent of the already existing historic skid trails in ground based units. The 50 percent disturbance value would not be used for units with an existing DSD of 8 percent or greater, where it is known that the existing skid trails cannot be reused due to the pattern or location of existing trails (Table 114).

It is assumed that units containing less than 8 percent DSD have fewer skid trails with less opportunity for reuse. As a result the 50 percent disturbance value in secondary entry values will not apply to these stands (see Table 114).

Post-harvest soil monitoring would be conducted in units where reduced DSD assumptions were utilized due to reentry and where skid trails cannot be reused (Table 114).

Soil Decompaction:

The sub-soiler is a piece of equipment designed specifically to resolve severe soil compaction that developed as a result of repeated heavy equipment use in timber sales. The equipment used to

accomplish this goal typically is an excavator bucket or grapple rake and contains 2 shanks which reduces soil compaction by digging into the soils, lifting up, and releasing the soil. Such techniques do not rotate or mix the soil horizons but simply reduce soil compaction and have proven useful in reducing compaction caused by a variety of management activities (Monk 2009; Archuleta et al. 2008; and Joplin 2009).

Post-harvest soil decompaction may involve using a piece of equipment similar to an excavator bucket with curved shanks or a grapple rake with curved shanks that can rip soil to a depth of 20-30 inches (50-75 centimeters) (Archuleta and Baxter 2008, Monk 2009). Soil decompaction can be accomplished in several ways including the following: sub-soiler grapple rake; sub-soiling excavator bucket; dozer shanks or a winged sub-soiler (Froelich and Miles 1984). When compared to using a true dozer with shanks or a winged sub-soiler the greatest benefit of using either a sub-soiling grapple rake or sub-soiling excavator bucket is the project cost savings where two operations can be completed by one piece of equipment for less than the cost of operating two pieces of equipment (dozer and excavator) during harvest activities followed by post-harvest decompaction (Monk 2009). Studies by Monk (2009) and Archuleta and Baxter (2008) displayed that additional soil compaction occurs when the dozer backed up on recently de-compacted soils thereby compacting surrounding soils once again. Such activities will involve soil restoration on skid trails and landings which were used by the purchaser during harvest activities (refer to Design Features in Chapter 2).

Soil decompaction (regardless of equipment or method) would not rotate or mix the soil horizons.

As stated above, soil restoration treatments are not expected to immediately restore detrimental soil conditions to pre-disturbance levels. However, by breaking up subsurface compaction, natural processes (such as root penetration, soil microbial activity, water infiltration, and freeze-thaw cycles) would be accelerated and would be more capable of returning the soil to a pre-disturbance condition and trend towards a desired condition. Within a 5 to 10 year timeline, the rehabilitated soils are anticipated to more closely resemble those of a reference condition (Heninger et al. 2002). In general, the goal of soil decompaction is to recreate pre-disturbance growing conditions, so that tree growth rates on treated soils will approximate those of undisturbed soils on similar sites (Bulmer et al. 2007).

Soil decompaction would not be allowed in units with historic properties (Table 114). Refer to Cultural Resource Report for more information.

CWD Placement:

Reductions in soil DSD may also be facilitated through placing downed woody material on skid trails to reduce impacts to soils (refer to Design Features in Chapter 2).

Effects of the No Action Alternative 1 – DSD

Under Alternative 1 timber harvest and other activities proposed with this project would not occur. However, changes in climate and vegetation would continue to occur. Should Alternative 1 be selected, the existing DSD values would trend to desired conditions. Vegetation regeneration and stand growth activities would continue to slowly recover over time on existing harvest units resulting in lower compaction values due to tree root growth, freeze-thaw activities, and increased soil nutrients from the decomposition of forest litter and course woody debris.

Direct and Indirect Effects of the Action Alternatives – DSD

The percent detrimental soil disturbance (DSD) is the measurement indicator of soil compaction for this analysis. Direct impacts on soils from management activities could include compaction,

rutting, and displacement. Typically these impacts take place as a result of vehicles/equipment traversing areas within proposed units such as skid trails, landings, and temporary roads. Soil compaction is most common where heavy equipment makes repeated passes over the same ground, particularly during times of high soil moisture (Kuennen 2003). Soil compaction can change slope hydrology and lead to overland flow of water during precipitation or snowmelt events. Compacted soils can also reduce soil productivity. These are some general direct effects that can occur with all timber harvest activities. Table 114 identifies the extent of these impacts for Alternatives 2, 3, and 4.

Fuels Treatments

Due to the suppression of wildfires over the last century, fuels have accumulated in many areas throughout the project area. The intent of fuels treatments is to reduce fuel levels and help meet vegetation management objectives. See Table 21 in Chapter 2 which summarizes the fuels treatment proposed with this project by each alternative.

Effects of the No Action Alternative 1 – Fuels Treatments

Alternative 1 does not propose any fuels treatments. Therefore, no direct effects to soils would occur from Alternative 1. Alternative 1 would also not reduce fuel loading in the project area. As a result, there would be a greater risk of indirect effects caused by high intensity wildfire and greater potential for damaging soil heating (Keane et al. 2002). The potential effects include alteration of soil structure, impacts to soil invertebrates, reduced nitrogen, and loss of soluble nutrients (Kuennen 2000). However, past experience with wildfires on Kootenai National Forest indicate that there is a very low risk of these effects even with high intensity fire.

Direct and Indirect Effects of the Action Alternatives – Fuels Treatments

Alternatives 2, 3, and 4 contain fuel reduction activities such as slashing and/or machine and hand piling, underburn, or broadcast burn/under-burn fuel abatement activities for all fuel treatment units.

The burning prescriptions in each action alternative were designed to use the minimum fire intensity needed to achieve management objectives. Direct effects resulting from burn activities such as under-burning can include soil heating and associated soil impacts such as loss of organic matter, impacts to soil organisms, and creation of water repellency. The potential for these impacts are minimized because the burning prescriptions for this project were designed for low to moderate fire intensity and would be implemented when soil moisture levels are high. Typically, burning is scheduled when the moisture in the lower duff layers is high enough so that the fire does not consume those layers, which insulate the soil from surface heating (DeBano 2000). When soils have adequate moisture to retain their biological, chemical, and physical integrity, effects from the loss of forest floor can be minimized (Barnett 1989; Frandsen and Ryan 1985; Hungerford et al. 1991; McNabb and Cromack 1990). Prescribed burning could potentially remove woody debris that would otherwise provide nutrients to the soil as the decay process occurs (Page-Dumroese et al. 2006). Hence, burning when soil moisture content is high helps to maintain coarse woody debris requirements. This is typically completed in early spring or late fall on the Kootenai National Forest.

Although a small portion of the nutrients would be lost through leaching, most of the nutrients would remain attached to or between the soil particles on-site. The re-introduction of fire in the project area is consistent with natural ecological processes of these forest types (Arno 1996). Positive impacts may include a short-term (1 to 2 years) increase in plant-available nutrients (Choromanska and Deluca 2001; Hart et al. 2005; and Certini 2005). Additionally, MacKenzie et

al. (2006) found that light to moderate fire may maintain higher nutrient availability in the long-term with the positive influences from charcoal. Therefore, implementation of an action alternative containing post-harvest burns is expected in the long term to trend the conditions towards a desired condition for nutrient cycling. This is supported by forest soil productivity monitoring (refer to the Project File).

The construction of a fire line directly impacts soils by removing (displacing) the organic layer down to mineral soil for 2 to 3 feet wide around the perimeter of the identified units. Some compaction along the fire line could occur if created using heavy equipment. The units identified for post-harvest fireline construction to be completed by machinery are those proposed harvest units with proposed prescribed underburn (see Table 3, Table 7, and Table 11 in Chapter 2). It should be noted that many of these units may only contain partial fireline construction based on surrounding borders already present (i.e. roads and past harvest units). The effects of potential fire line construction are included in Table 110 and apply only to those units where machinery may be involved in such activities. Hand firelines are proposed for some harvest units with topography too steep for an excavator. The impacts of hand dug firelines are minimal as such lines are only dug to the extent needed to control either post-harvest of fuel abatement fires.

Three Fuels Units (F18, F22 and F26) will include mechanical piling following harvest activities, and as a result, these three units would receive an anticipated 2 percent additional DSD (Table 115). No impacts to Soils DSD are anticipated to occur in the remaining fuels units.

Table 115. Detrimental Soil Disturbance (DSD) for Proposed Fuels Units under Alternatives 2, 3, and 4

Fuels Unit Number	Existing DSD%	Predicted Treatment DSD% Alts 2/3/4	Cumulative DSD% Alts 2/3/4
F1	Not Sampled[2]	0/0/0	0/0/0
F2	Not Sampled[2]	0/0/0	0/0/0
F3	Not Sampled[2]	0/0/0	0/0/0
F4	Not Sampled[2]	0/0/0	0/0/0
F5	Not Sampled[2]	0/0/0	0/0/0
F6	Not Sampled[2]	0/0/0	0/0/0
F7	Not Sampled[2]	0/0/0	0/0/0
F8	Not Sampled[2]	0/0/0	0/0/0
F9	Not Sampled[2]	0/0/0	0/0/0
F10	Not Sampled[2]	0/0/0	0/0/0
F11	Not Sampled[2]	0/0/0	0/0/0
F12	Not Sampled[2]	0/0/0	0/0/0
F13	Not Sampled[2]	0/0/0	0/0/0
F15	Not Sampled[2]	0/0/0	0/0/0
F16	Not Sampled[2]	0/0/0	0/0/0
F17	Not Sampled[2]	0/0/0	0/0/0
F18	Not Sampled[2]	2/2/2	2/2/2
F19	Not Sampled[2]	0/0/0	0/0/0

Fuels Unit Number	Existing DSD%	Predicted Treatment DSD% Alts 2/3/4	Cumulative DSD% Alts 2/3/4
F20	Not Sampled[2]	0/0/0	0/0/0
F22	Not Sampled[2]	2/2/2	2/2/2
F25	Not Sampled[2]	0/0/0	0/0/0
F26	Not Sampled[2]	2/2/2	2/2/2
F27	Not Sampled[2]	0/0/0	0/0/0
F28	Not Sampled[2]	0/0/0	0/0/0
F29	Not Sampled[2]	0/0/0	0/0/0
F30	Not Sampled[2]	0/0/0	0/0/0
F31	Not Sampled[2]	0/0/0	0/0/0
F32[1]	34	NA/0/0	NA/34/34
F33[1]	5	NA/0/NA	NA/5/NA
F34[1]	2	NA/0/NA	NA/2/NA
F35[1]	3	NA/0/NA	NA/3/NA
F36[1]	9	NA/0/NA	NA/9/NA

[1] Reduction in percent DSD is expected to occur over a period of years following harvest operations (R-1 Supplement 2500-2014-1.). Such impacts only apply to those areas where heavy equipment is suspected to be used. Based on higher post-harvest cumulative effects to soils recommend grapple piling from skid trails in in order to avoid exceeding the 15 percent DSD value.

[2] Not Sampled because no machinery was involved which would add to the existing DSD.

NA = not applicable

Similarly, some of the units will have slash treatments which are also anticipated to potentially impact soils DSD. Units that would have proposed grapple pile activities are listed in Chapter 2. Because mechanical piling is reducing the amount of woody material within a unit, it can also affect nutrient cycling.

Indirect impacts from all management activities could include erosion from surface water runoff being channeled into ruts, fire lines, and/or along temporary roads within units. With less vegetation, a conversion from a drier soil environment to a slightly moister site would occur. Less vegetation would mean a thinner canopy and more soil interception from rainfall above.

New skid trails may be required in areas where the existing skid trail network does not fit the current operations. Effects on temporary roads and skid trails on vegetative regrowth are expected to be temporary due to planned ripping and seeding following harvest operations. In units where existing skid trails already exist, these skid trails would be used to the extent feasible to minimize additional DSD. However, new skid trails may be required in areas where the existing skid trail network does not fit the proposed operations.

DSD Summary

In order to meet the 2015 Forest Plan and Northern Region (R1) Supplement 2500-2014-1, post-harvest soil decompaction activities may include ripping skid trails, temporary roads, and landings associated with units and seeding as necessary. Such activities will help to offset the

effects of harvest activities to soil productivity by allowing previously disturbed soils to re-establish as a productive area. During the pre-harvest soil sampling in 2014 field season, some proposed harvest units were found to either currently exceed 15 percent soil disturbance or are estimated to exceed 15 percent soil disturbance with the proposed harvest and fuel treatment activities (Table 114). Harvest Units 4, 6, 7, 8, 15, 28, 35B, 41B, 45B, 45C, 46, 48, 51, 52C, 52D, and 63 display signs of dozer operations on glacio-lacustrine silt loam landtypes resulting in ruts. Harvest Unit 77 appears to have been harvested using a rubber-tire skidder operation. Harvest Units 4, 6, 8, 28, 35B, 45B, 46, 52C, 63 are intermediate harvest prescriptions, while Harvest Units 7, 15, 41B, 45C, 51, 52D, and 77 are prescribed regeneration harvest units. In order to address exceedance of 15 percent DSD values Harvest Units 35B, 41B, 48, 51, and 63 would require winter harvest (refer to Design Features in Chapter 2).

Depending on the alternative selected, winter harvest operations would be conducted on Harvest Units 14, 14A, 33, 34, 35, 35A, 35B, 36, 37, 45C, 46, 52B, 52C, 52D, 52E, 57, 57A, 60, 61, and 61B in order to minimize additional soil disturbance values (refer to Table 114).

Harvest Units 51 and 63 currently exceed 15 percent DSD and will require post-harvest soil decompaction following harvest and fuel treatment activities in order to reduce soil disturbance values. Harvest units currently below 15 percent DSD may require soil decompaction if they exceed 15 percent DSD following treatment. See Table 114 for those units which are predicted to equal or approach 15 percent DSD. These units will be re-sampled following harvest and fuel treatment activities to determine post-harvest soil disturbance values. If the measured values exceed 15 percent DSD, these units will require soil decompaction to loosen compacted soils and enhance second growth activities as required under Northern Region guidance.

Under Alternative 2, Unit 41B would be winter harvested; its existing DSD of 34 percent does not meet the Region 1 Soil Quality Standard or 2015 Forest Plan guidance. Harvest Unit 41B (Alternative 2) and Harvest Unit 35B (Alternatives 2 and 4) will not have post-harvest soil decompaction due to historic property concerns. Under Alternatives 3 and 4, Unit 41B becomes Fuels Unit F32, with no harvest. Refer to the Design Features in Chapter 2 and the Cultural Resource Report in Chapter 3 for further information.

Based on this analysis, it is expected that if Alternative 2 is selected, Harvest Unit 41B will only become more compacted based on the proposed harvest activities and the inability to sub-soil and not meet Forest Service soil guidelines. Under Alternative 2 the remaining 10 units of concern are anticipated to increase in soil disturbance values which would be offset by soil restoration as needed. If either Alternative 3 or 4 is selected, Unit 41B is not a concern, because it is converted to Fuels Unit F32, with hand slash and burn treatment. Similarly, additional soil disturbance regarding Harvest Unit 35B is not expected to occur under Alternative 3 because this unit is converted to Fuels Unit F35 which is a hand slash and grind treatment. Following the Northern Region's 2011 Soil Technical Guide (USDA FS 2011), monitoring should occur for units with potential to exceed 15 percent DSD (see Table 114). If monitoring determines the unit exceeds 15 percent DSD post-treatment then decompaction activities are required. Funding to accomplish such activities can be accomplished through KV funding or through retained receipts from previous stewardship contracting.

Within 5 years following timber harvest approximately 75 to 80 percent of the regeneration harvest units are expected to be fully stocked. Depending on the alternative selected between approximately 1,950 to 2,345 acres of harvest would require regeneration. No heavy equipment would be associated with tree planting. Tree planting would not create detrimental soil disturbance or increase sedimentation rates. Therefore, regardless of the Alternative selected, tree planting would not contribute additional effects to soil resources.

Region 1 supplement to Forest Service Manual 2500 (2500-2014-1) establishes guidelines that limit detrimental soil disturbance to no more than 15 percent of an activity area. Forest Plan soil productivity monitoring results were reviewed throughout this project (Kuennen 2006a; Kuennen 2003; USDA Forest Service 2003; and USDA Forest Service 1998). The BMP implementation and effectiveness monitoring and documentation have been going on since 1988 (Gier 2014). The five-year results from 1992–1997 found less than one percent of the acres surveyed were above the 15 percent threshold, with 77 percent of surveyed areas having less than 10 percent detrimental disturbance. Between 1998 and 2005, none of the units surveyed were above the 15 percent threshold. Kuennen (2003; 2007a; and Kuennen and Gier 2013) compiled all monitoring data to date, which was used as the basis for soils analysis and specifying design criteria for this project.

Between 2012 and 2013 the Kootenai National Forest initiated a two-year study to determine soil recovery in timber sale units initially monitored following harvest activities between 1992 and 2006. This study re-sampled 183 timber sale units totaling 5,706 timber harvest acres. Secondary sampling involved collected soils information from 385 transects and 76,561 data points in harvest areas which had been previously monitored for soil disturbance. Information showed that of the units sampled 86 percent displayed reduced detrimental soil disturbance values as compared to the originally sampled values and is thought to primarily be based on soil freeze-thaw and vegetative relationships. All units were re-sampled at a 95 percent confidence interval (Gier and Kuennen 2013; Gier et al 2013a, 2013b). Results of this study indicate past activities were consistent with the 2015 Forest Plan Guidelines (FW-GDL-SOIL-01; FW-GDL-SOIL-02; FW-GDL-SOIL-04; and FW-GDL-SOIL-05).

Some increase in DSD is expected in all harvest units. Even so, eighty-six units would have expected DSDs at or below 15 percent. Eight units have expected DSD which would exceed 15 percent but would receive soil decompaction. Therefore, in the long term, soil conditions for most harvest units would trend towards desired conditions of the 2015 Forest Plan, due to soil restoration (where applicable) and by enhancing secondary stand replacement. As previously noted, Harvest Unit 41B (Alternative 2) and Unit 35B (Alternative 2 and 4), would not receive soil decompaction. Their expected DSD would exceed 15 percent DSD and not meet the Soil Quality Standard or 2015 Forest Plan guidance. However, in Alternative 3, these two units are converted to fuels units with no timber harvest. Therefore, all units in Alternative 3 would trend toward meeting 2015 Forest Plan soil desired conditions.

Management activities would follow the BMPs outlined in Soil and Water Project File and would be consistent with 2015 Forest Plan Standards. The 2011 KNF Monitoring Summary (USDA Forest Service 2011b) states that monitoring between 1991 and 2011 shows that 95 percent of the BMPs implemented during that time were effective.

DSD – Permanent Roads

As previously noted, National Forest System Roads as defined in 36 CFR 212.1 are not considered part of the productive land base. As a result, these features do not count toward the 15 percent soil quality standard (FSM 2500-2014-1).

DSD – Temporary Roads, Landings, and Skid Trails

All new temporary roads and skid trails are considered 100 percent detrimentally disturbed through removal of organic matter and compaction. For the OLY project area approximately 0.2 miles of temporary roads are planned for construction under each action alternative to access Harvest Unit 52. At the same time three segments of road are proposed to be re-routed for resource protection: approximately 0.5 miles on Road 14321A west of Kilbrennan Lake,

approximately 0.4 miles of NFSR 2380 (included in Alternatives 2 and 3), and about 0.3 miles on NFSR 14309 near the Troy Shooting Range. Work on the Kilbrennan Ridge and shooting range roads will be done as part of the timber sale while work on the NFSR 2380 road system is a part of the watershed restoration in the North Fork O'Brien Watershed. Other funds will be required for this work and will require money for both the road decommissioning of part of the NFSR 2380 as well as for reconstructing the NFSR 2380A.

Indirect effects from the action alternatives include the temporary erosion related to exposure of mineral soil associated with skid activities. Without a protective mat of vegetation and stable soil profile these areas are more susceptible to erosive forces of wind, water, and dynamic temperature changes (frost heaves). These localized effects are typically short-term (5-10 years) due to the warmer wet climate found in the lower elevations of the project area. It should be noted that frost-heave activities are believed to be one of the most important activities associated with long term soil amelioration on the KNF (Kuennen pers. comm. 2015).

All landings for the sale would be agreed upon by the Forest Service and purchaser. These areas would be constructed and used in adherence with BMPs to minimize their impacts to soils. Effects of temporary roads and skid trails would be temporary due to planned decompaction or recontouring to remedy soil compaction. Seeding would be done following harvest activities in areas used for harvest operations. These activities will help offset disturbance related to harvest activities to soil productivity by allowing previously disturbed soils to re-establish soil productivity.

Woody debris would be spread to stabilize soil from movement and to provide organic material on the road prism and water bars installed as appropriate to reduce water routing. These activities will help offset the harvest impacts to soil productivity by allowing previously disturbed soils to re-establish soil productivity. Harvest on steeper slopes may involve use of older stair-step excavated trails (i.e. jammer roads) which became less common in the 1970s. Using these roads is seen as being more beneficial to soils when compared to developing new skid trails in undisturbed soils. Based on this analysis, while some increase in DSD is expected with propose management activities, all activity areas are expected to be trending towards desired conditions.

Effects – Coarse Woody Debris

Forest ecosystems have evolved with a continual flux of coarse woody debris (CWD). As defined in the 2015 Forest Plan: coarse woody debris consists of dead woody material larger than 3 inches in diameter and derived from tree limbs and boles in various stages of decay (Graham et al. 1994, Brown et al. 2003). The 2015 Forest Plan provides CWD retention level recommendations for the three biophysical settings – Warm/Dry Biophysical Setting, Warm/Moist Biophysical Setting, and Subalpine Biophysical Setting. CWD performs many physical, chemical, and biological functions in the forest ecosystems. Physically it protects the forest floor and mineral soil from erosion and mechanical disturbances. CWD disrupts airflow and provides shade, which insulates and protects new forest growth and also has significant water holding capacity, making it an important source of moisture for vegetation during dry periods. This decaying woody debris provides nutrients, especially sulfur, phosphorus, and nitrogen, necessary for new plant growth. CWD also hosts ectomycorrhize, micro-organisms that play an important role in the uptake of nutrients and water by woody plants (Graham et al. 1994).

Retaining coarse woody debris and organic matter is important to maintaining the soil's most productive layer (FW-GDL-SOIL-02; FW-GDL-VEG-03). The importance of soil organic matter (duff layer) is indispensable to productivity and the ecological function of soils (Brady and Weil 2002). This organic component contains a large reserve of nutrients and carbon, and typically

includes the majority of microbial activity within the soil column. Forest soil organic matter influences many critical ecosystem processes such as the formation of soil structure, which in turn influences soil water infiltration rates and soil water holding capacity. Soil organic matter is also the primary location of nutrient recycling and humus formation, which enhances soil cation exchange and overall fertility.

Effects of the No Action Alternative 1

Alternative 1 does not propose any new management activities. Therefore, no direct, indirect, or cumulative effects to nutrient cycling could result from management activities under the no action alternative. Nutrient cycling would continue at present rates until a natural disturbance occurs.

Direct and Indirect Effects of the Action Alternatives

A direct impact from management activities in Alternatives 2 and 3 would be the removal of woody material from proposed timber harvest units. The removal of all or most of the organic material (both duff layers and CWD) from a site can cause temporary nutrient deficits that may affect physical and biological soil conditions (Brady and Weil 2002, Graham et al. 1994, Brown et al. 2003). To avoid this, it is important to maintain both fine and CWD on managed sites, especially regeneration harvest units where most of the overstory organic matter is removed (Graham et al. 1994, Brown et al. 2003). Allowing the accumulation and decomposition of a range of sizes of woody debris maintains both short-term and long-term soil productivity. The different decomposition rates provide for the slow continual release of nutrients.

This project was designed to provide for a continuous supply of woody material based on recommendations from Graham et al. (1994) and Brown et al. (2003). In harvest stands where more of the overstory is being removed, each activity area has been assigned a habitat-specific retention level for CWD (Table 116). In intermediate harvest units with underburn, or grapple pile activities, post-harvest stands would remain fully stocked, which would provide for yearly nutrient inputs through litter fall (Brady and Weil 2002) and long-term CWD as a result of future blow-down and disease. Regeneration harvest units will retain the recommended level of CWD described in the table below and in design features in Chapter 2 in order to protect soil productivity. Therefore, these units would meet the CWD requirements following harvest activity and project design would meet the intent of FW-GDL-SOIL-02 and FW-GDL-VEG-03.

Table 116. Target Levels of CWD (Greater than 3 Inch Diameter) for Proposed Units, Graham et al. (1994)

Biophysical Setting	Recommended CWD Tons per Acre	Units*
Warm/Dry	Drier Sites: 5 – 12 tons/acre	27, 37A, 68, 68A, 73, 75
	Moister Sites: 10 – 20 tons/acre	1, 3A, **4**, 6, **8**, 8A, 11, 14, 14A, 15, 21, 28, **32**, **35B**, **38**, **38A**, 42, 45, 45A, **45B**, 45C, **46**, 47, **48**, **49**, 50, **51**, **52**, 52A, 52B, **52C**, **52D**, 52E, 53, 53A, 54, 55, 55A, 55B, 69, 74, 74A, **77**
Warm/Moist	Drier Sites: 12 – 33 tons/acre	3B, 5, 7, 9, **12**, 16, 18, 20, 23, 24, 29, 30, 33, 34, **35**, **35A**, **36**, 37, 37C, **39**, 40, 40A, 41B, 44, 60, **63**, 70, 70A, 71
	Moister Sites: 17-33 tons/acre	25, 25A, 25B, **31A**, **31B**, **43**, **56**, 57, 57A, **58**, 59, 61, 61A, 61B, 62

*The existing condition of the units in **bold** are known to be deficient by more than 1 ton in CWD, based on field transects conducted during soils field review of each unit.

In summary, soil productivity would be maintained through retention of CWD at levels recommended in the 2015 Forest Plan for all action alternatives. Therefore, implementation of any of the action alternatives is not expected to adversely impact nutrient cycling in the analysis area and the project would be designed in accordance with FW-GDL-SOIL-02 and FW-GDL-VEG-03.

Cumulative Effects

Cumulative effects are the result of all the impacts that past, current, and reasonably foreseeable activities have on a resource. The results of past activities have resulted in the "Existing Condition" described above. The anticipated effects from proposed activities were then added to the existing condition and described in the section titled "Direct and Indirect Effects." The sum of the existing condition (including past actions) and the direct and indirect effects of proposed actions combined with current and reasonably foreseeable actions result in the cumulative effects described in this section.

The spatial scale or geographic bounds for consideration of cumulative effects consists of the same activity areas (harvest and fuels treatment units) analyzed used in existing condition, direct, and indirect effects. This is appropriate because soil productivity is spatially static and productivity in one location does not affect productivity in another location. The activity areas are delineated as directed by Forest Service Manual Northern Region (R-1) Supplement No. 2500-2014-1.

The temporal scale is dependent on the issue being addressed with no one scale being appropriate for all issues. The analysis may need to evaluate the effects of proposed management over all seasons for several days, years, and even decades. This is complicated by data constraints that require constant monitoring to detect change – though data is often insufficient to identify even trends or trajectories of change until the impact is large enough or has been occurring for some time. Furthermore, there is often a lag between some actions and the observed effect. This is particularly true for soils. This analysis strives toward an integrated approach to soil processes and function to project future trends in response to proposed management options to the best abilities.

Current versus Historic Management Practices

There are marked differences between past and current land management practices and policies. The evolution that has taken place is the result of science, technology, ongoing monitoring actions, and changing public values.

Prior to about 1990, the harvest methods focused primarily on providing low-cost wood products. Logging systems were selected primarily by the least expensive method to transport trees from the forest to the mill. Tractor skidding was typically used and trails and landings were not minimized. In addition to harvest activities, fuels reduction and site preparation for natural regeneration or planting were accomplished through dozer piling. Many of these practices led to excess soil disturbance and increased the risk of erosion

Over the last 20 years, impacts to soil and water resources from logging activities have been reduced because of Best Management Practices (BMPs), the Inland Native Fish Strategy (INFISH), and changes in science, technology, etc. Based on research studies, current BMPs and INFISH RHCAs can reduce sediment delivery to streams compared with historical practices (Lee et al. 1997, USDA Forest Service 1995b). The implementation of INFISH beginning in 1995 gave greater protection to soil and water resources in riparian areas adjacent to streams, lakes, and wetlands. INFISH gives riparian dependent resources priority over other resources. RHCAs are

not "lock out" zones. Activities that occur in them either benefit the riparian area and associated aquatic features or, at a minimum, do not slow the rate of recovery within the riparian area.

Harvest methods and removal of timber products from the national forest changed substantially over time. Modern timber harvest prescriptions and design emphasize desired conditions of the forest after timber harvest. This often results in the retention of various amounts of trees in a post-harvest stand to address objectives that may include seed production, shelter for the site, watershed objectives, soil productivity, wildlife, and others. Elements of modern harvest prescriptions that address specific resource concerns include retention of snags and down wood for soil nutrition, minimizing the number of skid trails, and maintaining sediment filtering vegetation in riparian areas near lakes and streams. Jammer roads and dozer piling does not occur on federal lands and rarely occurs on lands of other ownerships. Project specific BMPs would be incorporated into all land management activities as a principle mechanism for protecting soil resources (per FW-GDL-SOIL-05). The following BMPs apply to the OLY project (also see Design Features in Chapter 2):

- Units required to be logged during winter to minimize soil impacts shall occur on 4-inches frozen ground OR 1-inch frozen ground and cut-to-length (log forwarding). During harvest operations, the harvester shall place tops and limbs evenly in the skid trail as it proceeds. (C6.4#, C6.42#).
- Existing skid trails and other disturbed areas will be reused during harvest operations and machine piling as much as feasible in order to minimize new soil disturbance (B6.4).
- Excavated skid trails and temporary roads constructed for the project would be re-contoured and have slash placed on the re-contoured slopes after use (C6.632).
- Landings and jump-up roads to landings would be scarified and seeded following harvest activities (C6.633).
- Skid trails would be placed a minimum of 75 to 100 feet apart in order to reduce soil disturbance (see Design Features).
- All ground based equipment should only operate on slopes less than 40 percent in order to avoid detrimental soil disturbance. Where slopes within an activity area contain short pitches greater than 40 percent, but less than 150 feet length, ground-based equipment may be allowed, as designated by the timber sale administrator.
- Sub-soiling could be implemented using a piece of machinery such as an excavator bucket with curved shanks or grapple shanks that can rip soil to a depth of 20-30 inches (Archuleta and Baxter 2008; Monk 2009; Froelich and Miles 1984).
- Ensure that enough coarse woody debris is left to sustain long term soil productivity while still meeting fuel reduction objectives which equates to an average of 5-15 tons per acre depending on soundness of pieces (C6.406#, C6.7#). CWD requirements may also be met over time from overstory trees.
- Exclude RHCAs from harvest and equipment entry.
- Control erosion during and after harvest activities to protect water quality and soil productivity. Examples include ripping and/or water barring skid trails and landings, seeding and fertilizing, etc.

Proposed Project Actions

Road Construction and Reconstruction

Under Alternatives 2, 3, and 4 approximately 45 miles of NFS haul road would be reconstructed to meet State BMPs for water quality. At the same time two segments of road would be rerouted for resource protection (approximately 0.5 miles on NFSR 14321A west of Kilbrennan Lake and 0.3 miles near the shooting range). All road reconstruction and rerouting would be required to meet Montana State BMPs and FW-GDL-SOIL-05.

National Forest System Roads as defined in 36 CFR 212.1 are not considered a part of the productive land base. As a result, these features are not required to meet the 15 percent soil quality standard (FSM 2500-2009-1). In addition these areas are already disturbed. As a result, road management would have no cumulative effect on soils in the analysis areas because soil productivity effects are spatially static and productivity in one location does not affect productivity in another location. The exception is on roads proposed for active decommissioning, which would receive treatments that will reduce soil compaction (partial surface ripping) and encourage revegetation, which would decrease soil compaction and increase soil productivity over the long term.

Road Decommissioning and Storage

Approximately 10.7 miles of active road storage, 6.3 miles of passive road storage, 1.3 miles of active road decommissioning, and 7.0 miles of passive road decommissioning would be done on National Forest System roads not currently open for public motorized travel. Roads identified for long term needs would be placed in storage while roads identified as not being needed in the future would be decommissioned. Both storage and decommissioning may have a wide range of treatments including simple barrier installation (passive treatment) to pulling culverts (active treatment) or in some locations full recontouring when watershed risks are high.

Temporary Roads and Landings

Only 0.2 miles of temporary roads are planned in the OLY project area in order to reach Harvest Unit 52. As a result no significant changes in the detrimental disturbance values are expected to occur where this very short temporary road segment is proposed, because this short segment would be recontoured. Following activities all landings used for harvest would be ripped to reduce compaction, woody debris would be spread to stabilize soil and to provide organic material, and all disturbed areas would be seeded. Such activities would help to offset harvest impacts to soil productivity by allowing previously disturbed soils to become productive again.

Soil restoration would be required in units that exceed 15 percent soil disturbance. To meet Regional Standards, skid trails and landings would be ripped and/or re-contoured and covered with slash and CWD; FW-GDL-SOIL-02 and FW-GDL-VEG-03. Post-harvest and fuel abatement soil monitoring will determine if soil decompaction would be required. If restorative treatments are used in conjunction with adequate control of skidding equipment in activity areas that are being re-entered, the end result will be a net improvement in soil quality. Therefore, soils quality standards would be met. In areas where more than 15 percent detrimental soil conditions exist from prior activities, the cumulative detrimental effects from project implementation and rehabilitation should not exceed the conditions prior to the planned activity.

Under Alternative 2, soil restoration will not occur in proposed Harvest Unit 41B due to historic properties concerns, even though this unit currently exceeds 15 percent DSD. Therefore, this unit would not meet 2015 Forest Plan or Region 1 Soil Quality Standards.

Overall, following harvest operations and any required post-harvest treatments, the soils should be viewed as trending towards either a neutral or net positive impact as compared to currently existing conditions.

Ongoing and Reasonably Foreseeable Actions

In the following discussion, the effects of current and/or reasonably foreseeable activities are considered cumulatively with activities proposed with this project.

Vegetation Management and Fuels Reduction Activities

District-wide precommercial thinning of previously harvested units (Timber Stand Improvement 2010-2015) is ongoing within the OLY project area. Currently, approximately 224 acres of pre-commercial thinning are currently identified in the reasonably foreseeable future directly within the OLY project area. Additionally, 426 acres of daylight thinning of white pine at elevations greater than 4,000 feet is also expected to occur on lands in the OLY project area. It is expected that pre-commercial thinning would contribute indiscernible effects to soils within the analysis area. This is because pre-commercial thinning is done by hand and therefore no additional ground disturbance will occur. In addition, trees removed during thinning projects are left on-site. Also, none of these activities would overlap in space with the OLY treatment units; therefore no cumulative effects are expected.

It is expected that personal firewood collection will occur throughout the project area. Neither of these activities create additional ground disturbance or remove enough vegetation to affect soil productivity and therefore would not contribute additional effects to soil resources.

Road Maintenance and Reconstruction

Routine road maintenance would occur as needed on roads in the project area and would follow BMPs and INFISH standards and guidelines in order to minimize effects on soil resources and meet the approved road management objectives. Such activities include road blading, gate repair/replacement, cleaning and constructing ditches, cleaning culverts, placement of aggregate, brushing, debris removal, and surface grading to restore drainage efficiency.

Fire Suppression

Fire suppression activities would occur as needed. Effects from wildfire suppression would vary with location and size of the fire. Suppression of wildfires could have measurable effects to soils within the analysis area. These effects could include soil compaction, displacement, and erosion. Due to the unpredictable nature of wildfires, cumulative effects from future wildfire suppression activities could not be meaningfully quantified in this document. Any net negative impacts to soils would be trending towards a neutral impact to desired conditions as post-fire restoration activities progressively move towards a net improvement compared to previous conditions.

Disturbance of soils from fire suppression is usually limited to hand tools and dozer fire line. Such activities have only minor (insignificant) impacts to the soil resource. During fire suppression, closed roads may be reopened for access and incorporated as fire lines. As part of the post-fire work, the areas of disturbance are rehabilitated and the roads returned to the previous conditions in most cases. Water barring is also installed where needed on hand and dozer fire line. Using FW-GDL-SOIL-05 all potential fire concerns would be met regarding soils.

Invasive Plant Treatments

The control of noxious weeds on National Forest System land is an ongoing activity that normally occurs within the summer months. The Kootenai National Forest Invasive Plant Management ROD (2007) provides direction for noxious weed control on the District. Noxious weed control is expected to continue over the next 10 years. Most herbicide weed treatments are conducted along existing open roads with very few treatments occurring in timber harvest units.

Effects of noxious weed control were incorporated into the cumulative effects analysis through consideration of the effects disclosed in the Kootenai National Forest Invasive Plant Management Plan (2007), a review of the project database, and professional judgment and personal knowledge of noxious weed control. The findings of this assessment conclude that ongoing and reasonably foreseeable noxious weed control within the analysis area would cumulatively contribute indiscernible effects to the soils resource. An example would be spotted knap weed effects on increased soil erosion. The level of noxious weed control within the project area is not expected to increase much over the next 10 years. Most future applications would likely be focused along open or restricted roads. All activities will follow approved application methods as analyzed in the Kootenai National Forest Invasive Plant Management ROD (2007); therefore no adverse cumulative effects would occur and conditions are expected to trend towards a more desired future condition.

Recreation Maintenance

Trail maintenance may include brushing; removing blowdown, debris, and hazard trees; repairing or adding waterbars; repairing treads; repairing or replacing signs; and improving vistas. Routine trail maintenance would have no effect on soils in the activity areas identified. Administrative sites and trails do not count toward the 15 percent soil DSD standard. In addition, the trails are individually small, scattered across many watersheds, and not all work would occur in the same year.

Special Uses

Outfitter/guides are active during the big-game hunting season and fishing season on the District, and may be active in the project area on any given day during the hunting season. Other special uses include minerals exploration. Although there are several active mining claims within the project area none of these occur within proposed activity areas. Therefore, these activities would not add detrimental disturbance to the amounts listed in Table 114. Special use activities are not expected to occur within the proposed treatment units.

Public Uses

Recreational use of the project area is expected to include hiking, camping, fishing, hunting, photography, small forest product gathering (berries, mushrooms, cones, and boughs), Christmas tree cutting, firewood gathering, driving for pleasure, mountain biking, sightseeing, wildlife viewing, cross-country skiing, snowshoeing, trapping, and snowmobiling. These activities are expected to continue over the next 10 years. Because of increasing numbers of people moving into the local communities, it is expected that some of these activity levels would increase. Recreational activities would contribute indiscernible effects to soils. This conclusion is based on the fact that these activities are individually small, have indiscernible effects to soils, and are scattered across many watersheds.

No additional disturbance is expected from OHV use because very little of this use was detected in the activity areas, and because soil productivity effects are spatially static. Productivity in one

location does not affect productivity in another location. Regarding public use – overall soil conditions will continue to trend towards more desired future conditions.

Private Property

Currently the Stimson Lumber Company is looking at harvesting about 216 acres of timber on their Company land on Yaak Mountain by spurring off of the currently existing National Forest System Road located at the top of the mountain.

In total, the Stimson Lumber Company proposes to harvest approximately 910 acres within the OLY project area, of which 5 percent are regeneration, 60 percent overstory removal, and 35 percent partial harvest or commercial thinning.

Activities on private lands would have no effect on soils in the project area because soil productivity effects are spatially static and productivity in one location does not affect productivity in another location.

Consistency with Regulatory Framework

State and Federal Laws and Regulations

The National Forest Management Act (NFMA) requires the Forest Service to manage National Forest System Lands under ecosystem management principles without permanent impairment of land productivity and to maintain or improve soil quality. Harvest Unit 41B (Alternative 2), and Harvest Unit 35B (Alternatives 2 and 4), would not meet Regional Soil Quality Standards (SQS), because soil restoration would not occur due to historic properties. These units become fuels units in Alternative 3 (the Preferred Alternative). Harvest Units 28, 45B, 48, 51, 63 and 77 either currently exceed or would exceed SQS standards. However, soil restoration (decompaction) and monitoring would occur on these units to help meet SQS. All other activity areas would remain at or below 15 percent detrimentally disturbed soils per the Regional Soil Quality Standards (Northern Region (R1) Supplement 2500-2014-1).

2015 Forest Plan Direction

Goals:

FW-GOAL-SOIL-01: Maintain soil productivity and ecological processes where functioning properly, and restore where currently degraded. Maintain the physical, chemical, and biological properties of soils to support desired vegetation conditions and soil-hydrologic functions and processes within watersheds.

> The Selected Action would maintain long-term soil productivity by ensuring that harvest activities would only occur from NFS lands where soil, slope, and other watershed conditions would not be irreversibly damaged. Soil productivity is spatially static and productivity in one location does not affect productivity in another location. Therefore, OLY project activities would contribute to progress toward achieving FW-GOAL-SOIL-01.

Desired Conditions:

FW-DC-VEG-08: Down wood occurs throughout the forest in various amounts, sizes, species, and stages of decay. The larger down wood (i.e., coarse woody debris) provides habitat for wildlife species and other organisms, as well as serving important functions for soil productivity.

The alternatives would maintain soil productivity through retention of CWD per FW-GDL-VEG-03 at levels adequate to maintain a healthy ectomycorrhize and soil micro-organism community which in turn would play an important role in the uptake of nutrients and water by woody plants (Graham et al 1994). Therefore, OLY project activities would contribute to progress toward achieving FW-DC-VEG-08.

FW-DC-SOIL-01: Soil organic matter, physical conditions, and down woody debris maintain soil productivity and hydrologic function. Physical, biological, and chemical properties of soils are within the recommended levels by soil type as described in the KNF soil inventory. These soil properties enhance nutrient cycling; maintain the role of carbon storage, and support soil microbial and biochemical processes.

Adequate levels of coarse woody debris would be maintained per FW-GDL-VEG-03 in order to meet adequate levels required for a healthy ectomycorrhize and soil micro-organism community which in turn play an important role in the uptake of nutrients and water by woody plants (Graham et al 1994). Therefore, OLY project activities would contribute to progress toward achieving FW-DC-SOIL-01.

FW-DC-SOIL-02: Areas with sensitive and highly erodible soils or landtypes with mass failure are not destabilized as a result of management activities.

There are seven designated “landtypes of concern” on the KNF that are given additional consideration prior to the implementation of management activities. These are landtypes 102, 112, 325, 351, 365, 370, and 520 (Kuennen 2006c). When viewed at the project area level, Harvest Units 5, 6, 23, 24, and 25 contain portions of landtype 102 for a total of 76 acres in Alternatives 2 and 3, and 70 acres in Alternative 4. Based on unit design and logging systems, including skyline systems on steep slopes, activities on landtype 102 are not expected to be a concern. These measures will allow the activities to move forward while meeting FW-DC-SOIL-02. Therefore, OLY project activities would contribute to progress toward achieving this desired condition.

FW-DC-SOIL-03: Soil impacts are minimized and previous activity areas that have incurred detrimental soil disturbance recover through natural processes and/or restoration activities. Organic matter and woody debris, including large diameter logs, tops, limbs, and fine woody debris, remain on site after vegetation treatments in sufficient quantities to retain moisture, maintain soil quality, and enhance soil development and fertility by periodic release of nutrients as they decompose (refer to FW-GDL-VEG-03).

In order to help meet SQS, soil restoration (decompaction) and monitoring would occur on Harvest Units 28, 45B, 48, 51, 63 and 77, which either currently exceed or would exceed SQS standards. Decompaction would reduce DSD in these six units to pre-activity levels, thus meeting SQS. Harvest Unit 41B (Alternative 2), and Harvest Unit 35B (Alternatives 2 and 4), would not meet Regional Soil Quality Standards (SQS), because soil restoration would not occur due to historic properties. Alternative 3, the preferred alternative, converts these two units into fuels units. After harvest, all other activity areas would remain at or below 15 percent detrimentally disturbed soils per the Regional Soil Quality Standards (Northern Region (R1) Supplement 2500-2014-1).

In units with pre-existing skid trails, these skid trails would be used to the extent feasible to minimize additional soil disturbance. Effects of temporary roads and

skid trails would be temporary and proposed ripping and seeding operations will help remedy compaction. These activities would help offset disturbance related to harvest activities and improve soil productivity by allowing previously disturbed soils to re-establish as a productive area capable of producing future natural vegetative cover which in turn may one day be harvested again. Some increase in detrimental soil disturbance would be expected for all units with proposed management activities. However, eighty-six units would remain at/or below the 15 percent soil quality standards, while six others whose expected DSD exceeds 15 percent, would receive soil decompaction to help bring them at or below SQS. Therefore, in the long run soil conditions for all but two harvest units (if Alternative 2 or 4 is selected) would trend towards 2015 Forest Plan desired soil conditions. Therefore, OLY project activities would contribute to progress toward achieving FW-DC-SOIL-03.

FW-DC-SOIL-04: Soil organic matter and down woody debris support healthy mycorrhizal populations, protect soil from erosion due to surface runoff, and retain soil moisture. Volcanic ash-influenced soils that occur on most of the Forest are not compacted and retain unique properties, such as low bulk density and high water holding capacity, to support desired vegetative growth.

Coarse woody debris retained on site per FW-GDL-VEG-03 would physically protect the forest floor and mineral soil from erosion and mechanical disturbances. Retained woody debris would also disrupt airflow and provides shade, which insulates and protects new forest growth and also has water holding capacity, making it an important source of moisture for vegetation during dry periods. This decaying woody debris provides nutrients, especially sulfur, phosphorus, and nitrogen, necessary for new plant growth. Therefore, OLY project activities would contribute to progress toward achieving FW-DC-SOIL-04.

Objectives:

FW-OBJ-SOIL-01: Over the life of the Plan, initiate restoration of 75 to 150 acres not meeting soil quality criteria.

The OLY project includes treatment in two harvest units, Units 51 and 63 that exceed 15 percent DSD in the existing condition. Post-harvest, both units will receive subsoiling treatments to break up soil compaction. This treatment is designed to bring soil compaction below 15 percent in these two units. Therefore, the OLY project may contribute 46 acres toward achievement of this objective.

Guidelines:

FW-GDL-SOIL-01: Ground-based equipment should only operate on slopes less than 40 percent, in order to avoid detrimental soil disturbance. Where slopes within an activity area contain short pitches greater than 40 percent, but less than 150 feet in length, ground-based equipment may be allowed, as designated by the timber sale administrator.

In areas where slopes are consistently greater than 40 percent skyline/cable activities would be used. Therefore, the OLY project is designed in accordance with FW-GDL-SOIL-01.

FW-GDL-SOIL-02: Coarse woody debris is retained following vegetation management activities per (FW-GDL-VEG-03).

Appropriate levels of coarse woody debris would be retained throughout the planning area and as a result would provide for yearly nutrient inputs through litter fall (Brady and Weil 2002) and long-term CWD both as a result of post-harvest retained CWD and future blow-down and disease. Therefore, the OLY project is designed in exact accordance with FW-GDL-SOIL-02.

FW-GDL-SOIL-03: On nutrient- limited landtypes, harvesting organics should remain on site for at least 6 months or over a winter season to allow foliage nutrients to leach into the soil, except where site-specific analysis indicates the fuels would present an unacceptable hazard.

No nutrient limited soils have been identified within the project area. However, measures have been included to protect soil productivity through project design features. Therefore, the OLY project meets the intent of FW-GDL-SOIL-03.

FW-GDL-SOIL-04: Ground-disturbing management activities on landslide prone areas should be avoided. If activities cannot be avoided, they should be designed to maintain soil and slope stability.

RHCA buffers and design criteria to exclude any landslide prone areas found during sale layout would be implemented to maintain soil and slope stability. Therefore, the OLY project is designed in accordance with FW-GDL-SOIL-04.

FW-GDL-SOIL-05: Project specific best management practices (BMPs) should be incorporated into all land management activities as a principle mechanism for protecting soil resources.

All project activities would incorporate project specific BMPs as a principle mechanism for protecting soil resources in the OLY Project. Therefore, the OLY project is designed in accordance with FW-GDL-SOIL-05.

Transportation

Introduction

Forest roads are an essential part of the transportation system designed to support multiple use of National Forest System (NFS) lands. They help to meet recreational demands and facilitate access to forest commodities. Forest roads provide access needed to manage the many resources of each forest ecosystem.

The goal of interdisciplinary transportation analyses is to identify a road system that:

- Meets management objectives and needs;
- Is safe and responsive to public needs and desires;
- Is affordable and efficiently managed;
- Has minimal negative ecological effects on the land;
- Is in balance with available funding for needed management actions.

The Lower Yaak-O'Brien-Sheep Travel Analysis Process (TAP) took place during 2014-2015 and a report was completed in October of 2015. In addition, the KNF recently published a forestwide transportation analysis report (Final Travel Analysis Report for Kootenai National Forest, September 30, 2015) which is a broad-scale analysis that encompasses all existing NFS roads (NFSRs) on the Kootenai NF. These reports are separate, independent documents, resulting from interdisciplinary analyses of the existing road system. The Lower Yaak-O'Brien-Sheep TAP provided a site-specific assessment of the current transportation system for its benefits, risks, and need for the future in order to inform decisions related to identification of an efficient road system to provide access for administration, utilization, and protection of NFS lands.

A travel analysis report (TAR) was produced to document the road by road assessment and includes a list of opportunities that could reduce the environmental risk of roads and bring the road system closer to desired management goals. This Transportation section only considers the effects of the recommendations brought forward in the proposed action and alternatives. The Lower Yaak-O'Brien-Sheep Travel Analysis Report can be found in the Project File.

Analysis Area

The travel analysis area for the Lower Yaak-O'Brien-Sheep TAP was a slightly larger area than the boundary for the Lower Yaak-O'Brien-Sheep (OLY) NEPA analysis and data in the TAR was calculated using the travel analysis boundary. The travel analysis began earlier during project development before the OLY proposed action was narrowed down to a more specific area. The existing condition mileages in this specialist report were calculated for the OLY project area. Figure 47 below depicts the difference between the two boundaries.

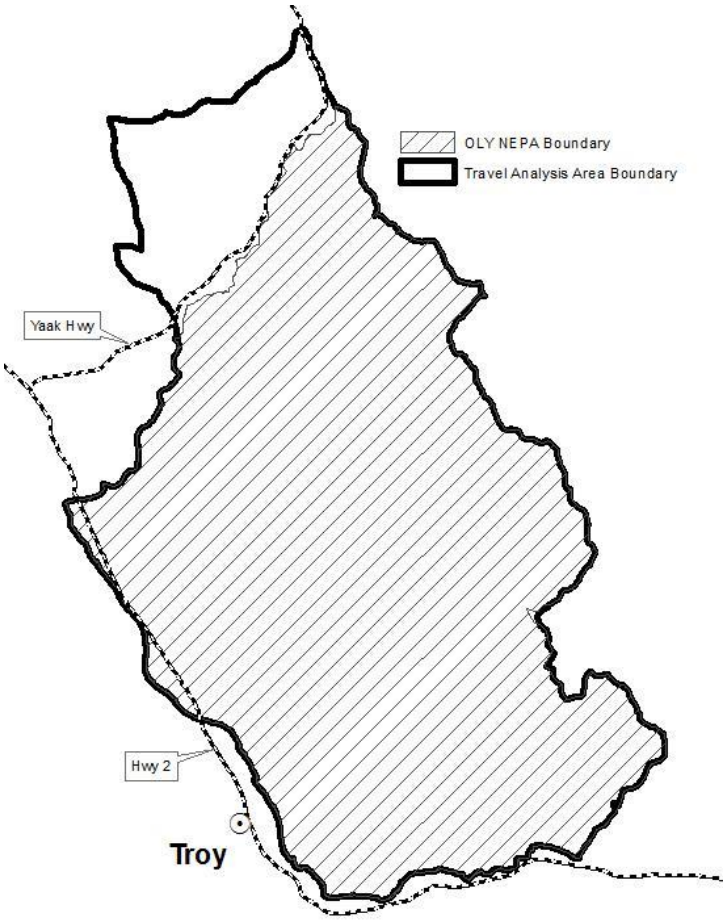


Figure 47. Difference between Travel Analysis Boundary and OLY Project Boundary

Regulatory Framework

The TAP complies with 36 CFR Part 212 Administration of the Forest Transportation System Final Rule and with the Forest Service (FS) Transportation Administrative Policy FSM Chapter 7700 (2009). The regulations are intended to help ensure that additions to the NFS road network are those deemed essential for resource management and use; that construction, reconstruction and maintenance of roads minimize adverse environmental impacts; and that unneeded roads are decommissioned and restoration of ecological processes are initiated (36 CFR 212 Subpart A).Transportation regulations and manual direction also require travel analysis for designation of roads, trails, and areas for motor vehicle use at 36 CFR 212 Subpart B. The OLY Interdisciplinary Team (IDT) completed a TAP for both subparts A and B. The travel management decisions in the OLY EIS Record of Decision would be used in updating the KNF transportation atlas, including the National Forest System Road inventory's spatial layer and the database of record.

2105 Forest Plan Direction

The 2015 Forest Plan provides overall guidance for the management of the lands on the KNF. It describes the goals, desired conditions, and objectives toward which the management of the land should be directed. And it establishes standards and guidelines to help achieve or maintain the desired condition or conditions, to avoid or mitigate undesirable effects, or to meet applicable

legal requirements. The plan components that apply to National Forest System roads in the project area are listed below. A glossary to assist in the understanding of certain terms used to describe or categorize roads is also included in the Transportation Section of the Project File.

Goals

GOAL-AR-01. Manage large areas on the Forest that accommodate opportunities for solitude, and self-reliance. Provide traditional recreational opportunities such as hunting, fishing, gathering products, and hiking. Water-based activities are provided at easily accessed destinations and accommodate concentrations of day use as well as overnight camping opportunities. Maintain a road and trail system that provides access to the Kootenai National Forest.

Desired Conditions

FW-DC-AR-07. A transportation system is in place that provides safe and efficient public and administrative access to the Forest for recreation, special uses, forest resource management, and fire management activities. It is efficiently maintained, environmentally compatible, and responsive to public needs and desires. The transportation system and its use have minimal impacts on resources including threatened and endangered species, sensitive species, heritage and cultural sites, watersheds, and aquatic species. Newly constructed or reconstructed roads do not encroach into streams and riparian areas in ways that impact channel function, geometry, or sediment delivery. Roads in intermittent stored service pose minimal risks to water quality and aquatic ecosystems. Drainage structures have a minimal risk of failure, and provide adequate drainage that prevents accelerated runoff, erosion, and sediment delivery to streams. In addition, stream crossings provide for passage of aquatic organisms. Unauthorized roads and trails are no longer created.

FW-DC-AR-08. Motor vehicle use designations are complete, accurate signing is in place, and motorized vehicle use maps are available. User conflicts are reduced. Loop opportunities are a part of both the road and trail systems. Community involvement is promoted and user awareness programs (educational and informational) enhance the recreational experience. Partnerships are developed with various interest and user groups to participate in evaluation, planning, and maintenance programs for both roads and trails. Easements are obtained to help provide access to NFS lands.

FW-DC-AR-09. The transportation system is connected to state, county, local public, and other federal roads and trails. The transportation system provides reasonable access to facilities, private in-holdings, and infrastructure (e.g., buildings, recreation facilities, municipal water systems, dams, reservoirs, range improvements, electronic and communication sites, and utility lines).

Objectives

FW-OBJ-AR-03. National Forest System Road Maintenance – The outcome is:

- Annually, meet maintenance level requirements on 20 to 30 percent of Operational Maintenance Level 3, 4, and 5 roads (roads that are drivable by passenger vehicles and provide primary access to many recreation opportunities).
- Annually, meet maintenance level requirements on 10 to 20 percent of Operational Maintenance Level 2 roads (roads that are drivable by high clearance vehicles and provide additional access to recreation opportunities).
- Over the life of the Plan, decommission or place into intermittent stored service 150 to 350 miles of road.

Standards

FW-STD-IRA-01. Within inventoried roadless areas, outside of the state of Idaho, the 2001 Roadless Area Conservation Rule (36 CFR 294 Subpart B, published at 66 Fed Reg. 3244-3273) shall apply. IRAs are identified in a set of inventoried roadless area maps, contained in the Forest Service Roadless Area Conservation, Volume 2, dated November 2000, which are held at the national headquarters office of the Forest Service, or any subsequent update or revisions of those maps (36 CFR 294.11). Maps of the IRAs are also found in appendix C of the Forest Plan FEIS.

> **Note:** The OLY project does not propose any road construction or other proposed road work in inventoried roadless areas. Therefore, this direction will not be discussed further.

FW-STD-WL-01 Northern Rockies Lynx Management Direction and FW-STD-WL-02 Grizzly Bear Access Management Direction. Refer to the wildlife section for information regarding lynx and grizzly bear road-related management direction and effects analysis.

FW-STD-RIP-03 Inland Native Fish Strategy. Refer to the watershed and aquatic species sections for more information regarding this management direction and road-related effects analysis.

Guidelines

MA2-GDL-AR-04. Reconstruction of roads is allowed.

MA6-GDL-AR-03. Road construction is allowed.

MA6-GDL-AR-04. Reconstruction of roads is allowed.

> **Note:** The OLY project does not propose any road construction, reconstruction, or any new motor vehicle use designations in any other management areas besides MA2 and MA6. Therefore, direction of guidelines for other management areas will not be discussed further.

Other Regulatory Framework

Factors of consideration for how roads relate to other resources follow the legally mandated processes of the Endangered Species Act, the Clean Water Act, State and Federal Best Management Practices, the Clean Air Act, and relevant administrative policy. The IDT developed opportunities that meet the 2015 Forest Plan desired conditions, goals and standards as they relate to the transportation system.

Measurement Indicators

Road miles are used to measure and quantify all facets of the transportation analysis.

Existing Condition

The existing condition for the road system within the OLY project area is displayed in Table 117.

Table 117. OLY Road System Existing Conditions

OLY Analysis Area Roads	MILES
Total Miles of All Roads In The OLY Project Area	377
National Forest System Roads (NFSR)	222

OLY Analysis Area Roads	MILES
U.S. Highway and other State Roads	7
County Roads	41
Stimson Lumber Company and Other Private Roads	99
Undetermined Roads on Forest Service Land (Impassable)	8
NFS Roads – Existing Road Standards and Characteristics	
Existing Access Management	
NFSR Open Yearlong	71
NFSR Restricted Yearlong	151
NFSR Restricted Seasonally	0
Operation Maintenance Levels*	
Maintenance Level 5	0
Maintenance Level 4	<1
Maintenance Level 3	27
Maintenance Level 2	48
Maintenance Level 1	147
Road Surfacing	
Asphalt	<1
Aggregate	28
Native	194

*Maintenance Levels are defined in the glossary

Physical Condition of the Roads

Since 1993, approximately 27 road-related projects have been implemented including 68 miles of road reconstruction, 5 miles of road construction followed by decommissioning, 18 miles of road storage work and 45 miles of road decommissioning. Eight major culverts have been replaced including two that provided fish passage. As part of this work, stream crossings were replaced to improve water quality and habitat for aquatic organisms. Other types of BMP work included the replacement and installation of drain dips, constructing or cleaning catch basins and ditches, blading, dust abatement, buttressing cut slopes and fill slopes and resurfacing roads. (See Appendix H, Known Past Road Treatments.) Overall, the roads database shows approximately 62 miles of road previously decommissioned (removed from the NFS road inventory) or converted to trail in this analysis area.

Overall conditions on some roads in the OLY area are deteriorating due to lack of maintenance as a result of lack of funding. Annual road maintenance is performed on approximately 20 percent of NFS roads forestwide with an objective maintenance level of 2 or higher (roads open to public travel). Brushing, road grading, slough removal and ditch cleaning are typical maintenance activities that are needed. When needed to address water resource concerns, the maintenance crew will implement BMPs. This usually involves adding culverts, surface water deflectors or drain

dips to correct obvious drainage problems. Maintenance activities may be constrained by budget, time, and weather.

Annual road condition surveys are conducted on a portion of maintenance level 1 roads (restricted yearlong). Basic custodial maintenance is performed if needed and as budget, weather and time allow, to prevent unacceptable resource damage with an emphasis on maintaining and repairing drainage facilities.

Efficiency of the Road System

A site-specific travel analysis of the OLY analysis area was completed and the existing roads were evaluated for their need to provide access for administration, utilization, and protection of NFS lands. The IDT analyzed and evaluated any and all resource concerns and needs for each existing road, whether they were NFS roads or "Undetermined Roads". Any obvious skid trails or illegally developed roads, for which the Forest Service already has the authority to eliminate traffic, were not analyzed, or considered as roads. The TAP has identified opportunities to reduce road maintenance costs and address aquatic resource risks and concerns while continuing to provide recreation and administrative access to NFS lands. The high priority opportunities were carried forward in the OLY project for environmental review under the NEPA.

Placing Roads into Intermittent Stored Service

During the site specific travel analysis process the IDT identified some roads that would be needed for future management activities but currently have moderate to high risk for sediment delivery to streams. Stabilizing and storing those roads until they are needed is recommended. Stabilization work could include, but is not limited to, removing undersized culverts or providing armored overflows, recontouring unstable sections of road, water barring, scarifying the road surface, and seeding. See the watershed report for more information and a complete list of the proposed roads for storage in Chapter 2, Table 17.

Decommissioning of Roads

Roads proposed to be decommissioned were identified through the interdisciplinary travel analysis process as being not needed for long-term resource management. Decommissioning removes a road from the National Forest road system. If physical work is done on the ground (e.g., pulling culverts or recontouring side slopes), it is called active decommissioning. If there are no hydrologic concerns and the road prism is allowed to naturalize without ground-disturbing activity, it is called passive decommissioning.

The roads identified for active decommissioning currently have a high sediment delivery risk. The active decommissioning work could include, but is not limited to, removing culverts, restoring natural stream channels, recontouring unstable fillslopes, waterbarring, ripping, placing slash and duff on the treated road surface, and seeding in some places. The purpose is to reduce long-term sediment delivery, reduce the risk of mass failures, reestablish natural stream courses, improve infiltration and accelerate revegetation with native species. See a complete list of the roads proposed for decommissioning in Chapter 2, Table 18.

Adding Existing Roads to the National Forest System

The Kootenai National Forest Transportation Atlas includes some road segments identified as undetermined. These unauthorized road segments are road prisms on NFS lands that were either constructed for previous management activities but were never documented as NFSRs or have

been illegally created by users. Although these routes are tracked in the transportation atlas to provide baseline resource information (road densities), they are not currently considered part of the National Forest route system. During the travel analysis process these roads were reviewed and the interdisciplinary team determined whether any are needed for current or future land management activities. Chapter 2, Table 20 lists those roads brought forward in this environmental analysis to consider for additions as NFSRs. If the decision-maker approves, the roads would be reclassified in the transportation atlas from undetermined to NFSR. There are no proposed public access changes. Those roads which are impassable and not proposed to be used for immediate project activities would remain in their current impassable condition. Those roads used for currently proposed project activities would be gated during implementation of harvest activities and would either remain gated or barriered after those activities are complete. See the Access Management Table and Map in Appendix E. Gated roads would be available for limited administrative use.

The undetermined roads that were identified as not needed for long-term forest management would be administratively reclassified as decommissioned in the forest transportation atlas (recorded in the Infra Roads Database). Chapter 2, Table 19 lists these roads. Site visits were made to the road segments with potential resource concerns and it was determined that three roads need active work to reduce potential water quality impacts. These segments are included in the proposed active decommissioning. The other roads are currently stable with no identified sediment or resource concerns and are grown in with vegetation. No ground-disturbing actions would occur on those roads, so physical conditions would be unchanged. Access to the public would not change because these roads are not currently drivable, nor are they legal for motor vehicle use.

Motorized Access

The existing road system in the OLY analysis area consists of open and restricted roads. Of the NFS roads in this area, 71 miles are designated for highway legal motor vehicles yearlong. The remaining NFS roads and non-system roads on NF lands are either gated or barriered with motor vehicle use prohibited yearlong in response to resource considerations including but not limited to: wildlife habitat security, protecting water quality, reducing the potential for spread of invasive weed species, and reducing annual maintenance costs. Gated roads allow some administrative motor vehicle use (limited number of trips per established season) and receive only critical resource protection maintenance as needed.

Environmental Consequences

Alternative 1 (No-Action)

Direct and Indirect Effects

Alternative 1 does not propose any new road treatments. Depending on budget and weather, basic road maintenance such as brushing, road grading, slough removal and ditch cleaning would continue on approximately 20 percent of the open (ML 2 and higher) road system. User safety, resource protection, and mission needs are used to prioritize roads for maintenance. When needed to address water resource concerns, the maintenance crew will perform BMPs. This usually involves adding culverts, surface water deflectors or drain dips to correct obvious drainage problems. Under this alternative, road prisms on ML 1 roads (closed roads) would continue to naturally recover as vegetation re-growth occurs and other natural factors deteriorate the road

prisms. Some ML 1 roads, particularly in the O'Brien and Kilbrennan watersheds, will continue to pose a risk to water resources. See the watershed report for more information.

Total road miles would remain unchanged.

Alternative 2, 3 and 4

Direct and Indirect Effects

Chapter 2 lists the proposed road management for the alternatives. The direct and indirect effects incurred by road management proposals in Alternatives 2, 3 and 4 are positive and beneficial to the transportation system, water quality, and wildlife resources. The following sections describe the direct and indirect effects of the proposed action and alternatives on the OLY project area road system. See the soils, watershed, fisheries, wildlife, and recreation sections for road-related effects to those individual resources.

Road Decommissioning

Routes proposed for decommissioning are those roads that are no longer needed for the long-term management of NFS lands and can be removed from the NF road system. Active decommissioning work could include, but is not limited to, removing culverts, restoring natural stream channels, recontouring unstable fillslopes, waterbarring, ripping, placing slash and duff on the treated road surface, and seeding in some places. The purpose is to reduce long-term sediment delivery, reduce the risk of mass failures, reestablish natural stream courses, improve infiltration and accelerate revegetation with native species. This would improve watershed conditions and reduce road system maintenance costs.

Total road miles in the OLY project area would be reduced by 13 miles (see Chapter 2, Table 18 and Table 19). This includes decommissioning 9.7 miles of NF system roads and 3.3 miles of undetermined roads that travel analysis determined were not needed for the long-term management.

Intermittent Stored Service

The minimal maintenance on ML 1 (closed) roads can incur maintenance costs and pose risks to water quality over time. Placing a road into intermittent stored service allows the watershed risks posed by the road to be minimized and maintenance costs deferred while the road remains on the NFSR system for future use. Treatment activities for intermittent stored service may include, but are not limited to, removing undersized culverts or providing armored overflows, recontouring unstable sections of road, water barring, scarifying the road surface, and seeding. Each road would be stored in accordance with the Kootenai National Forest Intermittent Stored Service/Decommissioning Policy, dated 6 April, 2012. Most of the road prisms would remain on the landscape and they would remain in the transportation atlas as NFS roads.

Placing 18.1 miles for Alternative 2, 3 and 4 into intermittent stored service would reduce road maintenance costs, reduce road-related effects to water quality and would help provide for wildlife security see Chapter 2, Table 17).

Additions to the National Forest Road System

The undetermined roads in the OLY analysis area that are proposed as additions to the transportation system are, in fact, previously constructed NF roads. The OLY project transportation analysis determined these roads were needed for the protection, administration and

utilization of the NFS land and the use and development of its resources. These existing roads provide the most efficient location for access for resource management and to recreational sites. If the undetermined roads were decommissioned, there would be no feasible motor vehicle access to utilize, manage and protect these resources. Because these roads are already on the landscape, adding them to the NF road system would not cause any new soil compaction or additional road construction effects. Adding them would allow the forest to use allocated road maintenance funding to install BMPs and reduce any water quality risks. (See Chapter 2, Table 20).

Approximately 0.16 mile of new road would be constructed on Yaak Mountain to provide Stimson Lumber Company reasonable access to their lands for land management purposes (see Figure 17 in Chapter 2). This addition to the Forest Service system of roads would meet the Forest's legal responsibility to provide reasonable access to private in-holdings. The proposed new road construction would be designed to meet Forest Service standards appropriate for the intended uses, considering safety, cost of transportation, and impacts on land and resources.

Adding the undetermined roads and Stimson access road to the Forest Service system of roads would contribute to progress toward FW-DC-AR-07, providing administrative access for the management of forest lands with minimal impact on natural resources. This action would directly and beneficially affect the efficiency and practicality of the transportation system. Adding the undetermined road miles to the NF system would not increase total miles in the transportation atlas, it would change 4.6 of those miles from undetermined status to NFS roads in the data base of record. The Stimson access road would increase road miles on NFS lands by 0.16 mile for all action alternatives but with appropriate permits the road costs of construction and maintenance will be that of Stimson Lumber Company. (see Chapter 2, Table 21).

Road Reconstruction and Maintenance

As part of the OLY project, road reconstruction and reconditioning activities would be implemented on the NFSR haul roads (approximately 45 miles). This work would include implementation of BMPs to reduce road-related sediment and work to provide for safe timber transport. Road reconstruction and reconditioning work may include, but is not limited to, the replacement and installation of drain dips and culverts, constructing or cleaning catch basins and ditches, blading, dust abatement, buttressing cut slopes and fill slopes and resurfacing.

The intent of the reconstruction and maintenance treatments would be to bring the road into conformance with its assigned maintenance level and function, not to improve the road beyond its assigned function. Because these roads are intended for long-term access, and in some cases would remain open to public vehicle travel, work would be performed to minimize environmental impacts and to provide a safe, stable road.

The proposed new road reconstruction would be designed to standards appropriate for the intended uses, considering safety, cost of transportation, and impacts on land and resources.

Accomplishing the reconstruction and maintenance for haul with funding as a result from logging activities will be beneficial in this time of limited road maintenance funding from regular budgets. This road work would contribute to progress toward FW-DC-AR-07, while maintaining a transportation system that provides safe and efficient public and administrative access to the Forest for recreation, special uses, forest resource management, and fire management activities. The work would also contribute to progress toward annual maintenance requirements in FW-OBJ-AR-03**.** The road reconstruction and maintenance on approximately 45 miles of NF roads would directly and beneficially affect the efficiency and practicality of the transportation system.

New Construction for Re-routed Access

Approximately 0.4 miles of new construction (to become part of NFSR 14321) would occur. In contrast, 0.5 miles of NFSR 14321, from milepost 1.1 to milepost 1.6, would be passively decommissioned and therefore there would be no net increase in NFS road. These actions would create a reroute to avoid a wetland (see Figure 14 in Chapter 2).

Approximately 0.3 miles of new construction from the end of NFSR 14309B would occur to allow a reroute around the Troy Shooting Range (see Figure 15 in Chapter 2). Approximately 0.2 miles of NFSR14309, from milepost 0.4 to milepost 0.6 would be passively decommissioned as it goes through the shooting range. In addition, undetermined road 14309A, 0.5 miles, was originally planned for use to access and harvest this area but after an on-site visit, it is proposed that this road segment be passively decommissioned, because the road is located in a swale that receives occasional stream flow.

The proposed new road reconstruction would be designed to standards appropriate for the intended uses, considering safety, cost of transportation, and impacts on land and resources.

Following harvest activities both of these re-routes would be restricted with a gate, allowing administrative motorized access for management purposes, but would continue to be restricted to motorized public access.

Temporary Road Construction

One segment of temporary road totaling approximately 0.2 miles would be constructed to access Harvest Unit 52. This short piece of road is not needed after harvest activities so will not be added to the system or tracked in the transportation atlas or roads database. This temporary road would be constructed to the minimum standard necessary to accommodate log truck haul and would be decommissioned following activities. Decommissioning of the road would include full recontouring, replacing excavated soils back onto the road prism to return the ground to its natural contour, placing woody debris upon the disturbed area, and seeding and fertilizing the disturbed soil.

Access Management

In alternatives 2 and 3, approximately 0.3-miles of NFSR 2380 would be decommissioned and revegetated from the junction of NFSR 752 and NFSR 2380 to the junction of NFSR 2380 and 2380A (see Figure 16 in Chapter 2). Concurrent with this work 0.7 miles of NFSR 2380A would be reconstructed so as to provide continued access to the to N.F. O'Brien area.

The purpose of this work would be to reduce sediment delivery to N.F. O'Brien and restore the riparian area while still providing public access to the same area. The work is dependent on funding availability. This work is proposed in Alternatives 2 and 3, but not in Alternative 4. Refer to other resource sections for effects of this action to their resources.

This is the only change proposed to the MVUM. Other motorized access changes with gates and berms are for administrative use and do not change access to the public. (Refer to Access Management Plan, Appendix E).

Cumulative Effects

As described in the "Affected Environment" section, there are currently about 222 miles of NFS roads in the OLY project area. This is a fraction of the approximately 7,894 miles of NFS roads

on the KNF. This is a result of road construction work over the last 100 years and road decommissioning work done over the last 15 to 20 years. Despite, the addition of xx unauthorized routes to the NF system, adding OLY's proposed decommissioning to the ongoing and planned decommissioning work yet to be completed forestwide, it is possible that the total number of miles of NFS roads will continue to be reduced as the Forest moves toward the road network needed for safe and efficient travel and for administration, utilization, and protection of NFS lands.

Timber Harvest and Associated Activities

The level of road traffic associated with timber sales typically requires road improvements to provide safe access and minimize effects to water resources. Funds generated from timber sales help supplement allocated road maintenance funds for BMP construction and maintenance. Precommercial thinning and prescribed burning do not generally require road improvement work because of the dispersed, short-term, or low impact nature of these activities on forest roads.

Noxious Weed Treatment

Traffic along roads would continue to have the potential to spread noxious weeds. The KNF has been successfully implementing the weed treatment program along the open road system and continues to work to prevent new infestations from developing. Road reconstruction activity associated with timber haul requires weed spraying to help prevent introduction and spread of noxious weeds.

Fire Suppression

Fire suppression and related activities would occur in the future. Roads that are impassable prior to a fire start may be opened with heavy equipment in emergency situations, which could impact surface and drainage features in the short term. Following the suppression actions, these roads would be restored to a condition that allows proper drainage.

Road Management

Deferred and regular, scheduled maintenance activities would continue to maintain and improve road conditions within the analysis area as funding permits.

Public Use

There has been a gradual rise in population in the county and this could leads to increased use of forest roads. The degree of change in traffic by the public will likely vary due to economic conditions (e.g., energy costs) and other demographics. Regardless, various roads in the analysis area are heavily used during the summer and fall months. Excessive speeds and braking activity cause corrugation and potholing in the gravel surface. Narrow road prisms can cause damage to edges of roads as traffic is forced onto road shoulders when vehicles meet. Traffic during wet periods may cause rutting and create surface drainage problems. Firewood gathering can plug road ditches and/or culverts when this activity is conducted outside the terms of the firewood permit. Other public use activities occurring throughout the year have a negligible effect to the road system. Annual maintenance of main roads is scheduled specifically to address high public use.

Recreation Maintenance

Maintenance of recreational facilities generally consists of removal of blown down timber, brush removal and minor drainage repair of trails or other recreational facilities. This activity has very little impact to the road system.

Special Uses

Special use permits (road use, water lines, utility lines, irrigation improvements, etc.) and outfitter/guide permits have not been identified as having a measurable effect on the road system. These activities have a low impact to road resources due to their dispersed nature. Cumulatively, there would be no effect.

Activities on Private Land

New residential construction would increase traffic on forest roads. These increases are gradual over time and not generally impactive unless hauling over wet roads occurs during periods of construction.

Overall, the previously described activities would have a neutral or beneficial impact to the road system and road management activities. Management activities that require heavy use of roadways collect monies for maintenance activities that improve road function and reduce road-related impacts to other resources. Other activities are low impact and dispersed in nature and outside of wet periods, generally have very little impact on road systems.

Regulatory Framework Findings

36 CFR 212

A science-based transportation analysis was completed per the requirements at 36 CFR 212 subpart A. The Forest has published annual motor vehicle use maps per the requirements at 36 CFR 212 subpart B since 2009. Changes to non-winter motor vehicle use designations that are proposed are shown above under Access Management in the Direct and Indirect Effects section above.

National Forest Management Act (NFMA)

In consideration of 16 USC 1608(b), the temporary roads in OLY would be designed with the goal of reestablishing vegetative cover on the roadway and areas where the vegetative cover has been disturbed by the construction of the road, within 10 years after the termination of the timber sale contract either through artificial or natural means.

The proposed new road construction and reconstruction would be designed to standards appropriate for the intended uses, considering safety, cost of transportation, and impacts on land and resources (16 USC 1608(c)).

The OLY project would comply with all other NFMA requirements through consistency with the 2015 Forest Plan.

Consistency with the 2015 Forest Plan

Goals

GOAL-AR-01: Manage large areas on the Forest that accommodate opportunities for solitude, and self-reliance. Provide traditional recreational opportunities such as hunting, fishing, gathering products, and hiking. Water-based activities are provided at easily accessed destinations and accommodate concentrations of day use as well as overnight camping opportunities. Maintain a road and trail system that provides access to the Kootenai National Forest.

> About forty-five miles of road will be reconstructed or maintained to BMP standards and contribute to maintaining a road system that provides access to the Forest. Therefore, the OLY project would contribute to progress toward achieving this goal.

Desired Conditions

FW-DC-AR-07: A transportation system is in place that provides safe and efficient public and administrative access to the Forest for recreation, special uses, forest resource management, and fire management activities. It is efficiently maintained, environmentally compatible, and responsive to public needs and desires. The transportation system and its use have minimal impacts on resources including threatened and endangered species, sensitive species, heritage and cultural sites, watersheds, and aquatic species. Newly constructed or reconstructed roads do not encroach into streams and riparian areas in ways that impact channel function, geometry, or sediment delivery. Roads in intermittent stored service pose minimal risks to water quality and aquatic ecosystems. Drainage structures have a minimal risk of failure, and provide adequate drainage that prevents accelerated runoff, erosion, and sediment delivery to streams. In addition, stream crossings provide for passage of aquatic organisms. Unauthorized roads and trails are no longer created.

> A site-specific travel analysis (see project record) was completed for the Lower Yaak-O'Brien-Sheep area. That analysis is designed to provide decision-makers with information to develop road and trail systems that are safe and responsive to public needs and desires, are affordable and efficiently managed, have minimal negative ecological effects on the land, and are in balance with available funding for needed management actions. In addition, the KNF recently completed a forestwide travel analysis (Final Travel Analysis Report for Kootenai National Forest, September 2015). The site-specific travel analysis report identified opportunities for storage, decommissioning, and maintenance and many were carried forward into the OLY project and are listed in Chapter 2 of this document. As a result of the proposed activities, the OLY project would contribute to progress toward achieving this desired condition.

FW-DC-AR-08: Motor vehicle use designations are complete, accurate signing is in place, and motorized vehicle use maps are available. User conflicts are reduced. Loop opportunities are a part of both the road and trail systems. Community involvement is promoted and user awareness programs (educational and informational) enhance the recreational experience. Partnerships are developed with various interest and user groups to participate in evaluation, planning, and maintenance programs for both roads and trails. Easements are obtained to help provide access to NFS lands.

The Forest has been publishing motor vehicle use maps showing designated non-winter motor vehicle use since 2009. Ongoing sign maintenance is part of the forest program of work. The OLY project would not make any changes to current non-winter motor vehicle use designations, easements, or ongoing partnerships. Therefore, the OLY project would be neutral to progress toward achieving this desired condition.

FW-DC-AR-09: The transportation system is connected to state, county, local public, and other federal roads and trails. The transportation system provides reasonable access to facilities, private in-holdings, and infrastructure (e.g., buildings, recreation facilities, municipal water systems, dams, reservoirs, range improvements, electronic and communication sites, and utility lines).

The OLY project would construct 0.14 miles of new road to provide Stimson Lumber Company reasonable access to their in-holding. Therefore, the OLY project would contribute to progress toward this desired condition.

Objectives

FW-OBJ-AR-03: National Forest System Road Maintenance – The outcome is:

• Annually, meet maintenance level requirements on 20 to 30 percent of Operational Maintenance Level 3, 4, and 5 roads (roads that are drivable by passenger vehicles and provide primary access to many recreation opportunities).

• Annually, meet maintenance level requirements on 10 to 20 percent of Operational Maintenance Level 2 roads (roads that are drivable by high clearance vehicles and provide additional access to recreation opportunities).

• Over the life of the Plan, decommission or place into intermittent stored service 150 to 350 miles of road.

The OLY project would contribute to this objective by authorizing 13 miles of decommissioning and 18 miles of roads placed in intermittent stored service. In addition, road maintenance associated with timber haul would be completed on approximately 26 miles of ML 2 roads and 19 miles of ML 3 roads.

Guidelines

MA2-GDL-AR-04: Reconstruction of roads is allowed.

The road reconstruction within MA2 proposed in the OLY project is in accordance with this guideline.

MA6-GDL-AR-03 Road construction is allowed.

The road construction proposed in the OLY project would be within MA6 and is in accordance with this guideline.

MA6-GDL-AR-04 Reconstruction of roads is allowed.

The road reconstruction within MA6 proposed in the OLY project is in accordance with this guideline.

Water Resources

Introduction

This section discusses the effects of the proposed Lower Yaak O'Brien Sheep (OLY) project on water related resources including water quantity, water quality, and riparian conditions. The purpose of this analysis is to determine if the project activities, combined with other ongoing or foreseeable activities, will cause or contribute to an adverse or beneficial effect on water resources. The activities that will be considered in this analysis are the proposed timber harvest, prescribed burning, road reconstruction, road storage, road decommissioning, stream site stabilization, and recreation site improvements.

A purpose and need for this project is to maintain or improve water quality and native aquatic species habitat by reducing the adverse impacts the existing road system has on water quality and stream channel conditions (see Chapter 1).

Regulatory Framework

Activities on the Kootenai National Forest (KNF) that may affect water resources are subject to Federal and state laws and regulations, and the 2015 Kootenai National Forest Land Management Plan (2015 Forest Plan). Table 118 identifies the laws, policy and direction that guide the analysis for water resources for the OLY project.

Table 118. Guiding Documents for Water Resources

Guiding Document	Direction
Clean Water Act of 1977 - Amendment to The Federal Water Pollution Control Act	Provides for the restoration of the Nation's waters. The U.S. Environmental Protection Agency (EPA) delegated most of the implementation of the CWA to the states.
Montana Water Quality Act (MCA 75-5)	Provides guidelines to protect the quality of Montana waters consistent with Federal law.
Executive Order 11988 – Floodplain Management	Requires Federal agencies to evaluate the potential effects of any actions it may take in a floodplain; and to restore and preserve the natural and beneficial values served by floodplains.
Executive Order 11990 - Protection of Wetlands	Requires Federal agencies to take action to minimize the destruction, loss or degradation of wetlands, and to preserve and enhance the natural and beneficial values of wetlands.
Montana Streamside Management Zone Law and Rules	Applies to commercial timber sales on private, state, or Federal land and establishes streamside management zones (SMZs) along streams, lakes, and other water bodies. Timber harvest and related activities are subject to restrictions in SMZs.
2013 Memorandum of Understanding between Montana Department of Environmental Quality and US Forest Service – Northern Region	To foster efficient strategies to protect and restore water quality on public lands managed by the Forest Service in Montana including implementation of best management practices (BMPs).
2015 Kootenai National Forest Land Management Plan	Provides direction for managing Forest land and resources on the Kootenai National Forest.

Guiding Document	Direction
National Best Management Practices for Water Quality Management on National Forest System Lands Volume1: National Core BMP Technical Guide April 2012	Provides direction for implementing the National Core BMP portion of the Forest Service National BMP Program.

2015 Forest Plan

The 2015 Forest Plan provides overall guidance for the management of the lands on the Kootenai National Forest. It describes the desired conditions toward which the management of the land should be directed. And it establishes standards and guidelines to help achieve or maintain the desired conditions, to avoid or mitigate undesirable effects, or to meet applicable legal requirements. The 1995 Inland Native Fish Strategy (USDA 1995) is incorporated into the 2015 Forest Plan as part of the riparian standards and guidelines.

The following 2015 Forest Plan components apply to water resources potentially affected by the OLY project. Compliance of the OLY project with the Forest Plan components is discussed in the Compliance with Regulatory Framework section at the end of the water resources section.

GOAL-WTR-01. Maintain or improve watershed conditions in order to provide water quality, water quantity, and stream channel conditions that support ecological functions and beneficial uses.

FW-OBJ-WTR-01. Over the life of the Plan, trend at least 15 percent of subwatersheds toward an improved watershed condition. Improvements in these watersheds may include passive or active restoration efforts, depending on opportunities and/or funding.

FW-DC-WTR-01. Watersheds and associated aquatic ecosystems retain their inherent resilience to respond and adjust to disturbance without long-term, adverse changes to their physical or biological integrity.

FW-DC-WTR-02. Water quality meets applicable state water quality standards and fully supports beneficial uses. Flow conditions in watersheds, streams, lakes, springs, wetlands, and groundwater aquifers fully support beneficial uses, and meet the ecological needs of native and desirable non-native aquatic species and maintain the physical integrity of their habitats.

FW-DC-WTR-03. Stream flows provide for channel and floodplain dimensions that mimic reference conditions. Stream flows allow for water and sediment conveyance and overall channel maintenance. Sediment deposits from over-bank floods allow floodplain development and the propagation of flood-dependent riparian plant species. Surface and groundwater flows recharge riparian aquifers, provide late-season stream flows, cold water temperatures, and sustain the function of surface and subsurface aquatic ecosystems.

FW-DC-RIP-02. Riparian and aquatic ecosystems, including stream channel integrity, channel processes, and sediment regimes function characteristically for a given landscape and climatic setting.

FW-DC-RIP-03. Water quality provides stable and productive riparian and aquatic ecosystems. Streams and lakes are free of chemical contaminants and do not contain excess nutrients. Sediment levels are within reference conditions, supporting salmonid spawning and rearing, and cold water biota requirements.

MA6-DC-WTR-01. Watershed and vegetative restoration is achieved predominantly through restoration activities but also through natural ecological processes.

GA-DC-WTR-BUL-02. Source water protection is provided in O'Brien Creek for the town of Troy.

This desired condition does not apply because O'Brien Creek is not a source water area for Troy. Troy gets its water from municipal wells.

FW-GDL-WTR-02. In order to avoid future risks to watershed condition, ensure hydrologic stability when decommissioning or storing roads or trails.

FW-GDL-WTR-03. Project-specific best management practices (BMPs) will be incorporated in all land use and project plans as a principle mechanism for controlling non-point pollution sources, meet soil and water goals, and protect beneficial uses. To the extent practicable, ditch and road surface runoff should be disconnected from streams and other water bodies.

Federal and State Water Quality Laws

Federal and state water quality laws and regulations pertinent to the OLY project include the following:

Water Quality Standards. The Clean Water Act requires states to establish water quality standards that provide for protection of the beneficial uses made of their waters (Federal Water Pollution Control Act-Title 33-Chapt. 26-Subchapter III-Sec. 303). State water quality standards consist of classifying streams, designating the beneficial uses, and developing water quality criteria sufficient to protect the designated beneficial uses.

The designated beneficial uses of most streams in the Kootenai River basin, including the streams in the project area, are drinking, culinary, and food processing purposes, after conventional water treatment; bathing, swimming, and recreation; growth and propagation of salmonid fishes, associated aquatic life, waterfowl, and furbearers; and agricultural and industrial water supply (Administrative Rules of Montana (ARM) 17.30.609; 17.30.623).

Montana has developed numeric or narrative criteria for various pollutants that may impact these beneficial uses. The pollutant of primary concern with forest management operations is sediment, and the beneficial use of most concern in these waters is generally fish. No increases of sediment or suspended sediment are allowed above naturally occurring concentrations which will render the waters harmful, detrimental, or injurious to fish (ARM 17.30.623). Naturally occurring is defined as conditions or material present from runoff or percolation over which man has no control or from developed land where all reasonable land, soil, and water conservation practices have been applied (ARM 17.30.602). The Forest Service addresses this requirement to apply reasonable land, soil, and water conservation practices through application of best management practices (BMPs) as described in the National Core BMP Technical Guide (USDA 2012).

303(d) List. States are required to assess whether streams meet established water quality standards, and if they do not states must establish total maximum daily loads (TMDLs) for those pollutants causing the impairment (Federal Water Pollution Control Act-Title 33-Chapt. 26-Subchapter III-Sec. 303; Montana Code Annotated (MCA) 75-5-703). No streams in this project area have been or are currently on the 303(d) list other than the Kootenai River which forms the southern boundary of the project area. The Kootenai River is on the 303(d) list due to

hydrological changes caused by the construction and operation of Libby Dam which is not under the jurisdiction of the Forest Service.

The **Montana Streamside Management Zone Law and Rules (SMZ Law)** (MCA 77-5-3 2001; Montana DNRC 1995) apply to commercial timber sales on private, state, or Federal land and establishes streamside management zones (SMZs) along streams, lakes and other water bodies. Timber harvest and related activities are subject to restrictions in SMZs. Activities that are in variance with the SMZ Law require an alternative practice permit from the Montana Department of Natural Resources and Conservation. In the 2015 Forest Plan, the Kootenai National Forest has established management restrictions and objectives for riparian habitat conservation areas (RHCAs) that include lakes, streams, wetlands, and landslide prone areas. Forest BMP monitoring includes evaluation of timber sale compliance with both the SMZ Law and the 2015 Forest Plan.

Resource Indicators and Measures

Table 119 summarizes the resource indicators that will be used to assess effects of the proposed project on water resources and measure movement toward the desired condition with respect to meeting the project's identified purpose and needs (see Chapter 1), and compliance with relevant 2015 Forest Plan components (previously listed in this section).

Table 119. Resource Indicators and Measures for Assessing Effects

Resource Element	Resource Indicator	Measure	Used to address: Purpose and Need, or Analysis Issue?	Source (2015 Forest Plan Component, Law, or Policy)
Water quantity	Effect on streamflows and stream channel condition	Equivalent clearcut area, watershed size, stream channel gradient, stream channel substrate size	Analysis Issue	Forest Plan components
Water quality	Road-related sediment delivery	Sediment quantity delivered from roads proposed for haul, storage, and decomissioning	Purpose and Need Analysis Issue	Forest Plan components, State and Federal water quality laws
Riparian condition	Riparian area improved	Riparian acreage restored by decommissioning	Purpose and Need Analysis Issue	Forest Plan components

Water Quality Concerns Not Affected by the Proposed Project

Other potential water quality issues are water temperature, excessive nutrients, and chemical pollution. The proposed project would have negligible effects on these water quality attributes and they will not be analyzed in detail as explained below.

Water Temperature

Implementation of riparian standards and guidelines will protect shading and riparian groundwater function. The proposed project would have no measurable effect on water temperature in the project area streams.

Nutrients

Nutrient increases in streams can occur following timber harvest, road work, and prescribed burning (Gravelle et al. 2009). In the OLY project area nutrient increases in streams as a result of the proposed activities are expected to be low and short-term due to the low intensity of harvest in any particular watershed, the retention of riparian buffers, the implementation of BMPs, and the overall low intensity of planned burns.

Affected Environment

For water resources the affected environment is limited to the watersheds that are potentially affected by the proposed project activities. These watersheds are Arbo, Kilbrennan, Koot, China, and O'Brien. There are proposed OLY harvest and prescribed burn units located in areas outside of these watersheds that drain primarily through subsurface flow to the Yaak and Kootenai rivers. These tributaries have intermittently visible surface channels that disappear once they reach the Kootenai and Yaak river valley bottoms, and are not fish bearing; therefore, do not lend themselves to surveying, water yield, or water quality monitoring. Water and sediment yield effects from these activities would not be discernible in such large river systems, and so these activities will not be considered further in this water resources analysis.

Physical Setting and Historical Conditions

The OLY project area is bounded by the Kootenai River on the south and west, and the Yaak River on the west. The high ridge that bounds the project area on the east and the north has numerous minor summits over 6,000 feet including O'Brien Mountain at 6,772 feet which is the highest point in the project area. The lowest elevation point in the project area is the confluence of the Yaak River and Kootenai River at 1,662 feet. Arbo and Kilbrennan creeks flow west into the lower Yaak River. O'Brien, Koot, and China creeks flow south into the Kootenai River.

The dominant bedrock is composed of metamorphosed sedimentary rock known as the Belt Supergroup (USDA and NRCS 1995). Steeper slopes with talus and rock outcrops are found in the north facing glacial cirque on Pulpit Mountain, along the Kootenai River canyon, and along the major geological fault that runs southeast/northwest through the O'Brien and Kilbrennan watersheds. Continental glaciation overrode the entire area leaving rounded mountain tops. The receding glaciers left deep glacial till soils on the mountain slopes. Some of these areas are vulnerable to landslides, particularly after vegetation removal by wildfire or harvest. Surface soil erosion is rare due to the moderately cohesive soil types, leaf and needle litter, and generally heavy ground vegetation.

Average annual precipitation ranges from approximately 26 inches in the Kootenai River valley bottom to about 75 inches along the ridge tops. November, December, and January typically receive the most precipitation; much of it comes as snow in the higher elevations. Maximum snowpack levels are usually reached in late March. Annual snowpack depths vary from less than a foot in the valley bottom to 4 to 6 feet at the higher elevations. Because of the elevation range there are both snow dominated and rain dominated hydrologic systems in the project area. During late fall, winter, and early spring high precipitation storms combined with above freezing air

temperatures can lead to the largest flow events of the year. Peak flows from normal spring runoff occur during April and May. Summers are generally dry and warm with July and August being the driest months of the year. Base flows are generally reached by mid-July and remain low until October. Thunderstorms occur occasionally, often accompanied by short duration high intensity rainfall.

Historically watershed conditions fluctuated in response to natural disturbances. Disturbances such as floods, droughts, and landslides directly and indirectly affected stream flow and channel conditions. Ongoing forest mortality due to wildfire, wind, and insect and disease led to frequent small scale changes in forest cover that had minor and short-term impacts on water quality and stream channel conditions. Less frequently, large wildfires caused widespread forest mortality that increased water yields, resulted in loss of riparian forest along stream channels, and in some areas led to landslides that scoured channels and deposited large quantities of sediment and woody debris. These effects from major disturbances on stream channel conditions could persist for several decades.

The historical frequency of the large fire events varied depending on climatic conditions. Warm dry periods favored higher fire intensities at more frequent intervals, and cooler, wetter periods favored low and mixed fire severities with less dramatic effects on stream flow and channel conditions.

South and west facing drainages like Koot and China creeks had more frequent and intense fires due to drier fuel conditions as compared to other aspects and higher elevations. North facing slopes and riparian areas burned less frequently and large cedar and other conifers grew in cooler valley bottoms. These trees provided shade, bank stability and long lasting sources of large woody debris in the streams. Portions of Kilbrennan and O'Brien watersheds have large shade tolerant trees and large stumps that indicate lower fire frequencies and intensities in these valley bottoms over the last 200 years.

Riparian areas were highly productive and contributed shading, wood, and organic material to the streams. Over time substrate conditions have varied depending on gradient and beaver activity. Slack water areas behind beaver dams would have accumulated sediment and buried gravels. In the non-inundated areas gravels and cobbles would have typically had low fine sediment conditions. Low gradient stream reaches would have been complex with debris jams, backwater areas, and overflow channels. These conditions provided for cooler water temperatures and sustained summer base flows. Large natural flood events occasionally caused significant scouring and deposition, and accumulation of woody debris jams.

Effect of Past Management Actions on Current Conditions

Periodic selective harvest of desired tree species and sizes has been ongoing since the early 1900s because of the proximity to the community of Troy. Past removal of large cedar and larch trees from the riparian areas has reduced a source of decay resistant woody debris that would have anchored large debris jams and led to more channel complexity than exists today.

In the project area, regeneration harvest and road construction began in the 1950s and continued through the late 1990s. Road construction resulted in considerable sediment delivery to streams due to lack of BMPs. In the 1950s and 1960s many road/stream crossings were built by placing logs in the stream channels and pushing dirt on top of them with a bulldozer. Often these structures were not removed after harvest and have plugged and failed over time. Older metal culverts have also caused problems as a result of being undersized, poorly installed, or due to

deterioration. Road-related sediment sources include erosion from road cutslopes, fillslopes, and ditches. Sediment from this type of erosion has significantly declined over the last 30 years as the roads have revegetated. However, road failures continue to occur during severe storms due to the decay of wood buried during the original road construction, lack of drainage maintenance, and culverts that are undersized for large storm events.

Between 1991 and 2000 several wildfires burned in the project area. Timber from portions of these fire areas was salvaged, which involved new road construction followed by both road storage and decommissioning. Sediment delivery to streams in Arbo, O'Brien, and China watersheds was elevated as a result of both the wildfire and the subsequent activities. Fire suppression and rehabilitation activities directly impacted streams. Road construction, reconstruction, storage, and decommissioning activities caused sediment delivery at stream crossings. In the fire areas in O'Brien watershed there were a number of mass failures and associated debris flows. In some cases associated road failures led to the contribution of more sediment than would have occurred in a burned natural landscape. The last known mass failure/debris event was in 2009 and sediment delivery has steadily tapered off as slopes and roads have revegetated.

Beaver populations are much lower than they were prior to the arrival of the fur traders in the 1700s. Even today beaver are frequently trapped out of areas they try to recolonize. Beaver dams can create deep pools, raise water tables, and create backwater channels. The reduction in beaver populations has resulted in more simplified stream systems, including loss of secondary and backwater channels, loss of deep pools, and narrower adjacent riparian areas. Related consequences include less aquatic and riparian habitat per mile of stream and lower summer base flows (Pollock et al. 2015). Given the naturally low stream gradients and evidence of old beaver dams it appears likely that segments of Kilbrennan and lower O'Brien creeks would naturally have supported larger populations of beaver than they do today.

Existing Watershed Conditions by Analysis Watershed

Watershed conditions at any point in time are a product of physical characteristics such as climate, soil type, and topography and the recent disturbance history. Disturbances can be natural such as wildfires and floods or management related such as timber harvest and road construction. Each watershed in the project area has a unique set of physical conditions, natural sensitivity, and disturbance history. The statistics listed in Table 120 indicate the degree of some watershed disturbances that affect water resources. How these disturbances interact with other watershed factors to affect water quality and stream channel conditions will be discussed by each analysis watershed.

Table 120. Watershed Disturbance Factors

Watershed	Watershed Size (Square Miles)	Percent Past Regeneration Harvest	Percent Wildfire	Current ECA	Road/Stream Crossing Density (crossings per square mile)
Arbo	7.7	15	73	35	0.1
Kilbrennan	8.3	22	8	11	3.1
Koot	2.7	21	0	11	1.8

Watershed	Watershed Size (Square Miles)	Percent Past Regeneration Harvest	Percent Wildfire	Current ECA	Road/Stream Crossing Density (crossings per square mile)
China	5.8	38	77	43	2.2
O'Brien	48.2	30	16	21	3.0

ECA = Equivalent Clearcut Acres

Arbo

Arbo is a third order stream that drains into the lower Yaak River. It has a 7.7 square-mile watershed. The entire watershed is National Forest System land. The Arbo watershed burned extensively in the 1910 fire and as a result it had extensive immature stands that were not ready for timber harvest during the peak logging era of the 1960s through 1990s. Modest levels of partial and regeneration harvest with associated road construction occurred during this period. In October 1991 over 50 percent of Arbo Creek watershed burned as a result of a windstorm that spread embers from burning slash piles. The high intensity wind driven fire almost completely burned the upper watershed in a few hours. The riparian areas along the stream courses were burned at equal intensity to upland areas because of the wind. Water yields are still elevated as a result of the combined harvest and wildfire related reductions in forest cover.

In 1993 and 1994, a portion of the fire killed timber was salvaged, and in 1996 the entire watershed road system was stored or decommissioned. This work involved removing nearly all the culverts in the watershed, including the three large culverts on main stem of Arbo Creek, and reestablishing the natural stream channels. This extensive road storage and decommissioning work likely led to a pulse of increased sediment to the stream during and immediately following the construction. Currently road conditions adjacent to the stream channels are stable and contributing little sediment.

For the last 19 years the Arbo watershed has been recovering from these disturbances through natural processes. The conifer regrowth has been vigorous, dominated by lodgepole on the south facing slopes and mixed conifer species on the north facing slopes. Many dead trees have come down creating heavy accumulations of down logs across the landscape including across the stream channels. The logs provide shading and instream woody debris. Shrubs are the dominant riparian vegetation in the fire areas and provide moderate shading. The lower three miles of stream were not burned and have a mostly mature conifer over story. Although water yield is still elevated as a result of the loss of forest from the fire, the rapid growth of conifers and consequent increase in soil moisture transpiration is decreasing water yield. Water yields are within historical ranges given that large wildfires would have periodically occurred over time.

There is one small mass failure site visible on satellite imagery; otherwise the natural slope stability appears to have been unaffected by the fire and harvest in this watershed.

Arbo Creek is a step-pool type stream system with a cobble/boulder substrate typical of many moderate gradient streams in the Yaak watershed. This channel type is resistant to high stream flows because the rocks that armor the channel banks and stream bottom are not easily mobilized. Sediment is readily transported downstream and does not accumulate in the channel. Overall, , Based on observations at several locations along several miles of stream, Arbo stream channel conditions are stable and should continue to improve with post-fire vegetative recovery.

Kilbrennan

Kilbrennan Creek is a third order stream that drains an 8.7 square mile watershed into the Yaak River south of Arbo Creek. Approximately 5 percent of the watershed is privately owned and the remainder is National Forest System land. The watershed was primarily harvested in the 1960s through the 1980s. Wildfire appears to have been a minor factor in this watershed during the last 100 years. The combined effects of harvest and wildfire on water yield are currently negligible.

Kilbrennan Creek begins at Kilbrennan Lake. The lake is fed from above by Feeder Creek. Roads in upper Feeder Creek watershed have no ability to deliver sediment downstream because Feeder Creek goes subsurface through a natural talus rock slide before reaching Kilbrennan Lake.

Kilbrennan Creek has a variable morphology determined by valley gradient and confinement. Below the lake there is about ¾ of a mile of steeper gradient gravel/cobble step-pool type channel. Then the stream reaches a bench where it meanders at a low gradient for a couple of miles through a flat-bottomed valley. Old beaver dams indicate this area is periodically occupied by beaver. Ongoing trapping and/or limited food sources are preventing beaver from more continuously occupying this area, and the existing beaver dams are breached. The breaching has resulted in a lowered water table and the loss of the deep pools and backwater areas associated with active beaver dams.

A permanent stream monitoring site in lower Kilbrennan Creek below the old beaver dam complex has unusually high fine sediment levels. In 2006 stream monitoring found 80 percent fines less than 6 millimeters, and in 2011 it found 24 percent fines less than 6 millimeters. This decline in fine sediment indicates an improving trend, although 24 percent fines is still considered high. Reference streams in this area typically have below 10 percent fines.

It is likely that Kilbrennan is naturally higher in fine sediment than most streams because of a tributary with naturally high calcium carbonate deposits. This tributary enters Kilbrennan Creek immediately upstream of the monitoring reach. The calcium carbonate deposits regularly flake off and are flushed downstream. Many fine flecks of calcium carbonate are visible in the sediment below this tributary.

Another source of fine sediment may be fairly recent breaching of the beaver dams that has released fine sediment trapped behind the dams. Although beaver dams naturally fail when beaver leave due to a lack of food supply, human removal of beavers may result in more frequent dam failures than happened historically.

The extremely high measurement of fine sediment in 2006 also may have been affected by sediment by upstream in-channel work conducted by Montana Fish Wildlife and Parks (MFWP) in the winter of 2006. MFWP constructed a concrete dam to block brook trout from migrating upstream. Installation of this structure involved construction work in the channel.

An ongoing source of fine sediment is the gravel county road immediately adjacent to the stream below the lake where there is no buffer between the road and the stream, and runoff from the road enters the creek directly. Road blading also contributes sediment to the creek.

During initial field review, three road/stream crossings on NFSR 4407B on the north side of Yaak Mountain were identified as not functioning correctly and at possible risk of failure. This is the only area in the watershed that appears vulnerable to mass failures based on land types and road failure history on adjacent corporate timber land. A road failure on this road could deliver sediment to lower Kilbrennan Creek. The road condition was field reviewed a second time

(K.Newgard 9/1/2015). Three crossings were identified during the first field review. One crossing is on Stimson Lumber Company Land and this segment of road would not be treated since it is not under Forest Service jurisdiction. However, the crossing is considered at low risk for failure. There are two crossings on National Forest System Lands. One crossing will be treated, and the second crossing shows no sign of a scour channel, has rocky fill and presents almost no risk for failure. It will not be treated.

Below the monitoring reach the stream gradient steepens again as it descends to the Yaak River.

Currently water quality in Kilbrennan Creek appears to be less than its potential, but improving. Aquatic and riparian habitat diversity might be improved if beaver were introduced or allowed to reestablish in Kilbrennan Creek. Management of beavers is under the jurisdiction of the State of Montana and not the Forest Service.

Koot

Koot Creek is a steep second order stream on a south facing aspect that flows into the Kootenai River just below Kootenai Falls. It has a 2.7 square mile watershed. Past harvest occurred in the upper portion of the watershed from the 1970s through the 1990s. Wildfire has been a minor influence in this watershed for the last several decades, although historically fire frequency was probably relatively high. The combined effects of harvest and wildfire on water yield are currently negligible in this watershed.

There is a high road density in the upper watershed. However, the road/stream crossing density is low for the high road density because of the lack of developed stream channels in the upper part of the watershed. The lack of stream crossings and location of roads in the watershed greatly reduces the effect roads have on peak flows and sediment delivery in this watershed. There is no evidence of natural or management-induced mass wasting. There is no private land in this watershed.

Approximately 25 percent of the riparian area has been harvested on one or both sides of the stream which may have reduced existing and potential large woody debris.

Koot Creek is perennial near its mouth due to spring flow, but much of the stream channel above is intermittent. Although Koot watershed has a winter snowpack in the upper elevations, it would be considered a rain dominated hydrologic system due to the lower elevations and warm aspect. The watershed has steep slopes with shallow soils that lead to a flashy hydrologic response during storm events. This situation has resulted in an entrenched stream with active bank scour. The dominant channel substrate is gravel which is easily mobilized at high flows. In the monitoring reach there were 9 percent fines less than 6 millimeters which is considered low. The reach is seasonally dry which limits its value to aquatic dependent species.

Overall, stream channel and water quality conditions are only fair, but the conditions appear to be natural in origin.

China

China Creek is a steep third order stream that flows south into the Kootenai River above Kootenai Falls. It has a 5.8 square mile watershed. There is no private land in this watershed. China watershed has been subject to timber harvest and road construction since the 1950s. Seventy-seven percent of the watershed burned at mostly high intensity in a lightening ignited fire in 1994. Most of the riparian zone along the main stem and tributaries burned. Water yields are still

elevated as a result of the combined harvest and wildfire related reductions in forest cover. Like Koot, historically China watershed probably burned more frequently than other watersheds in the project area because of its southerly aspect. Water yields are within historical ranges given that large wildfires would have periodically occurred over time.

About a quarter of the fire area was salvaged in 1997, and extensive road storage and decommissioning work was implemented in 1998. Despite this high level of disturbance the stream channel near the mouth is in a moderately stable condition. There is evidence of recent bedload movement and deposition, but it did not appear to be as extensive as what might be expected after such a large reduction in forest cover. The percent of sediment less than 6 millimeters was 15 percent which is modestly higher than reference (less than 10 percent). The reach gradient was 8 percent which is rather steep for the level of fines that were found. The source of fines is likely instream sources related to channel and bank erosion upstream. There is a short steep alluvial fan at the mouth where the stream enters the Kootenai River.

It appears that the land types in this watershed are quite stable. There were no slope or road failures evident on satellite imagery. Areas of the fire that were not salvaged have moderate to high concentrations of down logs from fire-killed timber. Many down logs are now acting as large woody debris in the stream channel which typically improves aquatic habitat and provides channel stability. As previously harvested and burned riparian areas revegetate, the amount of shading from forest cover will increase. The forest regrowth is variable with faster recovery on shaded lower elevation aspects. Water quality and stream channel conditions are expected to slowly improve with the vegetative recovery.

O'Brien

O'Brien Creek is a fourth order stream that has a 48 square mile-watershed. There are a series of falls and cascades located approximately 12.5 miles upstream of the mouth. In this analysis the term upper O'Brien will be used to refer to the stream and watershed above the falls and lower O'Brien will be used to refer to the stream and area below the falls. Studebaker Draw, Kedzie, and Noseeum are named tributaries to upper O'Brien. There are also several perennial unnamed tributaries. North Fork O'Brien, Hummingbird, Rabbit, and Lynx are named tributaries to lower O'Brien. There are no unnamed perennial tributaries in lower O'Brien. Because of the porous soil conditions runoff readily goes subsurface. There are a series of springs along lower O'Brien that are the result of the upwelling of this subsurface flow.

Historically, North Fork O'Brien flowed into O'Brien Creek near the base of the falls. Decades ago a water right was permitted on the North Fork that allowed it to be wholly diverted into Skinner Lake. Although Skinner Lake is within the O'Brien watershed it does not have regular surface outflow except during extreme high water. Water from Skinner Lake apparently drains through subterranean channels and resurfaces as spring flow adjacent to O'Brien Creek below the falls. This change in the surface hydrologic connectivity from historical conditions probably results in slightly reduced flows in lower O'Brien Creek.

Bankfull width in lower O'Brien is approximately 30 to 35 feet. Flows range from less than 15 cubic feet per second in the late summer to over 120 cubic feet per second during spring runoff. Upper O'Brien's channel morphology is generally a step/pool in the headwaters transitioning to a lower gradient riffle/pool system with shrubs, conifers, and rocks providing bank stability. Lower O'Brien has variable channel morphology due to changes in valley gradient and width. There are fairly confined moderate gradients with riffle/pools, meandering riffle/pools with bar development, and very low meandering glides with silt bottom and banks.

About 15 years ago the State of Montana reconstructed the lowest reach on O'Brien Creek where it enters the Kootenai River to provide low flow access for migrating bull trout. The accumulation of the alluvial deposition at the restoration site was likely the result of reduced Kootenai River high flows due to Libby Dam.

The shrub-dominated riparian area is much more extensive along O'Brien Creek than most other streams in this area. Typically in this area, conifers dominate the riparian area and blowdown contributes large woody debris that creates channel complexity which provides for aquatic habitat. In the shrub dominated reaches along O'Brien Creek the alder growing along the bank creates a different type of channel complexity by bending over the channel where it catches debris at high flow and creates debris jams and diversions. Over the last hundred years larger cedar and larch trees have been targeted for harvest which has reduced that stand component in the riparian areas.

Only 14 percent of O'Brien watershed is non-Federal land, but that ownership includes 80 percent of the main stem channel in lower O'Brien watershed. Most riparian areas on these lands have been partially or full harvested at some point in time, and the larger sizes of trees, snags, and large woody debris are significantly reduced compared to historic conditions. Private land development has resulted in water quality impacts from riparian vegetation removal, permitted water withdrawals, beaver and beaver dam removal, livestock grazing, floodplain development, and road construction.

O'Brien Creek used to be the water source for the city of Troy, and water is still withdrawn for non-potable uses. For a period of time there was a dam and millpond near the mouth of the creek. This infrastructure has mostly been removed and the stream is flowing unrestricted. Based on the State of Montana's records of approved water appropriations, water withdrawals from private landowners could reduce summer base flows by up to 10 to15 percent. The effect of summer withdrawals on stream flows on aquatic habitat would be more pronounced during drier years with lower base flows.

Hummingbird Creek does not have a continuous scour channel connecting to O'Brien Creek and so does not deliver sediment to O'Brien Creek except during the largest floods. Rabbit Creek is connected to O'Brien with perennial flow. It shows evidence of recent flood and debris events, and appears to have been a fairly significant source of sediment over the last 20 years. Lynx Creek is connected to O'Brien and had a major flood event in 1996. In the lower reach of stream, scour and depositional evidence of that flood event is still visible (see project file). However, most of the stream channel above appears to be quite stable, and overall Lynx appears to be a relatively low source of sediment to O'Brien.

O'Brien watershed has areas with deep deposits of compacted glacial till that can be unstable. When this till becomes saturated it can fail by shallow rotational landslides, and if confined in a draw, the sliding material can form a debris torrent. Slope failures have occurred within the last 20 years in Studebaker Draw, on Yaak Mountain, and in the upper watersheds of Hummingbird, Rabbit, and Lynx creeks. The most recent failure was in March 2007 on Yaak Mountain where a road fill slumped below a recently harvested area on private land and became a debris torrent that washed out six road crossings below. Most of the material was deposited in the floodplain and apparently did not reach O'Brien Creek.

About 30 percent of O'Brien watershed has been subject to regeneration harvest since the 1950s. Evidence of intermediate harvest can be found throughout the watershed. Many areas above 5,000 feet that were subject to regeneration harvest are recovering quite slowly and are decades

away from establishing a mature forest cover. Jammer logging on steep ground (short span cable logging using closely spaced excavated side hill roads) occurred in Rabbit and Hummingbird watersheds in the 1960s and resulted in a high density of roads and trails on the hillsides. Numerous road/stream crossings made with buried logs were left in place that have been gradually washing out and delivering roadway sediment to the streams.

In 1994 lightning strikes started two major wildfires (Studebaker and Pulpit) which burned 12 percent of the O'Brien watershed. Fire suppression often results in short-term water quality impacts from fire line construction, water source development, and retardant drops. These impacts have been reduced by the standardization of BMPs for fire suppression. In 1994 there were probably higher levels of impacts than would occur today. The fires were followed by two substantial salvage logging operations. The salvage operations included new road construction and reconstruction followed after harvest by extensive road storage and decommissioning. The road storage and decommissioning work was completed in 2003.

The areas affected by the wildfires included landslide prone soils, and subsequent storm events resulted in both mid-slope and road failures in the burn areas. Rabbit Creek watershed was particularly impacted by debris torrents that scoured several tributaries, delivering considerable sediment to Rabbit and O'Brien creeks. Evidence of bank scour and deposition is quite evident in Rabbit Creek and elevated channel erosion is still occurring.

The 1994 fire areas are in various states of vegetative recovery. The salvaged areas were planted and most of the non-salvaged areas were not. In some areas young trees are dense and growing rapidly. In other areas, especially at high elevations, brush is currently out-competing the conifers. Conifers in the Studebaker fire area are reestablishing faster than in the Pulpit fire area. Water yields remain elevated due to the lack of mature forest, but are within historical ranges given that large wildfires would have periodically occurred over time.

In 2000 several more lightning caused wildfires occurred, burning 4 percent of the watershed. These fires were of lower intensity than the 1994 fires and were not salvaged. Many roads were opened for equipment access and then closed after the fire suppression was completed. Post-fire road closure work included waterbarring, culvert cleaning, and seeding.

Considerable BMP work, storage and decommissioning have been implemented in O'Brien watershed over the last 20 years (see Appendix H, Past BMP Practices in the OLY Project Area). This work included increasing culvert sizes, adding cross drainage to disconnect roads from streams, recontouring unstable fills, removing failed or high risk road/stream crossing structures, and reconstructing stream channels. Monitoring of previously treated roads has found generally stable, low sediment producing conditions. An exception to this condition was found in Rabbit Creek on Roads 1998 and 1998A. At three decommissioned road/stream crossings the road fill had not been completely removed and the streams have continued to down cut or undercut road fill producing chronic sedimentation.

Active road failures or the risk of road failures on closed roads continue to pose a sedimentation risk in some locations including North Fork O'Brien, upper O'Brien, Hummingbird, and Lynx watersheds. The most common problems found were dirt covered log structures that had been placed in the stream channel in lieu of culverts or undersized culverts.

Open roads were also reviewed for sediment sources. Both NFSR 4445 (Lynx Creek) and NFSR 4429 (upper O'Brien Creek) have segments of steep grades with road drainage issues including scour on the road surface, plugged ditches, and deteriorating culverts.

There are two long-term monitoring reaches, one in the upper watershed above the falls, and one located between Rabbit and Lynx Creek confluences in the lower watershed. The dominant channel material is gravel in both reaches. The percent surface fines less than 6 millimeters declined in the upper reach from 15 percent in 2004 to 8 percent in 2009. This decrease in sediment may be a result of the recovery time that has passed since all the activities related to the fire salvage and post-fire road stabilization.

The surface fines in the lower reach were at 8 percent which is considered reference level. The substrate fines measured by Montana Fish Wildlife and Parks over the last 14 years are relatively high compared to a nearby reference stream (West Fork Quartz Creek), but appear to be declining (Dunnigan et al. 2013). The high levels of substrate fines recorded in the late 1990s and early 2000s were likely due to sediment delivery related to the fires, fire salvage, debris torrents, and road work that occurred during that period.

Overall, stream channel conditions in the tributary watersheds are improving with recovery from the fires, harvest, and road activities. The main stem of O'Brien appears to be gradually responding to the decreasing sediment delivery.

Environmental Consequences

Alternative 1 – No Action

The effects of Alternative 1 - No Action provide a baseline from which to compare the action alternatives. The No Action Alternative would not implement any of the OLY proposed activities. No timber harvest, prescribed burning, road reconstruction, road storage, road decommissioning, or stream site rehabilitation would occur. There would be no direct or indirect positive or negative effects to water resources because of the No Action Alternative. With no action the water yield will continue to decline as forest regrowth occurs in the previously harvested units and burned areas. Normal road maintenance activities such as ditch cleaning and culvert replacement would periodically occur. In O'Brien and Kilbrennan watersheds, there would continue to be sediment delivery from the roads proposed for road storage, decommissioning, and BMP work. The five eroding stream sites identified as needing stabilization work would continue to contribute sediment as well.

Alternatives 2, 3, and 4 - Action Alternatives

Summary and Comparison of Action Alternative Activities

The analysis watershed boundaries are shown with the proposed road activities on Map M-4. Alternatives 2 and 3 would have the same effect on the analysis watersheds (Arbo, Kilbrennan, O'Brien, Koot, and China) because the units dropped or modified under Alternative 3 are outside of the analysis watersheds. Under Alternative 4 there is a change in harvest activities in the analysis watersheds. Some units are reduced in size so that they do not exceed 40 acres. The prescribed burning units are the same in all action alternatives.

The same timber sale haul roads are used in all the action alternatives so the effects from the road use and reconstruction work is the same for all action alternatives. Both Forest Service and county roads will be used for haul. However, reconstruction work will only be implemented on Forest Service haul roads. The haul roads and their jurisdictions are shown on Map M-5.

The proposed road storage, road decommissioning work, stream site stabilization, and road reconstruction work not tied to timber sales is the same under all action alternatives except the proposed reconstruction of Road 2380A and decommissioning of 0.3 miles of Road 2380. This work is proposed under Alternatives 2 and 3, but not under Alternative 4. See a complete list of the proposed road work in Chapter 2 in Table 17, Table 18, Table 19, and Table 20.

The recreation site improvement work is the same under all action alternatives. See Chapter 2 for a list of the proposed work.

Project Design Features Common to Action Alternatives

Design features to protect water quality are detailed in Chapter 2 (Table 26). Harvest, burning, and road work activities have been designed to meet the Federal Clean Water Act and Montana State water quality regulations through the implementation of best management practices (BMPs). The objectives of the BMP work are to reduce sediment delivery to streams, reduce surface water runoff concentration by roads, and reduce the risk of mass failures and washouts. The U.S. Forest Service National Core BMPs (USDA FS 2012) will be incorporated into project planning and implementation as the principle mechanism for controlling non-point pollution sources and protecting beneficial uses.

The State of Montana has established BMPs for roads used for commercial timber operations on private, State, and Federal land. The Montana BMP 2012 Monitoring report states that "across all ownerships, BMPs were effective in protecting soil and water resources 99 percent of the time" (Montana DNRC 2012). See Appendix B for a description of the Forest's BMP program and a table listing the applicable BMPs for the proposed timber sale activities. Specific BMPs required for timber sale haul road stream crossings are listed in Chapter 2 (Table 26). Additional BMPs will likely be implemented on the Forest Service haul roads as part of the road reconstruction, but these other items are expected to be minor in terms of effect on water resources.

All project activities will comply with the 2015 Forest Plan standards and guidelines. Perennial and intermittent streams, springs, ponds, wetlands, and landslide prone areas in the timber harvest area are identified and protected by establishing RHCAs around these features. No activities will occur in RHCAs that will retard attainment of riparian management objectives or adversely affect inland native fish (see Fisheries analysis). Harvest units on Yaak Mountain which have the potential to include landslide prone soils were evaluated in the field. Requirements to minimize the risk of project activities leading to slope failures are included in the design features.

Analysis Methods

This effects analysis will consider the direct, indirect, and cumulative effects of the proposed activities. The analysis methods are described under each resource indicator heading.

Limitations and Scientific Uncertainty

Timber harvest, prescribed burning, and road activities have potential effects on water and sediment yield. Project activities that reduce forest cover could increase water yield which in turn could affect stream channel conditions. Project activities could increase or decrease sediment delivery to area streams which could result in increases or decreases in turbidity, fine sediment accumulation, and channel instability.

The effect of management activities on water quality and stream channel conditions is masked by the natural variability of environmental conditions and hydrologic events. Stream channel

conditions are continuously responding to changing riparian conditions, woody debris, sediment supply, and stream flows. In most cases it is not possible to establish a direct link between specific project activities and downstream conditions because of these other variables. This analysis will discuss the expected magnitude of the environmental stressor (water or sediment yield) and the stream sensitivity to that stressor.

Data Sources

Data sources for this analysis are shown in Table 121.

Table 121. Water Resources Analysis Data Sources

Factors	Data Sources
Equivalent Clearcut Area	Harvest history from forest vegetation database, Kootenai Forest ECA model, Forest road data, satellite imagery, Stimson Lumber Company harvest plan, field reviews
Road conditions	2008 decommissioned road surveys, satellite imagery, landtype maps, field reviews, sediment model results (Water Erosion Prediction Project -WEPP)
Mass failure risk	Landtype maps, satellite photos, field reviews
Stream channel sensitivity	PIBO long term monitoring sites (O'Brien and Kilbrennan), 2014 stream monitoring, field reviews

Direct and Indirect Effects on Water Quantity

Methodology and Assumptions

This effects analysis considers whether the ECA increases resulting from the proposed harvest and prescribed burning will affect water yield. The proposed recreation improvement work would have no effect on water yield. The proposed road work would not affect water yield, but would decrease the effect of roads on routing runoff to streams.

Only about one third of the proposed harvest acreage is located within the analysis watersheds (Arbo, Kilbrennan, Koot, China and O'Brien); the remainder of the proposed harvest is located along the Yaak and Kootenai rivers outside of these watersheds and would have no effect on water yield. Only one of the prescribed burn units (F1 in Arbo watershed) is expected to result in a high enough crown removal to potentially affect water yield.

The water yield (runoff from precipitation) of a given watershed changes in response to vegetative conditions. Water yield increases as the evapotranspiration capacity of a forested area decreases because of harvest or other mortality. Timber harvest usually increases water yield, and prescribed burning can increase water yield depending on the degree of tree mortality.

The effect of forest removal on the magnitude of water yield increase in a watershed can be predicted by calculating the equivalent clearcut area (ECA). The ECA is the total area within a drainage that exists in an equivalent clearcut condition for a given year (USDA 1974). Watersheds in an undisturbed condition are assumed to have a zero percent ECA. If forest cover is reduced through timber harvest, wildfire, prescribed fire, or road construction the ECA is increased in proportion to the loss of forest cover. A watershed with a 100 percent loss of forest cover has a 100 percent ECA. The treatments proposed for this project will be variable in terms of the density of the remaining trees. In order to simplify the analysis, regeneration harvest prescriptions will be modeled as clearcuts with 100 percent ECA which means that a 40-acre regeneration unit will

equal 40 ECAs. Intermediate harvest prescriptions will be modeled as 50 percent ECA which means that a 40-acre intermediate harvest unit will equal 20 acres of ECA. This approach may slightly overestimate the magnitude of ECA, and therefore the effect on water yield, however it is sufficient for the accuracy required for this analysis.

Over time as forest regrowth occurs in the harvested or burned areas, ECA decreases in proportion to the rate of new growth. The ECA calculations account for ECA increases due to new harvest or other disturbance, and decreases resulting from ongoing vegetative recovery in past disturbed areas. Roads and private land clearing are considered to be permanent openings. The modeled rate of vegetative recovery and the associated hydrologic response following a reduction in forest cover depends on the site productivity. For simplification purposes, the site productivity is assumed to be moderate in all the treatment areas although the watersheds all support a range of slow to fast growing areas. Full water yield recovery takes 60 to over 100 years depending on the site productivity. However, recovery is not linear and within the first 20 years, water yield increases are reduced on average by 50 percent (USDA 1974).

Grant et al. reviewed, synthesized and compared research results on the effects of timber harvest and roads on stream peak flows and concluded that there was no conclusive evidence of a direct correlation between peak flow changes attributed to forest harvest alone and changes to the physical structure of the streams. Grant et al. also found that cumulative ECA does not appear to produce measurable changes in peak flows until the ECA approaches approximately 19 percent of the watershed area. Where cumulative ECA exceeds 19 percent Grant et al. (2008) found that the 1 to 6 year recurrence interval peak flow events could be affected, but that these smaller flow events generally did not have any effect on channel conditions. As the peak flows got larger the effect of timber harvest on stream flows was not a discernible factor. In addition as the watershed size increases, peak flow effects from ECA are likely to decline because of the desynchronization of the runoff from the increasingly more complex terrain and vegetation conditions.

Other factors such as harvest patch size, type of treatment, number of trees retained on site, extent of riparian buffers, road density, and road/stream connectivity will also influence water yield. These factors will cause variations in effects to peak flow in watersheds with similar ECA values.

Forest roads can interact with harvest units to increase peak flows independent of harvest (Jones and Grant 1996). Roads, skid trails, and ditches conduct storm runoff more quickly to streams, potentially increasing the magnitude, frequency, or duration of peak flows during storms, especially in small watersheds (Wemple et al. 1996). In the most sensitive watersheds roads can double the peak flows for high frequency events (less than the 6-year recurrence interval). How water yield might be exacerbated by roads will be considered qualitatively for each watershed.

Although Grant et al. (2008) found no field studies that explicitly link peak flow increases to changes in channel morphology, they evaluated which stream channel conditions are likely to be vulnerable to flow increases and determined that streams with dominant substrate sizes of gravel or smaller could theoretically be affected by peak flow increases. Generally gravel, sand, and silt bed conditions are found in stream reaches with less than 2 percent gradients. Most stream reaches in the OLY project area are steeper step-pools with cobble/boulder substrate, and although peak flows may slightly affect the transport and deposition of fine sediment, the primary channel structures are probably not vulnerable to changes in peak flows.

Measurement Indicator

The measurement indicator used for assessing water yield effects is:

- Risk of project-related water yield increases causing peak flow increases that result in increased stream channel scour.

Time Span

For the purposes of this analysis all proposed activities are expected to occur within 10 years from the record of decision. The effects of water yield are most pronounced in the first 20 years, although effects can persist for 100 years depending on the extent of crown removal, the effect of roads and skid trails on runoff, and on the rate of vegetative recovery.

Water Yield Effects by Watershed

Table 122 summarizes the main factors used to determine water yield effects by watershed. The potential for effects on the stream channel conditions are discussed by watershed.

Table 122. Factors Influencing Peak Flow Effects on Stream Channels

Watershed	Watershed Size (square mile)	Existing Condition ECA (Percent)	Alt 2/3/4 Increase in ECA (Percent)	Alt 2/3/4 Cumulative ECA (Percent)	Road Influence on Peak Flows	Stream Sensitivity - Reaches With Channel Substrate that is Gravel or Finer	Risk of Alt 2/3/4 Causing Stream Channel Scour
Arbo	7.7	35	1/1/1	36/36/36	Low	No	None
Kilbrennan	8.3	11	4/4/3	15/15/14	Low	Yes	None
Koot	2.7	11	11/11/8	22/22/19	Low	No	Low
China	5.8	43	1/1/1	44/44/44	Low	No	None
O’Brien	48.2	21	2/2/1	23/23/22	Moderate	Yes	Low

Arbo

Arbo has an existing 35 percent ECA due primarily to a 1991 wildfire and is still experiencing elevated water yield as a result of that fire. The combination of the proposed harvest and prescribed burning would increase the ECA in Arbo by percent under all alternatives. However, the increase of 40 acres of ECA resulting from the proposed activities will be offset by the regrowth of trees in the recovering wildfire areas within the following year (estimated to be 47 acres) resulting in a negligible increase in water yield in Arbo. The entire road system in the drainage was decommissioned so roads have almost no influence on stream flow. The cobble channel substrate has low sensitivity to peak flow increases. Field reviews confirmed existing stable channel conditions. The OLY project will have no direct, indirect or cumulative effect on stream flows or channel conditions in Arbo Creek.

Kilbrennan

The cumulative ECA under all alternatives would be below the 19 percent threshold identified in Grant et al. 2008 so no increase in peak flow would be discernible and there would be no effect on stream channel condition from harvest activities. The influence of roads on stream flows in this watershed is low because of a low level water interception by ditches and relatively low precipitation. The OLY project would have no direct or indirect effect to stream channel conditions despite the relative sensitivity of the low gradient sections of stream.

Koot

The predicted cumulative ECA of 22 percent as a result of the OLY project under Alternatives 2 and 3 indicates that there is potential for slight measurable peak flow increases in Koot Creek. The road system in this watershed shows limited hydrologic connectivity so roads are unlikely to further exacerbate this effect. Defined stream channels disappear in the upper watershed where most of the roads are located and NFSR 4445, which contours through the mid-watershed, does not intercept much subsurface flow.

The stream reach selected for monitoring had a coarse gravel substrate which is erodible during higher flows, but overall the stream is a step/pool system which is not sensitive to peak flows. It appears that there could be some minor scouring and deposition of fine sediment in one or more reaches as a result of the proposed harvest under the action alternatives. The influence on peak flow is slightly greater under Alternatives 2 and 3 than under Alternative 4. Under all alternatives the ECA will drop below 19 percent in less than 10 years as vegetative recovery continues in the previously harvested areas of the watershed. The OLY project will result in either no or minor short term effects to stream channel conditions.

China

The existing ECA of 43 percent indicates the watershed is still experiencing elevated water yield as result of the 1994 wildfire. The proposed harvest of 27 acres will result in a one percent increase in ECA under all alternatives. This increase in ECA will be more than offset by the ongoing regrowth in the wildfire area within the following year (estimated to be 38 acres of ECA). The road system in the watershed was extensively treated with road decommissioning and storage work in 1998 after fire salvage activities were completed; therefore the road system would have little effect on peak flows. A field review of the lowest midslope road in the fire area found stable road and channel conditions. The dominant channel substrate in the monitoring reach is cobble indicating a low sensitivity to peak flow increases. The OLY project will not cause stream flow increases or affect channel conditions in the China watershed.

O'Brien

The existing watershed ECA is 21 percent and would increase to 22 to 23 percent under the action alternatives. This level of ECA could theoretically result in detectable peak flow increases although the relatively large watershed size and the dispersed location of the harvest units makes a measurable increase as a result of the project unlikely. The main tributary watersheds of O'Brien Creek are North Fork O'Brien, Studebaker, Hummingbird, Rabbit, and Lynx. None of these watersheds would experience a change in ECA as a result of this project and so there would be no effect on stream flows in these tributary watersheds. The effect of roads on stream flow is low to moderate in the tributaries, and low in the main stem. Because of the low impact of the project on stream flows there is almost no risk of effect to the low gradient fine sediment reaches in O'Brien Creek.

Summary of Direct and Indirect Effects of Water Yield

There would be no effect of project related water yield increases on channel conditions in Arbo, Kilbrennan, or China creeks. There is a low risk of a measurable change in sensitive reaches in Koot Creek, and an even lower risk in O'Brien Creek. The OLY project will not affect overall stream stability, water quality, or beneficial uses.

Direct and Indirect Effects on Water Quality

Methodology and Assumptions

Timber harvest often results in some bare soil exposure and limited soil erosion can occur on steeper slopes in the harvested areas. However, direct sediment delivery to streams is unlikely due to the relatively low erodibility of the soil types in the project area, the BMPs required within the harvest units, and the presence unharvested buffers adjacent to the stream channels (Litschert and McDonald 2009). Adjacent stream channels would be buffered by RHCAs which prevent sediment from reaching streams. Buffer widths range from 100 feet on each side of intermittent streams to 300 feet on each side of fish bearing streams. In RHCAs the presence of surface organic material including litter, vegetation, and down wood gradually eliminates the sediment carrying capacity of overland flow by dispersing, trapping, and absorbing water. Forest BMP monitoring indicates a 95 percent effectiveness rate in implementing harvest unit BMPs (KNF 2011) and research has shown that RHCAs are effective at reducing sediment delivery (USDA 1995).

Roads are the main source of sediment in managed forest watersheds (Brooks et al. 1997). This analysis considers the effects of sediment delivery to streams from roads that will be used, reconstructed, stored, or decommissioned by the proposed project that are within the analysis watersheds. Generally, roads in northwest Montana produce relatively low amounts of sediment from surface erosion (Sugden and Woods 2007). Recent research conducted to validate a sediment model found that much of the effect of roads on sediment delivery is from a small portion the road system. In a study in the Payette River watershed in southern Idaho 90 percent of the sediment delivery occurred from 10 percent of the road length and was routed to streams through 7 percent of the drainage features (Black 2012). The implication of these findings is that addressing the most obvious sediment sources on a given road system will probably eliminate most of the road-related sediment. The required BMP work on the haul roads focuses on these high risk road segments (see Table 26 Design Features). As a result of the implementation of these BMPs sediment delivery related to the timber sale haul is expected to be minimal.
The roads proposed for active storage and decommissioning were identified based on field reviews. Roads were prioritized considering active and potential sediment contribution. Based on the amount of road fill material over the affected culverts it is estimated that an average of 50

cubic yards (CY) of sediment per stream crossing would be prevented by treatment of these roads. In some cases the road/stream crossing structures are actively eroding and in other cases the crossings are at high risk of failing because of inadequate capacity for larger flood events. Considerably more sediment could be delivered if a debris torrent is initiated by a road failure. The timing of the potential sediment delivery is unknown and would likely occur during major storm events. The sediment may be contributed mostly in one flood event or incrementally eroded over a period of decades.

Excessive stream sediment can have an adverse effect on fisheries habitat (Furniss et al. 1991). The most common and widespread effect of road sediment on streams is fine sediment accumulation in low gradient reaches. Sediment can reduce pool capacity which provides habitat for fish. Sediment can cover and infiltrate coarse channel substrate affecting aquatic invertebrate populations and fish spawning habitat. Large quantities of sediment can also reduce channel capacity to accommodate high stream flows which causes bank erosion resulting in additional sediment generation.

The proposed recreation site improvement work would have a negligible effect on sediment delivery because of the minor amount of ground disturbance.

Measurement Indicators

- Estimated quantity of sediment reduced by road storage and decommissioning work (cubic yards per year)

Time Span

The effects of sediment yield are dependent on the magnitude and frequency of hydrologic events. Excessive sediment accumulation can persist in low gradient streams for a couple of decades, and the scouring and depositional effects of a mass failure induced debris torrent can often be observed for many decades after the event.

Sediment Delivery Effects by Project Activity and Watershed

Road Reconstruction and Use Related to Proposed Timber Sales

Forest Service Roads

Under all three action alternatives there would be 45 miles of NFS road used for timber haul (see map M-5). There are seven road/stream crossings on haul roads in the analysis watersheds. These crossings are all on gravel surfaced roads which reduces sediment substantially as compared to unsurfaced roads. Based on field review all but one of these crossings have minimal potential to contribute sediment. The one site where more sediment delivery is likely is where NFSR 4445 crosses O’Brien Creek. The crossing structure is a bridge that is located in a low point of the road grade. Sediment washes down to the bridge from the road approaches on both sides and spills directly into the creek. Correcting this issue will require paving the bridge approaches. It is expected that this will reduce the sediment at this site 1 to 5 cubic yards per year.

National Forest System road 14321 in the Kilbrennan Ridge area is proposed to be rerouted in order to avoid crossing small wetland. The existing road is little more than a skid trail and would be passively decommissioned. The 0.4 miles of new road will be on top of a flat ridge. There are no stream crossings or nearby streams, and there is no risk of sediment delivery. The proposed 0.2 miles of temporary road accessing Units 52 and 54 have no stream crossings and no risk of sediment delivery.

Decommissioning 0.3 miles of NFSR 2380 is proposed under Alternatives 2 and 3. If funding allows, NFSR 2380A will be reconstructed to where it ties into NFSR 2380 and 0.3 miles of NFSR 2380 below that point will be decommissioned. This section of NFSR 2380 is within 50 feet of North Fork O'Brien and it is estimated that decommissioning this road segment will reduce sediment by about 2 to 3 cubic yards per year. Alternative 4 would not include this work and so the effects for Alternative 4 will be same as the No Action, and sediment delivery to North Fork O'Brien Creek would continue to occur from this road segment.

Lincoln County Roads

County Road 176 (Eastside Road) and County Road 2394 (Kilbrennan Lake Road) are gravel surfaced county roads that would be used for timber sale haul, but would not have BMP work implemented for this project because the Forest Service is not authorized to do work on these roads. Haul on the county roads that do not have BMPs will result in minor or no sediment delivery to project area streams. There are five stream crossings on the County roads that would be used for haul. The road crossings on County Road 176 are steep stream gradient reaches and any fine sediment delivered at these crossings will have little effect on these streams other than possible short-term turbidity during rainfall events. The two stream crossings on County Road 2394 in O'Brien Creek watershed are on ephemeral channels that are dry most of the year, and are not likely to deliver sediment to O'Brien Creek. Sediment model results indicate that the timber sale haul will result in less than 1 cubic yard of sediment per year per stream crossing (see project file). This amount of sediment will have no adverse impact on stream conditions and beneficial uses.

Road Reconstruction on Other Project Area Roads

Reconstruction work is proposed on NFSR 4429 (Pulpit Mountain Jeep Road) and NFSR 4445 (Lynx Creek Road) to improve public access and reduce sediment (see map M-4). This work is not related to the timber sale, and timing and funding are uncertain. These two roads are open year around for public motorized access and are located in O'Brien Creek watershed. Both roads were built in the 1950s and have substandard culverts and inadequate road drainage control resulting in road surface erosion. BMP work would reduce sediment delivery. This work is included in all action alternatives.

Road Storage, Decommissioning, and Stream Site Stabilization

The proposed road storage, decommissioning, and stream site stabilization work is described in Chapter 2 and shown on map M-4. In order to minimize disturbance in grizzly bear habitat and provide replacement grizzly bear core area, the watershed improvement work in Lynx (4433, 4433A, 4433B) and upper O'Brien (4429F, 4420A, 4650, 14347, 14349, and stream crossings on 1998 and 1998A) watersheds will be required to be completed before the timber sale begins. This work will be funded and implemented. The road storage work on Yaak Mountain in Kilbrennan watershed must be completed in conjunction with the timber sale work on Yaak Mountain, and the Hummingbird watershed road storage and decommissioning work will most likely be implemented after the timber sale activities are completed. See Table 17, Table 18, and Table 19 in Chapter 2 for a list of roads that will be stored or decommissioned. Most of the road storage and decommissioning activities proposed in the O'Brien watershed is because of higher road failure risks, stream channel sensitivity to sediment, and the presence of bull trout. No work of this type is proposed in Koot or China watersheds.

Table 123 displays the estimated sediment reduction achieved by treating the at-risk stream crossings on the roads proposed for storage and decommissioning, and the four stream stabilization sites. Failed stream crossings and road slumps on closed roads can contribute

substantial sediment. The roads proposed for active storage and decommissioning are those currently contributing sediment to streams and those at risk of future washouts or mass failures. The potential long-term reduction in sediment was calculated based on field information from each road. Short-term sediment delivery would occur temporarily during the implementation of this work primarily as a result of culvert removals (Foltz 2007). Once the reconstructed stream channels are stabilized, the sediment yield would decline from the stored and decommissioned road crossings (Madej 2001).

Table 123. Alternatives 2/3/4 Sediment Reduction from Treated Stream Crossings Road Storage, Decommissioning, and Stream Site Stabilization

Watershed	Watershed Area (square miles)	Road/Stream Crossing and Stream Site Work Required Before Timber Sale		Road/Stream Crossing Work To Be Implemented During or After Timber Sale	
		Alternative 2/3/4 Number of Road/ Stream Crossings Treated	Estimated Sediment Reduced (CY)	Alternative 2/3/4 Number of Road/ Stream Crossings Treated	Estimated Sediment Reduced (CY)
Kilbrennan	8.3	0	0	1	10
O'Brien	48.2	13	635	7	340

CY = cubic yard

The road storage and decommissioning activities are also expected to reduce the risk of mass failures by controlling road drainage and preventing saturation of potentially unstable fill slopes. Although these episodic quantities of sediment are unknown, it is possible that the effect of the road storage and decommissioning activities will be a further decrease in sediment delivery beyond the amounts shown in Table 123.

Work To Be Implemented Prior to the Timber Sale (All Action Alternatives)

Most of the road storage work that is required to be implemented before the timber sale is in upper Lynx Creek. There are numerous road/stream crossings. Three crossings were identified as high priority for treatment: two crossings at the end of NFSR 4433B where the culverts will be removed and crossings recontoured, and one crossing on NFSR 4433 where the culvert will be replaced with a larger capacity culvert in order to provide continued snowmobile access. Several other crossings will be stabilized to reduce the risk of the culverts washing out. These actions will prevent road fill material from being eroded and contributing sediment to the streams. The storage work will include cleaning culverts and catch basins, providing controlled overflow relief for culverts in the event of failures, removing high risk culverts, stabilizing potentially unstable fills, waterbarring, scarifying, and seeding. In addition to preventing failures at the stream crossings, the storage work will reduce the risk of other road-related erosion.

Two short segments of road in upper O'Brien Creek will be required to be decommissioned (4429F, 4420A). The work will include removing existing stream crossing structures and rebuilding stream channels, recontouring unstable slopes, ripping non-recontoured areas, waterbarring, and placing slash and duff on the road way. The effects of this decommissioning work would be primarily to reduce sediment at the two main stream crossings, and improve site productivity on the abandoned segments of road.

There are three stabilization sites on Rabbit Creek (tributary to O'Brien Creek) and one on North Fork O'Brien Creek that are on roads previously decommissioned. These sites are currently active sediment sources. The site stabilization work will involve removing eroding fill material from the partially recontoured crossings.

Work to Be Implemented During or After the Timber Sale

The remainder of the road storage, decommissioning, and stream site stabilization activities are subject to timing restrictions required to protect grizzly bear habitat (see Chapter 2). These activities are not currently funded. The road storage work on Yaak Mountain would occur during the timber sale activities on Yaak Mountain, if funded.

The remainder of the road storage and decommissioning work is in Hummingbird watershed which is tributary to O'Brien Creek. The storage work will include cleaning culverts and catch basins, providing controlled overflow relief for culverts in the event of failures, removing high risk culverts, stabilizing potentially unstable fills, waterbarring, scarifying, and seeding. The decommissioning work will involve removing existing stream crossing structures and rebuilding stream channels, recontouring unstable slopes, ripping non-recontoured areas, waterbarring, and placing slash and duff on the roadway. The effects of the work would be to reduce sediment delivery, reduce runoff concentration by roads, reduce the risk of mass failures and washouts, and on decommissioned roads, improve infiltration and restore native vegetation.

Effect of Harvest on Sediment Delivery Related to Mass Failures

The past slope failures in the project area occurred on steep slopes in compacted glacial till that have a high content of silt/clay material. Proposed Harvest Units 20 and 21 on Yaak Mountain are the only harvest units located in an area where there is potential risk based on soil types and landslide history. Past failures occurred on adjacent corporate timber land that had been clearcut using ground-based equipment on steep slopes. The proposed OLY harvest and burn unit locations in the vicinity were field reviewed for evidence of past slope failures, physical signs of soil movement, and possible road drainage issues. No landslide prone terrain was identified within the units. These units will be skyline harvested which results in less water concentration as compared to ground-based logging, and Harvest Unit 21 will be an intermediate harvest treatment which will decreases the risk of slope failures. Design features for Harvest Unit 20 require excluding steeper slopes that may be susceptible to failure (see Design Features).

An important mitigating factor for sediment delivery from these units is that the intermittent streams that flow through the units do not connect to O'Brien Creek. Runoff goes subsurface and all signs of the scour channels disappear before reaching the main stream. As a result sediment from any slope failures is highly unlikely to reach O'Brien Creek. The units on Yaak Mountain are proposed for harvest under all action alternatives, although Harvest Units 20 and 21 are limited to 40 acres under Alternative 4. There may be a slightly reduced risk under Alternative 4 as opposed to Alternatives 2 and 3 because of less area treated, but it is not expected that implementation of any of the alternatives would result in sediment delivery to O'Brien Creek even if there were mass failures within the units.

The only proposed burn on steep slopes in O'Brien watershed is Fuels Unit F13 in Lynx Creek. The landtype in this location is rocky and not high risk for mass failures. This burn is expected to be of low intensity with pockets of moderate to high intensity. This type of burn will not produce soil and vegetation conditions that could lead to mass failures.

In summary there is a low risk of harvest and prescribed burn related mass failures delivering sediment to O'Brien Creek.

Summary of Direct and Indirect Effects on Sediment Delivery

The OLY project will not result in a measurable change in sediment delivery to Arbo, Koot, and China creeks. It is estimated there would be a 30 CY reduction in sediment contributed to Kilbrennan Creek if the storage work in this watershed is funded. It is estimated there will be a 500 CY reduction in sediment to O'Brien Creek resulting from the road storage and decommissioning work required before the timber sale occurs. There may be an additional reduction 450 CY reduction in sediment to O'Brien Creek if other work, currently unfunded, occurs. The reduction of sediment delivery will contribute to restoring watershed conditions and improving resilience to storm events. There will be virtually no risk of sediment delivery to O'Brien Creek resulting from harvest and burn activities because of implementation of BMPs.

The OLY project would reduce the sediment from roads in the project area through implementation of BMPs on haul roads, implementation of BMPs on other roads open to the public, storage work on roads closed to motorized access, and decommissioning activities on roads no longer needed. Short-term sediment could be increased by work in perennial streams such as culvert replacements and removals. It is expected that any short-term increases would be more than offset by long-term reductions in sediment delivery (Foltz 2007, Madje 2001).

Direct and Indirect Effects of Project Activities on Riparian Conditions

Under Alternatives 2 and 3, 0.3 of a mile of NFSR 2380 would be decommissioned. This road is located immediately adjacent to North Fork O'Brien and will restore approximately 2 acres of riparian habitat. The road surface will be ripped, recontoured and covered with organic material. Trees and other native vegetation will be planted. The direct effect will be to improve infiltration and reduce sediment delivery. The indirect effect will be the gradual reforestation of the riparian area which will provide shade, large woody debris, and riparian habitat. The time horizon is several decades to over 100 years.

No effects to riparian areas or water quality are expected from the proposed timber harvest because of implementation of RHCAs along all streams adjacent to harvest units.

Effects to riparian areas from prescribed fire will be mitigated by not igniting within riparian areas. Burns will be allowed to spread into the riparian areas, but are not expected to do so with enough intensity or extent that would modify overall conditions.

Three recreation improvement projects are proposed in riparian areas. Specific proposals are to pave a trail along Alvord Lake, pave the boat ramp in Kilbrennan Lake, and reconstruct a trail crossing on Prospect Creek. Since these projects are limited to improving existing recreation facilities, the improvements will have negligible new impacts on riparian resources. The other proposed recreation projects will not occur in riparian areas.

Cumulative Effects

Spatial and Temporal Context for Effects Analysis

The cumulative effects area for the hydrologic analysis is limited to the watersheds where effects from timber harvest, prescribed burning, and road work could potentially be discernible. These watersheds are Arbo, Kilbrennan, Koot, China, and O'Brien. There are project activities along land areas that drain through mostly subsurface flow to the Yaak and Kootenai rivers. Water and sediment yield effects from these activities would not affect such large river systems.

The time frame for effects is about 100 years. At high elevations, regenerating forests may take over 100 years to reach their maximum effect on water yield resulting from crown density and tree height. Mass failures that result in debris torrents may affect channel conditions for decades. However, the most significant effects on peak flow increases and sediment delivery generally occur in the first decade following the activity or disturbance.

Short-term sediment delivery from road use, maintenance, reconstruction, storage, and decommissioning activities is expected. Short term is considered to be during the activity, immediately following the activity and during the peak flows occurring in the first 1 to 2 years after the activity. Long-term effects persist or intermittently occur over a period of many years.

Past, Present, and Reasonably Foreseeable Activities Relevant to Cumulative Effects Analysis

Contrasting Effects of Past Actions with the Proposed Actions

Past timber sale practices had adverse effects on watershed condition and water quality. Current practices have a much lower risk of adverse effects. Table 124 compares changes in management practices over the last fifty years.

Table 124 Comparison of Past and Present Timber Sale Practices

Past Practices	Current Practices
New road construction - Between 1950 and 1990 most of the road built in the OLY project area was constructed for timber harvest.	No new permanent road construction is proposed and 1.1 miles of temporary road is proposed.
Use of dozers instead of excavators to build roads and install culverts resulted in sidecast of material into streams.	Excavators are used for any excavation work and can more carefully control placement of soil.
Stream culverts were often undersized for flood events.	New stream culverts are sized for 100-year flood events.
Lack of BMPs during road construction and maintenance to protect water quality resulted in sedimentation during and after road construction.	BMPs are required and included in timber sale and road contracts to reduce sediment delivery at stream crossings and improve road cross drainage so runoff intercepted by roads is more dispersed – see Appendix B for list of timber sale BMPs that will be part of this project.
Lack of BMPs in unit layout and skidding operations – skid trails crossed streams and were located in ephemeral draws; high skid trail densities on steep slopes concentrated water runoff.	BMPs required and included in timber sale and road contracts – see Appendix B for list of timber sale BMPs that will be part of this project.
Minimal protection of riparian areas and stream channels during harvest activities – harvest was allowed to occur to the edge of stream channels and in wetlands.	RHCAs protect riparian functions, channel stability, provide shading, protect sensitive soils, and trap sediment.
Removal of large wood debris from stream channels destabilized channels.	No removal of down wood from streams is allowed and RHCAs will provide future large woody debris recruitment.
Use of dozers to build fire lines that were 8 to10 feet wide – water was channelized down fire lines to road ditches where it carried sediment to streams.	Excavators used to build 2 to 3 foot wide fire lines.

Past Practices	Current Practices
No rehabilitation of excavated skid trails or temporary roads – excavated templates intercepted and channelized runoff.	Recontouring of excavated trails and temporary roads are required by timber sale contract.
Hot broadcast burns slowed vegetative recovery and caused heat damage to soils.	Light-intensity underburns or excavator slash piling minimizes mortality to vegetation and damage to soils.
Dozers were used to pile slash resulting in extensive displaced soil and scarification that increased erosion.	Excavators are used to selective pile slash resulting in minimal compaction and scarification.

As a result of the improved practices outlined above timber harvest activities are unlikely to have adverse effects on stream channel conditions.

Ongoing and Foreseeable Actions

The effects of current and reasonably foreseeable activities in the watershed analysis areas (Arbo, Kilbrennan, O'Brien, Koot, and China) are considered cumulatively with the proposed actions for each action alternative. Table 125 describes the current and reasonably foreseeable actions with the potential to affect water quality.

Table 125. Ongoing and Foreseeable Actions in the OLY Project Area

Ongoing Actions	Description of Watershed Effects
Timber Harvest on Stimson Land	Approximately 183 acres of harvest is planned on Stimson land in the O'Brien watershed between 2015 and 2022. Most of this harvest would be overstory removal or thinning and would not have a measurable effect on water yield. Stimson is required to implement SMZs and BMPs so sediment delivery would be negligible. Riparian zones would be maintained as required by Montana's SMZ law. The harvest proposed by Stimson on Yaak Mountain is not within any of the analysis watersheds. It is on the Kootenai River face. The harvest would be on the northwest side of Yaak Mountain. There are no apparent stream channels at the bottom of the slope of the proposed harvest area. The harvest and road construction would have no effect on water quality.
Road Construction on Yaak Mountain for Stimson Land Harvest	Stimson has proposed new road construction on Yaak Mountain to access timber ground outside of the watershed analysis area for this project. Only 0.1 mile of this road is in the O'Brien Creek watershed. The remainder of the proposed road system is located on face drainage areas to the Kootenai River and not within the analysis watersheds. There are no stream crossings and the road construction location is on stable landtypes. There would be no sediment delivery from this work.
Timber Stand Improvement on National Forest	Precommercial thinning, daylight thinning of western white pine, and post and pole harvest are planned to occur in the project area (see Chapter 3 Introduction). This work will be done by hand and would not effect sediment yield due to the lack of ground disturbance and an indiscernible effect on water yield because of the minor amount of tree canopy change.

Ongoing Actions	Description of Watershed Effects
Fire Suppression	Fire suppression can have short-term negative effects on the watershed due to suppression activities such as fire line construction, development of water sources, opening of revegetated roads for access, and rehabilitation of fire lines and other disturbed areas. Due to the unpredictability of wildfires, the direct, indirect and cumulative impacts of fire suppression on the watershed cannot be quantified and therefore are indiscernible. Fire suppression actions generally do not increase water yield. Fire suppression can have short-term effects on sediment yield. Forest Service fire management guidelines emphasize minimizing resource impacts during suppression and immediate rehabilitation.
Weed Control	Noxious weeds are sprayed annually along District roads in accordance with the 2007 KNF Invasive Plant Management Plan and Decision Notice (USDA 2007). Spraying under the guidelines of this decision minimizes the possibility of adverse effects on aquatic species. No adverse water quality effects are expected with the current weed spraying program, and this action would not cumulatively contribute to the water quality condition of the area streams. Weed spraying would have an indiscernible effect on water quality. Weed spraying has no effect on water or sediment yield.
Grazing	There are no grazing allotments on public lands on the Three Rivers Ranger District.
Communication Facilities	Radio repeaters installed on King Mountain will be maintained. The site is not close to any stream and there would be no effect on water quality.
Minerals	Placer mining claims, commercial mineral permits, and suction dredging operations in Snipetown and Why Not are ongoing in the Yaak River. These activities are outside of the hydrologic analysis area for this project and do not contribute to cumulative effects.
Special Uses	Maintenance of the shooting range will have no direct effect on water quality. However, year around traffic to the shooting range currently adds sediment to O'Brien Creek at the bridge crossing on NFSR 4445. This condition is proposed to be remedied by paving the approaches to the bridge as a part of this project, and the current sediment delivery will be reduced. Water rights – Private landowners have water withdrawal rights on Kilbrennan and O'Brien creeks, and the City of Troy has a water withdrawal right on O'Brien Creek. Withdrawals of unknown amounts of water are made. The water rights are minor on Kilbrennan, but involve substantially more water on O'Brien and decrease summer flows for over half of the main stem length. Water rights and withdrawals are managed by the State. The main water quality effect of decreased flows is warmer summer water temperatures. This effect would be more significant on low runoff years. The magnitude of the effect on stream water temperatures is unknown.
Recreation Activities	Ongoing trail and campground maintenance will occur on NFS lands. Yaak Mountain Lookout will continue to be maintained as a rental facility. These activities will have minimal effect on water or sediment yield. Minor amounts of vegetation or ground disturbing activities may occur with site maintenance, but these are so limited in scope that they would have no measurable effect on water or sediment yield. The development and use of Kilbrennan Camground has localized effects on the riparian condition of Kilbrennan Creek through compaction and vegetation removal.

Ongoing Actions	Description of Watershed Effects
Public Actions on Forest Service Lands	Personal firewood cutting is a common activity in the OLY project area. Since people are cutting down logs or dead trees there is no effect on water yield. Some minor damage occurs to ditches and road surfaces as a result of woodcutting, but overall the effect on sediment yield is not measurable. Due to terrain and vegetation, most vehicles are unable to maneuver off roads and drive cross country. Off-highway vehicle (OHV) use is legally limited to existing trails and open roads (USDA 2005). No measurable soil disturbance and related erosion is expected from OHV use. Therefore, there would be no effect from other public actions on the National Forest with respect to water or sediment yield. Trapping and removal of beaver on public land is managed by the State of Montana and is expected to continue to occur. Continued removal of beaver may prevent the reestablishment of more natural stream channel conditions in Kilbrennan and O'Brien watersheds. (For discsussion of the effects of beaver on stream channels see Physical Setting and Historical Conditions in this section.)
Road Activities – NFS Roads	Road maintenance activities will continue to occur in all the watershed analysis areas. Frequency of maintenance depends on level of use, road design standards, and funding. Road maintenance activities include brushing, blading, graveling roads, applying dust abatement, applying and repairing asphalt, repairing washouts, cleaning catch basins and culverts, replacing and upgrading culverts and bridges, adding drain dips and surface water deflectors, and cleaning ditches. BMPs apply to these activities and permits are required for work in stream channels. As a whole these activities maintain or decrease current rates of sediment delivery. Activities such as ditch cleaning and culvert replacement can generate short-term sediment, but maintenance of a functional drainage system prevents more severe erosion that might occur if the drainage system failed. The foreseeable road maintenance is expected to have no effect on water yield and no measurable effect on sediment yield.
Road Activities – County Roads	County Road 2394 (Kilbrennan Lake Road) has stream crossings and is adjacent to Kilbrennan Creek. Road use and maintenance result in chronic sediment contributions that slightly degrade water quality.
Actions on Private Lands	Within O'Brien watershed, continued development of private land is expected. Development is expected to include commercial timber harvest, land clearing, home construction, septic field installation, water well drilling, water withdrawal, beaver trapping, and livestock grazing. These activities may negatively impact water quality and quantity, but cannot be predicted in any measurable way.
Rocky Pine Prescribed Burning	Rocky Pine Fuels project is not located in the analysis watersheds.

Cumulative Effects Summary by Watershed

Arbo

The cumulative effect of any action alternative of the OLY project, when considered with ongoing and foreseeable actions, would have no effect on Arbo Creek because little activity is proposed in Arbo watershed. The overall high water quality conditions in Arbo Creek are expected to be maintained or slightly improve as the riparian vegetation recovers from the 1991 fire.

Kilbrennan

The cumulative effect of any action alternative of the OLY project, when considered with ongoing and foreseeable actions, would have a neutral effect on Kilbrennan Creek. All action alternatives would have a slight beneficial effect on Kilbrennan Creek by reducing sediment from three road/stream crossings if road storage work is funded. This benefit of the OLY project would be offset by the ongoing and foreseeable activities that potentially affect water quality and riparian conditions in Kilbrennan watershed (Kilbrennan campground use, county road use and

maintenance, and beaver trapping) that may continue to negatively affect water quality. The cumulative effect of the OLY project would be to maintain current conditions.

Koot

The cumulative effect of Alternatives 2 and 3, when considered with ongoing and foreseeable actions, would pose a slight risk of short-term channel scour due to water yield increases. Alternative 4 would pose no risk due to decreased harvest levels. There are no other ongoing and foreseeable actions that would cumulatively affect Koot Creek. Water quality conditions are fair in Kilbrennan Creek and are expected to remain so for the foreseeable future. The current scoured channel conditions and streamflow intermittency is likely natural. Overall, the cumulative effect of the OLY project would be to maintain current conditions.

China

The cumulative effect of any action alternative of the OLY project, when considered with ongoing and foreseeable actions, would have virtually no effect on China Creek because little activity is proposed in China watershed. There are no ongoing and foreseeable actions that would cumulatively affect China Creek. Water quality conditions are fair in China Creek and are expected to improve with ongoing riparian vegetation recovery from the 1994 wildfire.

O’Brien

The cumulative effect of any action alternative of the OLY project, when considered with ongoing and foreseeable actions, would improve water quality conditions in O’Brien Creek. The proposed timber harvest and fuels treatments would have a negligible effect on watershed quality. All the action alternatives would have a beneficial effect by reducing sediment delivery from road/stream crossings through the implementation of BMP work, road storage, road decommissioning, and stream site stabilization work. About half of the proposed watershed improvement work would be required and implemented in 2016. Required timber sale BMP work on NFSR 4445 would reduce sediment delivery to O’Brien Creek. Natural recovery from the 1994 and 2000 wildfires will also continue to contribute to improving conditions as revegetation improves riparian conditions and increases slope stability.

After the timber harvest is completed additional road storage and decommissioning would occur, if funded, in Hummingbird watershed which is tributary to lower O’Brien Creek. Sediment delivery would be reduced and riparian conditions improved if NFSR 2380 along North Fork O’Brien Creek is decommissioned. Other potential non-timber sale related BMP work would improve drainage and sediment delivery conditions in upper O’Brien Creek on NFSR 4429 and in Lynx Creek on NFSR 4445.

The other ongoing and foreseeable actions that may adversely affect O’Brien Creek are permitted water withdrawals, private land development, and ongoing removal of beaver on private and Federal land. These actions are not expected to negate the trend of gradual overall improvement.

Regulatory Framework Findings

Consistency with the 2015 Forest Plan

The proposed OLY project is consistent with the 2015 Forest Plan with respect to protection of water resources. It would either contribute positively or be neutral with respect to goals, objectives, and desired conditions. And all project activities have been designed in accordance with standards and guidelines.

Goals

GOAL-WTR-01. Maintain or improve watershed conditions in order to provide water quality, water quantity, and stream channel conditions that support ecological functions and beneficial uses.

The vegetation management activities of the OLY project will be implemented so as to maintain water quality, water quantity, and stream channel conditions. The OLY watershed restoration work will improve water quality and stream channel conditions. Overall, the OLY project will contribute positively to this goal.

Objectives

FW-OBJ-WTR-01. Over the life of the Plan, trend at least 15 percent of subwatersheds toward an improved watershed condition. Improvements in these watersheds may include passive or active restoration efforts, depending on opportunities and/or funding.

The OLY project will actively trend subwatersheds in a positive direction by addressing road conditions that are adversely affecting streams through sediment delivery. The proposed road storage, road decommissioning, and stabilization of road/stream crossing sites will reduce sediment delivery to Kilbrennan and O'Brien creeks. Therefore, the OLY project contributes to the attainment of this objective. See Road Storage, Decommissioning, and Stream Site Stabilization discussion in the Direct and Indirect Effects section.

Desired Conditions

FW-DC-WTR-01. Watersheds and associated aquatic ecosystems retain their inherent resilience to respond and adjust to disturbance without long-term, adverse changes to their physical or biological integrity.

The implementation of the OLY project will maintain intact riparian areas and riparian function which protect aquatic habitat resiliency by implementing the 2015 Forest Plan riparian standards and guidelines. Roads can affect watershed resiliency by contributing sediment and increasing peak flows. As a result of the OLY project improvements to road conditions will be made through BMP work, road storage, road decommissioning, and stream site rehabilitation that will reduce road-related hydrologic and sediment effects. This will improve the resilience of the affected aquatic ecosystems to hydrologic events and contribute toward this desired condition.

FW-DC-WTR-02. Water quality meets applicable state water quality standards and fully supports beneficial uses. Flow conditions in watersheds, streams, lakes, springs, wetlands, and groundwater aquifers fully support beneficial uses, and meet the ecological needs of native and desirable non-native aquatic species and maintain the physical integrity of their habitats.

Water quality meets applicable State standards; however sediment conditions in some reaches in Kilbrennan and O'Brien creeks are not optimal for fisheries. Although much of this sediment is likely due to natural factors, roads are known to contribute sediment in these watersheds. The OLY project will protect and improve water quality in Kilbrennan and O'Brien creeks by reducing the sediment contributed by roads through road BMP, storage, and decommissioning work and contribute toward attaining this desired condition.

FW-DC-WTR-03. Stream flows provide for channel and floodplain dimensions that mimic reference conditions. Stream flows allow for water and sediment conveyance and overall channel maintenance. Sediment deposits from over-bank floods allow floodplain development and the propagation of flood-dependent riparian plant species. Surface and groundwater flows recharge riparian aquifers, provide late-season stream flows, cold water temperatures, and sustain the function of surface and subsurface aquatic ecosystems.

Flow conditions are within natural ranges in Arbo, Kilbrennan, Koot, and China watersheds. Flow conditions are modestly altered in O'Brien due to permitted water withdrawals and diversions, and there may be reduced low flows in the summer as a result of these withdrawals. Vegetative treatment proposed for the OLY project will have little or no effect on flows and therefore the project is neutral with respect to this desired condition.

FW-DC-RIP-02. Riparian and aquatic ecosystems, including stream channel integrity, channel processes, and sediment regimes function characteristically for a given landscape and climatic setting.

O'Brien and Kilbrennan creeks do not appear to function characteristically for the landscape conditions because of the impairment of riparian conditions along some reaches. Riparian harvest, loss of beaver pond complexes, spread of weeds, private land development, and roads in some riparian areas are adversely impacting riparian function. Riparian areas in Arbo, Koot, and China are functioning more characteristically, although there are areas in the watershed affected by past riparian harvest and road construction. The OLY project contributes to attainment of this desired condition by reducing road-related sediment sources, reconstructing stream channels, and restoring riparian areas on decommissioned roads.

FW-DC-RIP-03. Water quality provides stable and productive riparian and aquatic ecosystems. Streams and lakes are free of chemical contaminants and do not contain excess nutrients. Sediment levels are within reference conditions, supporting salmonid spawning and rearing, and cold water biota requirements.

Water quality is not regularly monitored, but streams and lakes in the project area show no evidence of chemical contamination or excess nutrients. The OLY project contributes to progress toward the desired sediment condition by decreasing sediment contributed by roads to Kilbrennan and lower O'Brien creeks where sediment levels in spawning substrate are higher than optimal for salmonids.

MA6-DC-WTR-01. Watershed and vegetative restoration is achieved predominantly through restoration activities but also through natural ecological processes.

Undesirable vegetative conditions in the analysis watersheds are being actively addressed through harvest and prescribed burns. Water quality restoration is being addressed through active road treatments. Ninety-nine miles of road have already been decommissioned in the project area and an additional 4.5 miles are planned with the OLY project. Natural processes contributing to watershed restoration include growth of trees in previously harvested riparian areas, revegetation of previously decommissioned roads and recovery of stream channels that had been adversely affected by roads that are now stabilized. The OLY project is consistent with this direction.

MA6-DC-WTR-02. Restoration activities in MA6 are designed to: improve watershed and aquatic resource conditions, improve vegetation conditions, reduce fuels, improve wildlife habitat, or for other resource objectives.

OLY watershed restoration activities are designed to improve watershed and aquatic resource conditions and are consistent with this direction.

Standards

There are no applicable Forest Plan standards for watershed.

Guidelines

FW-GDL-WTR-02. In order to avoid future risks to watershed condition, ensure hydrologic stability when decommissioning or storing roads or trails.

The OLY project was designed in accordance with this guideline. Roads that would be stored or decommissioned for this project were reviewed. Roads were found to have hydrologic risks were designated as needing active work and will be treated with on-the-ground work before closure. Roads found not to pose a risk will be stored or decommissioned without treatment which is designated as passive storage or decommissioning.

FW-GDL-WTR-03. Project-specific best management practices (BMPs) will be incorporated in all land use and project plans as a principle mechanism for controlling non-point pollution sources, meet soil and water goals, and protect beneficial uses. To the extent practicable, ditch and road surface runoff should be disconnected from streams and other water bodies.

The OLY project was designed in accordance with this guideline. BMPs on timber sale haul roads that will be implemented with OLY in order to disconnect roads from steams are identified in Chapter 2 (Table 26). Road storage and decommissioning work will disconnect the roads from the streams through waterbarring or recontouring. As funding permits, road reconstruction work on NFSRs 4429 and 4445 will also implement BMPs to disconnect these roads from streams.

Climate Change

There will likely be effects of future climate change on the watershed hydrology of the project area, but the specific effects are not known. Changes in precipitation timing, location, and magnitude, and changes in the temperature regime will likely interact to affect the entire hydrological system. Consequences could include changes in flood characteristics and timing, lower summer stream flows and warmer water temperatures. The proposed project is consistent with the 2015 Forest Plan objectives which include maintaining and improving healthy stream and watershed functions in order to increase the resilience to environmental stressors related to climate change. Several of the vegetative and aquatic Forest Plan Desired Conditions address this issue. In particular **FW-DC-WTR-01** states: “Watersheds and associated aquatic ecosystems retain their inherent resilience to respond and adjust to disturbance without long-term, adverse changes to their physical or biological integrity.”

Consistency with Federal and State Laws

Federal Clean Water Act and Montana Water Quality Act

All alternatives of the OLY project comply with the Clean Water Act and the Montana Water Quality Act by maintaining or improving stream water quality and protecting beneficial uses in the project area streams.

No long-term increases in sediment or suspended sediment would occur above naturally occurring concentrations because all reasonable land, soil, and water conservation practices would be applied. This expectation is based on implementation of the following conservation practices: a water yield analysis has been conducted and demonstrates that peak flow increases would not affect channel stability; the protection of riparian areas through the designation of RHCAs and SMZs; the application of BMPs to all proposed timber harvest, road reconstruction, and prescribed burning activities; evidence from Forest monitoring results that the BMPs are effective; and the conclusion that the effects of BMP improvements to roads will reduce existing water and sediment contributions from the road network. If funded, road storage and decommissioning activities will further reduce both existing and potential sediment contributions.

The State of Montana has found consistent application and effectiveness of BMPS on all ownerships including Federal land (Montana DNRC 2012). The 2011 data summary for the KNF internal forest BMP reviews conducted from 1991 to 2011 shows that 97 percent of activities evaluated had appropriate BMPs implemented, and 95percent of those activities were effective (KNF 2011). BMPs that apply to timber sales are listed in Appendix B. These BMPs would be translated into required activities through the timber sale contract. BMP implementation would be monitored to ensure proper implementation. Project specific BMPs for haul roads are listed in Chapter 2 (Table 26). The results of BMP monitoring would be evaluated during BMP monitoring field trips conducted by the district and the forest. The monitoring plan for this project is outlined in Appendix G. The results of BMP monitoring for this project will be used to design future projects.

The proposed project would comply with the Montana Stream Management Zone Law and Rules. Stream management zones have been identified in or adjacent to the proposed units. These zones would be subject to all restrictions required by law. Assessing compliance with the SMZ law is an integral part of BMP monitoring.

Executive Orders

The OLY project would comply with Executive Order 11990 that requires that Federal agencies protect wetlands. On the Kootenai National Forest wetlands are protected through implementation of RHCAs as required by the Forest Plan. No timber harvest, road construction, or prescribed burn activities would occur in wetlands, including perennial seeps and springs. No prescribed fire would be ignited in wetlands although low intensity fire may be allowed to burn into adjacent small wetlands. Due to the expected low intensity of any burning no adverse effects are expected on the wetland communities.

The OLY project would comply with Executive Order 11988 by designating all floodplains as RHCAs and requiring that any management activities meet riparian goals and objectives which include protecting the stream channel stability, native riparian plant community, potential large woody debris recruitment, and thermal shade. No proposed activities are within active floodplains.

Other Relevant Mandatory Disclosures

Federal Permits, Licenses, or Other Entitlements

No Federal permits would be needed for this project. Section 404 of the Clean Water Act authorizes the Secretary of the Army to issue permits for the discharge of dredged or fill material into wetland. Silvicultural activities are exempt from the 404 permit process, as are associated road construction and maintenance that adhere to BMPs (CFR-Title 33-Part 323.4). Culvert replacements in live streams would require state permits (Montana Stream Protection Act 124 and 318 Authorization for Short-Term Water Quality Standard for Turbidity Related to Construction Activity). All required permits, including ones that are unforeseen at this time, would be obtained prior to implementation.

Short-term Uses and Long-term Productivity

Project related activities may increase short-term sediment delivery at stream crossings. However, as discussed in the effects analysis, a slight beneficial effect in water quality and stream channel conditions is expected from project road maintenance, storage, and decommissioning activities. Long-term aquatic ecosystem productivity will not be impaired by the OLY project.

Unavoidable Adverse Effects

Short-term sediment delivery would occur at some road/stream sites due to road improvement and watershed restoration work because some of the work will disturb short distances of stream channels. Fine sediment from the construction sites will be transported by these streams during the first peak runoff periods after completion of the work. Sediment will be reduced by implementing BMPs including restricting work activity to summer and early fall, performing instream work as quickly as possible, and stabilizing disturbed adjacent areas after completion of the work.

Irreversible and Irretrievable Commitments of Resources

There are no irreversible and irretrievable commitments of water resources that would occur as a result of this project.

Required Monitoring

Implementation of BMPs, RHCAs, and other project design features will be monitored during and after project activities (see Monitoring Plan Appendix G).

Summary of Environmental Effects

None of the alternatives would result in adverse effects to water resources from proposed timber harvest and prescribed burning activities. There would be a small increase in peak flow in Koot Creek with Alternatives 2 and 3, but overall stream channel conditions would not be affected. There would be continued sediment contributions from Forest Service haul roads under the No Action Alternative that would otherwise be decreased with all the action alternatives. Required BMP work would minimize sediment delivery from timber sale activities and contribute to long-term sediment reduction in the affected watersheds. Some road storage, road decommissioning, and stream site stabilization work would be required as part of the timber sale project and would benefit O’Brien Creek. Additional road storage, road decommissioning, and BMP work that would occur as funding becomes available, would also benefit O’Brien and Kilbrennan creeks by reducing sediment.

With regard to effects to water resources the action alternatives are similar. The major difference being that Alternative 2 and 3 would implement 2 acres of riparian restoration that Alternative 4 would not. Otherwise the alternatives implement the same road-related watershed improvement work and would realize the same benefit in reduction of road-related sediment.

Water resources and associated beneficial uses would be adequately protected under all alternatives in accordance with the regulatory framework. Stream channel conditions and water quality is expected to be maintained in Arbo, Koot, and China creeks, and improved in Kilbrennan and O'Brien creeks under all action alternatives.

Wildlife

Introduction

The Kootenai National Forest (KNF) provides habitat for over 300 different species of wildlife (USFS 2003) which is one of several natural resources that the Forest manages for. The National Forest Management Act (NFMA) specifies that the National Forest System be managed to provide for a diversity of plant and animal communities to meet overall multiple-use objectives. The "specific land area" (scale) for providing diversity is established in the framework as the area covered by a Forest Plan. One of the 2015 Forest Plan goals is that "The KNF manages wildlife habitat through a variety of methods (e.g., vegetation alteration, prescribed burning, noxious weed treatments, etc.) to promote the diversity of species and communities and to contribute toward the recovery of threatened and endangered terrestrial wildlife species" (GOAL-WL-01). This means that the Forest manages for a wide diversity of vegetation, structure and age classes, as well as specialized habitat required by some wildlife species. Therefore, vegetation management treatments designed to trend vegetation towards the desired conditions defined within the 2015 Forest Plan, such as those proposed by the Lower Yaak, Sheep, O'Brien (OLY) project, would provide a diversity of habitat conditions for the numerous wildlife species that inhabit the Forest. The OLY project's preferred alternative, Alternative 3, proposes approximately 3,069 acres of harvest and 1,744 acres of non-harvest fuels treatments, including about 1,616 acres of burn only treatments, which would contribute to Forestwide objectives for wildlife (FW-OBJ-WL-01 and FW-OBJ-WL-03). See the vegetation section for additional analysis related to progress toward achieving 2015 Forest Plan desired conditions.

Many of these 300 species of wildlife occur within the Three Rivers Ranger District and the OLY project area. The presence or absence of these wildlife species depends in part on the amount, distribution and quality of habitat used by each species. In addition to habitat changes, a number of these species are impacted by hunting or trapping. The Montana Department of Fish, Wildlife & Parks (MFWP) regulates game animal populations through hunting permits and seasons. The Forest Service and the MFWP work together to ensure that an appropriate balance is maintained between habitat capability and population numbers. The Forest Service also works closely with the U.S. Fish and Wildlife Service (USFWS) to assist in the recovery of animals listed under the Endangered Species Act (ESA). Proposed federal projects which have the potential to impact species protected by the ESA require consultation with the USFWS.

For the purpose of this Environmental Impact Statement, a number of wildlife species were selected for detailed analysis. The species chosen includes three groups: 1) threatened, endangered, and proposed species that may be present on the KNF as determined by the USFWS, 2) sensitive species which are designated by the Regional Forester, and 3) other species/habitat of interest. Species that would not be affected by any of the action alternatives have been reviewed, but not discussed in detail.

The wildlife analyses include direct, indirect, and cumulative effects of the proposed alternatives. Cumulative effects include past actions with ongoing effects (existing baseline) and effects of ongoing and reasonably foreseeable actions that are cumulative with the effects of the proposed alternatives." Please refer to Chapter 3, Table 32, Table 33 and Table 34 and Appendix F for information on past actions as well as ongoing and reasonably foreseeable actions that have or will occur in this area.

Threatened, Endangered, and Proposed Species

Introduction

Federally listed endangered species are those species in danger of extinction throughout all or a significant portion of its range and currently none are found on the KNF. Threatened species are those species which are likely to become an endangered species within the foreseeable future and include grizzly bear and Canada lynx. Also found on the KNF is designated lynx critical habitat. Proposed species are those proposed in the Federal Register to be listed under section 4 of the ESA; currently, there are no proposed species on the Forest.

Regulatory Framework

The ESA of 1973 declares that all Federal agencies … " utilize their authorities in furtherance of the purposes of this Act by carrying out programs for the conservation of endangered species and threatened species listed pursuant to section 4 of this Act." Under provisions of the ESA, federal agencies shall use their authorities to carry out programs for the conservation of listed species, insuring any action authorized, funded, or implemented by the agency is not likely to: 1) jeopardize the continued existence of any threatened, endangered, or proposed species or 2) result in the destruction of or adverse modification of critical habitat (16 USC 1536).

The National Forest Management Act (NFMA) directs the Forest Service to "provide for diversity of plant and animal communities based on the suitability and capability of the specific land area in order to meet overall multiple-use objectives."

This Environmental Impact Statement analyzes the potential effects of the proposed management treatments on all threatened and endangered species known or suspected to occur in the proposed action influence area (Table 126). The species list comes from the USFWS Montana Ecological Services Field Office website, www.fws.gov/montanafieldoffice/Endangered_Species/Listed_Species/Forests/Kootenai_sp_list.pdf, which is current as of May 2016.

Table 126. Threatened, Endangered, and Proposed Terrestrial Wildlife Species in the OLY Project Area

Species	Determination*	Comments
Grizzly Bear (*Ursus arctos horribilis*) Threatened	MALAA	Grizzly bears and their home ranges are documented within the project area.
Canada Lynx (*Lynx canadensis*) Threatened	MANLAA	Lynx presence documented within the project area.
Canada Lynx Critical Habitat	MANLAA	The analysis area is located in designated critical habitat within Northern Rocky Mountains Critical Habitat Unit #3.
North American Wolverine (*Gulo gulo luscus*) Proposed	NLJ	Observations of individuals within the project area and suitable habitat is available.

* Determination Key: MALAA = May Affect, Likely to Adversely Affect and MANLAA = May Affect, Not Likely to Adversely Affect; and NLJ = Not Likely to Jeopardize.

Grizzly Bear

Introduction

Grizzly bears are considered a generalist species in that they can and will use a variety of habitat types and seral conditions. Use of these habitats is generally dictated by food availability and distribution, as well as security from human disturbance and human-caused mortality. The availability of secure habitat is primarily influenced by motorized access management which, if not managed or mitigated, can negatively impact habitat use and increase the potential for grizzly bear mortality through human-grizzly interactions and the introduction of attractants. Therefore access management, as proposed or associated with other proposed activities, is a focus of the grizzly bear analysis. Because vegetation management alters the availability and location of forage and cover, this activity and its impacts to grizzly bear use of the project area is also discussed in detail. Due to the generalist nature of grizzly bears, most proposed activities have the potential to impact grizzly bears and/or their use of habitat and are discussed.

Analysis of this resource is directly related to the project Purpose and Need to "Provide forage opportunities while maintaining wildlife security . . . through access management."

Summary of Conclusions

The OLY project's proposed activities would move treated stands towards resilient vegetative conditions more characteristic of the area which includes improved availability and productivity of forage species. Design features would be implemented to protect important spring habitat and to reduce the level of activity occurring within an area at any one time. To reduce the risk of mortality associated with open roads, all barriered or restricted roads opened for harvest and watershed improvement activities would remain closed to public motorized travel. Also, large blocks of Core habitat are available within Bear Management Unit (BMU) 10 and would remain available for bears should they be temporarily displaced during activities. There would be minor 1 to 2 percent temporary changes to habitat parameter levels during project activities that would return to the existing condition post-project in the BMU. Proposed activities for all alternatives have been designed to be compliant with the 2015 Forest Plan grizzly bear access management direction. However, because forest management and watershed improvement work would occur in areas currently providing Core, they may result in adverse effects to grizzly bears. Therefore, implementation of any of the OLY project's action alternatives would result in determinations of **may affect, is likely to adversely affect** grizzly bears consistent with effects anticipated under the 2011 Access Amendment (USFS 2011a, b).

Regulatory Framework

2015 Forest Plan

The 2015 Forest Plan provides overall guidance for the management of the lands on the KNF. It describes the goals, desired conditions, and objectives toward which the management of the land should be directed. And it establishes standards and guidelines to help achieve or maintain the desired condition or conditions, to avoid or mitigate undesirable effects, or to meet applicable legal requirements.

The plan components which provide specific grizzly bear resource direction relevant to this project include:

Forestwide Direction

- FW-DC-WL-04
- FW-STD-WL-02
- FW-STD-WL-05
- FW-GDL-WL-01
- FW-GDL-WL-15

There are several other Forest Plan components that provide resource direction for a range of wildlife species or habitat conditions that are not specific to grizzly bears, but still are applicable to grizzly bear management. The full list of the plan components applicable to grizzly bear management are found in the "Regulatory Framework Findings" section of this analysis.

Grizzly Bear Habitat Analysis Framework

The following analysis addresses potential key stressors (risks and threats) and their effects to grizzly bears. These are activities that might impact grizzly bears if not managed or mitigated and some are outside of Forest Service control, such as activities that occur on adjacent private lands. The wildlife specialist report for the 2015 Forest Plan identifies five potential key stressors under Forest Service control: attractants, road impacts, motorized over-snow vehicle use after spring emergence, livestock/grizzly bear interaction, and major ground disturbing activities (mining) (Anderson 2014). Only those key stressors applicable to the existing condition of the project area and/or the proposed actions will be discussed. Also addressed are 2015 Forest Plan desired conditions, objectives, standards, and guidelines applicable to grizzly bears that would be used to achieve the goal to "manage(s) wildlife habitat through a variety of methods . . . to promote the diversity of species and communities and to contribute toward the recovery of threatened and endangered terrestrial wildlife species" (GOAL-WL-01). For grizzly bears, these elements of the 2015 Forest Plan have been grouped into the following categories: "Managing Habitat to Contribute to Grizzly Bear Recovery," "Application of Interagency Grizzly Bear Guidelines," and "Reduction of Human/Bear Conflicts and Potential Bear Mortality." The focus of the grizzly bear analysis is based on access management direction for Core habitat, open motorized route density (OMRD), and total motorized route density (TMRD) included in the 2015 Forest Plan (FW-WL-STD-02).

Interagency grizzly bear management guidelines (IGBC 1986) have been incorporated into the 2015 Forest Plan (FW-GDL-WL-15). All of the lands within the Recovery Zone on the Three Rivers Ranger District have been delineated into one of two management situations: MS-1 and MS-3. MS-1 lands are those areas managed for grizzly bear habitat maintenance, improvement, and minimization of grizzly-human conflict. Management decisions will favor the needs of the grizzly bear when grizzly habitat and other land use values compete. MS-3 lands include private lands, campgrounds or other lands where grizzly bear presence and factors contributing to their presence will be actively discouraged. Guidelines regarding maintenance and improvement of habitat, minimization of grizzly-human conflict potential, and resolution of human-grizzly conflict are provided for each management situation (e.g. Timber and Fire Management).

Effects analysis for the OLY project considers the potential key stressors, compliance with management direction, and best available science. In addition, potential effects from agency implemented or permitted activities (e.g., disturbance effects from timber harvest) will be addressed.

Resource Indicators and Measures

For the grizzly bear analysis, the habitat parameters of Core, OMRD, and TMRD (FW-STD-WL-02) will be the resource indicators for measuring change to security habitat and road densities from proposed changes in access management and other project road use. There are two measures of effects (i.e., resource indicators in Table 127) for the habitat parameter of Core (changes in percent and acres) with a single measure of effect for OMRD and TMRD (change in percent). For all three habitat parameters, the resource indicators and change in the measure of effects are used to compare alternatives as well as comparison against FW-STD-WL-02. A fifth resource measure is the potential increase in foraging opportunities provided by proposed vegetation management. The overall assessment of grizzly bear habitat also considers other activities or conditions that can affect the suitability and use of the analysis area for daily and annual requirements (e.g., forage and cover, movement, denning habitat) and the potential for mortality.

Table 127. Resource Indicators and Measures for Assessing Effects

Resource Element	Resource Indicator	Measure	Used to Address: P/N, or Key Issue?	Source
Core Habitat	Changes in the percent Core Habitat in the BMU	Percent Core Habitat	Purpose and Need	2015 Forest Plan FW-STD-WL-02
Core Habitat	Changes in the acres of Core Habitat in the BMU	Acres Core Habitat	Purpose and Need	2015 Forest Plan FW-STD-WL-02
OMRD	Changes in the percent OMRD in the BMU	Percent OMRD	Purpose and Need	2015 Forest Plan FW-STD-WL-02
TMRD	Changes in the percent TMRD in the BMU	Percent TMRD	Purpose and Need	2015 Forest Plan FW-STD-WL-02
Increased Foraging Opportunities	Changes to early successional habitat or the maintenance of open forest conditions resulting from timber harvest and fuels treatments	Acres treated that result in open forest conditions or early seral habitats	Purpose and Need	2015 Forest Plan FW-DC-WL-19

Methodology

Habitat parameters and acres were calculated using geographic information system (GIS) applications using project area, BMU, proposed unit, and road information. Activity unit acres and road lengths are in decimal format. Therefore, there may be slight differences in acres or mile totals as presented in the following analysis than elsewhere in the document (e.g., project description) depending on when rounding of the decimals took place (e.g., rounding each individual unit before summing or totaling all acres then rounding). Also, because vegetation management treatment acres are separated by whether they would occur within the BMU or Troy Polygon[5] the totals presented for each area will not match the overall totals for each alternative as provided in Chapter 2.

[5] See the "Spatial and Temporal Context for Effects Analysis" below for a description of the Troy Polygon.

Data Sources

Grizzly bear population ecology, biology, habitat description and relationships identified by research are described in the Grizzly Bear Recovery Plan (USFWS 1993), the annual progress reports for the Cabinet-Yaak grizzly bear research (Kasworm et al. 2014), and Kasworm and Manley (1988). That information is incorporated by reference. Grizzly bear occurrence data comes from recent District wildlife observation records, Natural Resource Information System (NRIS) wildlife database, and other agencies (MFWP, Montana Natural Heritage Program [MNHP], and USFWS).

Assumptions and Limitations

There are no assumptions or limitations associated with this resource analysis.

Affected Environment

Spatial and Temporal Context for Effects Analysis

The proposed project is in the Cabinet-Yaak Grizzly Bear Recovery Zone (USFWS 1993). The Cabinet-Yaak Ecosystem (CYE) is large and diverse, meaning that grizzly bear habitat and use in one part of the ecosystem may not be reflected throughout the whole ecosystem. Breaking the ecosystem down into smaller units, i.e. by BMU, allows for analysis to consider effects associated with the activity's area of influence so that potential effects would not be minimized by considering too large an area (IGBC 1990). The BMUs are biologically meaningful to grizzly bears in that they 1) are based on the average size of a female bear's home range, 2) provide seasonal and elevational movement in response to needs (e.g. food and denning habitat), and 3) provide contiguous, unobstructed habitat allowing for displacement (i.e. Core) (Christensen and Madel 1982, IGBC 1990). Delineating BMU boundaries using topographical features establishes a recognizable unit for management consistency, allowing for identification of management needs or concerns, activity planning, scheduling, coordination, and monitoring (ibid) within and among adjacent ranger districts and forests.

Christensen and Madel (1982), in Cumulative Effects Analysis Process chose a 515,000 acre cumulative effects analysis area which represented 56 percent of the Cabinet-Yaak Recovery Zone and was the focal point of mineral exploration and development on the KNF. In this analysis, it was assumed that if each smaller bear unit within that analysis area is maintained in a viable condition then the total of all bear units would remain a viable habitat. Based on that well established premise, the BMU has been consistently identified as the analysis area for analyzing and monitoring effects to the grizzly bear (e.g., in IGBC 1994, McMaster 1995, and IGBC 1998). Individual projects proposed on the KNF include activities to maintain or improve conditions in affected BMUs and move towards compliance with current standards where needed. Progress on this effort is documented by the KNF by BMU in the annual Forest Plan "Monitoring and Evaluation Reports" (e.g., USFS 2014a).

Most of the project area and proposed activities are located within the CYE and includes a portion of BMU 10 (see Bear Management Unit map, M-19 in the Map section). This BMU has known bear occupancy. In general, most human use within the BMU can be characterized by timber harvest activities and dispersed recreation over a network of roads and trails with most use concentrated along open roads. There has been a consistent but not overwhelming human presence in these areas. Human use in the southwestern portion of the BMU is influenced by its low elevation condition, close proximity to Troy, Montana and Highway 2, private property and

homes, recreational sites, and access to these sites. Most timber harvest activities would occur within lower elevation habitats along the southwestern edge of the BMU in roaded areas. They would be located outside or along the periphery of the large blocks of Core habitat within the BMU. Similarly, prescribed burn units are located in the west/southwest side of the BMU. The burns are generally associated with roaded areas; however, some burns do include areas of unroaded Core habitat. Most watershed improvement activities would occur on existing but barriered[6] roads that have contributed to Core for more than 10 years. Large activity-free areas of Core would continue to be available both within and adjacent to the project boundary. The eastern third of the affected BMU is found outside of the project area and would not experience any project activities. Portions of both Flagstaff and Saddle Mountain Inventoried Roadless Areas (IRAs) are found within the project area and generally associated with the eastern project area boundary. Any bears potentially displaced during project activities would likely move to the large areas of Core that are currently providing secure habitat and would not experience any project activities. Therefore, BMU 10 has been chosen as the appropriate scale of analysis for determining direct, indirect, and cumulative effects for the OLY project.

A small portion of the project area lies outside of the Recovery Zone and within the Troy Polygon. No recurring[7] grizzly bear use has been documented here. Therefore, it has been determined that the Troy Polygon does not have any National Forest System (NFS) land/management opportunities (USFS 2009a) for the recovery of the grizzly bear within the CYE. The NFS lands found within the Troy Polygon occur either as small extensions of the NFS lands found outside of the Polygon or as isolated parcels surrounded by private land development and corporate timberlands. The entire area is within the Wildland Urban Interface (WUI).

Temporal boundaries for the grizzly bear analysis include both short-term and long-term effects. Short-term effects are those that are expected to last between a few days to a season or portion of two seasons. Generally, once disturbance causing activities like prescribed burns, harvest, and watershed work have been completed bears can move back into and use the area. Grizzly bears have also been shown to use harvest areas during periods of inactivity (e.g., nights and weekends). As a result of vegetation management treatments, greater foraging opportunities may be available by the next season. Long-term effects are those that expected to last longer than a season or two. For example, vegetation management can alter the availability of cover depending on type of treatment. Following regeneration harvest it is expected that cover would return within approximately 15 years. Similarly, vegetation treatments can result in long-term foraging opportunities for grizzly bears and ungulates that bears may prey or scavenge upon, especially if maintenance activities such as thinning and fire (natural or prescribed) are continued within the treated stand. Also, changes in access management, including the construction of new roads or decommissioning of unneeded roads, would generally result in long-term effects to grizzly bears.

[6] For this analysis, "barriered" also includes roads coded as impassable in the INFRA database. Roads that fall into either of these categories are not drivable due to either the physical placement of a barrier (e.g., berm or large rocks) or the in-growth of vegetation that has resulted in a barrier to motorized use.

[7] Recurring Use Areas Process: Based on evidence of multiple individuals (priority given to females with cubs and collared bears) observed over multiple seasons and years, as well as credible observations, captures, documented mortalities, and radio telemetry data (USFS 2009).

Existing Condition

Introduction

Grizzly bears and their associated habitats are known to occur on the KNF as well as within BMU 10 during all seasons. There are two grizzly bear recovery zones on the KNF, the CYE and the Northern Continental Divide Ecosystem. Habitat conditions in the CYE have been improving steadily since 1987 as documented by Johnson (2002), Summerfield et al. (2004), and the annual Forest Plan monitoring reports on threatened and endangered species habitat (e.g., USFS 2014a).

Currently, the CYE grizzly bear population is estimated to have a minimum population of at least 37 grizzly bears, using a six year calculation, with a 50 percent probability of a downward population trend (Kasworm et al. 2014). This six year time frame corresponds to what was used for the Recovery Plan, but may under estimate the total by missing some bears that have survived (ibid). Preliminary results from the Cabinet-Yaak DNA study indicate a population of 45 to 49 bears within the CYE (IGBC 2013) and corroborated the estimate of 50 bears in 2012 (Kasworm et al. 2013). This estimate was based on a 10 year calculation. A maximum estimate of 69 bears only accounts for known mortality and probably overestimates the population as it is unlikely that all bears survived the 25 year monitoring period (Kasworm et al. 2014). Causes of grizzly bear mortality have generally been due to factors beyond Forest Service control (e.g. management removal due to food attractant on private land, hunter mistaken identity or defense of life, and illegal kill by humans). Kasworm et al. (2014) suggests that an increase in natural mortalities beginning in 1999 could be attributed to poor food production during 1998 through 2004, when huckleberry production was about half of the 20-year average.

Human-caused mortality is considered to be the major factor limiting grizzly bear recovery at this time (Anderson 2014). The availability of attractants and increased human occupancy of and access into grizzly bear habitat increases the opportunities for human-bear interactions and potential for mortality. Therefore, an integral part of grizzly bear management on the KNF is to implement measures within the authority of the Forest Service to minimize human-caused grizzly bear mortalities. This includes limiting sources of attractants associated with Forest Service permitted activities and management of motorized access.

The KNF enacted a Food Storage Order (USFS 2011c) which includes the proper storage and transportation of food and other attractants on all NFS lands on the KNF. There has been an increase in bear resistant garbage containers in developed campgrounds and a pack in/pack out policy for all other campgrounds and dispersed recreation sites. The KNF has also installed signs along popular roads to inform people that they are in grizzly bear habitat and they include grizzly bear identification information. Other agency efforts include many county refuse sites being fenced to keep bears from attractants. For instance, in 2011 the Savage Lake site located along Highway 56 was fenced on state owned lands with bear-proof electric fencing. Other smaller and privately owned refuse sites are still being evaluated for locations to effectively bear-proof them (Annis 2011). Public education efforts are ongoing to encourage people to live in a way that is more compatible with the needs and behaviors of bears. This includes assistance by MFWP with the installation of new electric fencing of chicken and pigeon coops in the Yaak to prevent future bear conflicts (Annis 2012).

Because motorized roads and trails facilitate human access into bear habitat found on the KNF, management of these systems influence where, when, and how many people could access these areas. An important aspect of motorized access management is to provide large secure areas

across the landscape where limited human use, and associated effects like attractants and disturbance, would occur.

It is important to note that human-caused grizzly bear mortality is also a function of other factors, such as the regulation of big game hunting, which are beyond the authority of the Forest Service to control. Regulation of hunting is the responsibility of the State of Montana. Montana has instituted a mandatory black bear hunter testing and certification program to help educate hunters in distinguishing bear species and reducing mistaken identity. Illegal poaching also contributes to human-caused mortality.

Grizzly Bear Occurrence

Bear activity in BMU 10 includes credible observations of bears spending some portion of time in the BMU starting in 1978 (see project file) with the most recent grizzly bear occurrence in 2012 (Kasworm et al. 2013). This includes recorded locations of collared bears whose home ranges, based on these locations, included portions of the BMU (Kasworm et al. 2014). However, these observations have not documented occupancy of female with young within this BMU over the past 26 years (ibid). Research records indicate two human-caused mortalities in this BMU from 1953 and 1977 (see project file, Kasworm et al. 2014).

Documented bear observations in the BMU includes areas of Core and some activity areas proposed by this federal action. Grizzly bear movement across the border into Canada from the Yaak has been documented, including signs of reproduction, whereas grizzly movement is limited between the Yaak and Cabinet Mountains. Also, there is evidence of low reproduction occurring within the Cabinet Mountain population. Therefore, augmentation efforts and evaluation of success of the grizzly population has focused on the Cabinet Mountains and has not yet occurred within the Yaak (Kasworm et al. 2012).

Description of Analysis Area

BMU 10 overlaps the Three Rivers Ranger District boundary and management is shared with adjacent Libby Ranger District to the east. Approximately 60 percent of the BMU is found within the OLY project area. Of the approximately 67,500 acres of NFS lands located within the project area, about 85 percent of those acres are found within BMU 10 and the remaining 15 percent are within the Troy Polygon.

Key Stressors and 2015 Forest Plan Direction to Facilitate Grizzly Bear Recovery

The intention of grizzly bear management on the KNF is to provide sufficient quantity and quality of habitat to facilitate grizzly bear recovery. As mentioned above, an integral part of the intent is to implement measures within the authority of the Forest Service to minimize human-caused grizzly bear mortalities. This intent is accomplished by addressing and mitigating the key stressors described above and achieving goals, desired conditions, objectives, standards, and guidelines identified by the 2015 Forest Plan applicable to grizzly bear recovery.

Attractants

Implementation of OLY's proposed activities and other permitted activities could result in the introduction of attractants in addition to those that may currently exist. Addressing this stressor includes identifying potential sources of attractants as well as measures taken to minimize the potential for grizzly-human conflicts.

Seven Forest Service facilities or permitted facilities are found within or along the boundary of the project area and BMU 10. This includes a rental lookout on Yaak Mountain, a communications site on King Mountain, the Troy Shooting Range, three campgrounds (Kilbrennan, Yaak River, and Yaak Falls) and Alvord Lake day use area which is located in the Troy Polygon. Other recreational sites include the Yaak Falls overlook and Kootenai Falls overlook and swinging bridge. As mentioned above, bear resistant garbage containers have been installed in developed campgrounds and some dispersed sites. The District has implemented a pack in/pack out policy for all other campgrounds and dispersed recreation sites to reduce attractants at human use sites. Mortality risk associated with management related sources of attractants is low.

Other primary sources of attractants in the area would be associated with the private homes located along the west/southwest portion of the project area and could include garbage, gardens, livestock/pets and their foods, birdfeeders, etc. Availability of these attractants would vary by homeowner.

Road Impacts

Road construction, primarily to facilitate timber harvest, has resulted in the arrangement of open and restricted roads (i.e., gated for administrative use) on the landscape today. Open road densities have dramatically dropped in the past several years as a result of restricting/reclaiming roads through decisions intended to facilitate grizzly bear recovery. These roads and their management have resulted in the existing condition related to the habitat parameters of Core habitat, OMRD, and TMRD that are displayed in Table 128 below.

Current management of motorized routes, primarily roads, within grizzly bear habitat on the KNF is guided by the 2015 Forest Plan. Habitat parameters are based on prudently drivable roads and are used to evaluate the quality of grizzly bear habitat. Habitat parameters that directly measure motorized route density include OMRD and TMRD, while Core measures the amount of secure habitat within the BMU(s) located at least 0.31 mile away from motorized roads and trails. Table 128 indicates the existing habitat parameter levels in the analysis area (see project file for habitat parameter outputs).

Table 128. Existing Habitat Parameter Conditions for BMU 10 Compared to the BMU Standards

BMU	Habitat Parameter	Parameter Standard	Existing Condition (Alternative 1)
10	Core	≥ 52%	54%
10	OMRD ≥ 1 mile per square mile	≤ 44%	43%
10	TMRD ≥ 2 miles per square mile	≤ 34%	26%

Core Areas

The requirements of Core include no motorized access (roads or trails) during the active bear season and located at least 0.31 mile from open or restricted roads, motorized trails, and high use trails. Blocks of Core habitat function as displacement areas for grizzly bears. No net loss of Core

area will occur on federal ownership within any BMU until all BMUs have reached established standards.

The current Core level for BMU 10 is 54 percent which is better than the BMU standard. Existing Core block acres for the BMU range from 2 to 45,485 acres (see Table 129).

Table 129. Existing Core Blocks and Acres in BMU 10

Core Blocks	Core Block Acres
1	2
2	3
3	4
4	5
5	6
6	7
7	19
8	45
9	53
10	119
11	193
12	237
13	374
14	495
15	1,986
16	2,386
17	3,839
18	42,485
All Blocks Total	**52,258**

OMRD

Open motorized route density is calculated on a BMU basis using GIS analysis. For BMUs not meeting the OMRD standard, actions affecting OMRD must result in a post-project movement toward the standard.

The existing OMRD level for BMU 10 is 43 percent and is better than the 44 percent standard.

TMRD

Total motorized route density is calculated on a BMU basis using GIS analysis. For BMUs not meeting the TMRD standard, actions affecting TMRD must result in a post-project movement toward the standard.

The existing TMRD level for BMU 10 is 26 percent and is much better than the 34 percent standard.

Motorized Over-Snow Vehicles

Over-snow motorized use after bears have emerged from their dens in the spring (after April 1) has the potential to disturb bears if the activity is located near a den. Snowmobile use within the project area is fairly limited compared to other areas on the Three Rivers Ranger District, such as the Keeler and Spread Creek drainages. The most popular route is along Lynx Creek on National Forest System Roads (NFSRs) 4433 and 4433B to access Pulpit Ridge. Other use includes riding the open loop roads that access higher elevation sites like China Basin or King Mountain as well as potential use up the Arbo Creek drainage into Wee Lake, although access to Wee Lake is limited to the old roadbed due to the thick post-fire vegetation. Some access to Flagstaff Mountain north towards China Basin occurs from the Libby Ranger District on the east side of the BMU. One groomed route is located along the eastern boundary of the BMU on the Libby Ranger District; there are no groomed routes or snow parks within the OLY project area.

Spring time use of these routes is often influenced by environmental conditions (e.g., winter snow pack, spring temperatures, and aspect) that can affect the location, amount, and condition of snow and whether is it suitable for use by snowmobiles or not. Suitability of the routes can vary from year to year depending on differences in these conditions. For example, a main route to China basin is along NFSR 4445 (Kootenai Face Road) which has a southern aspect and open terrain especially along the lower portion of the road. Because of the sun exposure this route receives, snow tends to melt off early and can limit access even early in the year.

Livestock/Grizzly Bear Interaction

There are no grazing allotments on the Three Rivers Ranger District; therefore, this activity is not a key stressor for grizzly bears in the OLY project area and will not be addressed further.

Major Ground Disturbing Activities (Mining)

There are no large mining operations located within the OLY project area nor are any proposed; therefore, this activity is not a key stressor for grizzly bears in the OLY project area and will not be addressed further.

Managing Habitat to Contribute to Grizzly Bear Recovery

System of Large Remote Areas

As discussed under “Road Impacts” above, blocks of Core habitat function as displacement areas for grizzly bears. Several large blocks of Core have been established based on past and current road management in and adjacent to this BMU. The largest Core block, comprised of approximately 45,485 acres, spans the entire length of the BMU from north to south in one contiguous block. This Core block includes lower elevation habitats associated with major drainages along the northern and southern borders and a high elevation ridgeline is the “backbone” of the area.

Flagstaff and Saddle Mountain IRAs are both located within BMU 10. They total approximately 25,774 acres within the BMU and their boundaries generally coincide with the Core block boundary; there are a few instances where IRA boundaries abut an open or gated road when Core does not. Similarly, Management Areas (MAs) 3 (Botanical), 4 (Research Natural Areas), and 5a/5c (Backcountry) are found within this Core block and are generally associated with the IRAs. These particular MA allocations provide non-motorized or limited motorized access during the

bear year. These large tracts of unroaded lands provide excellent habitat security, low levels of human disturbance, and largely natural vegetative conditions.

Landscape Connectivity and Local Area Movement

The 2015 Forest Plan's Geographic Area Direction identifies three movement areas associated with the OLY project: 1) east and west across the Yaak River and Highway in the vicinity of Yaak Falls (GA-DC-WL-YAK-04), north and south between the Yaak and West Cabinet Mountains near the confluence of the Yaak and Kootenai Rivers (GA-DC-WL-BUL-04 and GA-DC-WL-Yaak-04), and 3) north and south between the Yaak and Cabinet Mountains in the area of Flagstaff Mountain. Proctor et al. (2015) have identified potential linkage areas in similar locations along Highway 2 that are identified by the 2015 Forest Plan. Other modeling and habitat mapping efforts also suggests that these locations may provide connectivity between the Cabinet and Yaak grizzly bear populations (e.g., Crucial Area Planning System or CAPS described in MFWP 2011).

At the BMU scale, a landscape consisting of a mosaic of seral stages that provide a mix of both forage and cover conditions would facilitate grizzly bear use of the BMU and surrounding areas. These areas provide for movement between or within home ranges and are usually associated with seasonal movements of a species (e.g., access to forage or pairing for reproduction) within an ecosystem recovery area. Past natural disturbance events and vegetation management has resulted in a mosaic of seral conditions on the forest and within the BMU. Unharvested stands and those harvested prior to 2000 would now provide cover for movement within and between units. In addition, increased protection of riparian habitats has contributed to movement across the landscape.

A large (approximately 42,485 acres), contiguous Core block is available within BMU 10 which helps facilitate movement within the BMU. This Core block runs north to south in the eastern portion of the project area and BMU and generally coincides with Saddle Mountain and Flagstaff IRAs. The northwest and southern most portion of this Core block are found in the Yaak Falls and Flagstaff Mountain movement areas, respectively, as described above. In addition, only one open road to the north, Seventeen Mile, separates this Core block from another large, contiguous Core block located in adjacent BMU 11 and the Roderick IRA. Other large Core blocks are located in the western portion of the BMU and provide secure habitat for use within and movement through this area of the BMU towards the third identified movement area near the confluence of the Kootenai and Yaak Rivers.

Juxtaposition of Foraging Habitat and Cover

The availability and proximity of cover may influence the use of foraging habitats by grizzly bears. Consideration of historic vegetative conditions and natural disturbance processes when developing vegetation management treatments (e.g., seral stage, size and shape of harvest units, species composition) would result in a mosaic of forage and cover habitats similar to what grizzly bears evolved with in this area. Past harvests in the project area included regeneration harvest units in a variety of sizes. In most instances, those areas that were harvested 15 or more years ago would now have trees in the units of the size or density to provide cover for a grizzly bear. More recent regeneration timber harvests provide varying levels of cover as well as continuing to provide forage opportunities.

Maintain/Improve Habitat Suitability With Respect to Bear Food Production

Roaded lands have been managed for timber production using a number of methods that fall within the general categories of regeneration and intermediate harvest. Harvest activities on NFS lands began in the 1930s and have continued to the present. Regeneration harvest includes clearcut, seed tree, and shelterwood treatments and has occurred on approximately 26,729 acres of NFS land in the project area (about 50 percent). Intermediate harvest (e.g., commercial thinning, salvage, and individual tree selection) has occurred on approximately 9,014 acres or 17 percent of the project area. Past harvest has provided some variety of age classes and successional stages across the project area. In some cases, past harvests provided habitat conditions favorable for huckleberry production and other forage for grizzly bears.

Natural disturbances such as insect and disease, fire, and windthrow have also affected successional stages of vegetation in unharvested areas. Wildfires reduce timber and shrub overstory in the areas so affected, thereby creating some additional age classes and species diversity in both timbered stands and more open habitats (brushfields, alpine, etc.). This would benefit some shrub species, such as huckleberry, that provide forage for bears. No large wildfires have been documented in the project area in the past decade. However, tree recovery has been slow in some large fires areas that burned in 1994 and still exhibit an early seral shrub, grass, and forb community that provides forage opportunities. Prescribed burns can achieve some of these effects in the absence of wildfire. In contrast, fire suppression since the early 1900s has altered stand structure resulting in more homogenous stands with greater canopy closure in some areas, which has in turn reduced huckleberry and other berry production on some sites.

Huckleberries (*Vaccinium* spp.) are an important food source for grizzly bears in this ecosystem (USFWS 1993). Huckleberries are found in scattered patches throughout much of the project area. Although predicted to occur across mid-elevation slopes, huckleberries have also been observed at both higher and lower elevation habitats (see project file notes). Also, riparian habitats themselves are generally considered to be valuable feeding sites. Five main tributaries flow into the Kootenai River within the project area and include Arbo, Kilbrennan, O'Brien, Koot, and China Creeks. In addition, Hummingbird, Rabbit, and Lynx Creeks are large drainages within the project area that flow into O'Brien Creek before reaching the Kootenai River. Numerous smaller tributaries flow into these main streams, especially the large O'Brien Creek drainage.

Seasonal Components

In areas with important seasonal components such as spring range and denning habitat, potential disturbance to grizzly bears can be reduced by scheduling proposed major activities, such as timber harvest, to avoid known spring habitats during the spring use period (April 1 through June 15) and known denning habitats during the winter (December 1 through March 31).

Grizzly bears seek out sites that green up early in the spring and use by grizzly bears in the Yaak occurs below approximately 4,600 feet (1,400 meters, Kasworm et al. 2014). Most of the main drainages, including areas along the Yaak and Kootenai Rivers, are found below 4,600 feet and would provide spring foraging opportunities for grizzly bears within the project area. Denning habitat generally occurs at higher elevations with a mean elevation of about 5,571 feet in the Yaak (1,698 meters, Kasworm et al. 2014). These higher elevation areas that support potential denning habitat are centered along the prominent ridgeline and peaks that run north to south in BMU 10 with side ridges extending to the east and west. Denning habitat is generally found within the two largest Core blocks in the BMU (see project file). Four active den sites have been documented in

the northeastern portion of the BMU between the winters of 1992-1993 and 2004-2005 (Kasworm 2014); these historic den sites are found outside of the OLY project area.

Application of Interagency Grizzly Bear Guidelines

On NFS lands, the objectives of land management within grizzly bear habitat "are to maintain and enhance habitat and to minimize potential for grizzly-human conflicts" (IGBC 1986, pg. 2). Nearly all of BMU 10, approximately 88,417 acres (about 92 percent) has been classified as MS-1 lands. The remaining 7,510 acres are found around private property or a Forest Service campground and are classified as MS-3 due to human occupation or regular recreational use. Identifying and managing key stressors and trending towards desired vegetative conditions similar to what grizzly bears evolved with would meet the intent of the Interagency Grizzly Bear Guidelines (IGBC 1986) and 2015 Forest Plan direction. In summary, the following existing conditions of BMU 10 promote the recovery of grizzly bears within the CYE: 1) the restrictions identified in the Forest's Food Storage Order (USFS 2011c), including the proper storage and transportation of food and other attractants, are applied to all permitted activities on NFS lands on the KNF to reduce risk of human/bear interactions; 2) all habitat parameters currently are better than the standards for BMU 10; 3) large blocks of Core habitat facilitate movement throughout BMU 10 and into adjacent BMUs to the north and south; 4) and past timber harvest, fire management, and natural events have provided some variety of age classes and successional stages with the project area, including the creation of habitat conditions favorable for huckleberries and other forage species as well as cover for movement.

Reduction of Human/Bear Conflicts and Potential Bear Mortality

Most human-caused grizzly bear mortalities on the KNF have resulted from interactions between bears and big game hunters (Kasworm and Manley 1988). Grizzly bear vulnerability to human-caused mortality is partially a function of the availability of attractants and habitat security. Therefore, mortality risk can be assessed to some extent by the appropriate management of attractants (see Attractants discussion above) as well as the use of habitat components that maintain or enhance habitat security. Habitat components include motorized route density and displacement (Core) areas which are addressed under "Road Impacts."

There were no known mortalities in the CYE in 2013 (Kasworm et al. 2014). More recently, however, a grizzly bear was found dead just outside of the project area boundary in the spring of 2015; the circumstances of this death are under investigation.

Environmental Consequences

Alternative 1 – No Action

A range of fire severity, from non-lethal to stand replacing crown fires, historically played a role in developing the vegetative characteristics in the OLY project area. Although the type and frequency of fire experienced varies within a given area and vegetation type (based on biophysical setting), with some being more prone to infrequent stand replacing fire, the vegetation types within the project area have historically experienced low and/or mixed severity fires at least periodically. These natural disturbance regimes favor fire tolerant species, including older and larger diameter seral tree species such as western larch, western white pine, and ponderosa pine. The exclusion of low to moderate severity fires through fire suppression has altered the amount of shade-tolerant species in the understory of these forested stands as well as increased fuel loadings in the form of ladder fuels and downed woody materials. Fewer fires have

also reduced the amount of natural openings, structural diversity, and the number/size of patches across the landscape. Fire suppression has not yet resulted in a departure from historic ranges for all stands within the project area (especially those with naturally longer fire return intervals), although they too are trending towards a departure. Due to the denser fuel conditions, resulting stand replacing fires in these stands often kill many of the overstory trees which historically survived mixed-severity wildfires. Past vegetation management practices that targeted these old, large trees removed the relic seral species and further altered tree size and composition; this in turn has promoted the development of climax species and conditions. This has also influenced the persistence of root disease in now Douglas-fir dominated stands as the seral species, such as western larch and ponderosa pine, are more resistant to these diseases. Planting of non-native ponderosa pine before breeding zones were understood has resulted in unhealthy stands that are not adapted to the local growing conditions. In addition, the close proximity to Troy, MT influenced the removal of valuable western larch, western white pine, and ponderosa pine trees and snags in the lower elevation sites that supported local development and supplies (e.g., firewood). In general, the resultant stand patch sizes and occurrence, species composition, stand structure, and fire frequency and severity are departing from desired vegetative conditions based on historic range of variability within the project area. See the Fuels Management and Forest Vegetation sections for more detail.

No direct effects from federal actions would occur. The No Action alternative would maintain the existing vegetative condition on the landscape. Also, all existing condition grizzly bear habitat parameter levels would be maintained based on current motorized access. However, with continued fire suppression and lack of active management, the indirect effects of this alternative would include a continued trend towards uncharacteristic vegetative conditions. For example, as trees continue to shade out the forest floor and encroach upon forage openings the acres of productive foraging habitat would decline over time. Huckleberries and other forage species, where present, may be less vigorous and produce less reliable crops in shaded rather than more open environments. There would also be an increased potential for disease which would make the affected stands less tolerant to environmental changes or natural disturbances such as fire.

The increased tree density and continuous fuel profile from the ground up to the main canopy makes the area more susceptible to high severity stand replacing fires (see the Fuels Management section). If severe wildfires occur, it is likely that large openings would be created with less vegetative diversity found within the burn boundary. Although forage for grizzly bears would be expected to increase within a few years following the fires, its availability would be influenced by the area's road system, the availability of remaining cover and edge habitats, and possibly the seasonality of use.

Alternatives 2, 3, and 4 – Direct and Indirect Effects

A number of measures are used to gauge whether the key stressors and 2015 Forest Plan direction are being met. The following analysis describes the potential effects of the selected action by examining how these measures are implemented and, thus, how the direction relating to grizzly bear recovery are met.

Project Design Features and Mitigation Measures

There are several design features identified to minimize potential effects to grizzly bears, see Chapter 2 Design Features. The design features include seasonal and activity timing restrictions, motorized access management restrictions and changes, and provisions for the in-kind

replacement of Core. These design features will be discussed in more detail in the following effects discussion.

Key Stressors and 2015 Forest Plan Direction to Facilitate Grizzly Bear Recovery

Attractants

The action alternatives would not create any attractants such as garbage sources that increase the risk of conflict with humans. Contracts with the logging company would include language addressing the required handling of attractants at work sites and would be in compliance with the KNF Food Storage Order. Standard FW-STD-WL-04 would be met. Also, the KNF has a standardized seed mix to use for re-vegetation of disturbed sites such as harvest landings or decommissioned roads. This seed mix may be a KNF approved native or cultivar mix and does not include species such as clover that may be more palatable to bears in order to minimize the potential for attraction and human-bear conflict. In addition, the proposed actions do not include changes to the type of management or level of use of the seven Forest Service facilities or permitted facilities found within or adjacent to the project area boundary. The availability of bear resistant garbage containers and/or implementation of a pack in/pack out policy and the KNF Food Storage Order have improved conditions related to attractants in these human use areas.

Road Impacts

The 2015 Forest Plan incorporated the 2011 Access Amendment as a standard (FW-STD-WL-02) to be applied within the portion the KNF that falls within the CYE. FW-STD-WL-02 provides the habitat parameter standards by BMU for Core, OMRD, and TMRD as analyzed below and considers the best available science (Allen et al. 2011) for the CYE. The estimated grizzly bear population has increased since 1999 (20 bears) through the early 2000s (30 to 40 bears) to a current maximum estimate of 69 bears, although the actual number likely falls within the range between 37 and 69 bears (Kasworm et al. 2000, 2003, 2004, 2014). Similarly, an improvement in the calculated probability of decline (measured as a percent) has been observed since 2006, decreasing from 94 to 57 percent in 2012 (Kasworm et. al 2007, 2013) to 50 percent in 2013 (Kasworm et al. 2014)[8]. This suggests that the KNF's wheeled motorized access management policy over the last decade has contributed to improving the grizzly population towards recovery goals within the CYE by improving BMU parameter levels with many now meeting or being better than the standards. Implementation of FW-STD-WL-02 would continue this trend.

Proposed activities with the potential to impact the habitat parameters include road use associated with harvest and watershed improvement work. The level of impacts to the habitat parameters depends on variables such as the current and during project status of the roads being used (i.e., open, restricted, or barriered to motorized use), length of road being used, and proximity/configuration of the roads with other roads on the landscape. Where needed, post-

[8] The "probability of decline" reflects the probability that repeated calculations of the growth rate, using random combinations of values rather than the mean value from all years, would result in values of < 1 (i.e., a decreasing population). Therefore, although an improvement in the "probability of decline" does not directly indicate that the grizzly bear population is increasing, it means that the calculated growth rate is getting closer to 1.0 (i.e., a stable population). Even when the growth rate becomes just greater than 1.0 (i.e., an increasing population), there would still be some probability that the population is in decline due to portions of the bell curve still falling below 1.0. As of 2013, the growth rate reached 1.0 reflecting a stable population (Kasworm et al. 2014). A year later, the reported growth rate of 1.014 indicates an increasing population (Kasworm et al. 2015).

harvest activities such as machine or hand piling and burning would use the same roads as those used for harvest. In general, restricted roads opened for project use would return to the existing condition following completion of activities. The long-term management of barriered roads opened for project use differs by management activity. Those opened for harvest would generally then be managed as a gated road to allow for continued management of the area (e.g., future thinning). Those opened for watershed improvement work would return to their existing condition. The temporary road constructed for use during harvest would be returned to its pre-harvest condition upon completion of harvest activities for all alternatives.

Other system barriered roads found within harvest units may be used to skid logs from the cutting area to the landing. Seven roads have been identified for skidding use and total approximately 1.2 miles. These roads would not be improved to allow for passenger vehicle use or use as a haul road. Their use would be part of the harvest operation within the unit similar to the creation of a skid trail occurring elsewhere in the unit and would help minimize the amount of new soil disturbance by keeping impacts to an already disturbed site. Therefore, these activities would not impact the habitat parameters within the BMU. Post-harvest, the roads would be treated for any identified stabilization work.

Table 130 below describes the effects to the habitat parameters from road use associated with the OLY project's proposed in-kind replacement of Core habitat and timber harvest treatments. Although harvest unit shape and size differ slightly among alternatives, the units are located in essentially the same location; therefore, the effects of harvest road use would be the same for all alternatives.

Table 130. Effects of OLY's Proposed In-Kind Replacement of Core Habitat and Harvest Activities to Grizzly Bear Habitat Parameters in BMU 10: Existing Condition, During, and Post-Project Levels

Habitat Parameter (Standard %)	Existing Condition	In-Kind Replacement of Core[1]	During[2]	Post-Project[2]
Core (≥ 52%)	54	54	54	54
ORMD (≤ 44%)	43	43	44	43
TMRD (≤ 34%)	26	26	26	26

[1] As compared to the Existing Condition.

[2] As compared to the In-Kind Replacement Condition.

Multiple activities are proposed on Yaak Mountain, including OLY's proposed harvest and watershed improvement work and Stimson Lumber Company's (hereafter, Stimson) proposed road construction and harvest. Although unlikely to occur, implementation of all proposed activities at once would result in an increase in OMRD above the BMU standard. Therefore, to reduce potential effects to OMRD during the active bear year project design specifies timing and activity area restrictions for implementation of Stimson's proposed activities on Yaak Mountain. See Design Features in Chapter 2 for details. Stimson's proposed activity is described in more detail under "Cumulative Effects." Table 131 displays the effects of the two project's proposed activities on Yaak Mountain to the habitat parameters in BMU 10.

Table 131. Direct Effects of Proposed OLY and Stimson Road Use on NFS Lands on Yaak Mountain to Grizzly Habitat Parameters in BMU 10: Existing Condition, During, and Post-Project Levels

Habitat Parameter (Standard %)	Existing Condition	In-Kind Replacement of Core[1]	OLY's Harvest and Watershed Work[2]	Stimson's Road Construction and Harvest Use[2]	Post-Project[2]
Core (≥ 52%)	54	54	54	54	54
ORMD (≤ 44%)	43	43	44	44	43
TMRD (≤ 34%)	26	26	26	26	26

[1] As compared to the Existing Condition.

[2] As compared to the In-Kind Replacement Condition.

Table 132 and Table 133 display the effects to the habitat parameters from road use associated with proposed watershed improvement work. Five areas of proposed watershed improvement work would occur in the project area under all alternatives: Pulpit Mountain and O'Brien Creek (combined), Yaak Mountain, Hummingbird Creek, and Prospect Creek. A sixth area, NFSR 2380 Reroute located along the lower reach of North Fork O'Brien Creek, is proposed for Alternatives 2 and 3 but is not proposed for Alternative 4. Because the proposed work includes roads barriered to motorized use, this activity type has the most potential to impact all three habitat parameters. To reduce potential effects to the habitat parameters, especially Core, during the active bear year project design specifies timing and activity area restrictions for implementation of these work areas. This activity is described in more detail for each activity area below; also see Design Features in Chapter 2.

Table 132. Temporary Effects of OLY's Pulpit Mountain and O'Brien Creek Watershed Improvement Activities to Grizzly Bear Habitat Parameters in BMU 10: Existing Condition, During, and Resultant In-Kind Replacement of Core Condition

Habitat Parameter (Standard %)	Existing Condition	Pulpit Mountain/ O'Brien Creek	In-Kind Replacement of Core
Core (≥ 52%)	54	53	54
ORMD (≤ 44%)	43	45	43
TMRD (≤ 34%)	26	27	26

Table 133. Temporary Effects of OLY's Watershed Improvement Activities to Grizzly Bear Habitat Parameters in BMU 10: In-Kind Replacement of Core Condition, During, and Post-Project Levels

Habitat Parameter (Standard %)	In-Kind Replacement of Core	Yaak Mountain	Hummingbird Creek	NFSR 2380 Reroute	Prospect Creek	Post-Project
Core (≥ 52%)	54	54	54	54	54	54
ORMD (≤ 44%)	43	43	43	43	43	43
TMRD (≤ 34%)	26	26	27	26	26	26

Core Areas

The requirements of Core include no motorized access (roads or trails) during the active bear season and located at least 0.31 mile from open or restricted roads, motorized trails, and high use trails. Blocks of Core habitat function as displacement areas for grizzly bears. No net loss of Core area will occur on federal ownership within any BMU until all BMUs have reached established standards (FW-STD-WL-02).

Proposed activities with the potential to negatively impact Core includes barriered road use associated with harvest activities and watershed improvement work. This includes short segments of new road construction associated with minor re-routes of existing road prisms to maintain access or for resource protection. Also, although the temporary road constructed for use during harvest would not be found in Core under any of the alternatives its location would influence Core acres. All roads proposed for harvest and watershed improvement work that currently contribute to Core have done so for at least 10 years in accordance with FW-STD-WL-02. Conversely, storage or decommissioning of open or gated roads could positively impact Core.

The existing condition of Core is 54 percent which would be maintained throughout the project for most activities. As allowed under FW-STD-WL-02, there would be a temporary 1 percent reduction in Core to 53 percent during implementation of watershed improvement activities in the Pulpit Mountain/O'Brien Creek area. Upon completion of this watershed work, Core would return to 54 percent (see Table 130, Table 131, Table 132, and Table 133). For temporary changes to Core acres see Table 134, Table 135, Table 136 and Table 137 below. To simplify these tables and reduce unnecessary repetition, the following three tables only display the Core blocks in which changes to Core acres occur and the total Core acres for the BMU.

Harvest Associated Road Use

OLY's proposed harvest uses a combination of open, restricted, barriered, and temporary roads for unit access and haul; this proposed road use is common to all alternatives. The use of barriered roads for access and haul routes is required for units located on Kilbrennan Ridge (NFSRs 14393, 14393A, 14321, 176F, and temporary road), Sears Flats (portion of NFSR 4447), near the Troy Shooting Range (NFSRs 14309 and 4445C), near Arbo Creek (NFSR 2365), and off of Kilbrennan Lake Road (NFSRs 2394A and 2394I). Due to the location and arrangement of these barriered roads, they currently contribute to Core. To compensate for this potential loss of Core, three restricted road systems (NFSRs 2376, 4425, and 4433) would be effectively barriered and placed into Core for a minimum of 10 years in compliance with FW-STD-WL-02. In addition, three roads identified for passive decommissioning (NFSRs 2394B, 2394D, and 2394J) contribute to the Core compensation acres. Three additional barriered roads would be used for harvest (2394C, 4445G, and 9933), but their use would not impact Core. Thirty-day public use periods are not allowed on restricted roads within the recovery zone. Therefore, during road reconstruction, gates would be installed at the beginning of NFSRs 14321, 176F, 14309, 4445C, 4445G, 2365, 2394A, and 2394I as they are located off of open roads and they would not be open to public motorized use during the active bear year. Gates are not needed on the remaining roads listed above as they 1) currently are or would be located behind another gated road or 2) are so short in length they do not provide access as a road (defined as greater than 500 feet in length, (USFS 2011a, b) This would be consistent with FW-STD-WL-02. Following this in-kind replacement, overall Core acres would be increased by 7 acres within BMU 10 but would not result in a change in percent from the existing 54 percent.

Two minor re-routes that include segments of new road construction are proposed for harvest use. On Kilbrennan Ridge, NFSR 14321 currently runs through a small wetland area. The proposed re-route would utilize portions of existing NFSRs 14393 and 14393A and approximately 0.5 mile of new construction in a drier location farther up the slope. The length of new construction is similar to the original piece that would now be decommissioned by abandonment. The re-route would prevent damage to this site and maintain its value for use (e.g., water and forage) by grizzly bears and other wildlife species. Because this re-route in within the same "footprint" of the original roads, there would be no additional impacts to Core from this proposed activity. The second re-route is located at the Troy Shooting Range. This new construction would connect NFSR 14309B to an existing segment of NFSR 14309 around the southern edge of the Shooting Range facilities. Nearly all of the approximately 0.3 mile of new construction would occur within the Troy Polygon and outside of the BMU. Because of its adjacency to the BMU boundary, construction of this new segment could contribute to the reduction of Core; however, most of the reduction experienced in this area is due to the use of barriered NFSRs 14309 and 4445C that are found within the BMU. The in-kind replacement of Core described above would compensate for the reduction of acres that would occur as a result of this activity.

Upon completion of Harvest Unit 55B harvest activities, most of NFSR 2393 would be barriered near the junction with NFSR 176 (East Side Road) to apply the existing road management restriction as well as contribute to the improvement of grizzly bear habitat parameters within the BMU. This would increase the size of an existing Core block located along the Yaak River by 5 acres. Also, rehabilitation of the temporary road constructed on Kilbrennan Ridge would result in the creation of 1 acre of Core. This 6 acre increase in Core, in addition to the 7 created through the in-kind replacement of Core, results in a total increase of 13 acres of Core within BMU 10 as a result of OLY's proposed harvest and associated road management activities. Core percent would continue to be at the existing 54 percent post-project. Table 134 displays the effects of OLY's proposed harvest and in-kind replacement of Core to BMU 10's existing Core blocks and acres.

Table 134. Effects of OLY's Harvest Activities and Proposed In-Kind Replacement of Core to Core Blocks and Acres; Acre Difference in Parentheses

BMU	Core Block	Existing Condition (acres)	In-Kind Replacement of Core[1, 2]	Harvest Activities[3]	Post-Project[3]
10	4	4	0 (-4)	NA[4]	NA[4]
10	6	6	0 (-6)	0	0
10	8	19	4 (-15)	4	4
10	9	45	45	45	50 (+5)
10	16	1,986	1,989 (+3)	1,989	1,989
10	17	2,386	1,780 (-606)[5]	1,780	1,780
10	17A	NA	NA	NA	1 (+1)
10	18	3,839	4,383 (+544)	4,383	4,383
10	19	42,485	42,576 (+91)	42,576	42,576
10	**All Blocks Total**	**52,258**	**52,265 (+7)**	**52,265**	**52,271 (+6)[6]**

[1] As compared to the "Existing Condition."

[2] Positive differences in acres reflect the in-kind replacement Core acres whereas negative differences reflect those existing Core acres impacted by OLY's proposed harvest.

[3] As compared to the "In-Kind Replacement of Core" condition.

[4] This Core block's acres are incorporated into Core block 18 with the establishment of Core in the North Fork Lynx Creek (NFSR 4433) area.

[5] The acre difference includes the increase of 10 acres from passive decommissioning of two roads along the Kilbrennan Lake Road.

[6] The additional increase of approximately 6 acres of Core is established through the restoration of the temporary road used on Kilbrennan Ridge and barriering most of NFSR 2393 following completion of harvest activities. Overall, there would be a post-project increase of approximately 13 compared to the existing condition.

A small portion Stimson's proposed new road construction, approximately 0.2 mile, would occur across NFS lands before returning to their lands. Because of the location of this piece of road on NFS lands, it would result in a direct effect to Core acres within the BMU. Approximately 35 acres of Core would be impacted by this portion of Stimson's proposed activity, but would not result in a change in Core percent. Design features to reduce potential effects to OMRD during the active bear year specifies timing and activity area restrictions for the implementation of Stimson's proposed activities on Yaak Mountain. Stimson cannot begin road construction or harvest until OLY's activities on Yaak Mountain have been completed (see Design Features, Chapter 2). This also means that Stimson's activities would not occur until OLY's in-kind replacement of Core has been completed; therefore, the direct effects of this activity area compared to OLY's in-kind replacement of Core condition in Table 135 below.

In order to implement this new road construction that would impact Core acres, Stimson has proposed to provide in-kind replacement of Core on their lands elsewhere in the BMU. This proposal in its entirety, including all road construction and in-kind replacement of Core, will be discussed in more detail under the "Cumulative Effects" section of this analysis as nearly all activities would occur on Stimson's lands within BMU 10. This includes the cumulative post-project Core condition (see Table 139, Table 140, and Table 141).

Table 135. Effects of Stimson's Road Construction and Use to Core Habitat Acres as Compared to OLY's Proposed In-Kind Replacement of Core; Acre Difference in Parentheses

BMU	Core Block	In-Kind Replacement of Core	Stimson's Road Construction
10	17	1,780	1,745 (-35)
10	**All Blocks Total**	**52,265**	**52,230 (-35)**

Vegetation Mangement Treatments within Core

For all alternatives, only slivers of proposed harvest units would occur in Core for a maximum of 3 acres. This includes Harvest Units 4, 43, and 57 in Alternatives 2 and 3; Harvest Unit 43 would not be found in Core in Alternative 4. For all alternatives, all of prescribed ecosystem burn, Fuels Unit F1 and portions of Fuels Units F2, F12, F13, F19, and F25, are found in Core and total approximately 311 acres of treatment within Core in BMU 10. These activities would not reduce Core acres within the BMU based on the definition of Core as follows. The Interagency Grizzly Bear Committee Taskforce Report (IGBC 1998) defined Core areas as areas free of motorized traffic and high levels of human use during the Core security period. This area is identified, and percent of analysis area calculated, by buffering open roads and trails and those not meeting

restricted definition by 0.31 mile. Roads are defined as created or evolved routes that are greater than 500 feet long that are reasonably and prudently drivable with a conventional passenger car or pickup. Equipment used for timber harvest or prescribed fire used in these units (e.g. chainsaws, tractor, and skidders), do not require the use of roads nor create routes that meet the definition of a road.

Watershed Improvement Associated Road Use

Proposed watershed improvement activities include both active and passive road storage and decommissioning work, stream rehabilitation, and a minor re-route. Only the active work that requires the clearing of vegetation and the use of support vehicles to aid the construction equipment would potentially impact Core. Implementation of the six areas of proposed watershed improvement work has been split into five different activity areas based on their priority for implementation, location, impacts to Core habitat, and feasibility for completion within a single bear year when activities would occur within Core habitat. Each activity area is described below and includes a discussion of their effects to Core habitat. Overall, because the activity is limited to the road prism and would be of short duration, expected short term adverse effects would generally be limited to females with cubs as they tend to be more sensitive to human disturbance (Wilson 2011a, b).

Pulpit Mountain and O'Brien Creek

Watershed improvement work proposed in the Pulpit Mountain/O'Brien Creek activity area would be completed in a single summer prior to initiating most harvest and harvest related roadwork within BMU 10. This is because the proposed storage work on NFSR 4433 in the Pulpit Mountain area must be completed to provide in-kind replacement of Core necessary for vegetation management proposed to occur in existing Core habitat elsewhere in the BMU. Within this same combined activity area, NFSRs 2376 and 4425 would also be placed into storage through the installation of barriers to contribute to the in-kind replacement of Core acres; no other work is required on these roads. The storage of these three roads would provide nearly all of the total in-kind replacement Core acres needed for proposed timber harvest and associated road use that would impact Core. Also, completion of the proposed watershed work in these two areas is a priority due the existing watershed conditions and resultant improvement to important bull trout and cutthroat trout streams.

Combining these two areas into a single activity area is beneficial for a couple of reasons. First, common access to work sites along O'Brien Creek (NFSR 752) would result in more efficient implementation (e.g., one time mobilization of equipment and reduction in costs). Second, the estimated amount of work could be completed within a single year which would reduce the number of seasons of activity resulting in potential disturbance to grizzly bears in this area. Finally, completing this work prior to starting most harvest and harvest associated road work would mean that these two large areas of Core would be free of project activities and available for grizzly bear displacement throughout the remainder of the project. The Pulpit Mountain/O'Brien Creek activity area is located within portions of the two largest Core blocks in BMU 10 and includes a range of elevational habitat conditions. Upon completion of storage activities, there would be an overall increase of 91 acres in the largest Core block found within the BMU. Also, there would be an increase of 544 acres in the Pulpit Mountain area which includes the incorporation of a second small, 4 acre block of Core into a single block.

More specifically, the Pulpit Mountain area includes work on gated NFSR 4433 and barriered NFSRs 1998, 1998A, 4420A, 4433A, and 4433B. Access to the 4420A requires the use of

barriered NFSR 4420. During this portion of the watershed improvement work, the existing 3,839 acre block of Core habitat would be temporarily reduced to a total of 3,249 acres for one season. In the O'Brien Creek area, proposed activities include work on barriered NFSRs 4429F, 4650, 14347, and 14349. Access to NFSRs 4650 and 14347/14349 requires the use of parts of barriered NFSRs 4651 and 2380, respectively. The existing 42,485 acre Core block would be temporarily reduced to a total of 41,657 acres for one season in this area of watershed improvement work. In all, this proposed work would result in a temporary impact to 1,418 acres of Core (see Table 136) and would temporarily reduce Core percent from 54 to 53 percent (see Table 132) as allowed under FW-STD-WL-02. Although there would be a 1 percent decrease in Core percent, it would remain better than the BMU standard of 52 percent. After finishing the improvement work, the roads where active work occurred would be barriered and Core would return to 54 percent.

Harvest would be allowed to occur in 13 units (i.e., units 5, 6, 7, 15, 16, 23, 24, 25, 27, 42, 50, 55, and 55A) prior to or concurrent with the watershed improvement work in the Pulpit Mountain/O'Brien Creek area (see Design Features, Chapter 2). These units would be accessed via open county roads which means there would be no impacts to Core habitat and, therefore, harvest would not require the in-kind replacement of Core to be completed prior to implementation. Also, because the location of these units would be within the influence of the open road there would be limited potential for increased disturbance to grizzly bears as compared to the existing and regular motorized use of these roads. Therefore, allowing for harvest of these few, select units at the same time as the Pulpit Mountain/O'Brien Creek watershed work is not expected to result in additional or cumulative adverse effects to grizzly bears within BMU 10 than what is associated with the watershed improvement work alone.

Table 136 displays the effects of the Pulpit Mountain/O'Brien Creek work that would be completed first and provide many of the acres for the in-kind replacement of Core; only those Core blocks impacted by the watershed improvement work and subsequent contribution to the in-kind replacement of Core are shown.

Table 136. Temporary Effects of OLY's Proposed Pulpit Mountain and O'Brien Creek Watershed Improvement Activities to Core Habitat Acres as Compared to the Existing Condition; Acre Difference in Parentheses

BMU	Core Block	Existing Condition	Pulpit Mountain/ O'Brien Creek
10	18	3,839	3,249 (-590)
10	19	42,485	41,657 (-828)
10	**All Blocks Total**	**52,258**	**50,840 (-1,418)**

Yaak Mountain

Passive decommissioning of NFSRs 2394B and 2394J would result in an increase of 10 acres of Core in this Core block and contributes to the in-kind replacement of Core acres for proposed timber harvest and associated road use that would impact Core. Watershed improvement work proposed on Yaak Mountain would occur on a single barriered road, NFSR 4407B. The focus of this proposed work is a single stream crossing that needs improvement to prevent future failure. This work could be completed within a day through the use of an excavator that could walk over the existing vegetation on the barriered road. The road would not need to be opened to a condition that it could be used by passenger vehicles and, therefore, would not result in temporary reduction

in Core. However, because other potential work was identified, the duration and road use needs for all potential work was considered. In this case, the in-kind replacement Core block of 1,780 acres would be temporarily reduced to a total of 1,386 acres for an estimated 4 days of active work in this area (see Table 137). Although this activity would impact approximately 394 acres of Core, there would be no change to Core percent which would be maintained at 54 percent. To reduce the number of years of activity associated with OLY's proposed road work on Yaak Mountain, the watershed work would be completed within the same bear year as harvest related road reconditioning work on Yaak Mountain.

Table 137. Temporary Effects of OLY's Proposed Yaak Mountain, Hummingbird Creek, and Prospect Creek Watershed Improvement Activities to Core Habitat Acres as Compared to the In-Kind Replacement Condition; Acre Difference in Parentheses

BMU	Core Block	In-Kind Replacement of Core	Yaak Mountain	Hummingbird Creek	NFSR 2380 Reroute	Prospect Creek
10	16	1,989	1,989	1,486 (-503)	1,989	1,989
10	17	1,780	1,386 (-394)	1,780	1,745 (-35)[1]	1,745 (-35)[1]
10	All Blocks Total	52,265	51,871 (-394)	51,762 (-503)	52,230 (-35)[1]	52,230 (-35)[1]

[1] The reduction of approximately 35 acres due to Stimson's proposed road construction on Yaak Mountain.

Hummingbird Creek

Similar to Yaak Mountain, passive decommissioning of NFSR 2394D would result in an increase of 3 acres of Core in this Core block and contributes to the in-kind replacement of Core acres for proposed timber harvest and associated road use that would impact Core. Other proposed work in this Core block would occur in a stacked system of barriered roads found in the steep Hummingbird drainage. Active decommissioning and storage work is proposed on three barriered roads: NFSRs 4428B, 14306, and 14306B. Proposed activities would temporarily reduce Core acres within this block of habitat by approximately 503 acres and would maintain Core at 54 percent (see Table 137). This would not impact Core percent which would remain at 54 percent. Upon completion of work, all roads would be effectively barriered and once again contribute to Core.

NFSR 2380 Reroute

Open NFSR 2380 is located along the North Fork of O'Brien Creek. The beginning stretch of this road, from its junction with NFSR 752 to NFSR 2380A, is so close to the creek that maintenance and application of best management practices (BMPs) has and would continue to be a potential source of sedimentation into the creek. To improve the future health and function of the creek, the proposed re-route would utilize existing barriered NFSR 2380A which is located higher on the hillslope and flat above the creek which would eliminate the risk of sedimentation in the creek while continuing to provide access to the remainder of NSFR 2380. The re-route would include decommissioning of this stretch of NFSR 2380, re-construction of existing NFSR 2380A (both open and barriered segments), and restoration of the riparian habitat. In general, opening a barriered road means a potential impact to Core. However, because of NFSR 2380A's location in a narrow point between two existing open roads, this area does not meet the definition of Core and there would be no additional impact to Core habitat as a result of this activity. Therefore, no restrictions have been identified with regards to the timing of implementation of this activity with other activities.

Prospect Creek

Proposed work involves minor site rehabilitation at a stream crossing approximately 500 feet from the open road and Arbo Creek trailhead. The work would be completed by hand or possibly with a mini excavator; neither method would require opening barriered NFSR 2367 which is part of the non-motorized trail system. Therefore, there would be no change to Core acres or percent as a result of this activity. As for the NFSR 2380 Reroute area, no restrictions have been identified with regards to the timing of implementation of this activity with other activities.

Summary of Effects to Core

All alternatives propose routine forest management in Core blocks that have experienced a minimum of 10 years of Core area benefit. This requires an in-kind replacement of Core acres that results in the increase of approximately 13 acres in BMU 10 in compliance with FW-STD-WL-02. Because of this compensation and slight overall increase in Core acres prior to harvest, the reduction of existing Core acres that would occur with harvest associated road use would not result in a change to Core percent in the BMU. Except for NFSRs 176F, 2393, and 2394I which are not needed for future management of these stands (e.g., thinning), the barriered roads opened for harvest would remain gated following the completion of harvest activities and Core percent would be maintained within BMU 10.

The temporary reduction of Core percent in BMU 10 is due to proposed watershed improvement work in the Pulpit Mountain/O'Brien Creek activity area. Each of these areas could be completed on their own within a single bear and the temporary reduction in Core acres would not result in a reduction in Core percent. However, portions of these work areas are in close proximity and require relatively minor work that could be completed within a few days. Grouping the work in these areas together, and completing all activities within a single bear year, helps shorten the number of years of activity occurring in Core habitat and reduce potential disturbance and/or displacement effects to grizzly bears using these more remote Core blocks. In addition, because these areas are priorities for completion, proposed activities would be completed before most harvest begins and the BMU's two largest Core blocks would then be free of activities to provide abundant security habitat for potential bear displacement during the remainder of the project. Implementation of the other watershed improvement areas would not result in a reduction of Core percent because of the short length and/or location of the proposed work along the Core boundaries. By combining the proposed work in the Pulpit Mountain/O'Brien Creek activity area, Core levels would be temporarily reduced by a maximum of 1 percent and impact a maximum of 1,418 acres of Core during each season of work as allowed under FW-STD-WL-02. However, for these particular watershed improvement proposals the BMU Core standard would continue to be met during implementation. All roads currently contributing to Core have done so for a minimum of 10 years and work occurring in each activity area would be completed within a single bear year. Two proposals for watershed improvement work would not occur in Core or impact Core due to their location and/or type of methods of implementation.

The primary effect of the harvest, prescribed burn units, and watershed improvement activities to grizzly bears utilizing the area would be temporary disturbance from human/mechanized activities and noise not normally occurring in these areas. This could possibly result in avoidance of such areas until all activities are complete. Vegetation management activities occurring within Core blocks would be of short duration, possibly a day or two per unit. Road use associated with timber harvest and watershed work would last longer but generally no longer than a season within a given activity area. Core areas temporarily impacted by activities are small and affect at most 1 percent of Core within the BMU. Also, the large blocks of Core located outside the activity areas

would continue to provide secure areas for grizzly bears if temporarily displaced during activities. Expected effects would be short-term, i.e. during activities and for a short time following completion of activities as effects of the action are relaxed. At the conclusion of all project activities, any temporary reductions in Core acres and/or percent associated with watershed improvement activities would return to the existing or in-kind replacement condition as applicable. The OLY project would not result in a permanent reduction of Core area under any of the alternatives.

OMRD

Open motorized route density is calculated on a BMU basis using GIS analysis. For BMUs not meeting the OMRD standard, actions affecting OMRD must result in a post-project movement toward the standard. Proposed activities with the potential to impact OMRD includes road use associated with timber harvest activities and watershed improvement work that would occur on restricted, barriered, new construction, and temporary roads. The roads used during harvest and watershed improvement work are identified in the "Core" section above for each activity type and area. The following OMRD analysis will not repeat this list of roads but rather describe their current condition, for example open, gated, and/or barriered, and how that contributes to a change in OMRD.

The existing condition of OMRD is 43 percent, temporarily increasing to 44-45 percent during harvest and watershed improvement activities, respectively. Post-activities ORMD would return to 43 percent under all alternatives (see Table 130, Table 131, Table 132, and Table 133).

Harvest Associated Road Use

For all alternatives, approximately 9.0 miles of restricted, 10.1 miles of barriered, 0.5 mile of new construction, and 0.2 mile of temporary roads would be opened for access for timber harvest and haul within the BMU. Approximately 0.3 mile of new construction would occur just outside of the BMU; however, it could contribute to OMRD during activities because it is found within calculating distance of BMU 10 for assessing OMRD. Administrative use within the CYE shall not exceed 60 vehicle round trips per active bear year (April 1 – November 30) per road (FW-STD-WL-02). Therefore, to be consistent with FW-STD-WL-02, all gated and barriered roads used for harvest were modeled as being opened at the same time based on the timing restrictions described below. This is unlikely as one area would likely be completed before another begins both for road reconditioning/construction and harvest; therefore, this is a conservative estimate. Also, winter harvest occurring outside of the active bear year would not impact OMRD.

Multiple activities are proposed on Yaak Mountain, including OLY's proposed harvest and watershed improvement work and Stimson's proposed road construction and harvest. Grouping of activities and timing restrictions have been developed to keep OMRD to the BMU standard of 44 percent during activities. Including the Yaak Mountain watershed work along with OLY's road reconditioning for harvest would not increase OMRD above what would occur for harvest alone; OMRD would increase by 1 percent to 44 percent during activities if all of OLY's activities were to occur at once. The construction of Stimson's proposed road on NFS lands, however, would increase OMRD to 45 percent and it would no longer meet the BMU standard. Therefore, to ensure that OMRD continued to meet the 44 percent standard during implementation of the two projects timing restrictions have been identified. First, OLY's activities occurring on Yaak Mountain must be completed before Stimson can begin building their new road. Second, Stimson's activities cannot occur at the same time as OLY's road conditioning or harvest use on Kilbrennan Ridge (see Design Features, Chapter 2).

In summary, all alternatives would result in a temporary increase in OMRD to 44 percent. Although there would be a slight increase, this increase would be temporary and the OMRD level would continue to meet the BMU standard of 44 percent for the duration of harvest activities. To keep currently barriered and newly constructed roads restricted to public motorized use during and post-harvest activities, gates would be installed on those roads that would be accessible from an open road. Therefore, the in-kind replacement of Core activities that compensated for the harvest use of these barriered, new, and temporary roads would result in a change in the location of roads available for administrative use, but would not increase the amount of roads open to public motorized use during the active bear year.

Watershed Improvement Associated Road Use

As described above, proposed watershed improvement work would occur in the Pulpit Mountain/O'Brien Creek, Yaak Mountain, Hummingbird Creek, NFSR 2380 Reroute, and Prospect Creek activity areas. Due to the expected level of road use associated with the proposed activities, all gated and barriered roads used for watershed improvement work were modeled as being opened at the same time based on the activity areas described below. This is consistent with FW-STD-WL-02. Because of required and designed timing, implementation of the watershed improvement activity areas that would impact grizzly bear habitat parameters would not be completed within the same bear year. This reduces the number of gated and barriered roads opened during any one season. During implementation of the activities in the Pulpit Mountain/O'Brien Creek and Hummingbird Creek activity areas, OMRD would temporarily increase to 45 and 44 percent respectively.

Pulpit Mountain/O'Brien Creek

The Pulpit Mountain/O'Brien Creek activity area includes both gated and barriered roads that would be opened for watershed improvement work. The proposed work would result in a temporary increase in OMRD from 43 to 45 percent within the BMU for a single bear year. This work would be completed prior to the initiation of most other road work or harvest activity. Once the proposed work has been completed and the roads either decommissioned or placed into long-term storage, OMRD would return to 43 percent. There would be no permanent increase in OMRD as a result of proposed watershed work. See Table 132.

As described for Core, harvest would be allowed to occur in 13 units prior to or concurrent with the watershed improvement work in the Pulpit Mountain/O'Brien Creek area (see Design Features, Chapter 2). Because these units would be accessed via open county roads, there would be no impacts to OMRD nor an increase in disturbance that would be noticeably different than what is associated with the existing and regular use of these roads. Therefore, allowing for harvest of these few, select units at the same time as the Pulpit Mountain/O'Brien Creek watershed work is not expected to result in additional or cumulative adverse effects to grizzly bears within BMU 10 than what is associated with the watershed improvement work alone.

Yaak Mountain

Proposed watershed improvement work in the Yaak Mountain activity area involves a single barriered road. This work would occur within a separate bear year from other watershed improvement work in the Pulpit Mountain/O'Brien Creek and Hummingbird activity areas, but within the same bear year as harvest road conditioning work on Yaak Mountain. All proposed road work on Yaak Mountain would result in a temporary increase in OMRD from 43 to 44 percent within the BMU for a single bear year (see Table 131); however, the watershed work does not increase OMRD above what would be experienced with the harvest related road work alone

(see Table 130). Once the proposed watershed improvement road has been placed into long-term storage and harvest activities have been completed, OMRD would return to 43 percent. There would be no permanent increase in OMRD as a result of proposed watershed work.

Hummingbird Creek

The Hummingbird Creek activity area would occur on barriered roads that would be opened for watershed improvement work. Due to the roads' being grouped closely together and the existing OMRD level in the BMU and local area, this activity would not result in a change in OMRD from the existing level of 43 percent. This work would not begin until harvest associated road use has been completed within the BMU. Once the proposed work has been completed, the roads would either be decommissioned or placed into long-term storage and OMRD would be maintained at 43 percent (see Table 133). There would be no permanent increase in OMRD as a result of proposed watershed work in Hummingbird Creek.

NFSR 2380 Reroute

The watershed improvement work proposed in the NFSR 2380 Reroute area along North Fork O'Brien Creek is different than the other watershed improvement work in that it includes decommissioning a section of a road that is currently open to public motorized use. To maintain public access along the rest of this open road, a currently barriered road that connects between the two existing open roads would be reconstructed prior to the proposed decommissioning work. As explained under the "Core" section, because the barriered road that would be reconstructed is located in a narrow point between two existing open roads this area already has a high level of open road density and the slight shift in location does not result in a change in OMRD percent (see Table 133). Therefore, no restrictions have been identified with regards to the timing of implementation of this activity with other activities.

Prospect Creek

The proposed Prospect Creek work is located just beyond the Arbo Creek trailhead accessed via open NFSR 2365. Because this work is so close to the open road and would be completed by hand or with a small piece of equipment, the barriered portion of NFSR 2365 that now serves as the trail would not be opened for access. Therefore, there would be no impacts to OMRD from this activity and no restrictions have been identified with regards to the timing of implementation of this activity with other activities (see Table 133).

Summary of Effects to OMRD

All alternatives in BMU 10 would result in a temporary increase of 1 percent in OMRD during harvest and would continue to meet the BMU standard. FW-STD-WL-02 allows for temporary changes in OMRD levels during activities as long as Core habitat is being maintained. This is true for all alternatives as potential impacts to Core would be compensated through the in-kind replacement of Core activities.

Proposed watershed improvement activities in the Pulpit Mountain/O'Brien Creek activity area of BMU 10 would result in an OMRD level that temporarily does not meet the BMU standard (see Table 132). Under FW-STD-WL-02, habitat parameters are not required to meet the BMU standards or research benchmarks during implementation of road decommissioning/stabilization activities as long as only one entry in Core occurs per 10-year time frame and does not exceed one bear year. All roads currently contributing to Core have done so for a minimum of 10 years and work occurring in each area would be completed within a single bear year. OMRD levels during the Yaak Mountain, Hummingbird Creek, Prospect Creek, and NFSR 2380 Reroute

activity areas watershed improvement work would continue to meet or be better than the BMU standard (see Table 131 and Table 133).

The effect of the harvest and watershed improvement activities to grizzly bears would be temporary disturbance from human/mechanized activities and noise not normally occurring in activity areas not associated with open roads. This could possibly result in temporary avoidance of such areas until all activities are complete. The impacts to OMRD are small and result in a maximum temporary increase of 2 percent within a BMU. Expected effects would be short-term, i.e. during activities and for a short time following completion of activities as effects of the action are relaxed. At the conclusion of all project activities, any temporary increases in OMRD would return to the existing or in-kind replacement condition as applicable. There would be minimal risk for increased human-caused mortality associated with open roads as there would be no increase in public motorized use during the active bear year resulting from proposed activities. Restricted, barriered, new, and temporary roads opened for harvest or watershed improvement work would remain closed to public motorized use during implementation and would return to the designated access management condition (e.g., gates closed or barriers installed) once activities have been completed (see Access Management Plan, Appendix E). Also, bears would likely avoid these roads during activity. The large blocks of Core located outside or away from the activity areas would continue to provide secure areas for grizzly bears if displaced during activities. No permanent increase in OMRD would result from this project under any of the alternatives.

TMRD

Total motorized route density is calculated on a BMU basis using GIS analysis. For BMUs not meeting the TMRD standard, actions affecting TMRD must result in a post-project movement toward the standard. Proposed activities with the potential to impact TMRD includes road use associated with timber harvest activities and watershed improvement work that would occur on barriered, new, and temporary roads that currently do not experience motorized use. The roads used during harvest and watershed improvement work are identified in the “Core” section above for each activity type and area. The following TMRD analysis will not repeat this list of roads but rather described their current condition, for example open, gated, and/or barriered, and how that contributes to a change in TMRD.

The existing condition is 26 percent. All proposed harvest activities would maintain the existing and in-kind replacement TMRD level. Watershed improvement work in the Pulpit Mountain/O’Brien Creek and Hummingbird Creek activity areas would each temporarily increase TMRD to 27 percent during implementation and would return to 26 percent post-project (see Table 130, Table 131, Table 132, and Table 133).

Harvest Associated Road Use

For all alternatives, approximately 10.1 miles of barriered, 0.5 mile of new construction, and 0.2 mile of temporary roads would be used for timber harvest and haul access within the BMU. Approximately 0.5 mile of new construction would occur on Kilbrennan Ridge in order to bypass and protect a small wetland. Because the new segment of road is both similar in length and found within the same “footprint” of the original piece of road, this new construction would not impact TMRD. Also, approximately 0.3 mile of new construction located just outside of the BMU would contribute to TMRD during activities because it is found within calculating distance of BMU 10 for assessing TMRD. To continue to restrict public motorized use of these roads, gates would be installed at the beginning of most currently barriered and new roads that are accessed via an open road (see Access Management Plan, Appendix E). This is consistent with FW-STD-WL-02 which

does not allow a public use period on restricted roads within the recovery zone. The roadwork and gate installation would occur prior to harvest and these roads would become part of the total road system within the BMU.

As described under "Core" above, all alternatives would compensate for the potential loss of Core associated with OLY's proposed harvest activities by placing barriers on three gated roads and passively decommission three additional roads. This action would also compensate for the change in access management (i.e., gated to barriered and vice versa) and TMRD level within the BMU. This means that although the specific roads and location of the roads available for administrative use changes, the density of gated roads within the BMU would remain the same. Therefore, this action would maintain the existing TMRD level of 26 percent within the BMU during harvest activities for all alternatives and there would be no permanent increase in TMRD as a result of proposed harvest or associated in-kind replacement of Core activities (see Table 130).

A small portion of Stimson's proposed new road construction, approximately 0.2 mile, would occur across NFS lands before returning to their lands. Because of the location of this piece of road on NFS lands, it has the potential to result in a direct effect to TMRD within the BMU. However, because of its very short length and close proximity to existing roads the construction of this segment of new road does not result in a change in TMRD (see Table 131).

Watershed Improvement Associated Road Use

As described above, proposed watershed improvement work would occur in the Pulpit Mountain/O'Brien Creek, Yaak Mountain, Hummingbird Creek, NFSR 2380 Reroute, and Prospect Creek activity areas. Because of required and designed timing, implementation of the watershed improvement activity areas that would impact grizzly bear habitat parameters would not be completed within the same bear year. This reduces the number of barriered roads opened during any one season. During implementation of the activities in the Pulpit Mountain/O'Brien Creek and Hummingbird Creek activity areas, an increase of 1 percent would occur during implementation of each activity area to 27 percent (see Table 132 and Table 133). This would remain well below the BMU standard of 34 percent.

Pulpit Mountain/O'Brien Creek

The Pulpit Mountain/O'Brien Creek activity area includes both gated and barriered roads that would be accessed for watershed improvement work. Improvement work occurring on the gated roads would not impact TMRD; however, proposed work on barriered roads would result in a temporary increase in TMRD from 26 to 27 percent within the BMU for a single bear year (see Table 132). This watershed improvement activity area would be completed prior to most other activities within the BMU because it includes the long-term storage of three gated roads that would provide the in-kind replacement of Core required to implement proposed harvest in existing Core habitat elsewhere in the BMU. Placing the three gated roads into long-term storage also compensates for the change in access management related to TMRD by allowing for administrative motorized use in areas where the roads are currently barriered to motorized use. Once the proposed work has been completed and the roads either decommissioned or placed into long-term storage, the in-kind replacement TMRD level would be 26 percent and the same as the existing condition. There would be no permanent increase in TMRD as a result of proposed watershed work.

As described for Core and OMRD, harvest would be allowed to occur in 13 units prior to or concurrent with the watershed improvement work in the Pulpit Mountain/O'Brien Creek area (see Design Features, Chapter 2). Because these units would be accessed via open county roads, there

would be no impacts to TMRD nor an increase in disturbance that would be noticeably different than what is associated with the existing and regular use of these roads. Therefore, allowing for harvest of these few, select units at the same time as the Pulpit Mountain/O'Brien Creek watershed work is not expected to result in additional or cumulative adverse effects to grizzly bears within BMU 10 than what is associated with the watershed improvement work alone.

Yaak Mountain

Proposed watershed improvement work in the Yaak Mountain activity area involves a single barriered road. This work would occur within a separate bear year from other watershed improvement work in the Pulpit Mountain/O'Brien Creek and Hummingbird activity areas, but within the same bear year as harvest associated road conditioning work on Yaak Mountain. The proposed watershed work, even in combination with proposed harvest road use, would not impact TMRD within the BMU. Therefore, TMRD would be maintained at 26 percent and there would be no permanent increase in TMRD as a result of proposed watershed work (see Table 131 and Table 133).

Hummingbird Creek

The Hummingbird Creek activity area would occur on barriered roads that would be accessed for watershed improvement work. The proposed work would result in a temporary increase in TMRD from 26 to 27 percent within the BMU for a single bear year (see Table 133). This work would not begin until harvest activities have been completed within the BMU and, therefore, would not occur at the same time as the Pulpit Mountain/O'Brien Creek or Yaak Mountain watershed work. Because implementation of this proposed activity would occur after the construction of Stimson's road on NFS lands, Stimson's road was included in the TMRD calculation. However, due to its short length and association with existing roads it would not impact TMRD and the observed change is due to the proposed watershed work. Once the proposed work has been completed and the roads either decommissioned or placed into long-term storage, TMRD would return to 26 percent. There would be no permanent increase in TMRD as a result of proposed watershed work in Hummingbird Creek.

NFSR 2380 Reroute

The watershed improvement work proposed in the NFSR 2308 Reroute area along North Fork O'Brien Creek is different than the other watershed improvement work in that it includes decommissioning a section of a road that is currently part of the total road system. To maintain public access along the rest of this road which is open to public motorized use, a barriered road that connects between the two existing open roads would be re-constructed prior to the proposed decommissioning work. The area where this proposed re-route would occur already has a high level of total road density due to the close proximity of two open roads and the slight shift in location does not result in a change in TMRD percent (see Table 133). Therefore, no restrictions have been identified with regards to the timing of implementation of this activity with other activities.

Prospect Creek

The proposed Prospect Creek work is located just beyond the Arbo Creek trailhead accessed via open NFSR 2365 which is part of the BMU's total road system. Because this work is so close to the open road and would be completed by hand or with a small piece of equipment, the barriered portion of NFSR 2365 that now serves as the non-motorized trail would not be opened for access. If the small piece of equipment is used, it would be walked over the barrier and would not require improvements such that the road could be driven by a passenger vehicle. Therefore, there would

be no impacts to TMRD from this activity and no restrictions have been identified with regards to the timing of implementation of this activity with other activities (see Table 133).

Summary of Effects to TMRD

All alternatives propose routine forest management in Core blocks after 10 years of Core area benefit. This requires an in-kind replacement of Core acres in compliance with FW-STD-WL-02 which would occur prior to the implementation of harvest activities. This activity would also offset the potential increase in TMRD associated with harvest road use in areas where the existing roads are barriered to motorized use. Therefore, there would be no effect to TMRD from road use associated with proposed harvest activities and TMRD would be maintained at 26 percent during harvest activities (see Table 130).

For all alternatives, the temporary increases in TMRD are due to the use of barriered roads associated with proposed watershed work. These are existing roads already occurring on the landscape within a managed road system. The temporary increases are slight, with only a 1 percent increase in two of the proposed activity areas. Under FW-STD-WL-02, habitat parameters are not required to meet the BMU standards or research benchmarks during implementation of road decommissioning/stabilization activities as long as only one entry in Core occurs per 10-year timeframe and does not exceed one bear year. However, because the existing and in-kind replacement TMRD levels are much better than the BMU standard this temporary increase associated with OLY's watershed improvement work would continue to maintain a TMRD level much better than the BMU standard of 34 percent. All roads currently contributing to Core have done so for a minimum of 10 years and work occurring in each activity area would be completed within a single bear year.

The effect of the proposed harvest and watershed improvement activities to grizzly bears would be temporary disturbance from human/mechanized activities and noise not normally occurring in these areas, especially in areas associated with infrequently used gated roads or barriered roads. This could possibly result in temporary avoidance of such areas until all activities are complete. Temporary road use associated with the watershed work would not last longer than a single bear year within a given activity area and would remain restricted to public motorized use during implementation. The impacts to TMRD are small and result in a maximum temporary increase of 1 percent within the BMU. Expected effects would be short-term, i.e. during activities and for a short time following completion of activities as effects of the action are relaxed. Also, bears would likely avoid these roads during activity and the large blocks of Core located outside the activity areas would continue to provide secure areas for grizzly bears if displaced during activities. Once the improvement work has been completed, roads would be placed in the designated access management condition which generally consists of the re-establishment of barriers for most roads involved. Although two segments of new construction would occur on the landscape, they are re-routes of existing roads that are of similar length and in the same "footprint" of the original routes and their construction would not affect the long-term security of the grizzly bear in the project area.

Motorized Over-Snow Vehicles

Currently there are no groomed routes within the OLY project area and there are no proposals to allow for grooming on these routes. Therefore, OLY's proposed actions would meet the 2015 Forest Plan standard FW-STD-WL-05 which does not allow for grooming of snowmobile routes in grizzly bear Core habitat in the spring after April 1 of each year. The OLY project would not

influence the management of groomed routes located within the BMU but outside of the project area on the adjacent Libby Ranger District.

Watershed improvement work has been proposed on NFSRs 4433 and 4433B and includes both active and passive long-term storage. Historically, portions of these roads have been used by snowmobilers as a route to access the open terrain found within the identified over-snow use area on and around Pulpit Mountain. The proposed active work, primarily the removal of a culvert, would impact snowmobile use in this area because they could no longer cross the stream. Because of the historic and continued use of this road by snowmobilers, storage work would be designed to maintain snowmobile access and existing use of this route. However, snowmobile use is currently allowed through April 30 which extends into the early part of the spring emergence period. To reduce potential disturbance effects to grizzly bears during this period, especially sows with cubs of the year, a forest order would prohibit motorized over-snow use of this road after March 31 to be consistent with the 2015 Forest Plan guideline FW-GDL-WL-01 (see Design Features, Chapter 2).

To accommodate existing snowmobile parking currently occurring on private lands, the construction of a new parking area on nearby NFS lands near the bottom of NFSR 4445 (Lynx Creek Road) has been proposed. Development of the planned parking area would involve clearing a spot approximately ½ to 1 acre in size along the open road. To reduce future disturbance and avoid the additional removal of vegetation for this site, the parking area would be located approximately 0.2 mile up NFSR 4455 on a small flat and would utilize the landing created during harvest of regeneration Harvest Unit 29. Besides construction of the parking area, installation of a bulletin board is the only other activity that is expected to occur with the development of this site. Relocation of the parking area is not expected to increase snowmobile use above existing levels. However, because this parking area provides direct access to the over-snow use area associated with Pulpit Mountain, this route would be included in the forest order prohibiting motorized over-snow use after March 31 to be consistent with the 2015 Forest Plan guideline FW-GDL-WL-01 (see Design Features, Chapter 2). Full development of this site is dependent on securing funding.

Other existing snowmobile use within the BMU would not be impacted by proposed activities.

Managing Habitat to Contribute to Grizzly Bear Recovery

Introduction

Timber harvest, post-harvest fuels reduction, prescribed burn units, and other fuels treatments can affect the arrangement and abundance of vegetation, thus affecting the quality and quantity of food and cover. This, along with the impacts of roads described above, could then influence subsequent use of the treated areas by grizzly bears. Mace and Waller (1997) concluded that grizzly bears in the Swan Mountains of northwest Montana used cutting units as habitat, especially during summer. This likely coincided with the period when huckleberries would be available in older units. Use of cutting units is likely to begin only after about 12 years post-harvest, to peak at some young seral stage, and then to decline in later years. Mace and Waller (1997) found that forested stands were the cover types least used by grizzly bears during all seasons. In addition, Wielgus et al. (2002) found grizzlies selected against interior cedar-hemlock forest types possibly due to the relatively poor food supply compared to other habitat types studied.

The primary purpose and need of the OLY project is to move vegetative characteristics towards desired conditions which would also improve habitat conditions favorable to the grizzly bear within the treated areas. Although occurring on a small proportion of the project area, opening up the overstory while retaining and promoting the development of large, fire and disease tolerant tree species like western larch would provide more structurally diverse and productive stands, stimulate the growth of forage species including huckleberries where present, and emulate ecological processes like fire that have been absent on the landscape (see Forest Vegetation and Fuels Management sections). Also, the reduction in fuel loadings in these areas would encourage lower intensity fire within the stands thereby slowing the spread of fire into adjacent stands and evolving into a severe fire. Although wildfires can be beneficial to wildlife, a severe wildfire occurring on a large number of acres would greatly reduce both cover and forage compared to proposed harvest activities.

Alternative 2 of the OLY project proposes the most vegetation management treatments within BMU 10 at approximately 4,655 acres. Of this, timber harvest would be implemented on approximately 3,008 acres with 949 acres of intermediate harvest and 2,059 acres of regeneration harvest. Additionally, 1,564 acres of prescribed burning and 116 acres of other fuels reduction treatments would be implemented. Proposed treatments and total acres treated for Alternative 3 are similar to Alternative 2, with only a slight reduction of 29 acres in the total acres proposed for treatment. Approximately 54 fewer acres would be treated by regeneration harvest; however, over half of these acres would be converted to a fuels treatment that would achieve some of the desired vegetative conditions for the stand. In comparison, Alternative 4 would treat the fewest acres at 4,166 acres due to the reduction of approximately 505 acres of harvest. For Alternative 4, not only are there fewer acres of regeneration harvest being proposed compared to Alternative 2, fewer acres (about 15 total) would be converted to a fuels treatment as compared to Alternative 3. Table 138 displays the acres of proposed treatment within BMU by alternative.

A combination of underburns and pile burning would be used to reduce existing fuels and slash concentrations after timber harvest. Site preparation and restoring fire frequency to the area would be the goal of the approximately 1,919 acres of prescribed underburns in Alternative 2. Prescribed fire would occur on fewer acres under Alternatives 3 and 4 corresponding to reduced harvests acres under each. Approximately 1,882 and 1,540 acres of underburning would occur under Alternatives 3 and Alternative 4, respectively. Although Alternative 3 is treating fewer acres, the difference is slight (approximately 38 acres) and prescribed fire would occur on approximately 64 percent of the total harvest acres which is the same proportion as Alternative 2. Alternative 4 would apply prescribed fire to approximately 379 acres less than Alternative 2 and 341 acres less than Alternative 3 for approximately 62 percent of the total harvest acres. Alternatives 2 and 3 provide the greatest acres and amount of underburning to maintain and/or improve establishment and growth of characteristic understory vegetation, especially in areas in which is it currently lacking.

Table 138. Comparison of Vegetation Management Treatment Acres within BMU 10 by Alternative. Acre Differences in Parentheses are in Comparison to Alternative 2

Proposed Treatment	Alt 2	Alt 3	Alt 4
Intermediate Harvest	949	946 (-3)	975 (26)
Regeneration Harvest	2,059	2,005 (-54)	1,528 (-531)
Total Harvest Treatments	3,008	2,951 (-57)	2,503 (-505)
Prescribed Burn Units	1,564	1,560 (-4)	1,564 (0)

Proposed Treatment	Alt 2	Alt 3	Alt 4
Other Fuels Units	84	116 (+32)	99 (+15)
Total Fuels Treatments	1,648	1,676 (+28)	1,663 (+15)
Total Acres Treated	4,655	4,626 (-29)	4,166 (-489)

Regeneration harvest is expected to increase the amount of early seral habitat in the action area and would provide increased representation of shrub, forb, and grass species that favor more open conditions. Availability of these types of plants is expected to decline over time as successional changes alter the species composition of the site in the absence of disturbance, but may provide benefits for as long as 50 years on some sites. Huckleberries, where present, may respond to increased sunlight and produce more reliable crops than in a full-shade situation. Intermediate harvest methods, such as commercial thinning, and prescribed burning treatments can also increase production of huckleberries on some sites.

System of Large Remote Areas

As described under the existing condition for "Road Impacts," blocks of Core habitat function as displacement areas for grizzly bears. Several large blocks of Core have been established based on past and current road management in and adjacent to this BMU. By applying FW-STD-WL-02 to proposed project activities, Core habitat would be maintained at or better than the BMU standard (see "Core" discussion). To implement vegetation management in areas that have contributed to Core for at least 10 years, three gated roads that currently allow administrative use would be barriered and placed into Core to compensate for this potential loss of Core elsewhere in the BMU. This in-kind replacement of Core would occur within the two largest Core blocks within the BMU, resulting in a total increase of approximately 631 acres between these two blocks and 13 acres overall within the BMU. In the Pulpit Mountain area, this increase would result in the consolidation of two blocks of Core into one single block. These two largest Core blocks compose approximately 90 percent of the Core found within BMU 10 and provide abundant space for bears to use that is away from roads and experience little if any non-motorized human use. Other large Core blocks ranging from 119 to 1,989 acres in size are found within the BMU that also provide disturbance free areas for bears to use.

Associated with the largest of the Core blocks found within BMU 10 are Flagstaff and Saddle Mountain IRAs and MAs 3, 4, and 5a/5c. These particular management allocations provide non-motorized or limited motorized access during the bear year and these large tracts of unroaded lands provide excellent habitat security, low levels of human disturbance, and largely natural vegetative conditions. Except for one prescribed ecosystem burn Fuels Unit, F1, no other OLY activities would occur within these IRAs or MAs. The prescribed ecosystem burn could result in minimal, short-term and temporary disturbance in the immediate vicinity of the burn; however, the proposed activities would not impact or change the management of these areas related to motorized use or result in an increase in non-motorized human use.

In summary, the OLY project would maintain large remote areas that experience low levels of disturbance and would be consistent with the 2015 Forest Plan desired condition FW-DC-WL-02.

Landscape Connectivity and Local Area Movement

Public concern has been raised regarding proposed management in identified linkage areas. A review of literature provided, including landscape connectivity models and research related to grizzly bears, revealed different methods for assessing potential areas of connectivity or linkage

between fragmented populations (see project file). Landscape scale habitat modeling based on the availability and location of natural habitats versus human developed lands provides a broad view of potential movement areas. Such mapping efforts include the MFWP's Crucial Area Planning System, or CAPS (MFWP 2011), and Western Governors' Association Crucial Habitat Assessment Tool, or CHAT (WGA 2008). However, these efforts are limited in use at the project scale in that they do not provide site specific information regarding actual bear use or vegetation management direction for these areas. Ongoing research by Proctor et al. has been attempting to identify potential linkage areas that could connect fragmented grizzly bear populations. This research is based both on genetic analysis which identified the fragmented populations and patterns of fragmentation (Proctor et al. 2012) and habitat modeling based on known bear locations, human development, and adjacent habitat conditions (Proctor et al. 2015). This latter research identified two potential linkage areas associated with the OLY project that are found along Highway 2 that could help maintain connectivity between the grizzly bear populations in the Cabinet and Yaak portions of the Recovery Zone. These potential linkage areas correspond to two of the three movement areas identified by Geographic Area in the 2015 Forest Plan associated with the OLY project area: near the confluence of the Yaak and Kootenai Rivers (GA-DC-WL-BUL-04 and GA-DC-WL-Yaak-04) and in the area of Flagstaff Mountain (GA-DC-WL-LIB-01). The third movement area identified in the 2015 Forest Plan is in the vicinity of Yaak Falls (GA-DC-WL-YAK-04).

Although results from Proctor et al. (2015) identify potential linkage areas, it does not describe the type of vegetation management that would maintain or encourage use of these areas by bears. Rather, the authors were focused on the human activities occurring in these areas that should be reduced or minimized. Grizzly bears are considered a generalist species in that they can and will use a variety of habitat types and seral conditions. Proctor et al. (2012) and Proctor et al. (2015) found that the barriers to movement and fragmentation of populations "corresponded to settled mountain valleys and major highways" (Proctor et al. 2012) and not to specific vegetative conditions. Those areas identified as potential linkage areas had the least amount of development in the valley bottoms and were associated with the highest habitat scores in both the valley bottom segments and adjacent backcountry areas (Proctor et al. 2015).

In 2008, Proctor et al. (2008) produced a report titled "Grizzly bear linkage enhancement plan for the Highway 3 corridor in the south Purcell Mountains of British Columbia." In this document, they provide a range of recommendations for both private and public entities and include recommendations related to vegetation management such as human access management, seasonal timing restrictions, retention of cover and high quality habitat (such as food sources), and maintenance of seral stages and down woody materials. These are management considerations for all of the District's vegetation management projects whether activities are found within identified linkage areas or not.

Vegetation management treatments proposed in the identified movement or linkage areas would diversify the vegetative conditions found in these areas by trending towards historic range of variability for tree species composition, stand structure and age class distribution, and patch size and pattern (see Forest Vegetation analysis). This diversity would provide a mosaic of forested cover and foraging opportunities which are habitat features that contribute to bear movement through an area.

Flagstaff Mountain

No activities are proposed in the Flagstaff Mountain/Kootenai Falls area of the OLY project. Much of this area is steep and unroaded, and changes to the existing vegetation would be driven

by natural disturbance processes such as wildfire or insects and disease. There would be no impacts to the potential use of this area by grizzly bears to move to the Cabinet Mountains to the south and would be consistent with GA-DC-WL-LIB-01.

Confluence of the Yaak and Kootenai Rivers

The OLY project is proposing vegetation management in the Sears Flat area off of Highway 2 and near the confluence of the Yaak and Kootenai Rivers. For all three action alternatives, proposed management includes regeneration and intermediate harvest and fuels treatments as well as retaining areas that would be left untreated, resulting in a mosaic of vegetative conditions consistent with the desired and historic conditions of the area. This mosaic would provide three general conditions for grizzly bear use: 1) forage opportunities within the more open, early seral habitat types resulting from regeneration harvest, 2) mixed forage and cover within the opened timbered stands resulting from intermediate harvest and fuels treatments, and 3) retention of existing cover found in untreated stands. Except for one to two very small units adjacent to Highway 2, the NFS lands located between the highway and Kootenai River would not be treated.

Alternative 2 would treat the most acres in this area, including approximately 197 acres of regeneration harvest, 108 acres of intermediate harvest, and 53 acres of fuels treatments for a total of approximately 359 acres. This includes the harvest of five small units immediately adjacent to Highway 2, which range from 2 to 15 acres in size and are generally long and narrow in shape that parallel the highway. Untreated stands would be found between these small units and larger treatments to the northeast. Alternative 3 modified the proposed treatments to address heritage resource concerns as well as provide more habitat diversity. For example, a corridor of untreated timber would be left between Harvest Units 33 and 34 in a low area mapped as having a stream. Although no active stream is found here, this low area may have been more likely to survive a low to moderate intensity fire and would provide edge habitat (i.e., area of adjacent cover and forage) between the two regeneration harvest units for wildlife moving through this potential linkage area. With these changes, Alternative 3 would treat approximately 329 acres which is about 30 acres less than Alternative 2. The change in acres is primarily associated with the reduction in the total amount of regeneration harvest. Some change results from the reduction in unit size, but most is due to the conversion to fuels treatments which includes the units found along Highway 2. Changing the harvest treatments to fuels units would achieve some of the desired conditions for vegetation in this area while still addressing other resource concerns. Alternative 4 would treat the fewest acres with a total of approximately 311 acres. This alternative is similar to Alternative 2 except regeneration harvest unit size has been kept to 40 acres or less with some change to fuels treatment. This alternative would not meet the purpose and need of managing for desired vegetative conditions as well as the other two alternatives nor adequately address other resource concerns. All alternatives would maintain movement through this potential linkage area and would be consistent with GA-DC-WL-BUL-04 and GA-DC-WL-Yaak-04.

Two guidelines (FW-GDL-WL-12 and FW-GDL-WL-13) are related to wildlife crossing features associated with highways or high use forest roads. Currently, there are no such crossing features within the OLY project area nor is OLY proposing a change in the condition or use of these types of roads. However, Ament et al. (2014) identified the Sears Flat area within the project areas as an important area of connectivity for wildlife movement. In addition, the report identifies what they determined to be the best mitigation location along Highway 2 as well as the type of preferred structure to use at this site (i.e., an overpass with directional fencing). As described above, OLY's proposed vegetation management treatments in the Sears Flat area would trend vegetation towards desired conditions which would facilitate wildlife use of future crossing features that

may be developed. Therefore, the proposed activities would be consistent with FW-GDL-WL-12 and FW-GDL-WL-13.

Yaak Falls

Harvest is proposed along NFSR 176 (East Side Road) located to the east of the Yaak River and Highway 508 near Yaak Falls. This treatment area consists of regeneration harvest units of variable shape and size, ranging from approximately 15 to 51 acres depending on alternative, which are separated by untreated stands generally associated with streams and riparian habitat. The proposed treatments would result in vegetative diversity in the area, including the creation of edge habitat that provides cover in the untreated stands adjacent to forage opportunities in the treated units. This would facilitate movement from secure, non-motorized areas to the east to the timbered stands along the Yaak River to the west and would be consistent with GA-DC-WL-YAK-04.

BMU 10

Movement areas would be maintained throughout the BMU and activity areas under all alternatives. Within harvest activity areas, these include unharvested and recovered harvest stands adjacent to proposed units and Riparian Habitat Conservation Areas (RHCAs) applied to riparian areas. At a minimum, corridors associated with streams are a minimum of 200 feet wide. The variety of existing habitat conditions and, therefore, variety of proposed treatments on Kilbrennan Ridge and Sears Flat would result in a mosaic of post-treatment vegetative conditions. This mosaic of conditions would facilitate use and movement by grizzly bears by providing irregular patterns of edge habitats and variety of early and mid-seral conditions that would provide both forage and cover.

As described for the existing condition, a movement area consisting of a large contiguous block of Core is available along the eastern edge of the project boundary, generally coinciding with Saddle Mountain and Flagstaff IRAs. Because of past fire history and resultant post-fire vegetation conditions, only one prescribed ecosystem burn unit would occur on the south slopes of Saddle Mountain. This burn would consist of low to moderate intensity fire that is expected to result in minor reduction of canopy cover and a mosaic of burned and unburned ground cover that would improve foraging opportunities in secure habitat; bears may avoid the area for a day or two during implementation. Similarly, proposed watershed work within this Core block would occur along the edges of the BMU near open roads and would be of short duration. Therefore, implementation of these activities would have negligible effects to bear movement and this Core block would continue to provide for grizzly bear movement to the north and south within the BMU, at the Yaak Falls and Flagstaff Mountain areas as discussed above, as well as movement to the north into BMU 11. Other Core blocks located in the southwestern portion of this BMU, separated only by low use recreational roads, provide for movement through the more westerly portions of the BMU. These blocks of Core can facilitate movement to the southwest to the identified area near the confluence of the Yaak and Kootenai Rivers. Project activities are not expected to discourage bear and other wildlife movement or foraging opportunities in these areas.

Summary of Effects to Landscape Connectivity and Local Area Movement

The degree of habitat change is minimal and generally located in human activity areas within the BMU leaving well connected blocks of existing foraging habitat and cover that would not be changed by the proposed treatments. By providing a variety of habitat types and conditions that are consistent with the desired vegetative conditions for the site (see Forest Vegetation section) as well as adhering to FW-DC-WL-02, proposed treatments would facilitate movement within and

between management areas as well as across human occupied areas where NFS lands occur. The OLY project proposes vegetation management consistent with desired vegetative conditions on NFS lands in an area of mixed ownership at Sears Flat. There would be no in change in ownership in this area and proposed management would facilitate potential movement by grizzly bears through this area and be consistent with FW-DC-WL-17. Although there is no mixed ownership within the other potential linkage areas, management would still facilitate movement and be consistent with FW-DC-WL-17. All lands currently under federal ownership will remain so, as OLY does not propose any exchanges; therefore, all alternatives are consistent with FW-GDL-WL-14.

Juxtaposition of Foraging Habitat and Cover

The availability and proximity of cover may influence the use of foraging habitats by grizzly bears. Consideration of historic vegetative conditions and natural disturbance processes when developing vegetation management treatments (e.g., availability of bear foods, size and shape of harvest units, and movement areas) would result in a mosaic of forage and cover habitats similar to what grizzly bears evolved with.

This element of managing habitat for grizzly bear recovery addresses concerns regarding availability of cover in proximity to foraging habitat. Openings of various shapes and sizes as well as remnant patches of cover in wetter sites (e.g., riparian habitats) occurred historically in the project area through natural disturbance processes such as wildfire. Large, stand replacing fires occurred over thousands of acres whereas more frequent, mixed severity fires resulted in smaller patches in the range of 1 to 1,000 acres in size. These smaller patches introduced diversity through stand age, tree size class, species composition, and edge habitats (see Forest Vegetation section). Other disturbance processes such as wind, insects, and disease can similarly introduce stand and vegetative diversity and all are ecological conditions with which grizzly bears evolved with here. Edge habitats can provide unique combinations of cover and a diversity and abundance of forage species that may be beneficial for grizzly bears.

Vegetation Management

Proposed regeneration harvest would occur within two general stand conditions. In the wetter habitat types, the stands have high canopy closure and contain little to no ground, shrub, or small conifer cover in the understory. Although cover is high in these stands, little to no foraging opportunities exist for grizzly bears to use while moving through the area. These stands have also become dominated by shade intolerant species and are lacking in early seral species such as western larch and white pine. Harvest would provide diversity and foraging opportunities in otherwise homogenous areas of cover. In the drier habitat types, regeneration harvest is proposed in Douglas-fir dominated stands experiencing mortality due to root disease or in unhealthy ponderosa pine plantations that were planted with pine from outside of the local area. These pines are not adapted to the local conditions and have experienced poor growth and productivity over the years. Although these unhealthy stands generally provide open grown timber conditions providing both cover and understory forage opportunities, their current condition (e.g., lack of growth and mortality) would not allow for development of large trees and snags which are desired vegetative conditions of the 2015 Forest Plan (see Forest Vegetation section). Treating these stands would meet a purpose and need of the project, address desired vegetative conditions, and improve the conditions of the stands for species such as grizzly bears that utilize open forest and early seral habitats (FW-DC-WL-19).

The effects to grizzly bears include disturbance and potential avoidance of the activity areas; however, this is expected to be limited in units associated with open roads. The change in vegetative structure and composition would likely influence future use of the treated stands compared to the existing condition, although use would continue to be limited in areas near open roads. In the short term, the reduction of cover in these units may affect grizzly use of the stands such as their pattern of movement between Core areas. However, areas of cover would remain adjacent to and within units in the form of unharvested or recovered stands, riparian areas, and retained trees within units. Although bears may possibly change their patterns of use, the treatment area would continue to provide for movement between more secure areas. Long term, harvest would promote diversity within the treated area by creating a mosaic of seral communities (in conjunction with unharvest and past harvest areas). Treatments would provide both cover and forage opportunities and would facilitate use and movement areas where the vegetative condition is becoming a homogenous, high density stand with little to no forage species in the understory.

Regeneration Harvest Units Greater than 40 Acres

Alternatives 2 and 3 propose 32 and 30 regeneration harvest units, respectively, that would create openings greater than 40 acres in size, either on their own or in combination with another adjacent proposed unit. Tree species composition and health is variable among and/or within stands and although categorized as regeneration harvest, a range of overstory structure, canopy cover, and hiding cover would be retained where available. Post-harvest retention would range from few trees per acre to portions resembling an intermediate harvest. In all units, where feasible, retained trees would be grouped together in clumps of 4-12 or more trees especially in those areas with fewer, quality leave trees available. This is intended to better protect the leave trees as well as provide small areas of greater cover for wildlife use, including potential use by grizzly bears. In certain units, topography would provide some additional cover due to the rolling/broken nature of the land. Also, the establishment of forbs, shrubs, and conifers within a few years following harvest would break up the visuals of the harvest units and soon provide increased levels of vegetative cover. Resulting edge habitat totals approximately 102 miles around the perimeter of the units for Alternative 2 and 99 miles of edge habitat for Alternative 3. These alternatives would require Regional Forester approval for the creation of openings greater than 40 acres in size (see Chapter 2 discussion of Regeneration Harvest Units Over 40 Acres).

These large patch sizes and shape mimic natural disturbance processes described above as well as allowing for greater flexibility to work around and maintain features like hardwood patches, wet areas, or patches of leave trees that would increase within stand diversity in the greater cut area boundary. Also, edge habitat would be created along the boundary of the units. Larger unit boundaries are adjacent to different types of habitat (e.g., RHCAs) which were excluded from units, past harvested areas, unharvested areas, and old growth) resulting in different combinations of forested and more open habitats. In the long-term, larger patch sizes would provide more interior forested habitat as these patches go through the successional stages. In addition, variability of vegetation within or along the edge of larger units (e.g., irregularity of edge shape) could provide more forage and cover opportunities during movements through the area whereas availability of forage opportunities created under Alternative 4 would be patchier in nature with more linear edges.

The location of these large openings relative to roads, especially open roads, and season of use may have more influence on the use of clearcuts by grizzly bears than the size of the opening themselves (Mace et al. 1996, Wielgus et al. 2002, Wielgus and Vernier 2003). Large openings associated with open roads are expected to have less and/or conditional use by grizzly bears. For example, bears may use these areas to some extent at night when roads experience little to no

motorized activity or while moving between areas of more secure habitat. Some units are located entirely within the influence of open roads in BMU 10, such as Alternative 2 Harvest Units 14, 18, 20, 25, 42, 43, 61, 68, 70, and 74 and are expected to have limited grizzly bear use currently. However, portions of other units move away from the influence of the open roads or are only associated with restricted roads. Greater use of these latter units or portions of units by grizzly bears is expected now and into the future. Proposed harvest units are found within lower elevation sites that provide spring range for grizzly bears in the Yaak. In an average year, early spring conditions can prevent motorized use on some open roads in the project area for a short period of time. For example, rental use of Yaak Mountain Lookout does not begin until approximately mid-May. Similarly, stretches of bare and wet/muddy roads often end snowmobile use by mid to late April and delays other motorized traffic until mid-May or June on roads such as the Kootenai Face. Although limited, large openings in these areas would improve spring range and foraging opportunities during this narrow window when no motorized activity occurs along open roads. As spring progresses and roads firm up, they will become more accessible to motorized use. But snow melt and green up will also be occurring farther up slopes and begin providing additional foraging opportunities for bears to move into and away from the open roads in the creek bottoms and lower elevation areas.

Harvest unit size, shape, location with respect existing roads and other proposed or past units, and topography of the land influences current and future road use associated with vegetation management activities. In the short-term, the concentration of these larger units in a roaded area would have less disturbance and potential displacement effects during activities for species such as grizzly bears that show a negative association with open roads. In the long-term, there would be fewer re-entries in the area for vegetation management compared to not fully treating stands experiencing disease or lack of growth from trees not suited to the site or in an area with a checkerboard of smaller units such as would occur under Alternative 4. Overall there would be fewer periods of mechanized disturbance to manage the area and less post-harvest administrative road use on restricted roads for associated activities like burning, planting, and pre-commercial thinning.

Edge habitat created by these smaller units in Alternative 4 total approximately 96 miles.

Summary of Effects to Juxtaposition of Foraging Habitat and Cover

Alternative 2 would result in the greatest change towards meeting desired vegetative conditions for the project area which influences meeting the desired improvement in wildlife forage opportunities and habitat diversity while maintaining features such as movement areas. Alternative 3 would treat nearly the same acres as Alternative 2, but would result in a little more diversity of post-treatment conditions due to the implementation of more fuels treatments rather than regeneration harvest treatments on some acres, primarily in the Sears Flat area. Alternative 4 would treat the fewest amounts of acres, less foraging opportunities and edge habitat, and would not achieve the desired vegetative condition for the project area or diversity of conditions grizzlies would have experienced historically.

Maintain/Improve Habitat Suitability with Respect to Bear Food Production

A purpose and need of this project is to promote resilient vegetation conditions by managing towards the 2015 Forest Plan desired conditions for landscape-level vegetation patterns, structure, patch size, fuel loading, and species composition which includes maintaining or improving forage species for wildlife. Huckleberries are an important food source for grizzly bears in this ecosystem (USFWS 1993). Predicted huckleberry occurrence within the OLY project area is

found within the mid to high elevation areas and generally associated with Core habitat. These areas experienced three large wildfires in 1991, 1994, and 2000 which influenced timber cover and availability of forage species, including huckleberries, on a total of approximately 11,875 acres (see Fuels Management analysis). Tree recovery has been slow in some of these burns and they have maintained an early seral condition dominated by grass, forbs, and shrubs that provide forage for bears.

Natural disturbance processes such as this would continue to be the driver of vegetative diversity for stands located deep within Core habitat and/or MAs that limit motorized access and other management activities. Therefore, proposed treatments were not focused on the development and production of huckleberries as forage for grizzly bears because natural processes have already accomplished this in areas where active management, such as prescribed fire, would be feasible to implement. Also, the steep terrain and heavily timbered conditions propose concerns related to safety associated with implementation as well as being able to achieve desired results. Despite limited options, approximately 311 acres of prescribed burn units would occur within Core in all or part of ecosystem burn Fuels Units F1, F2, F12, F13, F19, and F25. These ecosystem burns are intended to restore fire's role as a natural process used to improve the ecological function of a site. The burns are in drier habitat types that would have experienced low to moderate severity fires. Re-introducing fire in these stands would improve the palatability and enhance the quality of the forage produced on these acres and provide improved foraging opportunities for grizzly bears in security habitat. Of these units, ecosystem burn Fuels Units F1 and F19 have been proposed within predicted huckleberry habitat associated with Core. The total for both units is approximately 512 acres; however, actual huckleberry improvement or availability to bears would not be expected on every acre and the benefit to bears would likely occur on fewer acres, especially in the lower portion of Fuels Unit F19. Although limited, both burns would be expected to maintain and/or improve huckleberry conditions within these stands by reducing the tree overstory and allowing more sunlight to reach the huckleberries where it exists, thereby encouraging growth and production. Forage would also be improved on the remaining burn acres although use may be somewhat limited due to their proximity to open roads.

In general, huckleberries are not predicted to occur in the lower to mid-elevation sites where harvest is proposed. However, shrubs have been observed in some of the proposed harvest units and harvest would reduce the tree overstory and allow more sunlight to reach the huckleberries where it exists. This would also benefit other berry producing shrubs and forage species. Huckleberry regeneration takes 10 to 15 years to reach maturity from seed (Barney 1999), yet plants re-sprout after fire. Also, slash burning would create more nutrients for the plants and stimulate growth. Therefore, by opening the canopy and/or applying prescribed underburning, the OLY project could stimulate huckleberry growth where it is found. The greatest potential for huckleberry improvement would be in Harvest Units 18, 20, and 68/68A that are associated with predicted huckleberry occurrence; however, treatments would not be expected to result in a measurable increase to huckleberry growth and productivity within the BMU.

Forage species are currently found within and adjacent to proposed harvest units; however, the occurrence, abundance, and/or productivity of forage species in the proposed units are variable depending on the habitat type and past management. Stands proposed for intermediate harvest generally consist of drier habitat types with developed understories that provide foraging opportunities for bears. Harvest would maintain these open stand conditions and forage species. In contrast, understory vegetation and forage is limited in stands with high canopy closure and dark understory conditions. Regeneration harvest of proposed units in this structural condition would remove most of the overstory cover, resulting in an early seral condition, which would

promote the development of understory species within these stands. Regeneration harvest is also proposed in unhealthy ponderosa pine plantations and disease infected Douglas-fir dominated stands. Although many of these latter stands are currently in open canopy conditions that provide foraging opportunities for grizzly bears, the overall health of the stands has been impaired as a result of past management practices (see Forest Vegetation analysis for more detail). Proposed regeneration harvest would improve the overall health and function which would not only contribute to bear forage but result in an improved habitat condition for other species as well.

Riparian habitats are generally considered to be valuable feeding sites. The proposed timber harvests do not include any riparian harvest and would follow other KNF riparian management guidelines, Montana Streamside Management Act (HB 731), and Inland Native Fish Strategy (FW-STD-RIP-03) guidelines. Burning would not be initiated within RHCAs although may be allowed to creep into these areas under low severity conditions (see Design Features, Chapter 2). Adherence to riparian area standards would ensure protection of the food resources in this important zone and would be consistent with FW-DC-WL-10.

All treatments are designed to meet the purpose and need which is to trend towards the desired vegetation condition for this area which includes the promotion of early seral habitats (e.g., tree species composition and structure), improving resiliency to insect and disease, and restoring fire's role on the landscape. This in turn results in a mosaic of conditions that maintains and improves upon existing forage while increasing forage in areas where is it currently lacking; this is another identified purpose and need of the project. The proposed treatments are consistent with FW-DC-WL-19 which described the desired condition to provide open forest and early seral habitats for those species adapted to or utilize those habitats.

The effects to grizzly bears would be some short-term disturbance and habitat alteration. However, natural disturbances processes, supplemented by prescribed burning, has maintained and/or enhanced mid to high-elevation shrub fields in the OLY project area. Also, proposed harvest would maintain and improve upon the availability of forage within lower elevation habitats for the long-term within the project area. Enhancement of the understory vegetation would contribute to grizzly bear foraging opportunities.

Seasonal Components

In areas with important seasonal components such as spring range, potential disturbance to grizzly bears can be reduced by scheduling proposed major activities, such as timber harvest, to avoid known spring habitats during the spring use period (April 1 to June 15) and known denning habitats during the winter (December 1 through March 31).

Spring bear use occurs in low elevation sites that provide early green up of vegetation as well as winter killed ungulates. In the Yaak, this occurs below about 4,600 feet. All proposed harvest activities, most prescribed burn acres, and some watershed improvement activities are found near or below this elevation and could potentially provide spring bear range in the project area. To minimize potential disturbance and displacement from these areas during the spring period of use, project design (see Chapter 2) has set a timing restriction for implementation of proposed harvest and associated slashing, machine piling, machine fire line construction, road construction/re-construction, or watershed improvement such that the proposed work would avoid the spring bear use period (April 1 – June 15). Along open roads, routine road maintenance activities (e.g., blading, culvert cleaning, brushing, and other activities of a similar nature), loading/hauling of logs, and hand thinning of Fuels Units F7, F8, F18, F20, F22, F26, F29, F31, F32, F33, F34, F35, F36 may occur during this period. Because these activities are similar to those already occurring

off open roads and are completed quickly, they are not expected to result in disturbance or displacement from spring foraging opportunities beyond what is already impacted by motorized use and activity along the open road. Similarly, road maintenance activities may occur on gated roads during the spring bear use period but must be completed within administrative use levels. Maintenance activities in the spring would target post-harvest and haul use that occurred during winter and would address potential run-off and sedimentation into streams. By keeping activity use to within administrative use levels, the level and duration of this activity as well as the potential for disturbance would be limited to the level of use that has been established for gated roads during the spring period in this ecosystem. Therefore, no displacement is expected from these activities and thus allows any sows with cubs to pass that knowledge along to her offspring. This would be consistent with FW-DC-WL-04 that describes a desired condition for all BMUs have low levels of disturbance and displacement to facilitate seasonal use, such as spring use in areas where forage is available.

In contrast to spring bear use, denning occurs at higher elevations with a mean elevation of about 5,571 feet in the Yaak (1,698 meters, Kasworm et al. 2014). Although four active den sites have been documented in the BMU based on collared bear use, the most recent occurring in the winter of 2004-2005, none are found within the project area. However, potential denning habitat is found along the eastern boundary and to the west along major ridgelines. Required winter harvest would occur under all alternatives to protect weeds, soil resources, and/or heritage properties in certain units. Acres of required winter harvest range from approximately 367 to 598 acres within the BMU, which is about 20 percent of the total acres for Alternatives 2 and 3 and 15 percent for Alternative 4. For efficiency, other units may also be harvested during winter due to their proximity to required units. Based on the mean denning elevation and mapped potential denning habitat, all required winter harvest would occur outside of denning habitat. Some bears may den lower than mapped potential habitat, but winter harvest is expected to have minimal adverse effects to denning bears given their location. In general, winter harvest would reduce the amount of harvest related activities occurring within the active bear year due to the low probability of a bear being far from a den during project activities. All or part of Harvest Units 18, 20, and 68, prescribed ecosystem burn Fuels Units F1 and F19, and watershed improvement would occur within potential denning habitat, but outside of the denning season, and would not impact bears during this period. The timing restriction for major activities in spring habitat also covers the spring emergence period (April 1 through May 1) and limits the implementation of most proposed activities during this time. Routine road maintenance and loading/hauling of logs could occur along open roads in or adjacent to potential denning habitat. However, this is unlikely given the elevation and early spring condition of these sites which often still have lingering snow and/or wet and muddy conditions that would prevent such use. Proposed vegetation management treatments and watershed improvement work would result in little to no disturbance in areas of potential denning habitat during the denning or spring emergence periods and would be consistent with FW-DC-WL-04 and FW-GDL-WL-01.

Snowmobile use is an ongoing recreational activity within potential denning habitat in BMU 10. The OLY project has proposed to maintain existing snowmobile access on NFSR 4433 through a design feature associated with road storage activities and construction of a parking area at the bottom of NFSR 4455. The effects of these activities to grizzly bears during the denning and spring emergence periods are discussed under “Motorized Over-Snow Vehicles” above.

Application of Interagency Grizzly Bear Guidelines

Identifying and managing key stressors and trending towards desired vegetative conditions similar to what grizzly bears evolved with would meet the intent of the Interagency Grizzly Bear Guidelines (IGBC 1986) and 2015 Forest Plan direction (FW-GDL-WL-15). The relevant language from the IGBC Guidelines (IGBC 1986) states:

> Management decisions will favor the needs of the grizzly bear when grizzly habitat and other land use values compete. Land uses which can affect grizzlies and/or their habitat will be made compatible with grizzly needs or such uses will be disallowed or eliminated (IGBC Guidelines p. 3).

The IGBC guidelines do not provide a specific definition of "compete" or "compatible," however, the intent of these provisions is made clear by the discussion in the IGBC guidelines regarding Forest Service grizzly bear management policy:

> The FS (Forest Service) will manage habitats essential to bear recovery for multiple land use benefits, to the extent these land uses are compatible with the goal of grizzly recovery.
>
> Land uses which cannot be made compatible with the goal of grizzly recovery, and are under FS control, will be redirected or discontinued. The IGBC management guidelines and objectives, the cumulative effects process, and goals for habitat capability and mortality will be used to guide activities which are compatible with grizzly bear recovery. It is also the policy of the Forest Service to facilitate recreation use in occupied grizzly habitat to the extent such levels or use are compatible with both human safety and grizzly recovery objectives (IGBC Guidelines p. 2).

Thus, it is apparent that the IGBC Guidelines recognize the multiple use nature of National Forest management. Furthermore, it is apparent that land uses which are, or can be made, compatible with grizzly bear recovery do not "compete" even if there is an impact on individual bears. The IGBC Guidelines provide a detailed process for determining compatibility between land uses and grizzly bear recovery which utilizes the consultation process to assist in determining compatibility between proposed land uses and grizzly bear recovery (IGBC Guidelines p. 6).

The determination of compatibility is based on the proposed federal action, not on individual components of such action. This is apparent from the IGBC guidelines which utilize the consultation process to assist in determining the compatibility of proposed land uses with grizzly bear recovery goals. Thus, the relevant consideration in the present case is whether the OLY project, as consulted on with the USFWS, is compatible with grizzly bear recovery goals and objectives. If it is, or can be made compatible, then the land uses encompassed by this project do not "compete" within the meaning of the IGBC guidelines.

Further, the 2015 Forest Plan established goals, desired conditions, objectives, standards and guidelines for its programs to provide for a more consistent interpretation and implementation of the Interagency Guidelines on the KNF. This array of direction should be strived for in all management activities but may be altered on the basis of site-specific needs as determined in the biological evaluation. As discussed in the analysis for key stressors and habitat management, implementation of OLY's proposed actions would be consistent with 2015 Forest Plan direction for grizzly bear management. Therefore, these actions would minimize the potential impacts or

effects of resource competition between bears and humans during the life of the project and would maintain habitat conditions favorable for grizzly bears throughout the project area and the affected BMU.

Reduction of Human/Bear Conflicts and Potential Bear Mortality

This aspect of grizzly bear management is a culmination of addressing and mitigating the key stressors, managing habitat for grizzly bear recovery, and applying elements of the Interagency Grizzly Bear Guidelines (FW-GDL-WL-15). The effects of OLY's proposed activities to these components of grizzly bear management have already been discussed in detail. In summary, addressing the key stressors of attractants and road impacts has the greatest potential to influence and reduce the level of human/bear conflicts and bear mortality. Managing for attractants removes the primary source, i.e. easy food, which would keep a bear within human occupied areas rather than simply moving through. In addition, managing roads reduces the potential for interaction by providing large, secure areas away from human occupation and use. Finally, managing the habitat for a mosaic of vegetation types and conditions based on desired vegetation conditions that provide for areas with low levels of disturbance, movement through human use areas, food and cover, and seasonal habitats improves habitat suitability for the daily, seasonal, and annual needs of grizzly bears on NFS lands.

Effects of Vegetation Management to Human/Bear Conflicts and Bear Mortality

Many of OLY's proposed harvest units are located along open roads and/or near private property. Therefore, harvest unit development was focused on trending the vegetation towards desired conditions appropriate to the site and not identified or designed specifically for grizzly bear habitat enhancement such as promoting huckleberry production. Harvested areas would maintain or increase potential forage opportunities for grizzly bears, but because a portion of many units are located along or within vicinity of open roads the availability of this habitat is limited due to bear avoidance of human use areas. Some spring time use may occur when road conditions are unsuitable for either snowmobile or passenger vehicle use. For example, this may be observed along the Kootenai Face and Yaak Mountain roads. Units along restricted roads and especially harvest areas adjacent to or just within the Core boundary would have greater potential for grizzly bear use due to limited access by humans.

In contrast, all or portions of four larger prescribed ecosystem burn units would occur within Core habitat for a total of approximately 311 acres. This is a minimum estimate of available use as additional burn acres found outside Core but in steeper terrain that limits human access, would also be expected to provide secure foraging opportunities. These burns were identified in areas generally not accessible by roads that would allow harvest treatment and where the introduction of fire alone could maintain the desired vegetation conditions of the site. Two of these burns also have predicted huckleberry occurrence that would enhance grizzly bear habitat, especially within the Core acres treated. Prescribed ecosystem burns would take approximately 10 years to complete as fire would generally be ignited within a small geographic area. Thus, the prescribed ecosystem burns would be spread out through time and space. Burns would be of low to moderate severity and would result in a mosaic of unburned and burned areas that are expected to recover quickly with a flush of growth. This periodic implementation of burning would incrementally provide areas of rejuvenated shrub, forb, and berry growth over the years to improve foraging. This would be in addition to those areas that have burned by wildfire within the recent past. Also, existing forage would continue to be available within untreated areas of secure habitat throughout the implementation period.

Therefore, grizzly bears are not expected to move into and stay in lower elevation habitats, areas of open roads, or around private property located along the west/southwestern portion of the BMU or result in unseasonal or increased use of these areas compared to their normal use. The prescribed ecosystem burn units would provide early successional habitat and foraging opportunities in secure habitat and the availability of secure forage opportunities elsewhere in the BMUs resulting from past wildfire events would minimize the potential for human/grizzly bear conflict as a result of the project. Taking into consideration the status of the habitat components listed above, mortality risk to the bear is generally low throughout the project area. The OLY project would continue to provide low levels of disturbance and displacement that would reduce human/bear conflicts and potential bear mortality while providing for seasonal use and forage. This is consistent with FW-DC-WL-04.

Direct and Indirect Effects by Activity Type

The following discusses the potential effects resulting from the implementation of the proposed activity types, such as the potential for disturbance and avoidance of activity areas by grizzly bears during harvest activities. These activities are often connected to other potential effects to grizzly bears that have been discussed elsewhere. For example, road use associated with timber harvest can affect the habitat parameters of Core, OMRD, and TMRD and these effects are discussed under "Road Impacts."

Effects of Timber Harvest and Associated Activities

Introduction

Timber harvest activities in individual units create a point disturbance as a result of the use of logging equipment, which includes chainsaws, skidders, loaders, cable yarders, or other machinery. These harvest activities typically occur during daylight hours and are concentrated within harvest unit boundaries. Grizzly bear response to logging, associated and/or similar activities, and activity areas is mixed and complex, and individual bears may respond in different ways. These responses are affected by such factors as the bear's sex and age, previous experience and exposure to human activities, topographical relief and features, and differences in habitat quality and diversity. McLellan and Shackleton (1989) investigated the response of grizzly bears before, during, and after mechanical, aerial, and seismic disturbance and found no significant difference in distribution of four bears over 3 years. On a yearly basis, only two of eleven bears showed a significant difference in habitat use. There is potential, however, that the nature and intensity of activities resulting from the OLY project could disturb or displace some bears from the immediate vicinity of harvest units.

Grizzly bears are capable of at least partially habituating to human activities (McLellan 1990) provided the activities are frequent enough and innocuous. It is reasonable to assume that bears would reduce their response to these activities over time. Females who may be displaced from an area during the implementation period at a given location should be able to utilize these areas before and after work occurs, thereby passing along knowledge of these areas to their offspring. A bear subjected to disturbance can choose to remain or move away, but both choices have costs. By staying, stress may increase metabolic expenditures and it may be subject to increased risk of mortality in a conflict situation with humans. By moving, it expends energy in travelling to an alternate habitat that may not be as productive and it may be subject to competition or predation by other grizzlies. The CYE is not considered to be a "high density" population, so the risk of interspecific encounters is considered to be low. The primary impact of displacement is considered to be the energetic cost of moving for a portion of the year and finding alternate food

sources. This effect may be tempered over time if bears can adapt to an activity's level of disturbance.

Human use patterns may also be altered, as logging practices may make grizzly bear habitat more accessible to humans, especially in densely forested areas found in the project area. Grizzly bear use of areas near open roads has been documented to occur less than expected based on availability (Mace et al. 1996, Kasworm and Manley 1990), and more heavily used roads are avoided at a higher rate than lightly used roads (Mace and Waller 1997). Although most roads used in this project already receive some level of motorized use or are in close proximity to such roads, the opening of restricted roads and increased use of open roads would likely result in short-term avoidance of areas proximal to these roads for the duration of activities and for some time after cessation of work as effects of the action are relaxed. For these reasons, suitable habitat free from intense human disturbance (Core areas) is provided to compensate for displacement from activities (see Bear Management Units Map, Map M-19).

Effects of Proposed Timber Harvest

Due to the predominance of gentle terrain found in the lower elevations of the OLY project area, the majority of units would be harvested with tractor skidding methods. On average, an estimated 6 to 8 acres per day could be harvested with the use of a feller buncher. For all alternatives, Harvest Unit 4 is the largest unit that could be harvested during the active bear year. At 172 acres, this unit would expect to be completed in less than 2 months of a single bear year. Some of the smallest units that are less than 10 acres in size could be completed within a single day. In the handful of units found in the steeper terrain, such as along the Kootenai Face, harvest would be completed with a skyline system. Due to the variability when working in skyline units for such things as timber type, contractor and crew, size and location of units (e.g., time to set up, take down, and move), it is more difficult to estimate how long it may take to complete a unit. In general, these units take longer to complete than tractor harvested units and for OLY it is estimated that about 2 acres per day could be completed for each component of a skyline system (i.e., faller and skyline pull of the logs). The largest skyline unit proposed for all alternatives is Harvest Unit 21 at 129 acres. Completing this intermediate harvest unit is estimated to be completed within about 3 ½ months.

In this project area, the timber units are geographically located along the west, southwest, and southern edges of the BMU. Although some of the larger units would take more time, many of the smaller units could be completed within a couple of weeks of activity. Units are generally clustered into groups (i.e., Kilbrennan Ridge, Sears Flat, Yaak Mountain area, and Lynx Creek Flats) and concentrated near open and restricted roads in lower elevation areas of the BMU (see Map M-19). This means disturbances would be isolated to maybe one or two specific areas at a time, leaving a large part of the BMU unaffected by logging activities. Larger units, as described above, would require more time to complete with increased noise and activity and includes motorized equipment moving in and out all day (especially during log hauling) within the unit boundaries. Altogether, these activities would create a pulse effect of disturbance. A pulse effect is defined as a short-term event whose effects are relaxed quickly following cessation of activities (USFWS and NFMS 1998).

Within the BMU, approximately 3,008 acres of timber harvest would be implemented under Alternative 2. Nineteen units, approximately 598 acres or 20 percent of the total acres, would be harvested during the winter (denning) season and would reduce the amount of activities and associated disturbance during the active bear year. The remaining units, approximately 2,410 acres, would be harvested at any time except during the spring bear season (April 1 to June 15).

Similarly, both Alternatives 3 and 4 have required winter harvest in several units. Winter harvest would occur in 14 units, for a total of approximately 542 acres (about 18 percent), under Alternative 3. Approximately 367 acres (about 15 percent) of Alternative 4 would be winter harvested. For all alternatives, more winter harvest may occur due to efficiency and proximity of other units near required units. This would further reduce the potential impacts of displacement and disturbance to grizzly bears during the active bear year. Additionally, a spring timing restriction for timber harvest would protect this important seasonal habitat from disturbance during a time when bears are recovering from the effects of their winter dormant period. Avoiding harvest during this time period also allows sows with cubs to pass along knowledge of those areas to her offspring.

Under all alternatives, less than 3 acres of timber harvest would occur within the Core boundary. Harvest within these areas would be completed in less than 1 day with limited potential disturbance or avoidance effects to grizzly bears. The treatment of only 3 acres is negligible at the BMU scale.

Potential effects, including temporary disturbance and displacement, during harvest activities occurring during the active bear year are likely. However, it is expected that these effects would be short-term during the periods of activity and limited given the units location as mentioned above. The concentration of units located off of or near open roads generally limits effects to areas experiencing relatively low levels, but regular human use during the active bear year. While the location of activities reduces negative effects to the bear, it also limits the availability of foraging opportunities in some areas that would otherwise be beneficial to bears through everyday avoidance of human occupied areas. Given ample Core habitat is available, it is expected that any bears using this treatment area would have opportunities to find alternate habitats with minimal impacts during harvest activities. This would allow bears to utilize most of the affected BMU, including Core areas, which are not experiencing activity (see “Road Impacts”). Due to the relatively small area of BMU 10 affected by proposed harvest, effects would be limited in scope and would not markedly change the ability of the area to support grizzly bears.

Effects of Haul Roads

Changes in access management for proposed activities can affect habitat parameters of Core, OMRD, and TMRD depending on the existing management condition and location of the roads. See the discussion under “Road Impacts” for a description of the roads used for harvest, changes in access management, and the effects of road use to the habitat parameters.

Many of the haul roads used for harvest would occur on roads open to public motorized use or allow limited public use (i.e., access to Yaak Mountain Lookout). This means most activities would occur in areas that already tend to be avoided by bears, or used by bears with some degree of tolerance for human activities. However, to access areas that are currently inaccessible to motorized use and contributing to Core habitat, the OLY project proposes a change in access management. In general, barriered roads used for harvest would become restricted roads that would then be available for current and future administrative use.

Road BMPs would be used during construction, reconstruction, and reconditioning for preparing haul routes and most would occur on existing road prisms. Timing of road work would be in the summer or fall seasons during the active bear year. Therefore, even though many timber harvest units are required to be winter logged, all roads were considered open during project to account for the road work that would occur during a short time of the active bear year.

The effect of road use to grizzly bears would be temporary disturbance from noise and human activities. This could possibly result in avoidance of such areas until all activities are complete. Proposed harvest associated road use would be expected to have minor impacts given the roads' current condition and the existing human activity on or near these roads. The Sears Flat and Kilbrennan Ridge areas are accessed by barriered and/or restricted roads and, therefore, experience no public motorized use. However, the gentle terrain has made these areas easily accessible to non-motorized human use in the past. Therefore, while these areas are more secure than areas along open roads, they still have experienced human presence and activities compared to more remote areas. The large blocks of Core located outside the activity areas would continue to provide secure areas for grizzly bears if displaced during activities. No new roads would be permanently placed on the landscape that would affect the long-term security of the grizzly bear in the project area.

Effects of Post-Harvest Fuels Treatments

Machine piling would occur in many tractor harvest units where existing high fuel loads make them unsuitable for underburning. Post-harvest, the excess material would be piled and burned on approximately 1,088, 1,069, and 963 acres in Alternatives 2, 3, and 4 respectively with the use of an exactor with a bucket and thumb set up (i.e., grapple piling). Piling for slash treatment is generally done in conjunction with harvest activities. However, in some units the slash is piled at a later date at the contractor's discretion, especially in winter logged units if the weather conditions do not permit piling. About 3-5 acres of slash per day could be piled, depending on the amount of fuels and topography. Accordingly, the time spent in a unit for such work depends on the size of the unit and would be similar to those expected for harvest. If piling of winter logged units has to be completed during the summer or fall, an excavator would not require the use of an open road and, therefore, would not affect Core or road densities.

Disturbance and displacement effects to grizzly bears from machine piling would be similar to that expected during harvest activities occurring during the active bear year. It is expected that these effects would be limited to the activity area and season of activity. Units adjacent to open roads would be expected to have minimal additional disturbance to bears compared to effects of the road. Most of the affected BMU would not be experiencing activity and would remain available for grizzly bear use. In addition, all machine piling would take place outside the spring bear season. This would protect the important seasonal habitat from disturbance during a time when bears are recovering from the effects of their winter dormant period. Minimizing the type and amount of mechanized activities during this time period also allows sows with cubs to pass along knowledge of those areas to her offspring.

Prescribed fire is used to reduce existing fuels and slash concentrations after timber harvest. Site preparation and restoring fire frequency to the area would be the goal of the approximately 1,919 acres of prescribed underburns in Alternative 2. Prescribed fire would occur on fewer acres under Alternatives 3 and 4 corresponding to reduced harvests acres under each. Approximately 1,882 and 1,540 acres of underburning would occur under Alternatives 3 and Alternative 4, respectively. Forage production for wildlife would be a benefit of the burning activities. Fire line construction with the use of an excavator is generally done at the completion of harvest activities. However, construction would likely occur at a later date in winter logged units and would be completed within about a week, depending on the size of the unit, during the following season. The harvest units to be burned would occur in spring or fall, dependent on the fuel moisture content, and ignited by hand. Implementation of prescribed fire would be spread out over both space and time. Not all of the harvest units with machine piling or prescribed underburning units would be ignited

at once, due to harvest completion, effects on wildlife, watershed concerns, public concerns about smoke, cost, and limited resources of the fire crew to ignite and control numerous fires at once. It is estimated that the burn management proposal could take up to 10 years accomplish all of the targeted acres. The underburns would vary from low to moderate severity, leaving a mosaic of burned and unburned areas. This would reduce ladder fuels and, similar to some timber harvest, fire can promote forage such as shrub growth and berry production for grizzly bears. Burning within machine piled units would be limited to the created piles. Therefore, some stimulation of understory vegetation would be expected but patchier in nature and scattered throughout units.

The effects of prescribed underburns would include disturbance to bears or other animals from ignition activities (e.g. increased human presence), smoke, and heat. The degree of disturbance associated with burning activities, relative to decreased intensity and duration, is much lower than for harvest, thinning, and piling activities. In comparison, burning would result in a lesser response from bears that may be using the area. Burning would create a short-term disturbance effect that would be relaxed almost immediately and would not be expected to disturb grizzly bears for more than a brief period. Once human activities are finished, and the fire or smoke abates, it is expected that bears and other wildlife would return to these areas relatively quickly as the entire unit would not burn and existing forage would be available. Abundant secure habitat would be maintained outside of the active burn areas during implementation.

Effects of Post-Harvest Soil Restoration

Some proposed harvest units have compacted or displaced soils resulting from past vegetation management activities. In these units the expected soil disturbance, in addition to the existing level of disturbance, could result in post-harvest soil disturbance values of 15 percent or more and would not meet Regional guidance. To improve the level of soil disturbance in these units such that the effects to the soil resource are trending towards either a neutral or net positive impact as compared to currently existing conditions, restoration would be require for those units that exceed 15 percent disturbance. Restoration may involve sub-soiling, re-contouring, and distribution of organic material using an excavator. Sub-soiling typically involves using an excavator bucket with two curved shanks (or similar construction) that could be inserted into the soil to a depth of 20 - 30 inches, lift the soil without mixing, and release the soil to reduce compaction. See the soils section in Chapter 3 for more information.

Harvest Units 51 and 63 would require restoration based on existing disturbance levels greater than 15 percent and would occur following harvest. Units 28, 45B, 48, and 77 are planned to need restoration work based on an anticipated level of soil disturbance that would exceed 15 percent. Post-harvest monitoring is planned for approximately 31 to 36 units to determine the resultant disturbance level (see Chapter 2, Table 28 and Table 29), and likely would occur at least 2 years post-harvest. Currently these units are not planned to require restoration based on expected cumulative disturbance levels. However, because expected levels are close or equal to the 15 percent threshold, monitoring is planned to identify if any of those units exceed the threshold and would then require restoration activities to meet Regional guidance.

Restoration of these disturbed sites would be completed within 3 to 5 years of the completion of harvest activities within the units. Proposed units for restoration work are located off of open and/or restricted roads and work would occur outside of the spring bear period. Activities would only take a day or two per unit to complete with the use of an excavator. This activity benefits soils resources within the units as well as attempting to leave these stands in a more natural condition for the benefit of many resources in the long-term, including grizzly bears. The units are found along or in close proximity to open and restricted roads which reduce the potential for a

bear to be found within the area. Impacts of road use are accounted for in the analysis of the habitat parameters as analyzed above. Additional effects to grizzly bears could be disturbance and avoidance of the area during activities, but are expected to be minor compared to the existing road use and timber harvest and/or machine piling/fire line construction occurring during the active bear year in these areas. Most of the affected BMU would not be experiencing activity and would remain available for grizzly bear use.

Effects of Prescribed Burn Treatments

Approximately 1,564 acres of prescribed fire occurring within ecosystem burns is proposed within BMU 10 for Alternatives 2 and 4; Alternative 3 would be just slightly less at 1,560 acres because of not including Fuels Unit F30. The ecosystem burn units would occur in spring or fall, dependent on the fuel moisture content, and ignited by hand or helicopter. Hand ignition of burn units is always considered first. However, depending on project and burn objectives, helicopters may be more cost and time efficient, logistically practical, and safer for both fire personnel and wildlife by discouraging their presence during ignition. If the latter tool is used, it is expected that only 1 day of helicopter use would be needed to complete a planned burn area. If additional time is needed, helicopter activities would not last more than 2 days per burn season (spring or fall) and would not exceed a total of 4 days of helicopter use per active bear year. Two days per burn area is satisfactory for fire operations as it gives personnel a chance to observe fire behavior and adjust burn prescriptions for weather or fuel conditions. If conditions and resources allow, 2 days would also give the option to complete a low elevation and high elevation burn within a season Also, restricting helicopter use to this time frame helps maintain a short-term event whose effects to grizzly bears would be relaxed almost immediately (USFS and USFWS 2009). Once human activities are finished, and the fire or smoke abates, it is expected that bears and other wildlife would return to these areas relatively quickly.

Bears are known to experience some effects from the use of helicopters. However, effects vary among individual bears and may include simple awareness of the aircraft, escaping to cover, and temporary displacement (USFS and USFWS 2009). Displacement is used to describe under-use of a habitat, rather than complete exclusion or avoidance of that area. Displacement may involve using different parts of the impacted area, using the same areas at different times of the day, as well as avoiding the area during activities (Wilson 2006). For the few prescribed ecosystem burn units located in unroaded areas or have limited association with open roads, use of a helicopter would minimize the chronic displacement effects or mortality risks that road-based operations inflict (USFS and USFWS 2009). Helicopter use involving short duration (≤ 48 hours) and low frequency (few trips) may affect grizzly bears but is not expected to cause injury or interfere with normal behavior patterns (ibid).

Fuels augmentation would occur in eight prescribed ecosystem burn units in order to achieve desired burn outcomes. Slashing of the smaller diameter trees would help mimic the outcome of a naturally occurring low severity fire burning through drier habitat types composed of ponderosa pine and Douglas-fir which would have killed and removed small diameter trees from the understory. The additional ground fuels would also help carry the prescribed fire throughout the understory to achieve the desired low severity fire in these units. Fuels augmentation would occur on approximately 450 acres in burn Fuels Units F2, F4, F5, F11, F12, F27, F28, and F31 and consists of selectively hand slashing conifers less than or equal to 6 inches diameter at breast height by chainsaw 1 to 2 years prior to ignition. Slashing a couple of years prior to the burn allows the slashed material to cure and improve burning conditions within these stands. Approximately 17 acres of Fuels Unit F12 is located within Core habitat which is a negligible

amount compared to the amount of Core found within the BMU. In addition, implementation would not occur during the spring during spring bear season (April 1 to June 15) to protect this important seasonal habitat from disturbance. Fuels augmentation would facilitate burning of the units and stimulate the development of shrubs and other groundcover species in the near future. Fuels augmentation would be expected to have minor impacts to grizzly bears.

Not all of the ecosystem burn units would be ignited at once, due to effects on wildlife, watershed concerns, public concerns about smoke, cost, and limited resources of the fire crew to ignite and control numerous fires at once. Most likely no more than two ecosystem burn units located in close proximity would be expected to be ignited at one time. Larger ecosystem burn units may require ignition in both spring and fall to complete. It is estimated that the burn management proposal would take a decade to accomplish all of the targeted acres. Therefore, implementation of the ecosystem burn units would be spread out over both space and time. The burns would vary from low to moderate severity, leaving a mosaic of burned and unburned areas. This would reduce ladder fuels and, similar to some timber harvest, fire can promote huckleberry growth and production where it occurs (see "Managing Habitat to Contribute to Grizzly Bear Recovery").

The effects of burning in the ecosystem burn units would involve disturbance to bears or other animals from ignition activities (e.g. human presence and/or helicopter noise), smoke, and heat. If helicopters are used, their use is a transitory event that would be spread out over several years and across the project area. The degree of disturbance associated with burning activities, related to decreased intensity and duration, is lower than for harvest activities. In comparison, burning would result in a lesser response from bears that may be using the area. Burning would create short-term disturbance effect that would be relaxed almost immediately and would not be expected to disturb grizzly bears for more than a brief period. Bears would be expected to utilize these areas rapidly after burning as grasses and forbs respond with a flush of young, palatable vegetation. Abundant secure habitat would be maintained adjacent or within close proximity to the ecosystem burn units during activities.

Effects of other Non-Harvest Fuels Treatments

Other non-harvest fuels treatments were identified for a variety of reasons and vary among alternatives. The majority of units initially identified for these treatments are located adjacent to private property where fuels reduction would improve safety to and from the property in the event of a fire, but timber harvest was not feasible due to the types of materials being treated. Some units include stands where prescribed fire was desired but not feasible due to terrain and location of adjacent non-NFS ownership (i.e., ability to hold the fire to NFS lands). Still other units include stands where harvest was initially identified as the desired treatment, but due to other resource concerns treatment was changed to a fuels treatment. Treating these stands as fuels units minimizes or eliminates the potentially negative effects to the concerned resources while still being able to accomplish some of the desired conditions that would have occurred with harvest or prescribed fire. These units are located along or in close proximity to open roads which experience regular motorized use.

All of these units involve the slashing of understory trees with a diameter at breast height of 6 inches or less. Treatment of the resultant ground fuels depends on the amount of trees being cut and other resource concerns, and includes grinding, lop and scatter, and grapple or hand piling where the piles would then be burned. The units are small and range from 1 to 23 acres in size. Depending on who is completing the work, slashing could occur at a rate of 2 to 5 acres per day so even the largest unit would be completed within approximately 2 weeks. Alternatives 2, 3, and 4 proposed non-harvest fuels treatments on approximately 84, 116, 99 acres, respectively.

Although the acres of fuels treatment is greatest for Alternative 3, the additional acres compared to Alternative 2 generally correspond to what would be treated by harvest for Alternative 2. So, similar acres would be treated under both Alternatives 2 and 3 but by different treatment methods (see Table 138). Alternative 4 would treat an intermediate amount of fuels compared to Alternatives 2 and 3.

Effects of implementing the non-harvest fuels treatments to grizzly bears would be potential disturbance during activities. However, the potential for disturbance from these activities is very low due to the short duration for completion and their proximity to open roads which grizzly bears are known to avoid.

Effects of Watershed Improvement (Road Storage or Decommissioning) Activities

Five watershed improvement activity areas are proposed within the project area and BMU 10: Pulpit Mountain and O'Brien Creek (combined), Yaak Mountain, Hummingbird Creek, NFSR 2380 Reroute, and Prospect Creek. Proposed activities target roads that, in most cases, were barriered to motorized use without addressing or anticipating future hydrological issues that ultimately may result in increased sedimentation into streams. These issues include inadequate or failing stream crossings such as culverts, old log bridges, and mass failures. Activities would stabilize the roads and either decommission or place the roads into intermittent stored service depending on future management needs. Design features (see Chapter 2) were identified to minimize the potential effects to the habitat parameters, especially the amount of watershed improvement activities occurring within Core within a given bear year. Storage and decommissioning work in the Pulpit Mountain/O'Brien Creek activity area must occur prior to most harvest or harvest associated road work in order to provide the required in-kind replacement of Core. Harvest may only occur prior to or concurrent with the Pulpit Mountain/O'Brien Creek watershed work in 13 identified units (see Design Features, Chapter 2) that would be accessed via open county roads. Use of these open roads would not impact the habitat parameters of Core, OMRD, or TMRD and would not be expected to result in a noticeable increase in disturbance to grizzly bears compared to the existing and regular use of these roads. Proposed activities taking place on Yaak Mountain would be implemented concurrent with either harvest activities or associated road work occurring on Yaak Mountain. The proposed Hummingbird Creek work could not occur until harvest activities have been completed. In general, each of the activity areas proposed for watershed improvement work is located within separate Core blocks and would be completed within a single bear year. Activities would be finished as huckleberries and other late berry producing shrubs become available for bear forage opportunities. Implementation of the Prospect Creek and NFSR 2380 Reroute work could occur at any time because they would not result in an impact to the habitat parameters due to their location and association with open roads. For details regarding the specific roads proposed for storage or decommissioning and potential effects to the habitat parameters in BMU 10, please see the discussion of effects under "Road Impacts."

Watershed improvement activities create moderately intense, localized disturbance along existing road prisms. Generally the roadway is cleared of existing vegetation, culverts are removed and channels reshaped, and the road prism restored to more natural conditions. Culvert removals vary based on the size of the pipe and depth of fill, but average about 1 to 2 days per culvert to remove the pipe and associated fill material and reshape and stabilize the channel. Work would occur between July 1 and September 30 depending on the location and type of work proposed. Work planned in bull trout watersheds would have to be completed within a shorter timeframe, from

about July 10 to August 31. This includes work periods as short as 1 to 2 weeks or as long as 8 to 10 weeks using excavators, dozers, and pick-up trucks for the larger activity areas. A smaller activity area, like the proposed work on Yaak Mountain, may require as little as 1 to 4 days to complete the planned work. Legally, the roads would not be open to public motorized use during operations but would not be barriered during activities. However, the construction activity and rough condition of the road deters public motorized use of the roads during implementation. Upon completion of activities, all roads would be effectively barriered to motorized use. For currently barriered roads, earthen barriers (berms) would be placed in the same locations as they were prior to the watershed improvement work. For gated roads that would be stored to provide in-kind replacement of Core, berms would be placed at or near the beginning of the road where it would provide an effective barrier to motorized use.

Bear activity has been documented in BMU 10 (e.g., Kasworm et al. annual reports). As described above under "Effects of Timber Harvest and Associated Activities," grizzly bear response to a new activity is expected to be variable by bear. However, research has documented that responses to different types of activities, including mechanical activity, can be minor during activities with normal use of the areas shortly following the completion of activities. Also, bear avoidance of roads has been documented in the Cabinet Mountains (Kasworm and Manley 1988), and it is expected that some degree of disturbance and avoidance would occur during watershed improvement activities. The degree and magnitude of displacement and disturbance is difficult to quantify and is influenced by a number of factors including the sex and age of the bear, past experiences, topography and cover in the area. This disturbance may result in a greater response by bears using areas that have been traditionally barriered to motorized use during the active bear year. For example, sudden disturbance in a previously undisturbed area may elicit a stronger flight response than might be expected from activities along an open road. However, the proposed road work is either concentrated within discrete drainages or on relatively short lengths of road located near the edge of the Core boundary. Large blocks of undisturbed Core habitat that provide excellent displacement areas would be available adjacent to the proposed work. Impacts to Core in any one year associated with this work represents no more than 1 percent of Core habitat within the BMUs, slightly less if considered for an entire home range represented by a BMU. It is likely that bears displaced during watershed improvement activities could find alternate habitats within their normal home range and would not require compensation for the disruption of normal activities during a portion of the active bear year. A female grizzly bear that may be displaced from an area for a maximum estimate of 10 weeks during a given work period is expected to be able to utilize these areas before and after work occurs, thereby passing along knowledge of these areas to her offspring. Because of the required and identified timing restrictions for implementation of these activities, the potential impacts to Core and grizzly bear use of the Core area would be spread out both in time and space. Also, huckleberries are predicted to occur throughout much of the mid to higher elevations, so it is unlikely that displacement from these drainages would limit a bear's ability to find food during the peak of huckleberry availability.

Potential effects to bears from this type of activity are generally assumed to be similar to those expected from harvest activities. The short-term opening of a road to administrative traffic only would likely displace bears from the immediate vicinity of the road during project operations and temporarily reduce the amount of undisturbed Core habitat available to the bear in the action area. Also, road densities would increase temporarily for Pulpit Mountain/O'Brien Creek and Hummingbird Creek activity areas (see Table 132). However, it is assumed that disturbance effects would not linger and that bears would likely return to these areas shortly after activities cease. Should temporary displacement of an individual occur, there would be no expected increase in mortality risk associated with encounters with other bears or humans.

Decommissioning of approximately 12.8 miles of road in the project area includes permanent removal of roads from Core and would no longer be available for future motorized use. Effects of watershed improvement activities would be the same for all alternatives.

Funding Dependent Resource and Recreation Improvement Work

The list of activities found in Chapter 2 includes a variety of identified potential resource improvement activities that could occur within the timber sale boundary, but are dependent upon available funding and are not required elements for project implementation. The proposed activities fall into one of four categories: post-harvest management, routine road maintenance, recreation improvements, and watershed improvement activities.

Post-harvest activities include inter-planting of trees, girdling mistletoe infected western larch, monitoring, landing rehabilitation including decompaction and seeding, weed spraying, and piling of harvest generated non-saw materials outside of gates to make it publicly available for firewood. Treatment areas would be accessed or occur along open roads or restricted roads under administrative use levels. Individuals or small crews would complete work within units with low levels of activity for a short period of time. Routine road maintenance on open roads, including brushing, surfacing, ditch cleaning, culvert replacement, and surface cross drainage on open NFSRs 4429 and 4445 would include mechanized equipment and a short period of increased activity in work locations. All of these potential activities would result in a temporary increase in activities and possible disturbance and avoidance of the activity areas. However, these effects are expected to be minor compared to the existing condition given the nature and location of the activities.

Proposed recreational improvements would occur at existing recreational sites such as campgrounds, trails and trailheads, and associated access roads. Kilbrennan Lake Campground is identified as MS-3 lands where grizzly bear presence and factors contributing to their presence will be actively discouraged. This campground is a popular destination and experiences regular human activity, especially for summer recreation; there are no documented observations of grizzly bears in the immediate vicinity of the campground. Improvements at Kilbrennan Lake Campground include replacing the existing native material boat ramp either with concrete or a floating structure. Trail improvements include the improvement of a portion of tread and one stream crossing on along Trail 196 in the Arbo Creek area (see “Road Impacts” and “Effects of Watershed Improvement Activities” associated with Prospect Creek). Trailhead improvements include the installation of signs and potential widening of existing trailheads for trails #43 China Rim, #366 Pulpit Mountain National Recreation Trail, #709 Pulpit Ridge, and #706 Skyline Ridge. The potential widening of trailheads would occur as part of road maintenance and includes brushing within the general footprint of the existing site to clear small tree and shrub growth along the edges where possible. Similarly, the creation/improvement of turnouts has been proposed for two access roads that would occur as part of routine road maintenance in areas where an opportunity already exists (e.g., existing small turnouts or wide spots in flat and open areas). On the Kilbrennan Lake Road, blading and/or brushing would widen existing turnouts where possible to better allow for vehicles to pass in the congested area along the shoreline. Because of the narrow shoreline, the ability to widen the turnouts is limited and there would only be minor changes to the existing condition in this area. This improvement activity is also proposed along NFSR 4429, Pulpit Jeep Road. The existing road is narrow with limited opportunity to pass an oncoming vehicle and the provision of some small turnouts would improve the safety for users of this open road. All of the recreational sites proposed for improvements are on or accessed by open roads and none are expected to result in a change in the existing type or

level of human use in these areas. Bear proof dumpsters and food storage boxes have been installed at the campground and the pack-in/pack-out policy would continue to be enforced at the other sites to minimize the potential for attractants and human-grizzly conflict in these areas.

Implementation of the majority of the proposed watershed improvement work is funding dependent and includes the activities in the Yaak Mountain, Hummingbird Creek, Prospect Creek, and NFSR 2380 Reroute activity areas. The proposed work in the Pulpit Mountain/O'Brien Creek activity area is required in order to provide the in-kind replacement of Core for proposed harvest; implementation of this work would occur prior to the implementation of most harvest activities or related roadwork. The effects of these activities to grizzly bears are discussed under "Road Impacts" and "Effects of Watershed Improvement Activities."

Activities Outside of the Recovery Zone – Troy Polygon

For all alternatives, all or a portion of four timber harvest and seven fuels treatment units lie in an area outside of BMUs known as the Troy Polygon. Approximately 61 acres of improvement harvest, 57 acres of regeneration harvest, 41 acres of underburns, and 26 acres of other fuels treatments is proposed for Alternatives 2 and 3. Except for an approximately 16 acre reduction in regeneration harvest acres (41 acres total), Alternative 4 is the same as Alternatives 2 and 3.

All but two roads used for access or as haul roads for these activities are open to public motorized access. Harvest Units 1 and 4 and Fuels Unit F22 would use restricted road 9915 and NFSR 14309. Although these roads are found outside of the BMU, they are within calculating distance of BMU 10 for assessing OMRD and TMRD. The use of these roads contribute to the increase in OMRD by 1 percent during harvest activities; however, the effects to OMRD from road use in this area is negligible and the change in OMRD is driven by road use occurring in the larger activity areas within the BMU like Kilbrennan Ridge, Sears Flat, and Yaak Mountain. Using NFSR 14309, which includes a new re-routed segment of road found within the Troy Polygon, could affect TMRD. However, this potential effect was offset through the in-kind replacement of Core; there would be no change to TMRD from this activity.

Because the Troy Polygon does not have documented recurring use by grizzly bears, management opportunities for the recovery of the grizzly bear are limited. Many of the proposed treatments are found along the edge or overlap the Troy Polygon/BMU boundary meaning there could be potential for proposed activities to result in the disturbance of a bear in the adjacent BMU. However, these units are located off of open roads and/or in areas associated with frequent human use (e.g., homes and the Troy Shooting Range), and it is unlikely that disturbance or displacement would occur from these activities compared to existing activities and levels of human use in these areas.

Funding dependent recreational improvements are proposed for the Alvord Lake day use site within the Troy Polygon. Proposed activities are intended to meet Americans with Disabilities Act (ADA) standards through improvements to existing access routes and trail on the northwest side of the lake. Improvements include paving a portion of the Alvord Lake trail to the Outdoor Classroom and possibly just beyond to the dock. This day use site is located within the interior of the Troy Polygon and surrounded by private property and corporate timber lands. Therefore, the proposed activities are not expected to affect grizzly bears at this site.

Cumulative Effects

The "Existing Condition" section describes relevant past and present factors affecting the existing habitat conditions in BMU 10. This Cumulative Effects section summarizes the past actions as well as further describes ongoing and other reasonably foreseeable contributions potentially impacting grizzly bear habitat and mortality.

Spatial and Temporal Context for Cumulative Effects Analysis

As described under the section "Spatial and Temporal Context for Effects Analysis," the affected BMU was chosen as the appropriate scale for grizzly bear cumulative effects analysis. In summary, 1) the BMUs are biologically meaningful to grizzly bears, 2) provides consistent boundaries for management and monitoring, 3) allows for analysis without minimizing activity effects, and 4) majority of Core areas are not experiencing activities and would remain available for dispersal (see Bear Management Unit map, M-19). Therefore, BMU 10 was chosen as the appropriate scale for cumulative effects analysis.

Temporal boundaries for the grizzly bear analysis include both short-term and long-term effects and were also described under "Spatial and Temporal Context for Effects Analysis." Short-term effects are those that are expected to last between a few days to a season or portion of 2 seasons, such as a bear moving back into a treatment area once the disturbing activities have been completed. Long-term effects are those that expected to last longer than a season or 2 and may include the maintenance of understory forage species through proposed treatments or changes in access management.

Past, Present, and Reasonably Foreseeable Activities Relevant to Cumulative Effects Analysis

Past Actions

The primary measure of habitat availability and quality is related to the amount and arrangement of roads on the landscape. Table 128 of this analysis summarizes the existing condition based on effects of past road construction and subsequent access management (e.g., decommissioning, storage, and gating of roads) as they relate to grizzly bears. Harvest has occurred in the project area since 1930 and has provided some variety of age classes and successional stages across the project area. In some cases, past harvests provided habitat conditions favorable for huckleberry production and other forage for grizzly bears and big game. Harvest units over 15 years old now generally contribute to cover for grizzly bears. Historically, natural disturbances such as wildfire resulted in a mosaic of habitats and forage conditions. Detailed description of previous vegetation management activities are found at the beginning of Chapter 3, including Table 32 and Table 33, as well as Appendix F of this document.

Activities affecting grizzly bear habitat have changed in recent years. Open road densities have dramatically dropped in the past several years as a result of restricting/reclaiming roads through decisions intended to facilitate grizzly bear recovery. Since the 1990s, application of Forest Plan direction has resulted in the better protection of riparian and seasonal habitats. More recently, vegetation management treatments are designed to trend vegetation towards the desired conditions including a greater proportion of early seral habitats, an increase in patch size and distribution, retention and development of desired tree species, etc. that would provide both greater foraging opportunities and cover within the same area. In contrast, fire suppression since the early 1900s has altered stand structure resulting in more homogenous stands with greater

canopy closure in some areas, which has in turn reduced huckleberry and other berry production on some sites.

Alternatives 2, 3, and 4 – Ongoing and Reasonably Foreseeable Actions

Reasonably foreseeable actions include those federal, state, or private activities that are ongoing or scheduled to occur, independent of this federal action. Table 34, located at the beginning of Chapter 3, identifies those current and foreseeable actions in the project area that were determined to be appropriate for inclusion in the analysis of environmental effects.

Actions on Forest Service Lands

The 2015 Forest Plan has a desired condition for increased use of natural, unplanned wildland fire to meet resource objectives which includes trending vegetation towards the desired condition and serving other ecosystem functions (FW-DC-FIRE-03). Under the right seasonal conditions, those natural wildland fires allowed to burn within more remote areas of the OLY project area (e.g., large Core blocks, backcountry MAs or IRAs) would create mosaics of forage and cover within secure habitat in addition to what has been proposed under this project and would benefit grizzly bears by maintaining open conditions for huckleberries.

A district wide thinning project of previously harvested units (Timber Stand Improvement 2010-2015) would occur within grizzly habitat within the project area. Approximately 592 acres of pre-commercial thinning and daylighting treatments are found within the project area BMU. These units provided foraging habitat following harvest, but are or becoming areas of increased cover with reduced foraging opportunities. Planned units would be accessed via open or restricted roads and possibly by foot; restricted road use would not exceed administrative levels. Work would be completed by hand through the use of chainsaws within a short activity period. The effects to grizzly bears may include short-term disturbance and avoidance of the immediate area during activity, but they would be expected to continue using the stands during inactive periods such as nights and weekends as well as following completion of the thinning work. There would be no effect to the habitat parameters of Core, OMRD, and TMRD. Cumulatively, effects would be minor. Although thinning of conifers may result in a low level of temporary disturbance, thinning would continue to provide open space for shrub and other understory vegetative growth and productivity (foraging opportunities) within the stands for a greater length of time.

One small post and pole sale, totaling approximately 20 acres, has been planned with the BMU. Harvest of pole sized trees less than 7 inches diameter at breast height would occur in an open timbered stand through the use of a chainsaw and skidded to the road with a ground cable. The unit is small and located along an open road and the activity would be similar to firewood gathering. The potential for disturbance to grizzly bears is minimal and activities would likely be completed before OLY activities begin. Therefore, the potential for cumulative effects with the OLY project would also be minimal.

There are several small mining and suction dredging claims within the project area as well as two free use rock picking sites. Access to these permitted sites is via open roads or by foot. Therefore, there are no effects to habitat parameters and the potential for disturbance is low and similar in nature to general public recreational use of the forest. Cumulatively, potential disturbance effects of these activities in addition to OLY's proposed activities would be minimal.

There are no other reasonably foreseeable federal activities planned that would change the magnitude or scope of effects described above.

Public Actions on Forest Service Lands

With population growth and development, it is reasonable to assume that some corresponding increase in human use of NFS lands is likely to occur. This increase is likely to be gradual and incremental, and tend to be focused on areas along or near roads open to motorized traffic. Bears may, over time, experience more frequent disruption of their daily activities if they are in proximity to roads, though as discussed earlier, these areas receive proportionately less use by bears than more secure (Core) areas. In addition, scattered cross country use or non-motorized use on other roads or trails may also increase slightly but is expected to continue to occur at a low level within the BMU. With this increase in human use comes the potential for an increased occurrence of grizzly bear mortality. OLY's proposed activities may result in a shift in use of non-motorized use areas due to clearing of vegetation associated with harvest; however, these activities would not encourage an increase in public motorized use as no new roads would be opened for public use. In addition, continued enforcement of the Forest's Food Storage Order would minimize the potential for human-grizzly conflict associated with attractants. A slight increase in recreational use for the project area would not appreciably change the condition for bears compared to the existing open road use. Cumulatively, the potential for an increased risk of mortality to grizzly bears associated with recreational use of the project area and implementation of the OLY project is negligible.

The relationship to this project of increased recreational use of the area centers on the potential for illegal shooting of grizzly bears. Currently, three outfitters are permitted to operate with set service days for this area. Areas used by the outfitters and other hunters may change as roads currently barriered due to vegetative growth are cleared; however, access would continue to be by non-motorized means as no new roads would be opened for public motorized use during the active bear year and exposure to humans would remain low. Levels of hunting pressure and potential for mistaken identity would not be expected to increase and the hunters must complete and pass the bear identification test in order to receive their license. Known mortalities have not been associated with outfitting operations and adherence to the Forest's Food Storage Order is condition of the outfitter's permit. Cumulative effects would be expected to be negligible related to increased recreation and no expected increased risk of mortality to grizzly bears associated with the outfitter operations. Hunting activities within the project area would cumulatively contribute to minor, short-term disturbance effects during the bear hunting seasons which would vary with specific area use and activity levels. There would be no change to the availability of Core habitat or road densities. Therefore, mortality risk and potential cumulative effects to grizzly bears would remain low within BMU 10 during project implementation.

Actions on Private Lands

Growth and Development

Approximately 13,833 acres (approximately 20 percent) of the project area is privately owned, including small landowners, State lands, and private timber company lands, with the heaviest concentration within the Troy Polygon and along the western boundary of BMU 10. Additional non-NFS lands are found within BMU 10 outside of the project area near Libby, Montana. Logging, land conversion, and development can contribute to species displacement, habitat alteration and/or change of suitability, changed forage availability, potential for conflicts due to attractants, and potential hunting pressure. Access through road construction and management has increased road densities and reduced security habitat.

Continued development of private land in the OLY project area is expected. Although considered basically unsuitable for grizzly bear occupancy, these private lands can contribute to the risk of grizzly bear mortality if landowners do not properly dispose of trash and manage pet and/or livestock food sources. Any additional cumulative effects to grizzly bears would be partially dependent on the duration of use (seasonal versus year-round) of these parcels and homes. Anticipated effects include species displacement, habitat alteration, and/or habitat loss. Within the BMU 10 portion of the project area, the majority of the private lands are composed of timber company lands recently placed into a conservation easement, other conservation lands, and some State lands. Future development and road construction on these lands would be limited to those activities consistent with land management which would help maintain the existing condition for grizzly bear habitat parameters within the BMU. Therefore, future development opportunities within BMU 10 are limited to the approximately 1,118 acres, or 2 percent, of the project area owned by small landowners. In general, additional habitat alterations on these lands would be minor compared to the amount of Core habitat available on NFS lands. Also, many of the activities that may occur on the private property parcels can only be estimated and all activities are outside the control of the Forest Service. Development and road construction on the private parcels located in the potential linkage area would be expected to impact the effectiveness of the general area for bear movement. However, the OLY project would not result in a change in NFS land which would remain within Federal ownership in this area or result in the development of structures or roads and OLY would maintain habitat for movement within this linkage area. Cumulatively, the expected effects of potential development and human use of private lands would be minor as the majority of private lands would not be developed, other private property makes up a relatively small portion of the BMU, growth is slow, and NFS lands would remain forested and provide forage, cover, and security areas for grizzly bears.

Stimson Lumber Company's Proposed Road Construction and Timber Harvest

Stimson has proposed to harvest approximately 216 acres of their timbered lands located at the top of Yaak Mountain. The existing road ends at the Stimson and NFS lands boundary and access to the proposed harvest area would require the construction of approximately 1.6 miles of road of which approximately 0.2 mile would cross NFS lands. Construction and use of this proposed road segment would be a Forest Service permitted activity based on approval. The direct effects of this activity were discussed under the "Alternatives 2, 3, and 4 – Direct and Indirect Effects" section of this analysis. The primary potential effect of this permitted activity to grizzly bears is cumulative impacts to the habitat parameters; cumulatively, this new road construction could negatively impact grizzly bear habitat parameters. However, the type and level of impact depends on the road's location compared to existing roads, timing of activities with OLY's activities, and provision for the in-kind replacement of Core. Other cumulative effects to grizzly bears include an increased duration of potential disturbance on Yaak Mountain.

To reduce potential cumulative effects to the habitat parameters, especially OMRD, during the active bear year project design specifies timing restrictions for implementation of Stimson's proposed activities with OLY's proposed activities (see Design Features, Chapter 2). OLY's in-kind replacement of Core would occur prior to any other harvest related road work or use could occur within the project area. Therefore, Stimson's in-kind replacement of Core is compared to OLY's in-kind replacement habitat parameter values in Table 139 rather than the existing condition. To minimize cumulative effects to OMRD, the implementation of the Stimson's proposed activities could not occur until OLY's harvest and watershed work has been completed on Kilbrennan Ridge and Yaak Mountain nor during the implementation of the Hummingbird Creek watershed improvement work. Table 139 and Table 140 do not display cumulative effects

for the OLY activities that would have already been completed based on timing restrictions or do not impact the habitat parameters.

Table 139. Cumulative Effects to Grizzly Bear Habitat Parameters in BMU 10 from Proposed Stimson Road Use with OLY's Harvest and Watershed Improvement Work: Existing Condition, During, and Post-Project Levels

Habitat Parameter (Standard %)	OLY's In-Kind Replacement of Core	Stimson's In-Kind Replacement of Core[1]	Harvest[2,3]	Hummingbird Creek Watershed Work[2]	Post-Project[2]
Core (≥ 52%)	54	54	54	54	54
ORMD (≤ 44%)	43	44	44	43	43
TMRD (≤ 34%)	26	26	26	27	26

[1] As compared to OLY's proposed In-Kind Replacement Condition.

[2] As compared to Stimson's In-Kind Replacement Condition.

[3] Calculations do not include harvest activities on Kilbrennan Ridge or Yaak Mountain which would have been completed.

Effects to Core includes the splitting of a single Core block of 1,780 acres into two Core blocks with a potential loss of 371 acres of Core to the north and along the west side of Yaak Mountain (see Table 140). Although this Core block would be split by this activity based on the definition of Core (located 0.31 mile from open or gated roads), the terrain along the west side of the mountain is steep and difficult to access by humans. It is likely that much of this area would continue to serve as secure habitat and facilitate movement to the north and south for grizzly bears following the completion of activities. However, to compensate for the potential loss of Core, Stimson would effectively barrier four of their restricted roads on the south face of Yaak Mountain (roads 4407A, 4407C, portion of 4407E, and 9905) and part of one restricted road near Hummingbird Creek (road 9909) prior to the new road construction to place these areas into Core for a minimum of 10 years. Because the location of the installed barriers on three of these roads would be at the beginning of a contained road system, all roads located behind the barrier within these systems would also be effectively barriered. Therefore, an additional six roads (roads 14115, 9905A, 9905B, 9905C, 14369, and 9909B) would also be barriered to motorized use and would contribute to Core. This compensation of Core would be a requirement of the permit that allows for road construction and access across NFS lands and would ensure the Forest Service's responsibility to be in compliance with FW-STD-WL-02, without further limiting public access on NFS lands. Implementation of Stimson's in-kind replacement of Core would result in the creation of 372 acres of Core, including 221 acres on the south face of Yaak Mountain, for a net increase of 1 acre. Table 141 is a summary of the cumulative change in Core acres from the completion of both projects displayed as incremental changes based on timing of the projects' activities. Cumulatively, there would be an overall increase of approximately 14 acres within BMU 10 at the completion of both projects. Although this is an improvement, this increase is negligible at the scale of the BMU and would not result in a change in Core percent. The new road constructed for access and harvest on Stimson lands would remain gated following the completion of harvest activities and Core percent would be maintained within BMU 10.

Table 140. Cumulative Effects of Proposed OLY and Stimson Activities to Core Blocks and Acres; Acre Difference in Parentheses

BMU	Core Block	OLY's In-Kind Replacement of Core	Stimson's In-Kind Replacement of Core[1]	OLY and Stimson Harvest[2]	OLY's Hummingbird Watershed Work and Stimson Harvest[2]
10	9	45	45	45	45
10	16	1,989	2,139 (+150)	2,139	1,621 (-518)
10	17	1,780	481 (+221)[3]	481	481
10	17A	NA	1,150 (-371)[3]	1,150	1,150
10	18	4,383	4,383	4,383	4,383
10	19	42,576	42,576	42,576	42,576
10	**All Blocks Total**	**52,265**	**52,266 (+1)[4]**	**52,266**	**51,748 (-518)**

[1] As compared to OLY's proposed In-Kind Replacement Condition.

[2] As compared to Stimson's In-Kind Replacement Condition.

[3] Stimson's proposed road location splits Core block 17 into two blocks of Core.

[4] Calculation of the overall change in Core is 1 acre more than looking at the sum of the parts for Core blocks 16, 17, and 17A; this is due to rounding differences during calculations.

Table 141. Summary of Cumulative Post-Project Change to Core Block and Acres from the Completion of both OLY and Stimson Proposed Activities

BMU	Existing Condition	OLY In-Kind Replacement[1]	OLY Post-Project[2]	Stimson In-Kind Replacement[2]	All Post-Project[1]
10	52,258	52,265 (+7)	52,271 (+6)	52,266 (+1)	52,272 (+14)

[1] As compared to OLY's Existing Condition.

[2] As compared to OLY's In-Kind Replacement Condition.

Stimson's construction and use of the new road for harvest would cumulatively impact OMRD within the BMU if their activities were to occur at the same time as some of OLY's proposed activities. To avoid this cumulative increase and be consistent with FW-STD-WL-02, the design features described above (also see Design Features, Chapter 2) have been identified that restrict timing of their construction and use in relation to the implementation of OLY's activities. With adherence to the design features, OMRD would cumulatively increase by 1 percent to 44 percent during road construction and subsequent use of the road for harvest (see Table 139). Therefore, this potential 1 percent increase would maintain the OMRD level at the BMU standard during implementation which would return to the OLY in-kind replacement condition of 43 percent post-activities. This is the same expected increase if either Stimson or OLY were the only activities occurring within the BMU (see Table 131). Because the implementation of OLY's Hummingbird Creek watershed improvement and Stimson's proposal could not occur at the same time, there would be no cumulative effect to OMRD. The new road constructed for access and harvest on Stimson lands would remain closed to public motorized use during implementation and would return to the designated access management condition (i.e., gates closed) once activities have been completed (see Access Management Plan, Appendix E).

New road construction has the potential to negatively impact TMRD. However, the proposed in-kind replacement of Core also compensates for the potential increase in TMRD within BMU 10. Cumulatively, there would be no effect to TMRD from implementation of this activity or the subsequent use for harvest and TMRD would remain at 26 percent (see Table 139). Implementation of OLY's Hummingbird Creek watershed improvement work would result in an increase in TMRD by 1 percent to 27 percent which is well below the standard of 34 percent. Because of the compensation of TMRD within the BMU associated with Stimson's proposed in-kind replacement of Core, there would be no cumulative increase in TMRD associated with the Hummingbird Creek work even if it were to occur after Stimson's activities (see Table 133 and Table 139). The new road constructed for access and harvest on Stimson lands would remain gated following the completion of harvest activities and Core percent would be maintained within BMU 10.

The potential for disturbance to grizzly bears within BMU 10 is reduced due to the generally concentrated area of activity on Yaak Mountain which is also the site of a popular Forest Service rental lookout. Therefore, the majority of the access for Stimson's proposed activity already experiences regulated but regular human use. The primary effect of the proposed road construction and harvest to grizzly bears utilizing the area would be temporary disturbance from human/mechanized activities and noise not normally occurring in these areas. This could possibly result in temporary avoidance of such areas until all activities are complete and expected effects would be short-term, i.e. during activities and for a short time following completion of activities as effects of the action are relaxed. Road construction and use associated with timber harvest would last approximately 1 to 2 seasons within the activity area. Cumulatively, this duration of activities would be in addition to the expected 2 years of activity associated with OLY's proposed management. A condition of Stimson's permit would be that no road construction or haul on the NFS portion of the road could occur during the spring bear period to allow for bear use during this important season. Also, the large blocks of Core located outside the activity area would continue to provide secure areas for grizzly bears if temporarily displaced during activities. There would be minimal risk for increased human-caused mortality associated with open roads as there would be no increase in public motorized use during the active bear year resulting from either proposed activities. The newly constructed road, as well as the access to this new road, would remain closed to public motorized use during implementation which would limit the amount and type of human use to project related activity only during this period. Once activities have been completed, status of the road would return to the designated access management condition (i.e., gates closed; see Access Management Plan, Appendix E). Also, bears would likely avoid these roads during activity. At the conclusion of all project activities, Core would continue to be at 54 percent and the temporary increases in OMRD and TMRD of 1 percent would return to the in-kind replacement condition. The OLY project would not result in a permanent reduction of Core area or increase in OMRD or TMRD under any of the alternatives.

The effect of Stimson's proposed timber harvest would be similar to the effects described under "Alternatives 2, 3, and 4 – Direct and Indirect Effects" for OLY's proposed harvest. The mix of regeneration, overstory removal, and commercial thin treatments would result in a mix of forage and cover conditions that could be used by grizzly bears. This would cumulatively contribute to the mosaic of open forest and early seral conditions found on Yaak Mountain and within the project area. However, at only 216 acres the vegetation changes are negligible at the OLY project scale (see Forest Vegetation analysis under "Effects of Current and Reasonably Foreseeable Actions"). Because public motorized use would continue to end at the lookout, the area to be harvested would continue to be remote for most human access and the steep terrain would further limit potential non-motorized use. So, although this area would no longer be within mapped Core

habitat it would continue to provide more secure habitat for grizzly bear foraging opportunities and movement to the north and south.

Combined Effects from Proposed and Ongoing Actions

BMU 10 would be affected by proposed OLY activities as well as other on-going or proposed federal and private actions. Separation of most activities in time and/or space as well as design features of the projects minimizes cumulative effects to grizzly bears. All of these activities may disturb a grizzly bear or cause it to temporarily avoid the activity areas until human actions are completed. However, abundant Core habitat would remain available both during and post-project for grizzly bear use and activities. The effects of proposed activities would be limited in scope and would not markedly change the ability of the area to support bears. Also, implementing this proposal would not create a significant departure from past human use patterns or create an obvious source of conflict between people and bears resulting in an increased potential in bear mortalities. Cumulatively, risk of mortality would not change appreciably due to implementing the proposed action.

Regulatory Framework Findings

2015 Forest Plan

The 2015 Forest Plan provides desired conditions, objectives, standards, and guidelines for grizzly bear within the Wildlife Resource. The following are applicable to the actions in this project[9]:

Forestwide Direction

- p. 28, **GOAL-WL-01**: The KNF manages wildlife habitat through a variety of methods (e.g., vegetation alteration, prescribed burning, noxious weed treatments, etc.) to promote the diversity of species and communities and to contribute toward the recovery of threatened and endangered terrestrial wildlife species.

  Proposed harvest and fuels treatments would result in the retention of remnant large tree species, better approximation of stand patch size and species composition, protection of riparian habitats, improved stand health, and general movement towards the desired vegetative condition based on historic range of variation with the stands for this area. Also, the creation of edge habitat that provides habitat diversity in both forage species occurrence and abundance as well as cover that may be beneficial to grizzly bears. Forage species, including huckleberries where present, would respond to increased sunlight (through overstory reduction or maintenance) and nutrient levels post-activities. Depending on the action alternative, timber harvest would occur on approximately 2,503 to 3,008 acres with additional fuels treatments occurring on 1,648 to 1,676 acres. See "Managing Habitat to Contribute to Grizzly Bear Recovery." Therefore, the OLY project would contribute toward achieving this goal.

[9] Goals, desired conditions, objectives, standards, and guidelines can be found on the noted pages in the 2015 Forest Plan.

- p. 28, **GOAL-WL-02**: The KNF manages and schedules activities to avoid or minimize disturbance to sensitive species and manages habitat to promote their perpetuation into the future.

  Project design features (see Chapter 2, Design Features) include several timing restrictions for proposed activities to reduce potential effects to grizzly bears within the project area. For example, limited mechanical activities (e.g., no harvest or watershed improvement work) would be allowed during the spring use period. The timing of OLY's proposed harvest and watershed improvement work, as well as Stimson's proposed road construction and harvest, have been coordinated to minimize the potential effects to the grizzly bear habitat parameters. In addition, required winter harvest for other resource concerns would reduce impacts to grizzly bears during the active bear year. See "Road Impacts" and "Seasonal Components." Therefore, the OLY project would contribute toward achieving this desired condition.

- p. 28, **FW-DC-WL-01**: Nests and den sites and other birthing and rearing areas for terrestrial threatened, endangered, proposed, or sensitive species are relatively free of human disturbance during the period they are active at these sites.

  No active dens are known within the project area and all required winter harvest would occur outside of denning habitat (see Seasonal Components). Also, to reduce potential disturbance effects to grizzly bears during spring emergence, a forest order would prohibit motorized over-snow use on NFSR 4433 and NFSR 4445 along Lynx Creek between March 31 and November 30 to be consistent with the 2015 Forest Plan guideline FW-GDL-WL-01 (see Design Features, Chapter 2), following the implementation of proposed watershed and recreation improvement work that would maintain existing snowmobile access (see "Motorized Over-Snow Vehicles"). Therefore, the OLY project would contribute toward achieving this desired condition.

- p. 28, **FW-DC-WL-02**: A forestwide system of large remote areas is available to accommodate species requiring large home ranges and low disturbances, such as some wide-ranging carnivores (e.g., grizzly bear).

  Large Core blocks are found within the affected BMU as well as IRAs and MAs that provide non-motorized or limited motorized access during the bear year. Limited prescribed burning activities would occur in these areas and would not change their existing management with respect to motorized access. Activity free areas would remain available during project implementation. Also, project activities would maintain the existing Core percent and would combine two Core blocks into a single block in the Pulpit Mountain area. See "System of Large Remote Areas." Therefore, the OLY project would contribute toward achieving this desired condition.

- p. 28, **FW-DC-WL-03**: Recovery of the terrestrial threatened and endangered species is the long-term desired condition. Foraging, denning, rearing, and security habitat is available for occupation. Populations trend toward recovery through cooperation and coordination with USFWS, state agencies, other federal agencies, tribes, and interested groups.

  Core habitat is currently at 54 percent which is better than the standard of 52 percent for BMU 10. Core would be maintained throughout project implementation through the in-kind replacement of Core habitat that would allow for forest management in areas

currently contributing to Core. See "Road Impacts." Availability of foraging, rearing, and denning habitats is addressed under **GOAL-WL-01**, **GOAL-WL-02**, **FW-DC-WL-01**, and **FW-DC-WL-02** above. Coordination with USFWS has been an ongoing process since the initiation of the project and would continue through consultation. Therefore, the OLY project would contribute toward achieving this desired condition.

- p. 29, **FW-DC-WL-04**: All grizzly BMUs have low levels of disturbance to facilitate denning activities, spring use, limit displacement, and reduce human/bear conflicts and potential bear mortality.

  Spring, summer, and fall forage is available for the grizzly bear. See **GOAL-WL-01**, **GOAL-WL-02**, **FW-DC-WL-01**, and **FW-DC-WL-02** above. Therefore, the OLY project would contribute toward achieving this desired condition.

- p. 29, **FW-DC-WL-17**: Forest management contributes to wildlife movement within and between national forest parcels. Movement between those parcels separated by other ownerships is facilitated by management of the NFS portions of linkage areas identified through interagency coordination. Federal ownership is consolidated at these approach areas to highway and road crossings to facilitate wildlife movement.

  Movement areas would be maintained throughout the BMU and activity areas under all alternatives and include unharvested and recovered stands, RHCAs, and a mosaic of different treatments with varying levels of cover. Movement along the eastern boundary of the project area, within a large contiguous block of Core, would not be impacted by project activities. Within identified linkage areas, proposed treatments would diversify the vegetative conditions found in these areas and provide a mosaic of forested cover and foraging opportunities which are habitat features that contribute to bear movement through an area. There would be no change to Federal ownership in these areas. See "Landscape Connectivity and Local Area Movement." Therefore, the OLY project would contribute toward achieving this desired condition.

- p. 30, **FW-DC-WL-19**: By trending towards the desired conditions for vegetation, habitat is provided for native fauna adapted to open forests and early seral habitats, or whose life/natural history and ecology are partially provided by those habitats.

  The more open conditions found in open forests and early seral habitats provide improved growing conditions for a diversity of understory plant species compared to closed canopy stands within the project area. Proposed harvest and prescribed burn units move treated stands towards desired vegetative conditions as well as result in the stimulation of forage species including berry producing shrubs such a huckleberries. See "Managing Habitat to Contribute to Grizzly Bear Recovery." Therefore, the OLY project would contribute toward achieving this desired condition.

- p. 30, **FW-OBJ-WL-01**: The outcome is the maintenance or restoration of wildlife habitat on 1,000 to 5,000 acres of NFS lands, annually, with an emphasis on restoration of habitats for threatened and endangered listed species and sensitive species.

  Grizzly bears are considered a generalist species in that they can and will use a variety of habitat types and seral conditions. Implementation of proposed harvest and fuels treatments that result in movement towards the desired vegetative condition based on historic range of variation would contribute to the maintenance or restoration of habitat

for grizzly bears. Depending on the action alternative, timber harvest would occur on approximately 2,503 to 3,008 acres with additional fuels treatments occurring on 1,648 to 1,676 acres. See **GOAL-WL-01** above and "Managing Habitat to Contribute to Grizzly Bear Recovery." Therefore, the OLY project would contribute to attaining this objective.

- p. 30, **FW-STD-WL-02**: The Motorized Access Management within the Selkirk and Cabinet Yaak Grizzly Bear Recovery Zone Management Direction and ROD is included in appendix B, and shall be applied.

  There would be no increase in the amount of roads open to public motorized use during the active bear year. Restricted, barriered, new, and temporary roads opened or constructed for activities would return to the designated status post-project. All roads that may exceed administrative trips were considered open for the bear year. Although this road use would result in project changes to OMRD and TMRD levels, these increases would be minor and post-project levels would be the same as the existing condition. Routine forest management in areas currently providing Core would occur through the in-kind replacement of Core acres. These activities would result in a slight but negligible increase in Core acres, which would maintain the existing Core percent in BMU 10 and be consistent with Access Amendment design element I. B. 3. Watershed improvement activities occurring in Core would comply with design element I. B. 2. a. See the Access Management Plan (Appendix E) and "Road Impacts." Therefore, the OLY project is designed in accordance with this standard.

- p. 31, **FW-STD-WL-04**: Permits and operating plans (e.g., special use, grazing, and mining) shall specify sanitation measures and adhere to the forestwide food/attractant storage order in order to reduce human/wildlife conflicts and mortality by making wildlife attractants (e.g., garbage, food, livestock carcasses) inaccessible through proper storage or disposal.

  The Forest Service has limited sources of attractants within the project area and implementation of the Food Storage Order in these areas reduces potential effects. Also, logging contractors would be required to properly handle activity associated attractants. Secure forage opportunities elsewhere in the BMU reduces potential human/bear conflict near proposed units associated with open roads or private property. See "Attractants." Therefore, the OLY project is designed in accordance with this standard.

- p. 31, **FW-STD-WL-05**: No grooming of snowmobile routes in grizzly bear Core habitat in the spring after April 1 of each year.

  Currently there are no groomed routes within the OLY project area and there are no proposals to allow for grooming on these routes. See "Motorized Over-Snow Vehicles." Therefore, the OLY project is designed in accordance with this standard.

- p. 31, **FW-GDL-WL-01. Grizzly Bear**: Management activities should avoid or minimize disturbance in areas of predicted denning habitat during spring emergence (April 1 through May 1).

  See **FW-DC-WL-01** above. Therefore, the OLY project is designed in accordance with this guideline.

- p. 32, **FW-GDL-WL-12. Connectivity**: During the construction or reconstruction of highways that cross national forest lands, or high use forest roads, wildlife crossing features should be included in the design where necessary to contribute to connectivity of wildlife populations.

  The OLY project does not propose the construction or reconstruction of highways or high use forest roads and, therefore, did not propose the development of wildlife crossing features. See "Landscape Connectivity and Local Area Movement." Therefore, the OLY project is designed in accordance with this guideline.

- p. 32, **FW-GDL-WL-13. Connectivity**: Management activities within one-quarter mile of existing crossing features, and future crossing features developed through interagency coordination, should not prevent wildlife from using the crossing features. The vegetative and structural components of connectivity, including snags and downed wood, should be managed according to the desired conditions for vegetation.

  OLY's proposed vegetation management treatments in the Sears Flat area would trend vegetation towards desired conditions which would facilitate wildlife use of future crossing features that may be developed. See "Landscape Connectivity and Local Area Movement." Therefore, the OLY project is designed in accordance with this guideline.

- p. 32, **FW-GDL-WL-14. Connectivity**: In wildlife linkage areas identified through interagency coordination, federal ownership should be maintained.

  All lands currently under federal ownership will remain so as OLY does not propose any exchanges. See "Landscape Connectivity and Local Area Movement." Therefore, the OLY project is designed in accordance with this guideline.

- p. 32, **FW-GDL-WL-15. Grizzly Bear**: Elements contained in the most recent "Interagency Grizzly Bear Guidelines," or a conservation strategy once a grizzly bear population is delisted, would be applied to management activities.

  Implementation of proposed actions that are consistent with the 2015 Forest Plan's established goals, desired conditions, objectives, standards and guidelines would meet the intent of the elements contained in the Interagency Grizzly Bear Guidelines. This would minimize the potential impacts or effects of resource competition between bears and humans during the life of the project and would maintain habitat conditions favorable for grizzly bears throughout the project area and the affected BMU. See "Application of Interagency Grizzly Bear Guidelines." Therefore, the OLY project is designed in accordance with this guideline.

Management Area Direction

- p. 62, **MA5a,b,c-DC-WL-01 (Backcountry)**: Large remote areas with little human disturbance such as those found in these MAs (in conjunction with MAs 1a, 1b, and 1c) are retained and contribute habitats for species with large home ranges. Habitat conditions within these management areas contribute to wildlife movement within and across the Forest. These areas also provide foraging, security, denning, and nesting habitat for wildlife.

MAs 5a and 5c are found within the project area in association with the largest of BMU 10's Core blocks as well as Flagstaff and Saddle Mountain IRAs. One ecosystem burn unit would be implemented within MA5a, otherwise these lands would continue to contribute to secure habitat for grizzly bears with low levels of non-motorized human disturbance and largely natural vegetative conditions. See "Landscape Connectivity and Local Movement." Therefore, the OLY project would contribute to progress toward achieving this desired condition.

Geographic Area Direction

- p. 74, **GA-DC-WL-BUL-04**: Wildlife move along the Idaho/Montana border and from the West Cabinets into the Yaak, in the vicinity of the confluence of the Kootenai and Yaak Rivers.

  OLY proposes vegetation management at Sears Flat which is found within this identified linkage area. Treatments would result in a combination of early seral habitat conditions, open timbered stands, and untreated stands that would trend towards the desired vegetative conditions for the area. There would be no in change in ownership in this area and proposed management (i.e., a mosaic of forage and cover) would facilitate potential movement by grizzly bears through this area. See "Landscape Connectivity and Local Movement." Therefore, the OLY project would contribute to progress toward achieving this desired condition.

- **GA-DC-WL-LIB-01**: Habitat conditions are retained for wildlife movement between the Cabinet Mountains and the Yaak, in particular, the area of Flagstaff Mountain.

  No activities are proposed in the Flagstaff Mountain/Kootenai Falls area of the OLY project and there would be no impacts to the potential use of this area by grizzly bears to move to the Cabinet Mountains to the south. See "Landscape Connectivity and Local Movement." Therefore, the OLY project would contribute to progress toward achieving this desired condition.

- **GA-DC-WL-YAK-04**: Wildlife move between the Yaak and West Cabinets, particularly in the area around Yaak Mountain, Teepee Mountain, and the confluence of the Yaak and Kootenai Rivers. Wildlife also moves across the Yaak River and Highway 508 in the vicinity of Yaak Falls.

  Proposed harvest treatments would result in vegetative diversity in an area near the Yaak River and Highway 508. Cover would remain available between and adjacent to the units that would continue to allow for movement across the East Side Road to the Yaak River. See "Landscape Connectivity and Local Movement." Therefore, the OLY project would contribute to progress toward achieving this desired condition.

Federal Law

Endangered Species Act (ESA)

The preferred alternative would be consulted on with USFWS and compliance with ESA would occur.

National Forest Management Act (NFMA)

The project would comply with NFMA direction to provide for diverse populations of plant and animal communities through compliance with the 2015 Forest Plan.

Statement of Findings

Support for the OLY effects determination can be found within the Biological Assessment (BA) which was submitted to U.S. Fish and Wildlife Service on March 30, 2016. Upon completion of formal consultation and receipt of the Biological Opinion (BO), both the BA and BO will be available within the Project Record.

Alternative 1 (No Action) **may affect, not likely to adversely affect** grizzly bears. This determination is based on: 1) active fire suppression would continue the trend towards uncharacteristic vegetative and fuel conditions, 2) an increased risk of severe fire behavior, 3) a decline in productive foraging habitat acres over time, 4) all existing condition habitat parameter levels would be maintained, 5) no introduction of Forest Service sources of attractants, and 6) no increase in mortality risk to grizzly bears.

Each of the action alternatives, Alternatives 2, 3, and 4, **may affect, is likely to adversely affect** grizzly bears. This determination is based on: 1) project activities may cause temporary disturbance and avoidance of the affected areas, and 2) entries into existing Core for routine forest management and watershed improvement work may result in short-term adverse effects to grizzly bears; however, 3) proposed activities would be compliant with FW-STD-WL-02, 4) the in-kind replacement of Core for harvest results in the slight increase of Core acres and consolidation of two Core blocks into one within BMU 10, 5) harvest impacts to OMRD and TMRD are temporary and road use would return to the designated condition upon completion of activities, 6) vegetation management treatments would move stands towards desired vegetative and fire tolerant conditions characteristic of the area, 7) the treatments would encourage increased production of forage species for grizzly bears and other wildlife, 8) mechanical activities would be limited during the spring period to reduce stress during grizzly bear emergence from the denning period and feeding activities at lower elevations, 9) late season snowmobile use on NFSR 4433 and a portion of NFSR 4445 would be prohibited past March 31 to reduce impacts during bear emergence from dens, 10) 367 to 598 acres of required winter harvest would reduce impacts to bears during the active part of the year, 11) roads currently not open to public motorized use during the active bear year would remain so during and post-project, 12) availability of large Core areas and maintenance of movement corridors would accommodate potential bear displacement from activity areas, 13) project activities would not generate bear attractants, and 14) no increased risk of bear mortality is expected.

Other Agencies and Individuals Consulted

Wayne Kasworm, USFWS Grizzly Bear Researcher for the Cabinet-Yaak Ecosystem

Communications have consisted of requests regarding grizzly bear use of the project area (e.g., historic observations and denning locations), providing a description of OLY's proposed actions, and discussions regarding potential concerns and suggestions for additional vegetation management with the BMU.

Katrina Dixon, USFWS Consultation Biologist

Communications have consisted of consultation throughout the development of the OLY project and included providing a description of OLY's proposed actions and discussions regarding potential concerns and expected determinations of effects for grizzly bears.

Kevin Aceituno, USFWS Consultation Biologist

Communications consisted of consultation during the latter stages of the OLY project, including informal and formal consultation.

Canada Lynx

Introduction

Canada lynx occupy northern boreal forests[10] which are primarily composed of cool, moist subalpine fir and Engelmann spruce and moist lodgepole pine forest which receive abundant snowfall. Snowshoe hares are the primary prey of lynx and habitat use by lynx is associated with those conditions that support hare populations. Therefore, young regenerating and mature multistory forest that provide habitat for snowshoe hares is important to lynx conservation. Especially important is winter habitat that continues to provide snowshoe hare forage and cover (twigs and stems that protrude above the snow or limbs that drop to the snow surface) during high snow periods. Denning habitat is found in forests with abundant dead and down trees, especially in areas near foraging habitat. Both natural (e.g. fire) and human disturbances such as timber harvest and prescribed fires can affect lynx habitat (USFS 2007a).

Although a variety of habitat and forest types may be found within a lynx's home range and used to some level (e.g., non-lynx habitat[11] for travelling between patches of boreal forest), in Northwestern Montana lynx select forest stands with high horizontal cover primarily consisting of Engelmann spruce and subalpine fir. Both mature multistory and early successional forest habitats provide for snowshoe hares, but use by lynx varies seasonally in response to snowshoe hare availability. Mature multistory stands provide the greatest foraging opportunities for both hares and lynx during winter and management that maintains and promotes a mosaic of mature multistory spruce-fir forests is most beneficial to the species (Squires et al. 2010).

Because of lynx's close association to habitat types and structural conditions that support snowshoe hares, the primary activity that might impact lynx is vegetation management that affects the suitability of lynx habitat. Therefore, proposed vegetation management that influences the amount and juxtaposition of young regenerating and multistory forest within an analysis area is the focus of the Canada lynx analysis. Other activities such as roads or infrastructure development that affect habitat availability, suitability, or connectivity will also be discussed. Those activities that do not involve changes to the vegetative condition, such as road BMPs occurring on open roads, are not considered for analysis.

Summary of Conclusions

Implementation of the OLY project's action alternatives result in a determination of **may affect, is not likely to adversely** affect Canada lynx. Proposed treatments would occur in currently unsuitable lynx habitat and non-lynx habitat in the China lynx analysis unit (LAU). Within lynx habitat, treatments would maintain the existing unsuitable condition in the short-term and improve future winter snowshoe hare habitat while continuing to meet vegetation management standards from the Northern Rockies Lynx Management Direction (NRLMD).

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[10] Boreal forests used by lynx are generally cool, moist, and dominated by conifer tree species, primarily spruce and fir. Boreal forest landscapes used by lynx are heterogeneous mosaics of vegetative cover types and successional forest stages created by natural and human-caused disturbance. In many places periodic vegetation disturbances stimulate development of dense understory or early successional habitat or snowshoe hares. (USFWS (2013a) description based on literature review).

[11] Non-lynx habitats are habitat types that do not support snowshoe hares such as dry forests or non-forested areas.

Regulatory Framework

2015 Forest Plan

The 2015 Forest Plan provides overall guidance for the management of the lands on the KNF. It describes the goals, desired conditions, and objectives toward which the management of the land should be directed. And it establishes standards and guidelines to help achieve or maintain the desired condition or conditions, to avoid or mitigate undesirable effects, or to meet applicable legal requirements.

The plan components which provide specific Canada lynx resource direction relevant to this project include:

Forestwide Direction

- FW-STD-WL-01

There are other 2015 Forest Plan components that provide resource direction for a range of wildlife species or habitat conditions that are not specific to lynx, but still are applicable to lynx management. The full list of the plan components applicable to lynx management are found in the "Regulatory Framework Findings" section of this analysis.

Resource Indicators and Measures

For the Canada lynx analysis, the NRLMD Vegetation Standards 1, 2, and 6 will be the resource indicators (see Table 142) for measuring change to lynx habitat from proposed vegetation management and will be used to compare alternatives as well as meeting the NRLMD standards. The overall assessment of lynx habitat also analyzes the relevant NRLMD objectives, standards, and guidelines in detail. Objectives, standards, and guidelines considered but found "not relevant" are found in the project file

Table 142. Resource Indicators and Measures for Assessing Effects

Resource Element	Resource Indicator	Measure	Used to address: P/N*, or key issue?	Source
NRLMD Standard VEG S1	Percent of lynx habitat within the LAU currently in an early stand initiation structural stage	Existing percent of ESI within the LAU, maximum of 30%	No	KNF Forest Plan FW-STD-WL-01
NRLMD Standard VEG S2	Change in the percent lynx habitat in an early stand initiation structural stage generated through timber harvest on NFS lands within the past 10 years	Acres of regeneration harvest proposed within lynx habitat, maximum of 15%	No	KNF Forest Plan FW-STD-WL-01

Resource Element	Resource Indicator	Measure	Used to address: P/N*, or key issue?	Source
NRLMD Standard VEG S6	Reduction of snowshoe hare habitat within lynx multistory forest as a result of vegetation management	Acres of treatment proposed within multistory forest	No	KNF Forest Plan FW-STD-WL-01

*P/N= Purpose and Need

Methodology

Forestwide lynx habitat is described using the terminology from the NRLMD. Lynx habitat was mapped for the KNF based on forest type, stand age, and elevation. In addition to lodgepole pine, Engelmann spruce, and subalpine fir forest types, mapping also includes cedar-hemlock and other cool, moist forest types as they may provide lynx habitat in Northwest Montana (USFS 2007a, b). Successional or structural stage is based on year of origin and assumptions about the length of time it takes for a stand to move from one stage to the next. However, age does not account for environmental conditions or disturbance processes that affect development of the successional stage. For example, cold temperatures and short growing seasons at high elevation sites may maintain a more early seral stage despite an old age and multiple years of origin. Also, natural disturbances such as fire or wind play an important role in the development of multistoried stands and without disturbance stands may remain in a stem exclusion stage for a longer period of time than expected. Therefore, mapping of lynx habitat based on stand data provides a broad estimation of lynx habitat within an LAU but may need to be fine-tuned based on field review.

Each harvest unit was surveyed (Bertram and Claar 2008 and professional judgment), photographed for the project record, and categorized as either contributing to lynx winter foraging habitat (stand initiation or multistory forest) or not. Similarly, the prescribed burn units were evaluated through the use of stand data, satellite imagery, field review, and photo documentation (documentation available in the project file). When the mapped habitat did not accurately depict the on-the-ground condition, the mapped acres were adjusted to correctly reflect the existing condition for those specific acres. For example, harvest was proposed in stands tentatively mapped as multistory habitat prior to field validation. However, upon field validation these stands were found to be in a stem exclusion structural stage that does not provide snowshoe hare foraging habitat and were not multistory habitat in reality. In Table 143, which displays the existing lynx habitat condition, the reviewed acres were changed from multistory forest to stem exclusion. This became the baseline from which to assess the effects of proposed vegetation management.

Connectivity was evaluated by visually examining the mapped lynx habitat, past management activities, the presence and location of IRAs and certain MAs that do not allow or limit motorized access, and topography to determine possible movement areas and potential areas where lynx travel may be hindered. Ridgelines and draws were considered high value movement areas.

Data Sources

Lynx population ecology, biology, and habitat description and relationships are also described in LIBT (2013), Ruggiero et al. (2000), and Ruediger et al. (2000). Population and habitat status on

a national scale is provided in the final lynx listing rule (USFWS 2000) and the most recent lynx distinct population segment status is found in the BO on the effects of the 2015 Forest Plan (USFWS 2013b). National population and habitat status descriptions in these documents are incorporated by reference.

Kosterman (2014) looked at the relationship between Canada lynx reproductive success and lynx habitat within occupied female lynx home ranges in Northwest Montana. The findings of this Master's research, provided in the 2014 thesis, provides new information to consider with regards to the management of lynx and lynx habitat. As such, Kosterman (2014) has been provided as opposing science to the current management direction provided by the NRLMD. However, a review of these findings (Marten 2016) present rationale and examples as to why "it is premature to conclude that the current management direction provided in the NRLMD is inadequate." In particular, although there appears to be a relationship between habitat and lynx reproductive success, the relationship is "not well enough understood to determine if, or what, specific changes in management are warranted" (ibid). Also, "the parameters and metrics used to demonstrate this relationship do not cross-walk well to the metric standards provided in the NRLMD" (ibid).

Lynx occurrence data comes from District wildlife observation records, NRIS wildlife database, and other agencies (MNHP, MFWP, and USFWS).

Assumptions and Limitations

Conditions on the KNF indicate that winter snowshoe hare foraging opportunities are met after approximately 15 years. Therefore, recent regeneration timber harvests (those within the last 15 years) are unlikely to offer adequate vegetation to provide snowshoe hare winter forage whereas timber harvests completed prior to 2000 would now have trees in the units of the size and density to provide high quality snowshoe hare habitat in the stand initiation structural stage.

Affected Environment

Spatial and Temporal Context for Effects Analysis

Based on the NRLMD, the analysis area for analyzing and monitoring project effects (direct, indirect, and cumulative) to lynx habitat is the affected LAU. This is an appropriate scale for analysis because: 1) the LAU represents the size of a home range of a female lynx, 2) maintaining habitat conditions at the scale of a lynx home range will allow for good distribution of lynx habitat components, and 3) expanding the analysis area could dilute the effects of the proposed project. In addition, the boundaries of an LAU remain constant and therefore provide for monitoring of and compliance with the objectives, standards, and guidelines of the NRLMD.

The project area and proposed activities are located within the China LAU (see Lynx Analysis Units map, M-20) which has records of lynx occurrence. Timber harvest is clustered along the lower elevation boundary of the LAU in roaded areas. Prescribed burn units targeted dry habitat types along or near the lower elevational boundary of the LAU and applying fire within these units would not result in the loss of lynx habitat or impede movement to or from adjacent LAUs. Also, ample lynx habitat would remain available within the LAU for lynx use during and post-project implementation. Therefore, the China LAU has been chosen as the appropriate scale of analysis for determining direct, indirect, and cumulative effects for the OLY project.

Temporal boundaries for the Canada lynx analysis include both short-term and long-term effects. Short-term effects are those that are expected to last between a few days to a season or two and up

to approximately 15 years. Although lynx are generally considered tolerant of human activity, it is expected that a range of behavioral response could occur depending on the individual and circumstances involved (ILBT 2013). Generally, once disturbance causing activities like prescribed burns, harvest, and watershed work have been completed lynx can move back into and use the area. With respect to vegetation treatments, regeneration harvest in lynx habitat would result in the re-initiation of the stand initiation structural stage where winter snowshoe hare habitat would not be available for approximately 15 years. Long-term effects are those that expected to last longer than 15 years. Following regeneration harvest, winter foraging opportunities would be expected to last from about 16 to 50 years post-harvest and again at over 100 years once a multistory stand develops.

Existing Condition

Introduction

The USFWS listed the contiguous U.S. distinct population segment of the Canada lynx as threatened in March 2000 (USFWS 2000) with the designation of critical habitat in 2006 (USFWS 2006). In February 2008, the USFWS issued a proposed rule revising critical lynx habitat (USFWS 2008a). Then, in February 2009, the USFWS issued their final rule to revise the critical habitat designation for lynx in the U.S. (USFWS 2009). The final rule delineated lynx critical habitat units across the lower 48 states from Maine to Washington. Based on this delineation, the OLY project on the Three Rivers Ranger District falls within the Northern Rocky Mountains Critical Habitat Unit #3 (ibid). Critical habitat boundaries were updated with a new final designation on September 12, 2014 (USFWS 2014a). There were only extremely minor changes to the critical habitat boundary on the KNF and all of these were small slivers along the critical habitat edge that were removed in the 2014 version. The updated boundaries are practically unchanged and the OLY project still falls within Unit #3 under this updated final rule. Critical habitat is analyzed in the following analysis, Canada Lynx Critical Habitat.

The Final Environmental Impact Statement for the NRLMD was completed in March 2007 (USFS 2007a, b). This decision has been incorporated into the 2015 Forest Plan and provides lynx management objectives, standards, and guidelines. The decision replaced the interim consideration of the Lynx Conservation Assessment and Strategy recommendations. The direction provided in the NRLMD is applied to lynx habitat at the LAU scale. The KNF has delineated 47 LAUs which approximate a lynx home range size. The OLY project area includes the majority of the China LAU, approximately 28,881 acres of 32,772 total LAU acres (Lynx Analysis Unit map, M-20).

Canada Lynx Occurrence

Lynx observations have been documented as early as the winter of 1979-1980 in the MFNP database (see project file). More recently, however, a lynx was documented within the project area near Kilbrennan Creek in November of 2011 (Chilton-Radandt 2014). The key habitat on the KNF is primarily located north of Libby, especially between Pete Creek to the west and Koocanusa Reservoir to the east (Squires 2012). In the Intermountain West young cats have been documented to travel up to 269 kilometers, or approximately 467 miles, during natal dispersal (Squires et al. 2006). Although this is at the far range of the dispersal distances documented, it demonstrates that lynx are a mobile species and are capable of traveling between the project area and the key habitats found on the Forest.

Description of the Analysis Area

Lynx Habitat Condition

Historically, natural disturbances (e.g., fire, insect, disease, wind) influenced successional stages of vegetation and resulted in habitat diversity of habitat type and distribution. Wildfire was a major contributor of landscape disturbance within lynx habitat and resulted in vegetative structural changes by reducing timber and shrub overstory in affected areas and creating additional age classes and species diversity. The last large, landscape fire occurred in 1994 covering approximately 7,194 acres (see Fuels Management section). Forested habitats that experienced stand replacing fire would be in the stand initiation structural stage and would soon become snowshoe hare winter foraging habitat. In other places, fire severity would have been low to mixed-severity resulting in smaller patches of habitat change. In contrast, fire suppression since the early 1900s has resulted in fewer and smaller fires with the most recent fire in the project area occurring in 2009 and only totaling 19 acres (see Fuels Management section). Effects of fire suppression includes alteration of stand structure resulting in more homogenous stands with greater canopy closure and poorly developed understories in some areas which has in turn reduced lynx foraging opportunities.

Roaded lands within the project area have been managed for timber production using a number of treatment methods. Harvest activities on NFS lands began in the 1950s and have continued to the present. Regeneration harvest includes clearcut, seed tree, and shelterwood treatments and has occurred on approximately 26,729 acres of NFS land in the project area (about 50 percent). Intermediate harvest (e.g., commercial thinning, salvage, and individual tree selection) has occurred on approximately 9,014 acres or 17 percent of the project area. Past harvest has provided some variety of age classes and successional stages across the project area. Regeneration harvest within the LAU would have resulted in structural changes to lynx habitat and influenced the proportions and juxtaposition of the different types of lynx habitat within the LAU. Immediately following regeneration, stands would have become temporarily unsuitable in that they would not provide winter forage opportunities for snowshoe hares. Conditions on the KNF indicate that winter snowshoe hare foraging opportunities are met after approximately 15 years. Therefore, recent regeneration timber harvests (those within the last 15 years) are unlikely to offer adequate vegetation to provide snowshoe hare winter forage whereas timber harvests completed prior to 2000 would now have trees in the units of the size and density to provide high quality snowshoe hare habitat in the stand initiation structural stage.

Boreal forest landscapes are naturally in a state of change, through disturbance and succession processes as mentioned above, and result in a changing environment of habitat types, distribution, and juxtaposition (USFWS 2013a). As such, not all potential lynx habitat acres provide suitable habitat all of the time and there may naturally be periods of time with low levels of suitable habitat. This variability of habitat suitability and distribution is reflected in habitat mapping done on lynx habitat to estimate historic range of lynx habitat levels, current levels on the KNF, and projected future levels under different management scenarios (ERG 2012). Historically, the KNF provided between 69,681 acres to 278,725 acres of multistoried suitable lynx habitat (ibid). Currently the KNF has approximately 149,781 acres of suitable lynx habitat which falls within the historic range of variation (ibid).

Lynx and non-lynx habitats in the China LAU were assessed for all ownerships in terms consistent with the NRLMD; only NFS lands are found within the China LAU. The Timber Stand Improvement 2010-2015 Project is ongoing and has updated the existing condition. Table 143 and

Table 144 display the current lynx habitat levels in the project area. Two sets of percentages are presented in Table 143. The first percentage reflects the total lynx habitat within the LAU (lynx habitat acres divided by the total acres within the LAU). The second set of percentages reflects the contribution of each category of lynx habitat (e.g., stand initiation) to the total lynx habitat within the LAU (each category of lynx habitat acres divided by the total lynx habitat acres within the LAU). See project file for calculations.

Approximately 3,086 acres of NFS lands of lynx habitat in the China LAU are in an early stand initiation structural stage due to past wildfire and regeneration harvest and considered 'unsuitable' as they do not yet provide winter forage opportunities for snowshoe hares. Some stands are smaller and scattered throughout the LAU whereas large patches of early stand initiation habitat are found within higher elevation areas and reflect past wildfire events on Pulpit Mountain and in the China Basin/Flagstaff Mountain area. Of this, only 54 acres were regenerated within the past 10 years as result of the Timber Stand Improvement Project and accounts for less than 1 percent of the lynx habitat within the LAU. Although found throughout the LAU, more multistory habitat appears to be along higher elevations ridges and on north facing slopes that likely receive and/or hold moisture better and have longer fire return intervals. Currently, this affected LAU meets the NRLMD standards based on 2014 data for the KNF (see Table 143, Table 144, and project file).

Table 143. Existing Lynx Habitat within the OLY Project Area LAU

LAU Name (Number)	LAU Total Acres	Total Lynx Habitat Acres[1] (%)	Early Stand Initiation (Summer Forage) Acres[2] (%)	Stand Initiation (Winter Forage) Acres[3] (%)	Multistory (Forage) Acres[4] (%)	Stem Exclusion (Non-forage) Acres[5] (%)
China (14407)	32,772	28,906 (88%)	3,086 (11%)	6,104 (21%)	13,945 (48%)	5,771 (20%)

[1] Acres do not include non-lynx habitat stands (considered unavailable as snowshoe hare habitat but suitable for lynx habitat connectivity), for example, dry Douglas-fir/Ponderosa pine stands; non-lynx habitat comprises the remaining 12 percent of the China LAU.

[2] Stand initiation structural stage that provides snowshoe hare forage in the summer only as the trees have not grown tall enough to protrude above the snow in winter – unsuitable habitat.

[3] Stand initiation structural stage that currently provides winter snowshoe hare habitat – suitable habitat.

[4] Mature multistory or late successional (multistory) structural stage; includes many age classes and vegetation layers that provide both summer and winter snowshoe hare habitat – suitable habitat.

[5] Includes closed canopy forested stands with limited understory vegetation that does not provide summer or winter snowshoe hare habitat – unsuitable habitat.

Table 144. Acres of Existing Lynx Habitat within the China LAU Changed to an Early Stand Initiation Structural Stage within the Past 10 years in the OLY Project Area

LAU Name	Total Lynx Habitat Acres	Early Stand Initiation Acres (%)	Habitat Changed to Early stand Initiation over Past 10 Years Acres (%)	Number of Adjacent LAUs that Exceed 30% Lynx Habitat in an Early Stand Initiation Structural Stage
China	28,906	3,086 (11%)	54 (<1%)	0

Connectivity/Linkage

Based on the existing lynx habitat condition, a mosaic of forested habitats and a system of higher elevation ridgelines are found within the China LAU and provide for habitat connectivity and lynx movement throughout the LAU. In addition, portions of both Flagstaff and Saddle Mountain IRAs occur within the China LAU and total approximately 9,696 acres. Similarly, MAs 4 (Research Natural Areas) and 5a/5c (Backcountry) are found within this LAU and generally associated with the IRAs. The IRAs and MAs provide non-motorized or limited motorized access, such as over-snow vehicle use in established areas. These large tracts of currently unroaded lands provide largely natural vegetative conditions along the eastern boundary of the China LAU and adjoining Lower Quartz and Upper Quartz LAUs, excellent habitat security, and low levels of human disturbance although lynx are generally considered tolerant of human activity (ILBT 2013).

There is an identified linkage area (USFS 2007c, KNF Lynx Taskforce 1997) as well as potential pathways for movement (Squires et al. 2013) within the China LAU. The linkage area is broadly associated with the southern boundary of the China LAU east of the town of Troy, Montana and corresponds to a movement area near Flagstaff Mountain identified in the 2015 Forest Plan (GA-DC-LIB-01). It goes south through an area of low elevation habitats located outside of an LAU, through predominantly NFS lands and some State lands, to NFS lands associated with the Crowl and Treasure LAUs located across the Kootenai River and Highway 2. China Creek is a larger drainage located within this linkage area and could be used by lynx to move through the lower elevation habitats down to the Kootenai River. The potential pathways identified by Squires et al. (2013) were mapped based on the habitat resources used by collared lynx and those within the China LAU are the southern-most routes east of Koocanusa Reservoir. The location of these identified potential routes appears to correspond to ridgelines and drainages that are generally considered for lynx connectivity. While these potential paths may provide for lynx movement within the China LAU and into LAUs to the north and Canada, these paths were not identified as the primary routes that may be expected to facilitate lynx dispersal from northern populations to areas of habitat that are capable of supporting lynx in the Northern Rocky Mountains (ibid). Pathways from the China LAU move east/northeast through the adjoining Lower and Upper Quartz LAUs and west/northwest to the adjacent Thunder LAU.

Private property is not located within the China LAU; however, a small parcel is located within the general area of the identified linkage area and is considered with respect to connectivity concerns. As mentioned above, the neighboring Thunder, Crowl, Treasure, Lower and Upper Quartz LAUs were considered with respect to connectivity concerns.

Human Use/Activities

Road construction has been limited in recent years and existing road densities have been reduced, in part, as a result of restricting/reclaiming roads through decisions intended to facilitate grizzly bear recovery. Highways 2 and 508 parallel the Kootenai and Yaak Rivers, respectively, and delineate the southern and western boundaries of the project area. They provide the primary travel routes into the communities of Troy and Yaak, Montana as well as recreational access. Both are high speed routes, but neither has been known as a source of mortality for lynx. Roads found within the LAU are low speed native or gravel surfaced roads that experience low levels of recreational use.

Snowmobile use within the project area is fairly limited compared to other areas on the Three Rivers Ranger District, such as the Keeler and Spread Creek drainages. The most popular route is

along Lynx Creek on NFSRs 4433 and 4433B to access Pulpit Ridge. Other use includes riding the open loop roads that access higher elevation sites like China Basin or King Mountain as well as potential use up the Arbo Creek drainage into Wee Lake, although access to Wee Lake is limited to the old roadbed due to the thick post-fire vegetation. Some access to Flagstaff Mountain north towards China Basin occurs from the Libby Ranger District on the southeast side of the LAU. There are no groomed routes or snow parks within the OLY project area.

Environmental Consequences

Alternative 1 – No Action

A range of fire severity, from non-lethal to stand replacing crown fires, historically played a role in developing the vegetative characteristics in the OLY project area. Although the type and frequency of fire experienced varies within a given area and vegetation type (based on biophysical setting), with some being more prone to infrequent stand replacing fire, the vegetation types within the project area have historically experienced low and/or mixed severity fires at least periodically. The combination of these natural disturbance regimes created smaller areas of disturbance within larger, previously disturbed areas and introduced diversity through stand age and tree size. This would have resulted in a mosaic of forage, non-forage, and denning habitat for lynx that was naturally shifting over the landscape. The exclusion of low to moderate severity fires through fire suppression has reduced the amount of natural openings, structural diversity, and the number/size of patches across the landscape as well as increased fuel loadings in the form of ladder fuels and small downed woody materials. Fire suppression has not yet resulted in a departure from historic ranges for all stands within the project area (especially those with naturally longer fire return intervals such as might be found in lynx habitat), although they too are trending towards a departure. Due to the denser fuel conditions, resulting stand replacing fires in these stands would likely be larger resulting in a more homogenous landscape. In general, the resultant stand patch sizes and occurrence, species composition, stand structure, and fire frequency and severity are departing from desired vegetative conditions based on historic range of variability (HRV) within the project area. See the Fuels Management and Forest Vegetation sections for more detail.

No direct effects from federal actions would occur. The No Action alternative would maintain existing vegetative condition on the landscape. With continued fire suppression and lack of active management, the indirect effects of this alternative would include a continued trend towards uncharacteristic vegetative conditions. For example, forested stands in the stem exclusion structural stage are unsuitable for snowshoe and lynx because there is little to no understory vegetation due to the closed canopy. Without a dominant disturbance process like wildfire to create openings and encourage understory development, these stands may remain in this successional stage for a longer period of time and continue to be unsuitable for snowshoe hare and lynx forage.

All existing condition vegetation management standards would continue to be met. Although large, severe wildfire has occurred within this area in the past, mixed severity fires would have also played a role in creating a mosaic of forest structural stages. This mosaic of structural stages in juxtaposition to one another provides for different lynx life requirements (e.g. foraging and denning habitats). However, if severe wildfires occur, especially over a large expanse, potentially drastic changes in the availability and distribution of suitable and unsuitable habitat across the project area could occur. Stand initiation forage opportunities would be limited for approximately

15 years and multistory forage and denning habitat would not be available within these areas for possibly a hundred years or more.

Alternatives 2, 3, and 4 – Direct and Indirect Effects

In the NRLMD, the objectives are descriptions of the desired resource conditions (FW-STD-WL-01). The standards and guidelines were developed to meet the objectives. Therefore, if the standards and guidelines are met then projects are meeting the objective or desired conditions for lynx and lynx habitat.

Objectives, Standards, and Guidelines Applicable to ALL Management Projects in Lynx Habitat

Objective ALL O1: Maintain or restore lynx habitat connectivity in and between LAUs and in linkage areas.

Habitat connectivity within the China LAU is generally good to the north and south within the LAU and between adjoining LAUs to the west due to the large amounts of multistory and stand initiation habitats. Movement outside the China LAU to the south and west are most influenced by the low elevation river valley bottoms and associated highways outside of the project area. All treatments are designed to meet the OLY project's purpose and need which is to trend towards the desired vegetation condition for this area which includes the promotion of early seral habitats and restoring fire's role on the landscape. This in turn results in a mosaic of structural conditions that maintains and improves upon existing forage opportunities and provide for movement within and between LAUs.

Standard ALL S1: New or expanded permanent development and vegetation management projects must maintain habitat connectivity in an LAU and/or linkage area.

This standard is met with respect to permanent development as no developments are proposed and there are no proposals to expand existing developments within the China LAU or linkage area.

No activities are proposed within the far southeastern corner of the China LAU that is associated with the identified linkage area. Much of this area is steep and unroaded, and changes to the existing vegetation would be driven by natural disturbance processes such as wildfire or insects and disease. There would be no impacts to the potential use of this area by lynx to move to the Crowl and Treasure LAUs to the south. This would also be consistent with GA-DC-WL-LIB-01 which describes a desired condition to retain habitat conditions for wildlife movement between the Cabinet Mountains and the Yaak, in particular, the area of Flagstaff Mountain.

Movement north and south within the LAU is facilitated by the presence of a high elevation ridgeline with suitable lynx habitat along the eastern boundary. The majority of this area is also in an unroaded or roadless condition and associated with the Saddle Mountain and Flagstaff IRAs as well as MAs 4, 5a, and 5c. No activities would occur is this movement area along the eastern boundary of the LAU which also provides connectivity with the adjoining Lower and Upper Quartz LAUs. Only one prescribed fire unit, Fuels Unit F1 as described below, would occur within the Saddle Mountain IRA and MA5a which would not change the characteristics of these designated areas.

Proposed harvest and prescribed burn units are found in the vicinity of the potential connectivity pathways identified by Squires et al. (2013). Only one proposed treatment on Saddle Mountain is associated with a pathway within the LAU. This ecosystem burn, Fuels Unit F1, would occur primarily in non-lynx habitat with minor areas of currently unsuitable stem exclusion lynx habitat which provides for movement but limited in foraging opportunities, especially during winter. The fire would be of low to moderate intensity, resulting in minor reduction of canopy cover and a mosaic of burned and unburned ground cover depending on vegetation type, availability of surface fuels, and moisture levels. Although there would be some changes, there would essentially be no change to the existing condition with respect to potential lynx use. The fire would not occur within the multistory habitat found along the north side of the ridgeline where lynx movement would likely occur through this area. The remaining vegetation management treatments occurring near the identified pathways would occur outside of the LAU in low elevation sites and drier forest types. Treatments here are designed to move towards the desired vegetative conditions for the area which would provide forage and cover for alternate prey species such as red squirrels and grouse. Also, RHCAs would be applied along streams and other riparian areas which would continue to provide cover in these potential movement areas. By treating these lower elevation sites to achieve a more characteristic vegetative condition, it would provide habitat variation and prey opportunities within this and other potential connectivity areas for lynx.

Habitat connectivity is maintained, therefore this Standard is met.

Objectives, Standards and Guidelines Applicable to Vegetation Management Projects in Lynx Habitat within LAUs

Objectives VEG O1, O2, O3, and O4: Manage vegetation to mimic natural succession and disturbance processes, including the use of fire, which would provide a mosaic of habitat conditions that would maintain or improve winter snowshoe hare habitat for the conservation of lynx. Focus of management should occur within areas that have potential to improve winter snowshoe hare habitat but presently have poorly developed understories that lack dense horizontal cover.

The action alternatives would implement timber harvest and prescribed fire within currently unsuitable lynx habitat and non-lynx habitat. Proposed vegetation management treatments are designed to re-introduce natural processes, such as wildfire, and better approximate historic stand patch size and species composition, retention of remnant large tree species while encouraging development/maintenance of a younger age class or structural stage, increased habitat diversity, and general movement towards the desired vegetative condition based on historic range of variation for this area.

Standard VEG S1: If more than 30 percent of the lynx habitat in an LAU is currently in a stand initiation structural stage that does not yet provide winter snowshoe hare habitat, no additional habitat may be regenerated by vegetation management projects.

See Table 145 for how the China LAU meets or is better than the 30 percent standard. Acres are mapped for all land within the LAU regardless of ownership. As mentioned previously, only NFS lands are found within the China LAU. Alternative 1/Existing Condition represents the amount of

early stand initiation habitat currently found within the LAU as shown in Table 143. Alternatives 2, 3, and 4 reflect the increase in early stand initiation habitat due to proposed regeneration harvest within the LAU. The percentage is calculated by dividing the early stand initiation habitat acres by the total lynx habitat acres within the LAU (see project file).

Table 145. Lynx Habitat Changed to an Early Stand Initiation Structural Stage[1] due to Implementation of OLY's Proposed Activities

LAU Name	Total Lynx Habitat Acres	Alt 1/ Existing Condition Acres (%)	Alt 2 Acres (%)	Alt 3 Acres (%)	Alt 4 Acres (%)
China	28,906	3,086 (11%)	3,162 (11%)	3,162 (11%)	3,153 (11%)

[1] Lynx habitat in a stand initiation structural stage that is currently not providing sufficient vegetation, quantity or quality (height), to provide winter snowshoe hare habitat.

Proposed regeneration harvest activities would occur in non-lynx habitat and stem exclusion habitat which currently does not provide foraging opportunities for snowshoe hares at any time of the year. Alternatives 2 and 3 propose approximately 76 acres of regeneration harvest within the China LAU. Alternative 4 would harvest slightly less at approximately 67 acres. For all alternatives, regeneration harvest would not result in a change in the level of lynx habitat found within early stand initiation habitat in the China LAU. Prescribed burn units would also occur within small amount of lynx habitat. However, the goal of the prescribed burn units is to rejuvenate and enhance the ground cover and understory vegetation in drier habitat types in areas of conifer encroachment into open timber stands with shrub understory and high canopy closure timber stands where little to no ground cover exists. The burns would not result in a change to the vegetation composition or structure and would not result in a measurable amount of increase in early stand initiation habitat in the LAU. In summary, the stands proposed for treatment within lynx habitat currently do not provide winter snowshoe hare habitat and the maintenance of or conversion to early stand initiation habitat would not change this condition. The China LAU would remain well below the maximum of 30 percent in compliance with Standard VEG S1.

Standard VEG S2: Timber management projects shall not regenerate more than 15 percent of lynx habitat on NFS lands within a LAU within a 10-year period.

Table 146 provides a comparison, by alternative, of how the China LAU complies with this standard which is specific to NFS lands. Alternative 1, the No Action alternative, represents the current amount of lynx habitat changed to early stand initiation habitat within the last 10 years within the LAU as shown in Table 143. Alternatives 2, 3, and 4 reflect the increase in early stand initiation habitat due to proposed regeneration harvest within the China LAU. The percentage is calculated by dividing the early stand initiation habitat acres by the total lynx habitat acres within the LAU (see project file).

Table 146. Lynx Habitat Changed to Early Stand Initiation Structural Stage[1] in the Last 10 Years due to Implementation of OLY's Proposed Activities

LAU Name	Total Lynx Habitat Acres	Alt 1/ Existing Condition Acres (%)	Alt 2 Acres (%)	Alt 3 Acres (%)	Alt 4 Acres (%)
China	28,906	54 (<1%)	130 (<1%)	130 (<1%)	121 (<1%)

[1] Lynx habitat in an early initiation structural stage that is currently not providing sufficient vegetation, quantity or quality (height), to provide winter snowshoe hare habitat.

Currently, less than one percent of the lynx habitat within the China LAU is in an early stand initiation structural stage because so few forested acres have been regenerated in the past 10 years. The additional 76 and 67 acres of regeneration harvest proposed for Alternatives 2 and 3 and Alternative 4, respectively, would not result in an increase to the existing level of early stand initiation habitat in the LAU. The China LAU would remain well below the maximum of 15 percent in compliance with Standard VEG S2.

Standard VEG S6: Vegetation management projects that reduce snowshoe hare habitat in multi-story mature or late successional forests may occur only: 1) within 200 feet of administrative sites, dwellings, outbuildings, recreation sites, and special use permit improvements, including infrastructure within permitted ski area boundaries; or 2) for research studies or genetic tests evaluating genetically improved reforestation stock; or 3) for incidental removal during salvage harvest (e.g. removal due to location of skid trails).

Table 147 provides a comparison, by alternative, of how the China LAU complies with this standard. Alternative 1, the No Action alternative, represents the current amount of suitable multistory habitat within the China LAU as shown in Table 143 Alternatives 2, 3, and 4 reflect the change in available multistory habitat due to proposed vegetation management within the LAU. The percentage is calculated by dividing the multistory habitat acres by the total lynx habitat acres within the LAU (see project file).

Table 147. Mature Multistory or Late Successional Forest Snowshoe Hare Habitat Impacted by Vegetation Management Activities in the OLY Project

LAU Name	Alternative	Acres of Multistory Habitat	Acres of Vegetation Management	Exception(s) Applied	Is Standard VEG S1 Being Met (Y/N)
China	1 (Existing Condition)	13,945	0	N/A – No activities proposed within multistory habitat	Y
China	2, 3, 4 (Post-Project)	13,945	0	None – No activities proposed in multistory habitat[1]	Y

[1] Timber harvest is allowed in areas that have potential to improve winter snowshoe hare habitat but presently have poorly developed understories that lack dense horizontal cover (e.g., uneven aged management systems, such as group selection, could be used to created openings where there is little understory so that new forage can grow).

The action alternatives would not reduce the amount of suitable multistory habitat within the China LAU as shown in Table 147 above. Treatments proposed within the China LAU were reviewed with respect to VEG S6, which prohibits reduction of snowshoe hare habitat within multistory or late successional forest. The purpose of this standard is to assist in maintaining lynx winter foraging habitat considered by lynx biologists to be critical in perpetuating viable lynx populations.

As described under the Methods section above, each proposed harvest unit was surveyed and categorized as either contributing to lynx multistory winter foraging habitat or not. No multistory winter foraging habitat would be treated in this project. Stands currently not contributing to winter forage habitat may be treated when meeting VEG S1 and S2. Such stands include mature stem exclusion habitat in which timber harvesting would improve winter foraging in the future (about 15 years), or non-lynx habitat.

Approximately 76 and 67 acres of lynx habitat are proposed for regeneration harvest under Alternatives 2 and 3 and Alternative 4 respectively, in the China LAU. Field validation determined that these stands have little to no understory vegetation and do not provide winter snowshoe hare habitat (i.e., they are currently not multistory habitat). These stands contribute to stem exclusion habitat within the LAU and existing acres of multistory and stem exclusion habitats presented in Table 143 were adjusted to reflect this field validated condition (see project file). Tree species composition and health is variable in these stands and although categorized as regeneration harvest, a range of overstory structure and canopy cover would be retained. Post-harvest retention would range from few trees per acre to portions resembling an intermediate harvest. In all units, where available, retained trees would be grouped together in clumps of 4-12 or more trees especially in those areas with fewer, quality leave trees available. This is intended to better protect the leave trees as well as provide small areas of greater cover for wildlife use, including use by lynx as they move through the area. As stated above, the regeneration harvest units have high canopy closure and contain little to no ground, shrub, or small conifer cover in the understory. Opening up the canopy would encourage stem initiation of shrubs and conifers in the understory. After field review, these regeneration harvest units were approved for implementation based on the rationale listed above and its compliance with the NRLMD, which encourages timber harvest in areas where the harvest would improve winter snowshoe hare habitat (USFS 2007b). Also, the China LAU meets VEG S1 (less than 30 percent of the LAU in an early stand initiation condition) as shown in Table 143 and Table 145 above.

Three prescribed ecosystem burns, Fuels Units F1, F13, and F19, are at least partially located within the China LAU for a total of approximately 525 acres; the proposal is the same for all alternatives. As for the harvest units, the prescribed burn units were assessed as to whether they contribute to winter snowshoe hare habitat or not. For these units, all were identified and proposed due to the presence of drier habitat types (i.e., non-lynx habitat types) and where low to moderate intensity fire could be applied on the landscape to reach desired vegetative conditions in a safe and controlled manner. Review of these units determined that fire would not be implemented within or reduce multistory habitat and were approved for implementation based on the rationale listed above and its compliance with the NRLMD. Also, the China LAU meets VEG S1 (less than 30 percent of the LAU in early stand initiation habitat) as shown in Table 143 and Table 145 above.

In summary, after review to validate stand conditions it was determined that activities would not occur within multistory habitat and regeneration harvest would occur within stem exclusion

habitat with the potential to improve winter snowshoe hare habitat. Proposed activities are in compliance with Standard VEG S6.

Guidelines VEG G1, G4, G5, and G11: Provide habitat for snowshoe hares by promoting high densities of understory vegetation in areas where it is currently lacking, provide habitat for alternate prey species including red squirrel, minimize creation of travel routes that facilitate snow compaction associated with prescribed fire, and provision of denning habitat (large amounts of down woody debris) within the LAUs.

Project activities would treat areas that are either in non-lynx habitat or are currently not providing winter habitat for snowshoe hares. For treatments within lynx habitat, regenerating stands in currently unsuitable habitat would provide future winter habitat within approximately 15 years and contribute early successional forage habitat to the landscape mosaic. Fire would be used as a post-harvest fuels treatment in units where existing fuels are light. The intent is to initiate a low severity burn that would stimulate forb and shrub development. This would speed up vegetative recovery to conditions suitable for summer foraging within approximately 2 to 3 years. Large areas of adjacent forest stands would continue to provide mature habitat for red squirrel and other prey species within the LAU. Prescribed ecosystem burn units in non-lynx habitat would rejuvenate existing shrub communities and stimulate shrub and conifer growth where it is currently lacking that would similarly provide for alternate prey species. None of the project vegetation management activities would contribute to travel routes that facilitate snow compaction. The proposed harvest units do not have large quantities of down coarse woody materials to provide denning habitat for lynx. However, within the major draws found in the LAU, many of the north facing slopes provide productive growing environments for trees due to their warm/moist conditions. Reduced fire events and lack of access for vegetation management has likely resulted in accumulations of down woody debris that could be used by denning lynx. Also, based on project surveys in previously managed areas, the existing tons/acre of coarse woody debris generally exceeds the 2015 Forest Plan guideline. Therefore, other areas that receive limited or no active management (e.g., IRAs, other unroaded areas such as within MAs 5a and 5c, and old growth stands) within the LAU would be expected to provide varying and potentially high levels of coarse woody materials. In addition, project design would leave down coarse woody debris and snags or recruitment snag levels (refer to the Forest Vegetation section) that would continue to provide appropriate levels and size of down coarse woody for the given habitat type and wildlife use. While these stands would not provide denning habitat for lynx in the immediate future, the retained coarse woody materials provides a baseline level to which more down woody material would be added as the stand matures and potentially becomes denning habitat.

Objectives and Guidelines Applicable to Human Use Projects in Lynx Habitat within LAUs

Objective HU O1: Maintain the lynx's natural competitive advantage over other predators in deep snow, by discouraging the expansion of snow-compacting activities in lynx habitat.

Snowmobiling is an ongoing winter activity within the project area. Use of these roads by snowmobilers, however, is influenced by the condition of the roads and ingrowth of vegetation on many barriered and restricted roads has reduced their use for snowmobiling. Watershed

improvement activities, including storage and decommissioning work on barriered roads, is not identified as a risk to lynx nor is it addressed in the NRLMD. However, because this activity requires roads to be brushed out to complete the work it presents an opportunity for winter snowmobile use on roads that may not have received much use in the past. All NFSRs proposed for watershed improvement work are legally open to snowmobile use between December 1 and April 30. This includes approximately 13 miles of active roadwork within the China LAU. Use levels could increase on these roads following roadwork until vegetation once again limits their use. Use of the roads would also be influenced by their location and the type of roadwork occurring. For example, the removal of culverts and restructuring of stream channels can influence snow conditions at these locations and whether or not it is suitable for crossing by a snowmobile. In general, because of potential lack of stream crossings and heavily timbered stands along roadsides many roads proposed for watershed work would not likely receive much snowmobile use. Those that do would become heavily vegetated again with alder within a few years to the extent that it makes use of the road difficult.

Two NFSRs proposed for watershed improvement work have also been proposed to include design features to maintain snowmobile access. Historically, NFSRs 4433 and 4433B have been used by snowmobilers as a route to access the open terrain on Pulpit Mountain. Because of the historic and continued use of this road by snowmobilers, design features to maintain snowmobile access on this road would be implemented during watershed improvement activities. The watershed improvement work for the remaining roads would not include design features for snowmobile use.

In summary, proposed watershed work would clear treated roads of vegetation and may incidentally and temporarily increase snowmobile use for a short time until the vegetation recovers. Design features to maintain existing snowmobile use would only occur on two roads within the same road system with historic and current use. Therefore, proposed activities occurring on these roads are expected to maintain the existing levels of snowmobile use and the project would not result in an expansion of snow compacting activities in lynx habitat.

Objective HU O2: Manage recreational activities to maintain lynx habitat and connectivity.

Winter recreational activities within the project area consist primarily of snowmobile activity along Lynx Creek up to Pulpit Mountain as well as in the China Basin/Flagstaff Mountain area on the southeastern boundary of the China LAU. Areas of snowmobile use or levels of use would not be expected to appreciably change as a result of this project. Lynx habitat and connectivity is currently good and would remain so post-project.

Proposed recreational improvements would occur at existing recreational sites within the China LAU including trailheads and access roads. Trailhead improvements include the installation of signs and potential widening of existing trailheads for trails #43 China Rim, #366 Pulpit Mountain National Recreation Trail, #709 Pulpit Ridge, and #706 Skyline Ridge which either start or lead into the China LAU. The potential widening of trailheads would be minor and would only involve the use of a chainsaw to clear small tree and shrub growth. As part of the routine road work proposed for NFSR 4429, Pulpit Jeep Road, blading and/or brushing would widen existing or potential turnouts where possible to better allow for vehicles to pass. The existing road is narrow with limited opportunity to pass an oncoming vehicle and the provision of some small turnouts would improve the safety for users of this open road. All of the recreational sites proposed for improvements are on or accessed by open roads, would not result in the measurable

reduction or change of the existing vegetative condition, and none are expected to result in a change in the existing type or level of human use in these areas.

Guideline HU G8: Cutting brush along low-speed, low-traffic-volume roads should be done to the minimum level necessary to provide for public safety.

The routine roadwork on NFSR 4429 that would be completed, in part, to maintain recreational access would include brushing of the road edges. As mentioned above, the existing open road is narrow and gets further restricted with the encroachment of brush along the edges. Brushing would be limited to the edges of the roadway and turnouts to improve user safety.

Alternatives 2, 3, and 4 - Summary of Effects of Proposed Activities

Timber harvest and associated activities, prescribed burn units, and watershed improvement activities would result in a period of increased human activity and noise in proposed treatment/activity areas. Although lynx are generally considered tolerant of human activity, it is expected that a range of behavioral response could occur depending on the individual and circumstances involved (ILBT 2013). As such, implementation of the proposed activities within occupied lynx habitat may result in short-term disturbance and avoidance of the area by resident lynx. However, large areas of lynx habitat are not being treated and would not experience increased levels of use within the China LAU. Also, the adjacent Lower and Upper Quartz LAU have no known on-going activities in lynx habitat. Any lynx potentially displaced during project activities would be able to find secure habitat given the ample suitable habitat within the affected LAU and adjacent LAUs.

Cumulative Effects

Introduction

The Existing Condition section describes relevant past and present factors affecting lynx and lynx habitat conditions and trends in the China LAU. This cumulative effects section summarizes the past actions as well as further describes ongoing and other reasonably foreseeable contributions potentially impacting lynx in terms of the standards and guidelines of the NRLMD.

Spatial and Temporal Context for Cumulative Effects Analysis

As described under the section “Spatial and Temporal Context for Effects Analysis,” the China LAU was chosen as the appropriate scale for lynx cumulative effects analysis. In summary, 1) the LAU represents the size of a home range of a female lynx, 2) maintaining habitat conditions at the scale of a lynx home range will allow for good distribution of lynx habitat components, 3) expanding the analysis area could dilute the effects of the proposed project, 4) the LAU provides a consistent boundary for monitoring of and compliance with the objectives, standards, and guidelines of the NRLMD, and 5) the LAU is large enough to include all the important effects of proposed activities.

In addition, areas outside of the impacted LAU were evaluated for potential impacts related to habitat availability and connectivity to adjacent LAUs. Given the location of OLY’s proposed activities (see Lynx Analysis Unit map, M-20), the existing conditions of adjacent LAUs (currently meeting Standard VEG S1), and type and nature of activities along the shared boundaries of the project and adjacent LAUs, there are no apparent conditions that would warrant expanding the boundary beyond the China LAU. Therefore, the China LAU was chosen as the appropriate scale for cumulative effects analysis.

Temporal boundaries for the Canada lynx cumulative effects analysis include both short-term and long-term effects and are the same as were described under "Spatial and Temporal Context for Effects Analysis." Short-term effects include effects associated with potential disturbance to lynx that would only be expected to last during the period of project activity. Regeneration of lynx habitat could result in the reduction of winter snowshoe hare for up to 15 years. Long-term effects to lynx and their use of lynx habitat are expected to last a minimum of 15 years and up to 100 years or more depending on the desired lynx habitat (i.e., stand initiation or multistory forage, respectively).

Past, Present, and Reasonably Foreseeable Activities Relevant to Cumulative Effects Analysis

Past Actions

Table 143 and Table 144 of this analysis summarize the existing condition based on effects of past actions and post-treatment conditions as they relate to lynx habitat. More specifically, the detailed description of previous vegetation management activities is found at the beginning of Chapter 3, including Table 32 and Table 33, as well as Appendix F of this document. Stand replacing wildfires have occurred periodically in the project area and created early successional habitat which was temporarily unsuitable for lynx winter foraging. In addition, regeneration harvest has occurred within the project areas primarily since the 1950s. It also resulted in forest structural changes that were temporarily unsuitable for lynx winter foraging. After approximately 15 years, these stands developed into winter foraging habitat. Over time, the combination of wildfire and regeneration harvest has resulted in a mosaic of structural stages within the project area LAU. Because of natural recovery, only a total of 271 acres of wildfire and regeneration harvest that have occurred within the past 15 years in lynx habitat in the China LAU are in an unsuitable condition today.

Alternative 1 – No Action

The No Action Alternative does not directly contribute any cumulative effects. However, the vegetative conditions with the project area would continue to trend towards a departure from historic conditions which include a more homogenous landscape lacking in diversity of patch size and shape, species composition, and successional stage. Disturbance processes, such as wildfire, contribute to the succession process including re-initiation of lynx habitat into a stand initiation structural stage or the transition of unsuitable stem exclusion habitat into suitable multistory habitat that provides for lynx's primary prey species the snowshoe hare. Without active management functioning as a source of disturbance, the landscape would likely become a more homogenous landscape of unsuitable habitat that does not provide for lynx life requirements.

Alternatives 2, 3, and 4 – On-going and Reasonably Foreseeable Actions

Reasonably foreseeable actions include those federal, state, or private activities that are ongoing or scheduled to occur, independent of this federal action. Table 34, located at the beginning of Chapter 3, identifies those current and foreseeable actions in the project area that were determined to be appropriate for inclusion in the analysis of environmental effects.

An ongoing federal action with treatments occurring in the China LAU is the Timber Stand Improvement 2010-2015 Project. This project is a district wide program of work consisting of precommercial daylight thinning around western white pine and pruning white pine branches in overstocked stands between 12 and 30 years of age. Only daylight thinning around western white pine would occur within LAUs as allowed per the exception under Standard VEG S5. The units

would retain 80 percent of the winter snowshoe hare habitat present and approximately 54 acres of the 271 total acres proposed in stand initiation habitat within the LAUs would be treated. As described under the VEG S1 and S2 discussion above, the proposed vegetation management treatments would not result in a change in the existing levels with respect to the 30 and 15 percent standards in the China LAU (see Table 145 and Table 146). Also, the OLY project does not propose additional precommercial thinning activities within the LAU. Cumulatively, effects to Canada lynx and lynx habitat would be negligible as proposed vegetation management activities would not measurably increase of the amount of early stand initiation habitat while maintaining available winter snowshoe hare habitat within the China LAU.

With population growth and development, it is reasonable to assume that some corresponding increase in human use of NFS lands is likely to occur. This increase is likely to be gradual and incremental, and tend to be focused on areas along or near roads open to motorized traffic. Recreational activities such as sightseeing, hiking, cross country skiing, camping, snowmobiling, hunting and fishing, mushroom picking, and firewood cutting are additional activities that have occurred and would continue to occur within the project area. Potential for snow compacting activities may increase slightly with population growth and development of the area and use of the Pulpit Mountain area would continue. However, use throughout the rest of the project area would not likely occur far beyond the existing restricted and open roads due to the generally heavily forested condition of the area. Cross-country snowmobile use in the China Basin area would be expected to decrease over time as the forest recovers following the last fire event. No increases in winter snowmobile routes would occur under this proposal. Therefore, proposed activities would not be expected to increase snow compaction with the LAU and no appreciable cumulative effects associated with recreational activities would be expected as a result of implementing the OLY project.

Standards ALL S1, VEG S1, and VEG S2

Standard ALL S1 (connectivity) requires evaluating the existing condition to see what linkage areas and movement corridors exist as their location and availability have been influenced by past actions. The cumulative effects analysis identifies potential changes in those movement corridors/linkage areas from the proposed actions in context of effects to those corridors/linkages resulting from other past, present, and reasonably foreseeable actions. No permanent roads would be constructed within the China LAU, there would be no increase in the amount of roads open to public motorized use, nor would there be an increase in winter snowmobile routes as part of the OLY project. Minimal harvest would occur within the LAU, but would increase diversity and productivity within the treated areas including some increase in the amount of future foraging habitat. Prescribed burning would result in a mosaic of burned and unburned conditions which would maintain cover and foraging opportunities during potential lynx movement through non-lynx habitat areas. These stands along with riparian areas, ridgelines, and other forested habitat would remain intact and available for lynx movement. Cumulatively, because the project would not decrease connectivity in the project LAU, there would be no change to overall connectivity.

Outside of the China LAU, continual development of private land in the Yaak and Kootenai watersheds is expected. Although located within low elevation habitat, alteration of habitat on these private lands could reduce connectivity between LAUs. Cumulative effects to lynx would be partially dependent on the extent and type of development and duration of use (seasonal versus year-round) of these parcels and homes. In addition to potential connectivity effects, anticipated effects include possible disturbance, habitat alteration, and/or loss of cover. Many of the activities that may occur on the private property parcels can only be estimated and are outside the control

of the Forest Service. Only one small parcel of private land is located within the linkage area and the site is not likely to be developed beyond its existing recreational use associated with Kootenai Falls. Also, no proposed activities would occur outside the LAU in this area and NFS lands would remain in a forested condition. Therefore, there are no anticipated cumulative effects to Canada lynx and the availability of alternate prey associated with private lands in this linkage area. In the potential movement areas between the China and Thunder LAUs as identified by Squires et al. (2013), there is no private property within the project area and only a small concentration of private lands around the confluence of Seventeen Mile Creek and the Yaak River. Development here is expected to be minor at most, and no OLY activities have been proposed on NFS lands in this immediate area. Therefore, any development of private land within this area is unlikely to cumulatively affect lynx movement between the LAUs.

Vegetation management Standards VEG S1 and S2 require the consideration of past actions, primarily stand replacing fire and/or regeneration harvest, to determine how much of the LAU is in a stand initiation structural stage that does not yet provide winter snowshoe hare habitat. As such, these standards are also considered for the cumulative effects analysis.

Conditions on the KNF indicate that winter snowshoe hare foraging opportunities are met after approximately 15 years. For Standard VEG S1, all regeneration harvest occurring within the last 15 years is considered to be temporarily unsuitable for winter snowshoe hare forage and contributes to the 30 percent standard. As indicated in Table 143, approximately 11 percent (about 3,086 acres) of lynx habitat in the China LAU is currently in a temporarily unsuitable condition as a result of recent wildfire events and vegetation management treatments. Approximately 76 and 67 acres of regeneration harvest would occur within the China LAU under Alternatives 2 and 3 and Alternative 4, respectively, which would contribute to a change in the amount of early stand initiation habitat. Cumulatively, when adding the proposed action to the current condition, there would be no change to the percent of early stand initiation habitat in the China LAU. The value for China LAU is well below the 30 percent limit and is in compliance with Standard VEG S1. There are no private lands located within the LAUs. Therefore, there are no cumulative effects related to vegetation management on private lands.

For Standard VEG S2, only those stands regenerated within the past 10 years on the KNF are considered. Currently, a negligible amount of lynx habitat in the affected LAUs has been regenerated in the past 10 years (see Table 144). Again, regeneration harvest would only occur within a small amount of stem exclusion habitat within the affected LAUs. As shown in Table 146, when adding the proposed action to the current condition there would be no cumulative change to the percent of lynx habitat in early stand initiation habitat occurring within the past 10 years in the China LAU. This value remains well below the 15 percent limit and is in compliance with Standard VEG S2.

2015 Forest Plan Biological Opinion (USFWS 2013b) – Terms and Conditions

In addition to the evaluation of the above NRLMD Standards for cumulative effects, the Terms and Conditions of the BO are also a measure to evaluate cumulative effects. The Terms and Conditions address the exemptions from Standards VEG S1, S2, S5, and S6 for fuels management projects within the WUI and exceptions under VEG S5 and S6 for precommercial thin and vegetation management projects that reduce snowshoe hare habitat. Both the exemptions and exceptions are limited to a certain amount of activity within lynx habitat that is measured cumulatively within a LAU and/or within an administrative unit (i.e., National Forest). See Table 148 for a description of the Terms and Conditions and the project's compliance with the Terms and Conditions.

Table 148. Terms and Conditions from the Biological Opinion on the Effects of the NRLMD on Canada Lynx Applicable to the OLY Project

Term and Condition	Compliance
Fuels management projects conducted under the exemptions from standards VEG S1, S2, S5, and S6 in occupied lynx habitat shall not occur in greater than 57,052 ares in the WUI on the Forest.	The KNF has not conducted any acres of fuels management projects under the exemptions for NRLMD Standards VEG S1, S2, S5, and S6 in lynx habitat within the WUI (see project file) since the BO established the new baseline of 57,052 acres. Although a portion of the OLY project is a fuels management project, none of these units occur within the LAU; therefore, no exemptions from the standards would be used for the treatments. No acres would be added to the Forest total and the KNF would remain at the 57,052 acres allocated for the Forest.
Fuels management projects conducted under the exemptions from standards VEG S1, S2, S5, and S6 in occupied lynx habitat shall not result in more than 3 adjacent LAUs not meeting the VEG S1 standard of no more than 30 percent of an LAU be in stand initiation structural stage.	Although a portion of the OLY project is a fuels management project, none of these units occur within the LAU; therefore, no exemptions from the standards would be used for the treatments. All affected and adjacent LAUs are currently better than the 30 percent standard (see project record).
Vegetation management projects conducted under the exceptions from standards VEG S5 and S6 in occupied lynx habitat shall not occur in greater than 11,862 acres on the Forest.	The KNF has conducted approximately 212 acres of precommercial thin acres allowed per the exceptions under VEG S5 and S6 (see project file) since the BO established the new baseline of 11,862 acres. Within the OLY project area, the China LAU meets VEG S1. Also, although a portion of the OLY project is a fuels management project, none of these units occur within the LAU; therefore, no exemptions from the standards would be used for the treatments. No acres would be added to the Forest total and the KNF would remain below the allocated 11,862 acres.
In occupied lynx habitat, percommercial thinning and vegetation management projects allowed per the exceptions listed under VEG S5 and S6 shall not occur in any LAU exceeding VEG S1, except for protection of structures.	Within the OLY project area, the China LAU meets VEG S1. Also, although a portion of the OLY project is a fuels management project, none of these units occur within the LAU; therefore, no exemptions from the standards would be used for the treatments.

Regulatory Framework Findings

2015 Forest Plan

The 2015 Forest Plan provides desired conditions, objectives, standards, and guidelines for Canada lynx within the Wildlife Resource. The following are applicable to the actions in this project[12]:

Forestwide Direction

p. 28, **GOAL-WL-01**: The KNF manages wildlife habitat through a variety of methods (e.g., vegetation alteration, prescribed burning, noxious weed treatments, etc.) to promote the diversity

[12] Goals, desired conditions, objectives, standards, and guidelines can be found on the noted pages in the 2015 Forest Plan.

of species and communities and to contribute toward the recovery of threatened and endangered terrestrial wildlife species.

> Proposed harvest and fuels treatments would result in the retention of remnant large tree species, better approximation of stand patch size and species composition, protection of riparian habitats, improved stand health, and general movement towards the desired vegetative condition based on historic range of variation with the stands for this area. Depending on the action alternative, timber harvest would occur on approximately 67 to 76 acres within lynx habitat. Regeneration harvest of these stem exclusion stands would increase future foraging opportunities for snowshoe hares and lynx within approximately 15 years. See "Standard VEG S2." Therefore, the OLY project would contribute to progress toward achieving GOAL-WL-01.

p. 28, **FW-DC-WL-01**: Nests and den sites and other birthing and rearing areas for terrestrial threatened, endangered, proposed, or sensitive species are relatively free of human disturbance during the period they are active at these sites.

> No active dens are known within the project area and none of the proposed harvest or prescribed burn units would occur within denning habitat (see "Guidelines VEG G1, G4, G5, and G11"). Therefore, the OLY project would contribute to progress toward achieving FW-DC-WL-01.

p. 28, **FW-DC-WL-03**: Recovery of the terrestrial threatened and endangered species is the long-term desired condition. Foraging, denning, rearing, and security habitat is available for occupation. Populations trend toward recovery through cooperation and coordination with USFWS, state agencies, other federal agencies, tribes, and interested groups.

> A mosaic of lynx habitat is found throughout the LAU. Stand initiation and multistory forage habitats would not be impacted by proposed activities (see "Standard VEG S6") and regeneration harvest of stem exclusion habitat would increase foraging opportunities in approximately 15 years while maintaining levels of early stand initiation habitat well below the standards for VEG S1 and VEG S2 (see "Standard VEG S1 and Standard VEG S2"). Therefore, the OLY project would contribute to progress toward achieving FW-DC-WL-03.

p. 29, **FW-DC-WL-13**: Down wood, especially down logs are available through the Forest for terrestrial mollusk, reptiles, and amphibians, small mammals, and other species who habitat requirements includes this component.

> Denning habitat is not found within the proposed harvest or prescribed burn units and would not be impacted by the OLY project. Within harvest units, coarse woody debris levels would be retained as appropriate for the given habitat type. See "Guidelines VEG G1, G4, G5, and G11." Therefore, the OLY project would contribute to progress toward achieving FW-DC-WL-13.

p. 29, **FW-DC-WL-17**: Forest management contributes to wildlife movement within and between national forest parcels. Movement between those parcels separated by other ownerships is facilitated by management of the NFS portions of linkage areas identified through interagency coordination. Federal ownership is consolidated at these approach areas to highway and road crossings to facilitate wildlife movement.

> Movement areas would be maintained throughout the LAU and activity areas under all alternatives and include unharvested and recovered stands, RHCAs, and newly treated stands along the lower elevation LAU boundary. Movement along the eastern boundary of the project area/LAU boundary, much of which includes unroaded and roadless areas and an abundance of multistory and stand initiation habitats, would not be impacted by project activities. No treatments are proposed within the identified linkage area and there would be no change to federal ownership in this area (see project file). See "Objective ALL S1" and "Standard ALL S1." Therefore, the OLY project would contribute to progress toward achieving FW-DC-WL-17.

p. 30, **FW-OBJ-WL-01**: The outcome is the maintenance or restoration of wildlife habitat on 1,000 to 5,000 acres of NFS lands, annually, with an emphasis on restoration of habitats for threatened and endangered listed species and sensitive species.

> Canada lynx are associated with certain habitat types and structural conditions that support their primary prey, snowshoe hares. Proposed activities would not impact stand initiation or multistory foraging habitats, important for providing critical winter foraging opportunities and contributing to lynx recovery. Proposed treatments would provide additional foraging habitat within approximately 15 years with only a slight increase in the level of early stand initiation habitat that would remain well below the standards for VEG S1 and VEG S2. See "Standard VEG S1," "Standard VEG S2," and "Standard VEG S6." Therefore, the OLY project would contribute to the attainment of FW-OBJ-WL-01.

p. 30, **FW-STD-WL-01**: The Northern Rockies Lynx Management Direction (2007) and ROD is included in appendix B, and shall be applied.

> Management direction from the NRLMD direction has be applied to actions proposed in the OLY project. See the "Direct and Indirect" and "Cumulative Effects" discussions as organized by the objectives, standards, and guidelines of the NRLMD. Also, see the project file for those objectives, standards, and guidelines considered but determined to be not relevant to this project. Therefore, the OLY project is designed in accordance with this standard.

p. 32, **FW-GDL-WL-14. Connectivity**: In wildlife linkage areas identified through interagency coordination, federal ownership should be maintained.

> All lands currently under federal ownership will remain so as OLY does not propose any exchanges (see project file). Therefore, the OLY project is designed in accordance with this guideline.

p. 32, **FW-GDL-WL-21**: Management activities on NFS lands should avoid/minimize disturbance at known active nesting or denning sites for other sensitive, threatened, or endangered species not covered under other forestwide guidelines.

> No active dens are known within the project area and none of the proposed harvest or prescribed burn units would occur within denning habitat (see "Guidelines VEG G1, G4, G5, and G11"). Therefore, the OLY project is designed in accordance with this guideline.

Management Area Direction

p. 62, **MA5a,b,c-DC-WL-01 (Backcountry)**: Large remote areas with little human disturbance such as those found in these MAs (in conjunction with MAs 1a, 1b, and 1c) are retained and contribute habitats for species with large home ranges. Habitat conditions within these management areas contribute to wildlife movement within and across the Forest. These areas also provide foraging, security, denning, and nesting habitat for wildlife.

> MAs 5a and 5c are found within the project area in association with the Flagstaff and Saddle Mountain IRAs. One ecosystem burn unit would be implemented within MA5a, otherwise these lands would continue to contribute to secure habitat for lynx with low levels of non-motorized human disturbance and largely natural vegetative conditions. See "Standard ALL S1." Therefore, the OLY project would contribute to progress toward achieving this desired condition.

Geographic Area Direction

p. 97, **GA-DC-WL-LIB-01**: Habitat conditions are retained for wildlife movement between the Cabinet Mountains and the Yaak, in particular, the area of Flagstaff Mountain.

> No activities are proposed in the Flagstaff Mountain/Kootenai Falls area of the OLY project and there would be no impacts to the potential use of this area by lynx to move to the Crowl and Treasure LAUs to the south. See "Standard ALL S1." Therefore, the OLY project would contribute to progress toward achieving GA-DC-WL-LIB-01.

Federal Law

Endangered Species Act

The preferred alternative would be consulted on with USFWS and compliance with ESA would occur.

National Forest Management Act

The project would comply with NFMA direction to provide for diverse populations of plant and animal communities through compliance with the 2015 Forest Plan.

Statement of Findings

Support for the OLY effects determination can be found within the Biological Assessment (BA) which was submitted to U.S. Fish and Wildlife Service on March 30, 2016. Upon completion of formal consultation and receipt of the Biological Opinion (BO), both the BA and BO will be available within the Project Record.

Alternative 1 (No Action) **may affect, not likely to adversely affect** Canada lynx. This determination is based on: 1) no activities would take place that would alter lynx habitat, 2) all vegetation management standards would continue to be met in the short-term, and 3) there would be no increases in mortality risk; however, 4) active fire suppression would continue the trend towards uncharacteristic vegetative and fuel conditions, 5) with an increased risk of severe fire behavior, and 6) an increased potential for large scale changes in available suitable and unsuitable lynx habitat with in the China LAU.

Alternatives 2, 3, and 4 **may affect, is not likely to adversely affect** Canada lynx. This determination is based on: 1) project activities could disturb a lynx in activity areas and may cause temporary avoidance of the affected areas although lynx are generally considered tolerant of human activity and 2) proposed harvest would result in a slight increase in early stand initiation habitat that temporarily does not provide winter foraging opportunities for snowshoe hares; however, 3) proposed activities would move stands towards desired vegetative conditions characteristic of the area, including increased habitat diversity, 4) regeneration harvest is proposed within stands that currently do not provide lynx foraging habitat (i.e., stem exclusion) which could improve lynx winter foraging opportunities in approximately 15 years, 5) treatments would reduce the risk of severe fire within the treated and surrounding areas, 6) there would be no increase to the percentage of early stand initiation habitat within the China LAU which would remain well below the standards for VEG S1 and VEG S2, 7) activities would maintain the identified linkage area as well as potential movement areas, 8) large areas of the LAU would remain free of activity to accommodate potential lynx displacement from activity areas, and 9) no increase in lynx mortality is expected.

Other Agencies and Individuals Consulted

Katrina Dixon, USFWS Consultation Biologist

Communications have consisted of consultation throughout the development of the OLY project and included providing a description of OLY's proposed actions and discussions regarding potential concerns and expected determinations of effects for Canada lynx.

Kevin Aceituno, USFWS Consultation Biologist

Communications consisted of consultation during the latter stages of the OLY project, including informal consultation.

Canada Lynx Critical Habitat

Introduction

Canada lynx occupy northern boreal forests[13] which are primarily composed of cool, moist subalpine fir and Engelmann spruce and moist lodgepole pine forest which receive abundant snowfall. Snowshoe hares are the primary prey of lynx and habitat use by lynx is associated with those conditions that support hare populations. Therefore, mature multistory[14] and young regenerating[15] forest that provide habitat for snowshoe hares is important to lynx conservation. Especially important is winter habitat that continues to provide snowshoe hare forage and cover (twigs and stems that protrude above the snow or limbs that drop to the snow surface) during high snow periods. Denning habitat is found in forests with abundant dead and down trees, especially in areas near foraging habitat. Both natural (e.g. fire) and human disturbances such as timber harvest and prescribed fires can affect lynx habitat (USFS 2007a).

Although a variety of habitat and forest types may be found within a lynx's home range and used to some level (e.g., matrix habitat[16] for travelling between patches of boreal forest), in Northwestern Montana lynx select forest stands with high horizontal cover primarily consisting of Engelmann spruce and subalpine fir. Both mature multistory and young forest habitats provide for snowshoe hares, but use by lynx varies seasonally in response to snowshoe hare availability. Mature multistory stands provide the greatest foraging opportunities for both hares and lynx during winter and management that maintains and promotes a mosaic of multistory spruce-fir forests is most beneficial to the species (Squires et al. 2010).

With designation of lynx critical habitat, physical and biological features important to lynx were considered to identify those essential to the conservation of the species. Examples of these features include nutritional or physiological requirements, cover or shelter, and reproductive sites. The physical and biological features of critical habitat essential to lynx conservation, or the Primary Constituent Element (PCE), has been defined as "(1) Boreal forest landscapes supporting a mosaic of differing successional forest stages" containing the following sub-elements: (1a) snowshoe hares and their preferred habitat, (1b) adequate winter snow conditions, (1c) denning habitat with abundant coarse woody debris , and (1d) matrix habitat which facilitates lynx movement and dispersal by connecting areas of suitable habitat (USFWS 2013a). Therefore, proposed vegetation management that influences the amount and juxtaposition of young regenerating and multistory forest within an analysis area is the focus of the critical habitat analysis. In addition, vegetation management treatments or other activities that affect the other

[13] Boreal forests used by lynx are generally cool, moist, and dominated by conifer tree species, primarily spruce and fir. Boreal forest landscapes used by lynx are heterogeneous mosaics of vegetative cover types and successional forest stages created by natural and human-caused disturbance. In many places periodic vegetation disturbances stimulate development of dense understory or early successional habitat for snowshoe hares. (USFWS 2013a description based on literature review).

[14] Mature multistory forests that include many age classes and vegetation layers in which conifer boughs touch the snow surface.

[15] Dense young forests in which the vegetative growth is sufficient to protrude above the snow.

[16] Forest and non-forest habitat types that do not support snowshoe hares, but allow for lynx movement between associated patches of boreal forest.

sub-elements of the PCE will also be discussed. Those activities that do not affect the PCE, such as activities occurring outside of critical habitat, are not considered for this analysis.

Summary of Conclusions

Implementation of the OLY project's action alternatives result in a determination of **may affect, is not likely to adversely affect** Canada lynx critical habitat. Proposed vegetation management would occur in potential and matrix habitats in the China LAU. Timber harvest in mature stands with poorly developed understories would increase the future amount of snowshoe hare preferred habitat conditions within critical habitat. Harvest and prescribed fuel treatments within matrix habitat would continue to provide conditions suitable for lynx movement and connectivity between stands of preferred habitat. Impacts to the PCE of lynx critical habitat currently available within the project area would be negligible at the scale of the LAU.

Regulatory Framework

2015 Forest Plan

The 2015 Forest Plan provides overall guidance for the management of the lands on the KNF. It describes the goals, desired conditions, and objectives toward which the management of the land should be directed. And it establishes standards and guidelines to help achieve or maintain the desired condition or conditions, to avoid or mitigate undesirable effects, or to meet applicable legal requirements.

There are no plan components which provide specific Canada lynx critical habitat resource direction relevant to this project. However, there are other 2015 Forest Plan components that provide resource direction for a range of wildlife species or habitat conditions that are not specific to lynx critical habitat, but still are applicable to the management of critical habitat for a threatened species. The full list of the plan components applicable to lynx management are found in the "Regulatory Framework Findings" section of this analysis.

Resource Indicators and Measures

For the lynx critical habitat analysis, the PCE sub-elements of mature multistory forest, young forest, and matrix habitat will be the resource indicators (see Table 149) for measuring impacts to lynx critical habitat from proposed vegetation management. The changes to these habitats will be used to compare alternatives. The overall assessment of lynx critical habitat also analyzes the potential effects to winter snow conditions and denning habitat within the analysis area.

Table 149. Resource Indicators and Measures for Assessing Effects

Resource Element	Resource Indicator	Measure	Used to address: P/N*, or key issue?	Source
Mature Multistory Forest	Reduction of snowshoe hare habitat within mature multistory forest	Acres treated that result in a percent change in the level of mature multistory forest within the analysis area	No	ESA designation of critical habitat and identification of the PCE (USFWS 2013a)

Resource Element	Resource Indicator	Measure	Used to address: P/N*, or key issue?	Source
Young Forest	Reduction of snowshoe hare habitat within young forest	Acres treated that result in a percent change in the level of young forest within the analysis area	No	ESA designation of critical habitat and identification of the PCE (USFWS 2013a)
Matrix Habitat	Alteration of matrix habitat such that it impedes movement and dispersal to preferred habitats	Acres treated or removed; if removed, how does the alterative affect movement and connectivity	No	ESA designation of critical habitat and identification of the PCE (USFWS 2013a)

*P/N = Purpose and Need

Methodology

Lynx habitat was mapped for the KNF based on forest type, stand age, and elevation. In addition to lodgepole pine, Engelmann spruce, and subalpine fir forest types, mapping also includes cedar-hemlock and other cool, moist forest types as they may provide lynx habitat (USFS 2007a, b). Successional or structural stage is based on year of origin and assumptions about the length of time it takes for a stand to move from one stage to the next. However, age does not account for environmental conditions or disturbance processes that affect development of the successional stage. For example, cold temperatures and short growing seasons at high elevation sites may maintain a more early seral stage despite an old age and multiple years of origin. Also, natural disturbances such as fire or wind play an important role in the development of multistory stands and without disturbance stands may remain in a stem exclusion stage for a longer period of time than expected. Therefore, mapping of lynx critical habitat based on stand data provides a broad estimation of the habitats available within an LAU but may need to be fine-tuned based on field review.

Each harvest unit was surveyed (Bertram and Claar 2008 and professional judgment), photographed for the project record, and categorized as either providing preferred snowshoe hare habitat conditions or not. Similarly, the prescribed burn units were evaluated through the use of stand data, satellite imagery, field review, and photo documentation (documentation available in the project file). Stands found to be contributing these conditions generally would not be harvested. Whereas harvest occurring in stands that have the potential to provide these habitat conditions (i.e., stands currently with poorly developed understories) would improve snowshoe hare habitat in the future. When the mapped habitat did not accurately depict the on-the-ground condition, the mapped acres were adjusted to correctly reflect the existing condition for those specific acres. For example, harvest was proposed in stands initially mapped as multistory habitat prior to field validation. However, upon field review these stands were found to be in a structural condition that currently does not provide snowshoe hare foraging habitat (i.e., stem exclusion). In Table 150, which displays the existing critical habitat PCE conditions, the reviewed acres were removed from the mature multistory forest acres. This became the baseline from which to assess the effects of proposed activities.

Matrix habitat proposed for treatment was evaluated with respect to the expected post-treatment condition and its ability to support movement and connectivity to preferred habitats. For example, the implementation of treatments that would move the stand towards desired conditions for that

habitat type would be able to continue to support lynx movement. If the proposal results in the removal of matrix habitat, such as for the construction of a highway, then the analysis would consider effects such as the scale of the change compared to available critical habitat within the analysis area, whether the activity impedes movement to preferred habitats, how the change is impeding movement and where is it occurring with respect to source or sink populations, etc. Ridgelines and draws were considered high value movement areas.

Data Sources

Lynx population ecology, biology, and habitat description and relationships are described in Ruggiero et al. (2000), ILBT (2013), and USFWS (2013a). Critical habitat designation and the PCE are described in USFWS (2014a).

Assumptions and Limitations

Conditions on the KNF indicate that young forests provide preferred conditions for snowshoe hares approximately 15 years after a stand re-initiation disturbance event. Therefore, recent regeneration timber harvests (those within the last 15 years) are unlikely to offer adequate vegetation to provide snowshoe hare winter forage whereas timber harvests completed prior to 2000 would now have trees in the units of the size and density to provide high quality snowshoe hare habitat in a young forest condition.

Affected Environment

Spatial and Temporal Context for Effects Analysis

The analysis area for considering effects of the proposed project to lynx critical habitat is the affected LAU. Similar to the selection of the LAU for lynx, the LAU is the appropriate scale for critical habitat analysis because lynx have large home ranges in which the vegetative composition and distribution have historically been influenced by landscape processes such as wildfire. The amount of change to lynx habitat could then be evaluated against the remaining levels of habitat available for lynx use with their home range.

The project area and proposed activities are located within the China LAU (see Lynx Analysis Units map, M-20). Timber harvest is clustered along the lower elevation boundary of the LAU in roaded areas. Prescribed burn units are similarly located along or near the lower elevational boundary primarily in matrix habitat and some potential[17] habitat. Treatment of these areas would not result in the loss of habitat or impede movement to or use of adjacent foraging or denning habitats. Also, ample lynx habitat would remain available within the LAU for lynx use during and post-project implementation. Therefore, the China LAU has been chosen as the appropriate scale of analysis for determining direct and indirect effects to critical habitat for the OLY project. The effects analysis for critical habitat addresses the type and magnitude of effects to the PCE by considering impacts to each sub-element (USFWS 2009, 2013a).

Temporal boundaries for the lynx critical habitat analysis include both short-term and long-term effects. Short-term effects are those that are expected to last approximately 15 years. Regeneration harvest in young or mature multistory forests would result in the re-initiation of the

[17] Habitat types that have the potential to develop habitat conditions preferred by snowshoe hares, but currently lack dense vegetation that protrudes above the snow and/or multistory structure where conifer boughs touch the snow surface.

stand such that winter snowshoe hare habitat would not be available for approximately 15 years. Long-term effects are those that expected to last longer than 15 years. Following regeneration harvest, winter foraging opportunities would be expected to last from about 16 to 50 years post-harvest in a young forest condition and again at over 100 years once a mature multistory forest develops on the site.

Existing Condition

Introduction

Following the listing of Canada lynx within the contiguous U.S. as threatened in March 2000 (USFWS 2000), the USFWS designated lynx critical habitat in November 2006 (USFWS 2006). Since 2006, the USFWS subsequently revised the critical habitat designation (USFWS 2009) which delineated lynx critical habitat units across the lower 48 states from Maine to Washington. Based on this delineation, the OLY project on the Three Rivers Ranger District falls within the Northern Rocky Mountains Critical Habitat Unit #3 (ibid). Critical habitat boundaries were updated with a new final designation on September 12, 2014 (USFWS 2014a). There were only extremely minor changes to the critical habitat boundary on the KNF and all of these were small slivers along the critical habitat edge that were removed in the 2014 version. The updated boundaries are practically unchanged and the OLY project still falls within Unit #3 under this updated final rule.

The OLY project area includes the majority of the China LAU, approximately 28,881 acres of 32,772 total LAU acres (Lynx Analysis Unit map, M-20). Much of this area includes large tracts of unroaded and roadless lands in two IRAs (Saddle Mountain and Flagstaff) and three MAs (MA4, 5a, and 5c) totaling approximately 9,696 acres and 10,579 acres within the LAU, respectively, and provide largely natural vegetative conditions.

Condition of PCE within the China LAU

Historically, natural disturbances (e.g., fire, insect, disease, wind) influenced successional stages of vegetation and resulted in diversity of habitat type and distribution. Wildfire was a major contributor of landscape disturbance within lynx habitat and resulted in vegetative structural changes by reducing timber and shrub overstory in affected areas and creating additional age classes and species diversity. The last large landscape fire occurred in 1994 covering approximately 7,194 acres (see Fuels Management section). Forested habitats that experienced stand replacing fire would be in an early successional stage that temporarily would not provide the habitat conditions preferred by snowshoe hares. In other places, fire severity would have been low to mixed-severity resulting in smaller patches of habitat change. In contrast, fire suppression since the early 1900s has resulted in fewer and smaller fires with the most recent fire in the project area occurring in 2009 and only totaling 19 acres (see Fuels Management section). Effects of fire suppression includes alteration of stand structure resulting in stands with greater canopy closure and poorly developed understories in some areas which has in turn reduced the suitability of the stands for snowshoe hares and, therefore, lynx.

Roaded lands within the project area have been managed for timber production using a number of treatment methods. Harvest activities on NFS lands began in the 1950s and have continued to the present. Regeneration harvest includes clearcut, seed tree, and shelterwood treatments and has occurred on approximately 26,729 acres of NFS land in the project area (about 50 percent). Intermediate harvest (e.g., commercial thinning, salvage, and individual tree selection) has occurred on approximately 9,014 acres or 17 percent of the project area. Past harvest has

provided some variety of age classes and successional stages across the project area. Regeneration harvest in lynx critical habitat would have resulted in structural changes that influenced lynx and matrix habitats. Immediately following regeneration harvest, stands would temporarily not provide snowshoe hare preferred habitat conditions. Conditions on the KNF indicate that young forests provide these preferred conditions after approximately 15 years. Therefore, recent regeneration timber harvests (i.e., those within the last 15 years) are unlikely to offer adequate vegetation to provide snowshoe hare winter forage whereas timber harvests completed prior to 2000 would now have trees in the units of the size and density to provide high quality snowshoe hare habitat in a young forest condition.

Boreal forest landscapes are naturally in a state of change, through disturbance and succession processes, and result in a changing environment of habitat types, distribution, and juxtaposition (USFWS 2013a). As such, not all lynx habitat acres provide suitable habitat all of the time and there may naturally be periods of time with low levels of suitable habitat. This variability of habitat suitability and distribution is reflected in habitat mapping done on lynx habitat to estimate historic range of lynx habitat levels, current levels on the KNF, and projected future levels under different management scenarios (ERG 2012). Historically, the KNF provided between 69,681 acres to 278,725 acres of mature multistory suitable lynx habitat (ibid). Currently the KNF has approximately 149,781 acres of mature multistory suitable lynx habitat which falls within the historic range of variation (ibid).

Mature multistory and young forests (PCE 1a) as well as matrix habitat (PCE 1d) in the China LAU was assessed for all ownerships; however, only NFS lands are found within this LAU. In addition, the ongoing Timber Stand Improvement 2010-2015 Project has updated the existing condition. Table 150 displays the current critical habitat PCE conditions in the project area. The percentages reflect the contribution of each habitat type (e.g., mature multistory forest) to the total amount of critical habitat available within the LAU (each category of habitat acres divided by the total habitat acres within the LAU). See project file for calculations.

Approximately 20,049 acres of NFS lands in the China LAU are in a structural condition that can support snowshoe hares and lynx during the critical winter period (see Table 150). Approximately 43 percent of these critical habitat acres within the China LAU occur as mature multistory forest and 19 percent as young forest. Mature multistory forest is found throughout the LAU, as a mosaic of both smaller and larger patch sizes and intermixed with young forest, potential habitats, and matrix habitat. In general, more mature multistory habitat appears to be along higher elevations ridges and on north facing slopes that likely receive and/or hold moisture better and have longer fire return intervals. Young forest is found both as smaller patch sizes associated with past harvest as well as larger patch sizes associated with recent fires in areas like the Arbo Creek and Studebaker/Kedzie Creek drainages. Matrix habitat comprises about 3,866 acres (12 percent) of the LAU and is generally located along the lower elevation boundaries of the LAU, but also as patches of drier habitat types on south facing slopes or non-forested areas, bare ridgetops, etc. that do not support snowshoe hares but still provide for lynx movement.

Table 150. Existing Critical Habitat PCE Conditions[1] within the China LAU

LAU Name (Number)	LAU Acres	Mature Multistory Forage Acres (%)	Young Forest Acres (%)	Matrix Acres (%)
China (14407)	32,772	13,945 (43%)	6,104 (19%)	3,866 (12%)

[1] Only those habitat types that currently contribute to snowshoe hare habitat and matrix habitat are presented. Other habitat types that have the potential to develop habitat conditions preferred by snowshoe hares (e.g., stem exclusion

habitats) are also found within the project area. These potential habitats comprise the remaining approximately 27 percent of the China LAU.

Environmental Consequences

Alternative 1 – No Action

A range of fire severity, from non-lethal to stand replacing crown fires, historically played a role in developing the vegetative characteristics in the OLY project area. Although the type and frequency of fire experienced varies within a given area and vegetation type (based on biophysical setting), with some being more prone to infrequent stand replacing fire, the vegetation types within the project area have historically experienced low and/or mixed severity fires at least periodically. The combination of these natural disturbance regimes created smaller areas of disturbance within larger, previously disturbed areas and introduced diversity through stand age and tree size. This would have resulted in a mosaic of forage, non-forage, and denning habitat for lynx that was naturally shifting over the landscape. The exclusion of low to moderate severity fires through fire suppression has reduced the amount of natural openings, structural diversity, and the number/size of patches across the landscape as well as increased fuel loadings in the form of ladder fuels and small down woody materials. Fire suppression has not yet resulted in a departure from historic ranges for all stands within the project area (especially those with naturally longer fire return intervals such as might be found in lynx habitat), although they too are trending towards a departure. Due to the denser fuel conditions, resulting stand replacing fires in these stands would likely be larger resulting in a more homogenous landscape. In general, the resultant stand patch sizes and occurrence, species composition, stand structure, and fire frequency and severity are departing from desired vegetative conditions based on historic range of variability within the project area. See the Fuels Management and Forest Vegetation sections for more detail.

No direct effects from federal actions would occur. The No Action alternative would maintain the existing vegetative condition on the landscape which includes forested stands with preferred habitat conditions that support a snowshoe hare population, denning sites, and matrix habitat that supports lynx movement. With continued fire suppression and lack of active management, the indirect effects of this alternative would include a continued trend towards uncharacteristic vegetative conditions. For example, forested stands with a mature closed canopy overstory have little to no understory tree and shrub development and are, therefore, currently unsuitable for snowshoe hare and lynx because they do not provide winter foraging opportunities. Without a dominant disturbance process like wildfire to create openings and encourage understory development, these stands may remain in this successional stage for a longer period of time and continue to be unsuitable for snowshoe hare and lynx forage.

Although large, severe wildfire has occurred within this area in the past, mixed severity fires would have also played a role in creating a mosaic of forest structural stages. This mosaic of structural stages in juxtaposition to one another provides for different lynx life requirements (e.g. foraging and denning habitats). However, if severe wildfires occur, especially over a large expanse, potentially drastic changes in the availability and distribution of preferred and potential habitat across the project area could occur. Preferred habitat conditions would be limited in the burned areas for approximately 15 years and multistory forest and denning habitats would not be available within these areas for possibly a hundred years or more.

Alternatives 2, 3, and 4 – Direct and Indirect Effects

Mature multistory and young forests provide the preferred habitat conditions for snowshoe hares. Natural disturbance processes, such as wildfire, historically resulted in a diversity of habitat conditions (e.g., patch size and shape, species composition, and successional stage) and arrangement on the landscape. Active fire suppression has impacted the development of early seral conditions and multistory characteristics within mature habitats. Proposed vegetation management treatments are designed to simulate and re-introduce these natural processes, especially wildfire, and better approximate historic conditions that would result in movement towards the desired vegetative condition for this area. Vegetation management treatments that encourage the maintenance and/or development of the habitat conditions preferred by snowshoe hares as well as denning and matrix habitats would maintain or improve the PCE for lynx.

The following analysis describes the effects of proposed OLY activities to the PCE, by sub-element, for designated lynx critical habitat within the China LAU. Table 151 provides a comparison, by alternative, of how the proposed activities impact lynx critical habitat PCE. Alternative 1, the No Action alternative, represents the current critical habitat PCE conditions within the China LAU as shown in Table 150. Alternatives 2, 3, and 4 reflect the changes in critical habitat PCE acres due to proposed vegetation management within the LAU. The percentage is calculated by dividing the acres of PCE sub-element habitat impacted by the existing PCE sub-element habitat acres within the LAU (see project file).

Table 151. During Project and Future Effects[1] of Harvest Activities to Lynx Critical Habitat PCE Conditions within the China LAU

LAU Name	PCE Sub-Element	Alternative 1/ Existing Condition Acres (%)	Alt 2 Acres (%)	Alt 3 Acres (%)	Alt 4 Acres (%)
China	Mature Multistory	13,945 (0%)	0 (0%)	0 (0%)	0 (0%)
China	Young Forest	6,104 (0%)	0 (0%)	0 (0%)	0 (0%)
China	Young Forest – Future[1]	--	76 (1%)	76 (1%)	67 (1%)
China	Matrix	3,866 (0%)	60 (2%)	60 (2%)	44 (1%)

[1] Impacts to mature multistory forest and matrix habitats are for during project only. For young forest habitat, the table also displays the future increase in young forest habitat that would occur as a result of proposed harvest within stem exclusion habitat. This future young forest would provide preferred habitat conditions within about 15 years post-harvest.

Boreal forest landscapes supporting a mosaic of differing successional forest stages and containing:

(1a) Presence of snowshoe hares and their preferred habitat conditions, which include dense understories of young trees, shrubs or overhanging boughs that protrude above the snow, and mature multistory stands with conifer boughs touching the snow surface.

The action alternatives would not reduce the amount of mature multistory and young forest habitats in lynx critical habitat within the China LAU as shown in Table 151. As described under the “Methods” section above, treatments proposed within the LAU were reviewed with respect to the occurrence and potential effects to these habitat types. This is because the maintenance of preferred habitat conditions that provide winter foraging opportunities for both snowshoe hares

and lynx is considered by lynx biologists to be critical in perpetuating viable lynx populations. None of the proposed harvest treatments would occur within mature multistory or young forests.

Each of the action alternatives include regeneration harvest in the China LAU either in matrix habitat or potential lynx habitat (i.e., stem exclusion structural stage within boreal forest habitat types) which have a high canopy closure and contain little to no ground, shrub, or small conifer cover in the understory. Approximately 70 and 67 acres of lynx habitat are proposed for regeneration harvest under Alternatives 2 and 3 and Alternative 4, respectively, in the LAU. Prior to field validation, these stands were tentatively mapped as potential multistory foraging habitat. However, field validation determined that these stands have poorly developed understories and do not provide conditions preferred by snowshoe hares. These stands currently contribute to potential habitat (i.e., stem exclusion) within the LAU and are not multistory foraging habitat, and existing acres and percent of mature multistory forest habitat presented in Table 150 above were adjusted to reflect this condition (see project file). After field review, these regeneration harvest units were approved for implementation based on the rationale listed above. There would be no impacts to mature multistory forest habitat within the China LAU under any of the alternatives. Harvest would, however, increase future young forest habitat within each LAU as described below (also see Table 151).

Timber harvest is proposed in mature stands; therefore, there would be no direct effects to the existing young forest habitat found within the China LAU. However, indirectly, the amount of young forest habitat would be increased within the project area in about 15 years as the recovered vegetation grows to a density and height (protrudes above the snow) to be able to support a snowshoe hare population during the winter months. As mentioned above, within potential habitat the proposed regeneration harvest units have high canopy closure and contain little to no ground, shrub, or small conifer cover in the understory. Opening up the canopy would encourage stem initiation of shrubs and conifers in the understory. In addition, fire would be used as a post-harvest fuels treatment in units where existing fuels are light. The intent is to initiate a low severity burn that would stimulate forb and shrub development. This would speed up vegetative recovery within this early seral habitat. As displayed in Table 151, all alternatives would result in an approximately 1 percent increase in future young forest habitat. Alternatives 2 and 3 propose approximately 9 more acres than Alternative 4.

Three prescribed ecosystem burns, Fuels Units F1, F13, and F19, are at least partially located within the China LAU for a total of approximately 525 acres; the proposal is the same for all alternatives. As described for the evaluation of proposed harvest units, the prescribed burn units were also assessed as to whether they provide habitat conditions preferred by snowshoe hares or not. As this PCE (1a) sub-element defines, habitat conditions preferred by snowshoe hares are young dense forest that protrudes above the snowline in winter and mature multistory forest with conifer boughs touching the snow surface. For these units, all were identified and proposed due to the presence of drier habitat types and where low to moderate intensity fire could be applied on the landscape to reach desired vegetative conditions in a safe and controlled manner. Review of these units determined that the prescribed burn units would not occur within or reduce mature multistory forest or young forest; therefore, these units were approved for implementation based on the rationale listed above.

Proposed watershed improvement work would occur on existing road prisms within the China LAU and lynx critical habitat. Approximately 13 miles of active roadwork would cross through a variety of lynx habitats, including mature multistory forest and young forest habitats. Clearing of the existing vegetation (e.g., alder and small conifers) would be necessary in order to access the

sites and complete the desired work. Once the work has been completed, shrubs and conifers would be expected to re-establish on the site within a few years and contribute to the cover and forage available within the adjacent stands. Removal of this vegetation would be incidental to the proposed work and would be negligible at the stand and LAU scales.

Summary: Mature multistory and young forests that provide habitat conditions preferred by snowshoe hares are not being treated through vegetation management in this project. Proposed harvest and prescribed burn treatments occurring within mapped mature multistory and young forests, based on drawn unit boundaries, were verified as not providing these preferred habitat types. Depending on the alternative, between 67 to 76 acres of regeneration harvest could contribute early successional habitat to the landscape mosaic and provide preferred snowshoe hare habitat conditions in about 15 years. Alternatives 2 and 3 would result in the most acres treated. Implementation of the prescribed burn units would occur within potential and matrix habitats and have no effect to PCE sub-element (1a). Proposed watershed improvement work would result in negligible, short-term reductions in vegetation along existing roadbeds.

(1b) Winter snow conditions that are generally deep and fluffy for extended periods of time.

This sub-element of the PCE is primarily a climatic condition and proposed activities would not impact the location or condition of winter snow on the landscape.

(1c) Sites for denning that have abundant coarse woody debris, such as downed trees and root wads.

The prescribed burn units occurring within the China LAU are located within matrix habitat and would not impact current or future denning habitat. Similarly, denning habitat is not found along the roads proposed for watershed improvement work.

The proposed harvest units occurring within the China LAU do not have large quantities of coarse woody debris to provide denning habitat for lynx. However, many of the north-facing slopes found within the LAU's major draws provide productive growing environments for trees due to their warm/moist conditions. Reduced fire events and lack of access for vegetation management has likely resulted in accumulations of coarse woody debris that could be used by denning lynx. Also, based on project surveys in previously managed areas, the existing tons/acre of coarse woody debris generally exceeds the 2015 Forest Plan guideline. Therefore, other areas that receive limited or no active management (e.g., IRAs, other unroaded areas such as within MAs 5a and 5c, and old growth stands) within the LAU would be expected to provide varying and potentially high levels of coarse woody materials. In addition, project design would leave coarse woody debris and snags or recruitment snag levels (refer to the Forest Vegetation section) that would continue to provide appropriate levels and size of coarse woody for the given habitat type and wildlife use. While these stands would not provide denning habitat for lynx in the immediate future, the retained coarse woody materials provides a baseline level to which more coarse woody debris would be added as the stand matures and potentially becomes denning habitat.

(1d) Matrix habitat (e.g., hardwood forest, dry forest, non-forest, or other habitat types that do not support snowshoe hares) that occurs between patches of boreal forest in close juxtaposition (at the scale of a lynx home range) such that lynx are likely to travel through such habitat while accessing patches of boreal forest within a home range.

The proposed rule to designate revised critical habitat states that "In matrix habitat, activities that change vegetation structure or condition would not be considered an adverse effect to lynx critical habitat unless those activities would create a barrier or impede lynx movement between foraging and denning habitat within a potential home range, or if they would adversely affect adjacent foraging habitat or denning habitat" (USFWS 2013a).

Regeneration harvest would occur on approximately 60 and 44 acres of matrix habitat under Alternatives 2 and 3 and Alternative 4, respectively, in the China LAU. All matrix habitat proposed for harvest is located along the lower elevation boundary of the LAUs and found as small inclusions within lynx habitat. Tree species composition and health is variable in these stands and although categorized as regeneration harvest, a range of overstory structure and canopy cover would be retained. Post-harvest retention would range from few trees per acre to portions resembling an intermediate harvest. In all units, where available, retained trees would be grouped together in clumps of 4-12 or more trees especially in those areas with fewer, quality leave trees available. This is intended to better protect the leave trees as well as provide small areas of greater cover for wildlife use, including use by lynx as they move through the area, until the understory vegetative community develops within a few years. Also, fire would be used as a post-harvest fuels treatment in units where existing fuels are light. The intent is to initiate a low severity burn that would stimulate forb and shrub development. This would speed up vegetative recovery and improve conditions for lynx movement as well providing for alternate prey species.

Prescribed burn units are planned at a slightly larger scale than the harvest units to introduce fire in areas that would have historically experienced periodic low to moderate severity fire. The three prescribed burn units range from approximately 20 to 333 acres for a total of approximately 525 acres within the China LAU; the proposal is the same for all alternatives. Prescribed burn units would occur along or near the low elevation boundary of the LAU in drier habitat types with southern exposures. Therefore, the proposed burns would occur in matrix habitat which provides for lynx movement between patches of boreal habitat but does not provide the habitat conditions described under PCE (1a). The goal of the burn units is to rejuvenate and enhance the ground cover and understory vegetation primarily in drier site, open timber stands. This would occur through the application of low to moderate intensity fire that is expected to result in a slight reduction of canopy cover and a mosaic of burned and unburned ground cover depending on vegetation type, availability of surface fuels, and moisture levels. Although there would be some vegetative changes, there would essentially be no change to the existing condition with respect to potential lynx use. By maintaining the desired vegetative conditions for the area, the stands would continue to provide forage and cover for alternate prey species such as red squirrels and grouse and maintain the value of this matrix habitat for lynx connectivity.

Summary: Proposed regeneration harvest would occur on approximately 60 and 44 acres of matrix habitat within the China LAU under Alternatives 2 and 3 and Alternative 4, respectively, all of which are located along the lower elevation boundary of the LAU. Due to the location of the proposed treatment units and that only a minor amount of the LAU's matrix acres would be treated (i.e., only 44 to 60 acres out of 32,772 total acres), effects to the juxtaposition of boreal and matrix habitat would be negligible. Similarly, prescribed fire occurring within matrix habitat would result in a mosaic of burned and unburned vegetation that would not alter the overall existing condition of the area. Lynx would be able to continue to move through the area following completion of the burns. The project would not affect the ability of lynx to travel and access patches of boreal forest (see Lynx Analysis Unit Map, M-20).

Cumulative Effects

Introduction

The project area falls within designated lynx critical habitat. The KNF recently received a BO (USFWS 2013b) which analyzed the effects of current lynx management on NFS lands. Analysis determined that the Forest's current management addresses the PCE and critical habitat would continue to serve the intended conservation role for the species.

The "Existing Condition" section describes relevant past and present factors affecting lynx critical habitat and the existing condition of the PCE in the China LAU. The cumulative effects analysis describes effects of the project as well as relevant past, on-ongoing, and foreseeable project to critical habitat and the PCE specific to lynx in the contiguous United States.

Spatial and Temporal Context for Cumulative Effects Analysis

As described under the section "Spatial and Temporal Context for Effects Analysis," the cumulative effects analysis for lynx critical habitat uses the affected LAU because the magnitude of change to lynx habitat could then be evaluated against the remaining levels of habitat available for lynx use with their home range. In addition, areas outside of the China LAU were evaluated for potential impacts that reduce preferred snowshoe hare habitat conditions or alter matrix habitat such that movement or use of adjacent foraging or denning habitats is impeded. Given the location of OLY's proposed activities (see Lynx Analysis Unit Map, M-20), the availability of mature multistory and young forest conditions within the LAU and type and nature of activities along the shared boundaries of the project and adjacent LAUs, there are no apparent conditions that would warrant expanding the boundary beyond the China LAU. Therefore, the China LAU was chosen as the appropriate scale for cumulative effects analysis.

Temporal boundaries for the lynx critical habitat cumulative effects analysis include both short-term and long-term effects and are the same as were described under "Spatial and Temporal Context for Effects Analysis." Regeneration harvest in young or mature multistory forests would result in the re-initiation of the stand such that winter snowshoe hare habitat would not be available for approximately 15 years. Following regeneration harvest, winter foraging opportunities would be expected to last from about 16 to 50 years post-harvest in a young forest condition and again at over 100 years once a mature multistory forest develops on the site.

Past, Present, and Reasonably Foreseeable Activities Relevant to Cumulative Effects Analysis

Past Actions

Table 150 and Table 151 of this analysis summarize the existing condition based on effects of past actions and post-treatment conditions as they relate to lynx critical habitat and the PCE. More specifically, the detailed description of previous vegetation management activities is found at the beginning of Chapter 3, including Table 32 and Table 33, as well as Appendix F of this document. Stand replacing wildfires have occurred periodically in the project area and created early successional habitat which temporarily did not provide habitat conditions preferred by snowshoe hares. In addition, regeneration harvest has occurred within the project area primarily since the 1950s. It also resulted in forest structural changes that temporarily did not provide habitat conditions preferred by snowshoe hares. After approximately 15 years, these stands developed preferred habitat conditions and provided winter foraging habitat. Over time, the combination of

wildfire and regeneration harvest has resulted in a mosaic of structural stages within the China LAU.

Alternatives 2, 3, and 4

On-going and Reasonably Foreseeable Actions

Reasonably foreseeable actions include those federal, state, or private activities that are ongoing or scheduled to occur, independent of this federal action. Table 34, located at the beginning of Chapter 3, identifies those current and foreseeable actions in the project area that were determined to be appropriate for inclusion in the analysis of environmental effects. There are no foreseeable actions within the China LAU.

The Timber Stand Improvement Project is a District wide program of work consisting of precommercial thinning, daylight thinning around western white pine, and pruning white pine branches in overstocked stands between 12 and 30 years of age. Only daylight thinning around western white pine would occur within critical habitat in the China LAU. The units would retain 80 percent of the young forest habitat present and approximately 54 acres of the 271 total acres proposed in this habitat would be treated. This acreage is incorporated into the existing condition acres in Table 150. However, the OLY project does not propose additional precommercial activities within the LAU and there would be no additional cumulative effects related to the reduction of young forest habitat.

Cumulative Effects Specific to the Lynx Critical Habitat PCE

Boreal forest landscapes supporting a mosaic of differing successional forest stages and containing:

(1a) Presence of snowshoe hares and their preferred habitat conditions, which include dense understories of young trees, shrubs or overhanging boughs that protrude above the snow, and mature multistoried stands with conifer boughs touching the snow surface.

The OLY project does not propose vegetation management activities within mature multistory or young forest habitats in the China LAU. Therefore, there would be no cumulative reduction in the habitats that provide snowshoe hare preferred habitat conditions. However, proposed harvest occurring in potential habitats would result in an increase in the amount of young forest habitat found within the LAU. Cumulatively, an increase of approximately 67 and 76 acres would occur within the China LAU in approximately 15 years which is about a 1 percent increase over the existing condition acres.

(1b) Winter snow conditions that are generally deep and fluffy for extended periods of time.

This sub-element of the PCE is primarily a climatic condition and proposed activities would not impact the location or condition of winter snow on the landscape; therefore, there would be no cumulative effects to winter snow conditions.

(1c) Sites for denning that have abundant coarse woody debris, such as downed trees and root wads

Abundant coarse woody debris is expected throughout the project area, especially in those areas that receive limited or no active management (e.g. unroaded areas, IRAs, and old growth stands).

In general, coarse woody debris levels would be reduced in proposed regeneration harvest units occurring in potential habitat, but these stands currently lack the spruce-subalpine fir forest type selected for by denning lynx in Northwest Montana (Squires et al. 2008). Also, coarse woody debris within the units would be retained at levels recommended for both soil productivity and wildlife habitat and could contribute to denning habitat in the future. Thinning activities occurring with the Timber Stand Improvement Project would not reduce coarse woody debris levels. Therefore, no cumulative reduction in denning habitat is expected.

(1d) Matrix habitat (e.g., hardwood forest, dry forest, non-forest, or other habitat types that do not support snowshoe hares) that occurs between patches of boreal forest in close juxtaposition (at the scale of a lynx home range) such that lynx are likely to travel through such habitat while accessing patches of boreal forest within a home range.

The proposed rule to designate revised critical habitat states that "In matrix habitat, activities that change vegetation structure or condition would not be considered an adverse effect to lynx critical habitat unless those activities would create a barrier or impede lynx movement between foraging and denning habitat within a potential home range, or if they would adversely affect adjacent foraging habitat or denning habitat" (USFWS 2013a). The OLY project proposes approximately 44 to 60 acres of regeneration harvest within matrix habitat found along the lower elevation boundary of the LAU. In addition, the Timber Stand Improvement Project would precommercial thin on approximately 5 acres within matrix habitat spread throughout the LAU in previous harvest units. Cumulatively, about 49 to 65 acres of matrix habitat would be affected by proposed activities out of 32,772 LAU acres. Effects to the juxtaposition of boreal and matrix habitat would be negligible. Implementation of the OLY project would not affect the ability of lynx to travel and access patches of boreal forest (see Lynx Analysis Unit Map, M-20). Cumulative effects to matrix habitat and its ability to support lynx movement would be negligible within the China LAU.

Summary of Cumulative Effects

Minimal harvest would occur within the LAU in small areas of potential habitat (i.e., boreal forest within the stem exclusion structural stage) that would contribute to increased diversity within the treated areas as well as the future amount of snowshoe hare preferred habitat conditions. Prescribed burning would result in a mosaic of burned and unburned conditions which would maintain cover and foraging opportunities during summer movements. Currently the KNF has approximately 149,781 acres of suitable lynx habitat which falls within the historic range of variation (ERG 2012). Treatments that maintain and/or improve the critical habitat PCE would cumulatively improve upon this estimate.

The proposed action and other ongoing actions within the China LAU would not result in permanent loss of habitat or conversion of boreal forest, nor alter the characteristics of the affected stands to the extent that would appreciably reduce the PCE and functioning of critical habitat. There would be no appreciable cumulative effects to lynx critical habitat.

Regulatory Framework Findings

2015 Forest Plan

The 2015 Forest Plan provides desired conditions, objectives, standards, and guidelines for Canada lynx critical habitat within the Wildlife Resource. The following are applicable to the actions in this project[18]:

Forestwide Direction

p. 28, **GOAL-WL-01**: The KNF manages wildlife habitat through a variety of methods (e.g., vegetation alteration, prescribed burning, noxious weed treatments, etc.) to promote the diversity of species and communities and to contribute toward the recovery of threatened and endangered terrestrial wildlife species.

> Proposed harvest and fuels treatments would result in the retention of remnant large tree species, better approximation of stand patch size and species composition, protection of riparian habitats, improved stand health, and general movement towards the desired vegetative condition based on historic range of variation with the stands for this area. Depending on the action alternative, timber harvest would occur on approximately 67 to 76 acres within potential habitat. Regeneration harvest in these stands would increase future foraging opportunities for snowshoe hares and lynx within approximately 15 years. See "PCE 1a" and Table 151. Therefore, the OLY project would contribute to progress toward achieving GOAL-WL-01.

p. 28, **FW-DC-WL-03**: Recovery of the terrestrial threatened and endangered species is the long-term desired condition. Foraging, denning, rearing, and security habitat is available for occupation. Populations trend toward recovery through cooperation and coordination with USFWS, state agencies, other federal agencies, tribes, and interested groups.

> A mosaic of lynx habitat is found throughout the LAU. Multistory and young forest habitats would not be impacted by proposed activities and regeneration harvest of potential habitat (i.e., stem exclusion habitat) would increase foraging opportunities in approximately 15 years (see "PCE 1a"). There would be no impacts to denning habitat (see "PCE 1c"). Therefore, the OLY project would contribute to progress toward achieving FW-DC-WL-03.

p. 29, **FW-DC-WL-13**: Down wood, especially down logs are available through the Forest for terrestrial mollusk, reptiles, and amphibians, small mammals, and other species who habitat requirements includes this component.

> Denning habitat is not found within the proposed harvest or prescribed burn units and would not be impacted by the OLY project. Within harvest units, coarse woody debris levels would be retained as appropriate for the given habitat type. See "PCE 1c." Therefore, the OLY project would contribute to progress toward achieving FW-DC-WL-13.

[18] Goals, desired conditions, objectives, standards, and guidelines can be found on the noted pages in the 2015 Forest Plan.

p. 30, **FW-OBJ-WL-01**: The outcome is the maintenance or restoration of wildlife habitat on 1,000 to 5,000 acres of NFS lands, annually, with an emphasis on restoration of habitats for threatened and endangered listed species and sensitive species.

> Canada lynx are associated with certain habitat types and structural conditions that support their primary prey, snowshoe hares, with mature multistory and young forests being their preferred habitat conditions. Proposed activities would not impact mature multistory or young forest habitats, important for providing critical winter foraging opportunities and contributing to lynx recovery. Proposed treatments would provide additional foraging habitat within approximately 15 years (see "PCE 1a)." Within matrix habitat, proposed treatments would maintain or trend the existing vegetation towards the desired vegetative conditions for the area which would provide forage and cover for alternate prey species and maintain the value of matrix habitat for lynx connectivity (see "PCE 1d"). Therefore, the OLY project would contribute to attainment of FW-OBJ-WL-01.

Federal Law

Endangered Species Act

The preferred alternative would be consulted on with USFWS and compliance with ESA would occur.

National Forest Management Act

The project would comply with NFMA direction to provide for diverse populations of plant and animal communities by applying Forest Plan Desired Conditions, Standards, and Guidelines.

Statement of Findings

Support for the OLY effects determination can be found within the Biological Assessment (BA) which was submitted to U.S. Fish and Wildlife Service on March 30, 2016. Upon completion of formal consultation and receipt of the Biological Opinion (BO), both the BA and BO will be available within the Project Record.

Alternative 1 (No Action) **may affect, not likely to adversely affect** Canada lynx critical habitat. This determination is based on: 1) no activities would take place that would alter lynx habitat; however, 2) active fire suppression would continue the trend towards uncharacteristic vegetative and fuel conditions, 3) with an increased risk of severe fire behavior, and 4) an increased potential for large scale changes in available preferred, denning habitat, and matrix habitats with in the China LAU.

Alternatives 2, 3, and 4 **may affect, is not likely to adversely affect** Canada lynx critical habitat. This determination is based on: 1) vegetation management, both regeneration harvest and prescribed burning, would primarily affect the PCE sub-element matrix habitat; however, 2) management would not alter the existing stand structure or impact lynx movement through the area to areas of preferred habitat, 3) there would be no impact to the extent of winter snow conditions, 4) also, no reduction of coarse woody debris within mature spruce-fir forest with abundant denning habitat expected in surrounding areas, 5) no reduction of mature multistory and young forest habitats that provide preferred snowshoe hare habitat conditions, and 6) an increase of approximately 1 percent in young forest habitat in approximately 15 years.

Other Agencies and Individuals Consulted

Katrina Dixon, USFWS Consultation Biologist

Communications have consisted of consultation throughout the development of the OLY project and included providing a description of OLY's proposed actions and discussions regarding potential concerns and expected determinations of effects for lynx critical habitat.

Kevin Aceituno, USFWS Consultation Biologist

Communications consisted of consultation during the latter stages of the OLY project, including informal consultation.

North American Wolverine

Introduction

Due to their large home range size and habitat needs, the North American wolverine is rare and uncommon and most likely always has been. Wolverines use higher elevation, steep, remote habitat. Wilderness and roadless lands account for much of the areas wolverines are known to use, although it is unknown if this is due to avoidance of people or that wolverine tend to choose areas that are not conducive to human development (Copeland et al. 2007). Wolverines appear capable of adjusting to human disturbance (USFWS 2013c). Wolverines travel long distances throughout large home ranges that average between 186 to 310 square miles (ibid) but can range from 28 to over 360 square miles (Banci 1994). Wolverines are considered to be a generalist species, one that is able to thrive in different habitat types and makes use of a variety of different resources within their home range. Wolverines are generally scavengers of carrion, but do prey on small mammals and birds and will eat berries, fruits, and insects (Hornocker and Hash 1981). Dens are dug into the snow to ground level and are generally located on north-facing slopes under rocks, boulders, tree roots, or avalanche debris (Magoun and Copeland 1998). Females enter dens in mid-February, giving birth to a litter of young, and then utilize a series of dens or rendezvous sites until mid-May when her offspring are mobile enough to travel (Copeland and Yates 2008, Magoun and Copeland 1998).

Recent work on wolverine habitat requirements suggests that they are restricted to areas that retain snow until mid-May and where the average temperature in August is less than 72 degrees (Schwartz et al. 2009, Copeland et al. 2010). In North America, 69 percent of den sites were located in areas where snow cover persists until mid-May for an average of six to seven years while 98 percent of all den sites were located in areas of at least one year of snow cover (i.e., "persistent snow," Copeland et al. 2010). Similarly, Inman et al. (2013) modeled wolverine habitat and categorized the habitat by areas suitable for survival (primary habitat), reproduction (maternal habitat), and dispersal. Inman et al.'s (2013) mapped primary habitat corresponds closely to the persistent snow areas mapped by Copeland et al. (2010). The USFWS (2013c) review of the effects of climate change to wolverines, including their relationship to deep persistent snow, concluded that "Deep snow that persists into the month of May is essential for wolverine reproduction." Talus slopes and alpine cirques may, therefore, provide important thermal and denning habitat. Based on current research it appears that suitable wolverine habitat is limited to areas at or above the subalpine zone on the KNF.

Because habitat use by wolverines appears to be closely tied to areas with persistent snow (i.e., daily use, movement, and especially as denning habitat), the project area would be assessed for the presence of persistent snow areas capable of supporting wolverines and whether proposed activities would impact the persistent snow conditions and movement between these suitable habitat areas.

Summary of Conclusions

Implementation of the OLY project's action alternatives results in a determination of **would not jeopardize the continued existence** for the proposed wolverine. Land management activities proposed with the OLY project are consistent with those described in the proposed special rule of the ESA and are not considered to result in impacts that would significantly affect the conservation of the species (USFWS 2013c). Proposed harvest and prescribed fire treatments would improve scavenging and other foraging opportunities in dispersal habitat by opening up the

canopy in dense stands, providing habitat diversity, and trending vegetative characteristics towards desired conditions in the project area.

Regulatory Framework

2015 Forest Plan

The 2015 Forest Plan provides overall guidance for the management of the lands on the KNF. It describes the goals, desired conditions, and objectives toward which the management of the land should be directed. And it establishes standards and guidelines to help achieve or maintain the desired condition or conditions, to avoid or mitigate undesirable effects, or to meet applicable legal requirements.

There are no fine-filter plan components which provide specific wolverine habitat resource direction relevant to this project. However, there are other 2015 Forest Plan coarse-filter components that provide resource direction for a range of wildlife species or habitat conditions that are not specific to wolverines or their habitat, but still are applicable to the management of habitat for this species. The full list of the plan components applicable to wolverine management are found in the "Regulatory Framework Findings" section of this analysis.

Resource Indicators and Measures

Wolverines show a strong association with areas of persistent snow. Therefore, for the wolverine analysis, the presence of persistent snow is an indicator of whether a project area could support wolverines. There are two measures for assessing the ability of the project area to support wolverines (i.e., resource indicators in Table 152): the acres of suitable habitat consisting of areas where there is at least 1 year of snow cover and the acres of suitable habitat consisting of areas that have between 6 and 7 years of snow cover on average into mid-May. The overall assessment of wolverine habitat also analyzes the potential effects to the persistent snow conditions and connectivity within the analysis area.

Table 152. Resource Indicators and Measures for Assessing the Ability of the Project Area to Support Wolverines

Resource Element	Resource Indicator	Measure	Used to Address: P/N*, or Key Issue?	Source
Persistent Snow	Availability of persistent snow to provide suitable habitat for wolverine use	Acres of suitable habitat associated with the project area that have snow for an average of 1-7 years	No	Research – referenced throughout this analysis, also most current was reviewed and summarized in USFWS 2013c
Persistent Snow	Availability of persistent snow to provide suitable habitat for wolverine use	Acres of suitable habitat associated with the project area that have snow for an average of 6-7 years	No	Research – referenced throughout this analysis, also most current was reviewed and summarized in USFWS 2013c

*P/N = Purpose and Need

Methodology

Based on the research by Copeland et al. (2010), wolverine denning habitat was mapped using Region 1 snow layer. In addition, suitable wolverine habitats mapped by Inman et al. (2013) were used to compare against Copeland's modeled habitat. Areas of connectivity were evaluated by visually examining the mapped persistent snow areas and wolverine dispersal habitat.

Data sources

Detailed wolverine population ecology, biology, habitat description and relationships identified by research are described in Hornocker and Hash (1981), Banci (1994), Copeland et al. (2007), Schwartz et al. (2009), Copeland et al. (2010), Inman et al. (2013), and USFWS (2013c). These provided additional information in evaluating potential habitat and effects to wolverine, and are incorporated by reference.

Wolverine occurrence data comes from recent District wildlife observation records, NRIS wildlife database, research studies, and other agencies (MFWP, MNHP).

Assumptions and Limitations

There are no assumptions or limitations associated with this resource analysis.

Affected Environment

Spatial and Temporal Context for Effects Analysis

Wolverine home ranges in Montana range from approximately 24,711 acres for females with young to 104,278 acres for males and home ranges of both sexes overlap (Hornocker and Hash 1981). Within the OLY project area, persistent snow is found along the high elevation ridgeline running from Flagstaff Mountain in the south to just beyond Arbo Mountain in the north and totals approximately 22,773 acres. Because this contiguous area of persistent snow is smaller than the average home range for a female with young in Montana, the analysis boundary for direct and indirect effects to individuals and their habitat was extended to include modeled habitat within 7.9 kilometer (or about 4.9 miles) of the edge of the persistent snow area. Hornocker and Hash (1981) found that 7.9 kilometer was the average distance that female wolverines traveled in northwest Montana which is less than those observed for males. This analysis area is large enough to assess potential effects in context of wolverine dispersal or other short-term use of the project area as it is not likely to support resident wolverine due to its small size. Given the size of a wolverine's home range and dispersal capabilities, expanding the effects boundary further would only tend towards diluting the potential effects of the proposal.

Temporal boundaries for the wolverine analysis include both short-term and long-term use of habitats by wolverines. Wolverine use of dispersal habitats are only expected to last for a few days or weeks (short-term) as they move between patches of suitable habitat. Use of suitable habitats that provide for survival and reproduction would be used for the long term on the order of months or years.

Existing Condition

Introduction

On February 4, 2013, the USFWS proposed listing the wolverine as threatened and published a proposed 4(d) rule that lists several activities that are not considered significant threats to the species and would not result in incidental take and a violation of section 9 of the ESA (USFWS 2013c). Subsequently, the USFWS withdrew the proposal to list the wolverine as a threatened species based on their "conclusion that the factors affecting the DPS [distinct population segment] as identified in the proposed rule are not as significant as believed at the time of the proposed rule's publication" (USFWS 2014b). With the withdrawal of the proposed ruling, the wolverine was placed back on the Regional Forester's list of sensitive species for the KNF. More recently, a court ruling in April 2016 vacated the withdrawal of the proposed rule and remanded the matter to USFWS for further consideration consistent with the order (Christensen 2016). The wolverine is once again a proposed species and currently not a sensitive species for the KNF.

In the proposed ruling, the USFWS proposed that global climate change was the primary threat to the species and that legal and incidental trapping of wolverines are substantial threats in concert with climate change (USFWS 2013c). In addition, this review concluded that there are no Forest Service land management activities or public use activities on NFS lands that threaten wolverines (direct effects) or high-elevation habitats (indirect effects) due to the nature and scale of such human activities which include: 1) dispersed recreation such as snowmobiling, skiing, backpacking, and hunting for other species; 2) land management activities such as timber harvest, wildland firefighting, prescribed fire, and silviculture; and 3) mining (ibid). These activities are not likely to disturb wolverines or their habitat to the extent of impacting the population and, therefore, threaten the viability of the species (USFWS 2013c). In 2014, it was determined that the wolverine population had grown and individuals had expanded into suitable but previously unoccupied areas despite evidence of a warming climate within wolverine range. Based on this and insufficient information on the effects of wolverine response to climate change, the USFWS concluded that the effects of climate change was not likely to place the wolverine distinct population segment in danger of extinction in the foreseeable future (USFWS 2014b). Also, the current low level of mortality associated with regulated and incidental trapping of other furbearers was not considered to be a threat to the distinct population segment of wolverines on its own (ibid). However, based on the best available science that demonstrates the relationship between wolverines and areas of persistent snow, especially for denning purposes, Christensen (2016) determined that the USFWS must reconsider their decision on the effects of climate change to wolverines and their habitat. This ruling also requires the USFWS to reconsider other parts of their withdrawal determination; however, USFWS was not remanded to reconsider their determinations regarding the effects of land management or public use activities as described in the proposal (USFWS 2013c).

Individuals have been shown to travel through, spend time within (including reproduce), and survive in areas of high human use and disturbance (e.g., areas of concentrated recreational activities, developments, habitat alteration) (USFWS 2013c). Currently, there appears to be no evidence that the activities listed above (e.g., snowmobiling, skiing, timber harvest, or mining) translate to threats to characteristics of subpopulations and populations or population persistence (ibid). USFWS (2013c) cited ongoing research into the impacts of high levels of recreational use on wolverines in central Idaho. The cited ongoing research has documented wolverines living in areas of high recreational use (i.e. disturbance) (USFWS 2013c citing Heinemeyer 2012 and Heinemeyer and Squires 2012).

Wolverine Occurrence

District observation and monitoring data indicates there are three records of wolverines from the early 1980s as well as an observation in 1993 of a wolverine in the Arbo Creek drainage. More recently, another wolverine was documented near Arbo Creek during the summer of 2012 (Kendall 2013). This site is along the fringe of OLY's persistent snow area. Johnson (2004) shows wolverine presence confirmed in seven of the eight planning units on the KNF, including the Bull, Kootenai, and Yaak Planning Units that are found in the project area.

Description of the Analysis Area

Wolverine Habitat Condition

Forest-wide, about 555,500 acres of persistent snow (average one to seven years) have been identified of which approximately 89,900 acres have persisted on the landscape until mid-May for six to seven years on average (see project file). Such sites, where snow more consistently persists until mid-May, may provide more suitable habitat for denning wolverines. Approximately 22,773 acres of persistent snow is associated with the project area along the higher elevation ridgelines, including a small 160 acre area that occurs for an average of six to seven years near China Mountain (see Table 153). This contributes to less than one percent of the persistent snow area. Also, features such as large snowdrifts that were not captured by the snow layer coverage may exist within the periphery of the mapped habitat and could be used by denning wolverines (Copeland et al. 2010). Inman et al. (2013) went further by identifying habitats that are suitable to specific wolverine uses, including maternal habitat. These are sites suitable for reproductive females and include those areas with high quality habitat. Approximately 1,068 acres of maternal habitat is found within the persistent snow area, but occurs as small and scattered patches. This particular area of persistent snow occurs as an island of wolverine habitat surrounded by lower elevation lands that do not retain snow late into the spring months. Although this area provides habitats suitable for wolverine survival and reproduction, it is considered too small to provide for even the smaller home range sizes used by females with young. Also, the limited amount of maternal habitat or snow that persists for an average of six to seven years may further discourage use of the area for reproduction and other denning use. Therefore, this island of suitable habitat is not expected to provide for use by resident wolverines.

Table 153. Resource Indicators and Measures for the Existing Condition

Resource Element	Resource Indicator	Measure (Quantify if possible)	Existing Condition (Alternative 1)
Persistent Snow	Availability of persistent snow to provide suitable habitat for wolverine use	Acres of suitable habitat associated with the project area that have snow for an average of 1-7 years	Yes – 22,772 acres
Persistent Snow	Availability of persistent snow to provide suitable habitat for wolverine use	Acres of suitable habitat associated with the project area that have snow for an average of 6-7 years	Yes – 160 acres

Connectivity

Persistent snow areas also appear to influence summer habitat use by wolverines and connectivity between wolverine populations and habitat patches (Copeland et al. 2010, Schwartz et al. 2009). Therefore, this island of suitable habitat may provide a stepping stone for wolverine movement throughout the KNF. Research efforts by Schwartz et al. (2009) looked at genetic patterns to infer connectivity. Within the OLY project area, they identified a northern end of a pathway of connectivity from the Cabinet Mountains to between Skyline and Feeder Mountains which is predicted to experience a moderate level of use. From there, the pathway splits to the northwest and northeast with lower predicted levels of use. These pathways correspond to two movement areas identified in the 2015 Forest Plan where the desired conditions are to maintain wildlife movement between the Cabinet Mountains and the Yaak, particularly in the area of Flagstaff Mountain (GA-DC-WL-LIB-01) and across the Yaak River and Highway 508 in the vicinity of Yaak Falls (GA-DC-YAK-04). Inman et al. (2013) mapped potential dispersal habitat for both male and female wolverines. Although still generally associated persistent snow areas, dispersal habitat is more broadly mapped and includes habitats that provide for short-term use (e.g. days or weeks) while moving between patches of suitable habitat with persistent snow. Nearly all of the KNF is mapped as male dispersal habitat and, therefore, males could potentially move through all habitat types and conditions within the vicinity of the OLY project area including along the pathways identified by Schwartz et al. (2009). Mapping of female dispersal habitat is a little more restrictive in that it does not include lower elevation valley bottoms such as those along the Yaak and Kootenai River corridors. It should be noted that areas not mapped for female dispersal do not necessarily reflect the presence of private property or intensive human development. For example, the Forest Service is the primary landowner along the Kootenai River corridor between Troy and Libby, Montana yet it was considered unsuitable for female dispersal. Therefore, although female wolverine are capable of traveling the distance between the patches of suitable habitat with persistent snow adjacent to the project area, and there is no evidence that human development/activities or transportation corridors prevent wolverine movement through these areas (USFWS 2013c), certain habitat characteristics of these low lying areas may deter some females from attempting to move through them. If so, the primary pathway for female dispersal to and from the project area may be along the northeast pathway identified by Schwartz et al. (2009).

Trapping

The regulation of trapping activities is the responsibility of the states of Idaho and Montana and is beyond the authority of the Forest Service to control. Currently, neither state has a trapping season for wolverines.

Environmental Consequences

Alternative 1 – No Action

The topography and climate in the higher elevation peaks and ridgelines in the OLY project area is conducive for snow to remain on the landscape in mid-May for up to an average of seven years. No direct effects from federal actions would occur and the persistent snow conditions would continue to provide suitable habitat for use by wolverines. There would be no impact to trapping activities and, therefore, no threat of mortality to wolverines.

Alternatives 2, 3 and 4 – Direct and Indirect Effects

The OLY project proposes vegetation management that includes timber harvest and prescribed fire treatments under all alternatives. Neither proposed treatment would impact the environmental conditions that maintain the location or duration of spring snow on the landscape in this analysis area. Proposed timber harvest would not occur within or adjacent to persistent snow areas. Similarly, none of the prescribed burn units would occur within persistent snow areas although fuels Unit F1 is found near patches of primary habitat identified by Inman et al. (2013). The proposed treatments would result in mosaic of habitat types and diversity in low elevation areas that is currently trending outside of historic conditions and becoming homogenous in species composition and structure. This includes the re-establishment and/or improvement (e.g., productivity) of understory vegetation that could benefit future wolverine foraging (prey) opportunities during dispersal movements.

The OLY project also proposes watershed improvement work that is found in higher elevations sites and some would occur within persistent snow areas. However, active work would be limited to approximately 3.75 miles of existing roadbed found along or accessed from the outer edge of the snow areas. Short-term work on these roads during the summer months would not impact the persistent snow conditions or wolverine movement within the project area as wolverines can successfully cross even active transportation corridors (USFWS 2013c).

The implementation of OLY's proposed activities are not expected to impact wolverine movement within the project area or connectivity to adjacent patches suitable habitat. No project activities are located along the mapped pathway from the Cabinet Mountains south of the project area through Flagstaff Mountain and north beyond Skyline Mountain. The existing vegetative condition would continue to allow for wildlife movement, including wolverines, in the area near Flagstaff Mountain and would be consistent with GA-DC-LIB-01. Also, there would be no change to the occurrence or existing use of the transportation corridor located along the Kootenai River between the project area and the Cabinet Mountains. As concluded in USFWS (2013c), "The available evidence indicates that dispersing wolverines can successfully cross transportation corridors." Proposed harvest and post-harvest fuels treatments are located along the East Side Road in the vicinity of Yaak Falls. Wolverines are habitat generalists and changes to the vegetative condition of its home range do not appear to negatively impact the species (USFWS 2013c). Similarly, changes to the vegetative condition within dispersal habitat would not be expected to negatively impact the species but rather would be expected to improve scavenging and other foraging opportunities by opening up the canopy in dense stands, providing habitat diversity, and trending vegetative characteristics towards desired conditions in the project area. This would be consistent with the Yaak Geographic Area's desired condition for providing for wildlife movement across the Yaak River and Highway 508 near Yaak Falls (GA-DC-WL-YAK-04). Portions of both Flagstaff and Saddle Mountain IRAs and MAs 5a/5c (Backcountry) are found within the persistent snow areas. Only one prescribed fire unit, fuels Unit F1, would occur within the Saddle Mountain IRA and MA5a that are associated with dispersal habitat. Implementation of this unit would not change the characteristics of this management area's allocation or its potential use of dispersal habitat by wolverine and would be consistent with MA5a,b,c-DC-WL-01. In addition, wolverine use of dispersal habitat is limited and expected only for movement between patches of suitable habitat as 95 percent of summer wolverine locations reviewed by Copeland et al. (2010) occurred within the persistent snow areas. Therefore, use of these areas by wolverines would be infrequent and short term, and the likelihood of encountering or impacting a wolverine in areas outside of suitable habitat is low. In summary, connectivity between wolverine populations and habitat patches is generally tied to persistent spring snow, and

wolverines appear to currently be able to disperse between habitats and through areas where human developments occur (Schwartz et al. 2009, USFWS 2013c). Proposed activities would not affect the persistent spring snow that provides connectivity for wolverine populations.

All three proposed activities are considered land management activities under the proposed rule. The proposed rule states: "Wolverines are not thought to be dependent on specific vegetation or habitat features that might be manipulated by land management activities, nor is there evidence to suggest that land management activities are a threat to the conservation of the distinct population segment (USFWS 2013c)." Therefore, human activities associated with proposed harvest and watershed improvement work are not expected to impact wolverine populations. It is possible that individual wolverines may be impacted and not use areas near project activities as much as they may have in the absence of those activities, although these impacts to a few individuals would not rise to the level of impacting the population. This conclusion is based on the information described previously regarding the apparent ability of wolverines to coexist in areas of human disturbance and the mobility of the species. In summary, although wolverine dispersal habitat would be altered at least temporarily compared to the existing condition, treatments would promote the vegetation conditions more characteristic of this area which could continue to be used by wolverines in the long-term.

Implementation of the proposed activities would not impact state trapping regulations related to wolverines. Also, there would be no change in public motorized access associated with this project that may influence the level of incidental trapping of wolverine. Therefore, there would be no expected increase in the risk of mortality to individual wolverine as a result of this project.

Cumulative Effects

Introduction

The "Existing Condition" section describes relevant past and present factors influencing the existing habitat conditions in the project area. This cumulative effects section summarizes the past actions as well as further describes ongoing and other reasonably foreseeable contributions potentially impacting wolverines and their habitat.

Spatial and Temporal Context for Cumulative Effects Analysis

The cumulative effects boundary would be the same as for the direct and indirect analysis described under the section "Spatial and Temporal Context for Effects Analysis." The cumulative effects boundary includes suitable and dispersal habitat occurring within 7.9 kilometer (or about 4.9 miles) of the edge of the OLY project's persistent snow area. This analysis area is large enough to assess potential effects in context of wolverine dispersal or other short-term use of the project area as it is not likely to support resident wolverine due to its small size.

Temporal boundaries for the wolverine cumulative effects analysis would also be the same as those described for direct and indirect effect under the section "Spatial and Temporal Context for Effects Analysis." Wolverine use of dispersal habitats would be for the short-term, lasting only a few days to a week, while use of suitable habitats could be expected to last for years for resident wolverines.

Past, Present, and Reasonably Foreseeable Activities Relevant to Cumulative Effects Analysis

Past Actions

Wolverines are habitat generalists and are not associated with specific vegetative types, structure, or features; therefore, land management activities are not considered to significantly affect the conservation of the species (USFWS 2013c). Wolverines have been able to use and persist on this landscape over the past 60 or more years in association with land management activities, including timber harvest which began in the project area in the 1930s. Detailed description of previous vegetation management activities are found at the beginning of Chapter 3, including Table 32 and Table 33, as well as Appendix F of this document.

Alternatives 2, 3, and 4 – Ongoing and Reasonably Foreseeable Actions

Reasonably foreseeable actions include those federal, state, or private activities that are ongoing or scheduled to occur, independent of this federal action. Table 34, located at the beginning of Chapter 3, identifies those current and foreseeable actions in the project area that were determined to be applicable for inclusion in the analysis of environmental effects. Because habitat suitability for wolverines is tied to persistent snow areas (generally higher elevation and rugged habitats) there are no apparent conditions within the analysis area that would contribute to effects to wolverine or its habitat. Also, implementation of the proposed activities would not impact state trapping regulations related to wolverines or the increased potential for incidental trapping and mortality. Therefore, there would be no threat to the viability of the species as a result of this project.

The proposed rule states: "The available scientific and commercial information does not indicate that other potential stressors such as land management, recreation, infrastructure development, and transportation corridors pose a threat to the DPS [distinct population segment]" (USFWS 2013c). Past, present, and reasonably foreseeable actions within the analysis area fall within this list of potential stressors and consists largely of land management activities. They each occur at a small scale compared to a wolverine home range, are found outside large expanses of suitable habitat found within places like national parks and wilderness areas, and do impact the persistent snow areas that wolverines are associated with. Proposed activities in addition with past, present, and reasonably foreseeable actions would not negatively impact wolverines and the distinct population segment. There are no cumulative effects anticipated that would change the effects determination to the wolverine from implementation of the proposed federal action.

Regulatory Framework Findings

2015 Forest Plan

The 2015 Forest Plan provides desired conditions, objectives, standards, and guidelines for wolverine within the Wildlife Resource. The following are applicable to the actions in this project[19]:

[19] Goals, desired conditions, objectives, standards, and guidelines can be found on the noted pages in the 2015 Forest Plan.

Forestwide Direction

- p. 28, **GOAL-WL-02**: The KNF manages and schedules activities to avoid or minimize disturbance to sensitive species and manages habitat to promote their perpetuation into the future.

  Only watershed improvement activities would occur within OLY's persistent snow area. Implementation of these actives would occur during the summer months, outside of the denning period, and would not impact the persistent snow condition. Implementation of proposed activities in dispersal habitat would not be expected to impact wolverines as it is unlikely to encounter a wolverine in these lower elevation sites due to their infrequent and short-term use. See the "Direct and Indirect Effects" discussion. Therefore, the OLY project would be neutral with regard to progress toward GOAL-WL-02.

- p. 28, **FW-DC-WL-01**: Nests and den sites and other birthing and rearing areas for terrestrial threatened, endangered, proposed, or sensitive species are relatively free of human disturbance during the period they are active at these sites.

  No active dens are known within the project area and due to the small size of the suitable habitat, it is unlikely that this area supports resident wolverine including females with young. Only a small amount of watershed improvement work would occur within persistent snow areas which would not occur during the denning period. See "Existing Condition" and "Direct and Indirect Effects." Therefore, the OLY project would be neutral with regard to progress toward FW-DC-WL-01.

- p. 29, **FW-DC-WL-17**: Forest management contributes to wildlife movement within and between national forest parcels. Movement between those parcels separated by other ownerships is facilitated by management of the NFS portions of linkage areas identified through interagency coordination. Federal ownership is consolidated at these approach areas to highway and road crossings to facilitate wildlife movement.

  The implementation of OLY's proposed activities are not expected to impact wolverine movement within the project area or connectivity to adjacent suitable habitat patches. No activities are proposed within the potential movement area that runs north and south along the edge of the project area to the Cabinet Mountains. Vegetation management activities occurring within dispersal habitat that trend toward the desired conditions that would improve scavenging and other foraging opportunities during wolverine's limited use of these areas. See the "Direct and Indirect Effects" discussion. Therefore, the OLY project would contribute progress toward FW-DC-WL-17.

- p. 32, **FW-GDL-WL-21**: Management activities on NFS lands should avoid/minimize disturbance at known active nesting or denning sites for other sensitive, threatened, or endangered species not covered under other forestwide guidelines.

  No active dens are known within the project area and due to the small size of the suitable habitat, it is unlikely that this area supports resident wolverine including females with young. Only a small amount of watershed improvement work would occur within persistent snow areas which would not occur during the denning period. See "Existing Condition" and "Direct and Indirect Effects." Therefore, the OLY project was designed in accordance with FW-GDL-WL-21.

Management Area Direction

- p. 62, **MA5a, b, c-DC-WL-01 (Backcountry)**: Large remote areas with little human disturbance such as those found in these MAs (in conjunction with MAs 1a, 1b, and 1c) are retained and contribute habitats for species with large home ranges. Habitat conditions within these management areas contribute to wildlife movement within and across the Forest. These areas also provide foraging, security, denning, and nesting habitat for wildlife.

  MAs 5a and 5c are associated with persistent snow found in the project area as well as Flagstaff and Saddle Mountain IRAs. One ecosystem burn unit would be implemented within MA5a, otherwise these lands would continue to contribute to largely natural vegetative conditions, wolverine movement, and areas where individual wolverines are less likely to be temporarily disturbed by human activities. See "Direct and Indirect Effects." Therefore, the OLY project would contribute progress toward MA5a,b,c-DC-WL-01.

Geographic Area Direction

- p. 87, **GA-DC-WL-LIB-01**: Habitat conditions are retained for wildlife movement between the Cabinet Mountains and the Yaak, in particular, the area of Flagstaff Mountain.

  No activities are proposed in the Flagstaff Mountain area of the OLY project and there would be no impacts to the potential use of this area by wolverine to move to the Cabinet Mountains to the south. See "Direct and Indirect Effects." Therefore, the OLY project would be neutral with regard to progress toward GA-DC-WL-LIB-01.

- p. 94, **GA-DC-WL-YAK-04**: Wildlife move across the Yaak River and Highway 508 in the vicinity of Yaak Falls.

  Proposed harvest treatments would result in vegetative diversity in an area near the Yaak River and Highway 508. Vegetation management activities implemented within dispersal habitat that trend the existing vegetation toward the desired conditions would improve scavenging and other foraging opportunities for wolverine use during their limited use of these areas. See the "Direct and Indirect Effects" discussion. Therefore, the OLY project would contribute progress toward GA-DC-WL-YAK-04.

Federal Law

National Forest Management Act

The project would comply with NFMA direction to provide for diverse populations of plant and animal communities through compliance with the 2015 Forest Plan.

Statement of Findings

Support for the OLY effects determination can be found within the Biological Assessment (BA) which was submitted to U.S. Fish and Wildlife Service on March 30, 2016. Upon completion of formal consultation and receipt of the Biological Opinion (BO), both the BA and BO will be available within the Project Record.

Alternative 1 (No Action) **would not jeopardize the continued existence** for the proposed wolverine. Wolverines would continue to use areas of persistent snow within the analysis area and there would be no impact to trapping that would threaten resident wolverines under the no action alternative.

Alternatives 2, 3, and 4 (Action Alternatives) **would not jeopardize the continued existence** for the proposed wolverine. OLY's proposed vegetation management and watershed improvement work are consistent with the proposed rule (USFWS 2013c) which states: "Land management activities (principally timber harvest, wildland firefighting, prescribed fire, and silviculture) can modify wolverine habitat, but this generalist species appears to be little affected by changes to the vegetative characteristics of its habitat." In addition, proposed activities would not impact the availability or condition of persistent snow found within the project area that wolverine could use as a stepping stone of suitable habitat for movement and connectivity through the area. Also, proposed activities would not influence a change in the level of incidental trapping occurring within the project area. Individual wolverines may temporarily avoid areas adjacent to activities while those activities are occurring, but the effects would not rise to the level of impacting the population.

Other Agencies and Individuals Consulted

Kevin Aceituno, USFWS Consultation Biologist

Communications consisted of consultation during the latter stages of the OLY project, including informal consultation.

Sensitive Species

Introduction

Sensitive species are administratively designated by the Regional Forester (Forest Service Manual, FSM 2670.5) and are those species for which population viability is a concern.

Regulatory Framework

The National Forest Management Act (NFMA) directs the Forest Service to "provide for diversity of plant and animal communities based on the suitability and capability of the specific land area in order to meet overall multiple-use objectives" [16 U.S.C. 1604(g) (3) (B)].The vegetation management approach in the 2015 Forest Plan is one that provides for ecosystem diversity by providing the ecological components, patterns, and processes at multiple scales on the landscape, and thereby provides the full spectrum of habitats and conditions needed for all of the biological organisms associated with the various ecosystems (USFS 2013). This includes the goal GOAL-WL-01 and GOAL-WL-02 to "manage wildlife habitat through a variety of methods (e.g., vegetation alteration, prescribed burning, invasive species treatments, etc.) to promote the diversity of species and communities and to contribute toward the recovery of threatened and endangered terrestrial wildlife species" and to manage sensitive species habitat "to promote their perpetuation into the future." The 2015 Forest Plan also has an objective that states "The outcome is the maintenance or restoration of wildlife habitat on 1,000 to 5,000 acres of NFS land, annually, with an emphasis on restoration of habitat for threatened and endangered listed species and sensitive species."

In addition, the 2015 Forest Plan provides "fine filter" management direction in the form of species-specific or ecological characteristics (snags, coarse woody debris, and old growth) desired conditions, standards, and guidelines as the companion to the ecosystem diversity (coarse filter) plan component approach. The fine filter approach narrows the focus to those species that require habitat that may be outside the range of variation and are not covered under the coarse filter.

Sensitive species are administratively designated by the Regional Forester (Forest Service Manual (FSM) 2670.5) and managed under the authority of the NFMA. FSM 2670.22 requires the maintenance of viable populations of native and desired non-native species and to avoid actions that may cause a species to become threatened or endangered are required. The NFMA's implementing regulations at 36 CFR 219.19 defines a viable population as "a population of species that continues to persist over the long term with sufficient distribution to be resilient and adaptable to stressors and likely future environments." The sensitive species analysis in this document meets the requirements for a biological evaluation as outlined in FSM 2672.42.

The following table (Table 154) shows the Regional Forester's sensitive species designations for the KNF (USFS 2011d). Four of these species will not be discussed further because either there is no suitable habitat available for the species in the project area, and therefore they are not suspected to be present in the project area, or activities would not occur within the identified suitable habitat. The analysis for these species can be found in the project file. Those species that are suspected to be present in the project area have been analyzed below.

Table 154. Sensitive Wildlife Species on the KNF and Status within the OLY Project Area

Sensitive Species	Status*	Determination**	Comments
American Peregrine Falcon (*Falco peregrinus anatum*)	S	No Impact	Suitable habitat limited to the cliff areas above the Kootenai River on the southern boundary of the project area. No proposed activities would occur within close proximity to these cliffs; therefore, project activities are not expected to affect habitat, individuals, or the species.
Bald Eagle (*Haliaeetus leucocephalus*)	K	May Impact	Observations within the project area, including documented nests at Kilbrennan Lake and along the Kootenai River. Suitable habitat available.
Bighorn Sheep (*Ovis canadensis*)	K	May Impact	Resident herd that utilizes the open, rocky terrain on the slopes above the Kootenai River. Suitable habitat in the area known as the Kootenai Face.
Black-backed Woodpecker (*Picoides arcticus*)	S	May Impact	A single documented observation within the project area, a year following a large fire event. Potential habitat is currently limited to general forest habitat as high quality habitat, consisting of early post-fire forests, are currently not available within the project area.
Coeur d'Alene Salamander (*Plethodon vandykei idahoensis*)	K	May Impact	Known occupied location within the project area and suitable habitat available.
Common loon (*Gavia immer*)	K	May Impact	Three lakes within the project area provide suitable habitat for common loons. Observations and reproduction documented at all locations.
Fisher (*Pekania pinnanti*)	S	May Impact	Two historic observations within the project area and potential habitat available.
Flammulated Owl (*Otus flammeolus*)	S	May Impact	No documented observations within the project area. However, suitable and potential habitat is available and flammulated owls have been documented just a few miles to the southwest.
Gray Wolf (*Canus lupus*)	K	May Impact	Documentated use by both individuals and at least one pack. Big game winter range for multiple ungulate species provides year-round foraging opportunties.
Harlequin Duck (*Histrionicus histrionicus*)	S	No Impact	Observations and suitable habitat limited to the Kootenai River and the lower reaches of Seventeen Mile which border the project area; no identified known or potential habitat streams within the project area.

Sensitive Species	Status*	Determination**	Comments
Northern Bog Lemming (*Synaptomys borealis*)	NS	No Impact	Not suspected as there is no suitable habitat within or adjacent to the project area. Therefore, project activities are not expected to affect habitat, individuals, or the species.
Northern Leopard Frog (*Rana pipiens*)	NS	No Impact	Not suspected as the project area occurs outside the known current range of the northern leopard frog; no documented observations within project area. Therefore, project activities are not expected to affect habitat, individuals, or the species.
Townsend's Big-Eared Bat (*Corynorhinus townsendii*)	K	May Impact	Observations along the boundary of the project area in the Yaak River corridor. Foraging habitat abundant; however, suitable hibernating and roosting habitat limited within the project area.
Western Toad (*Bufo boreas*)	K	May Impact	Observations and suitable habitat within the project area including breeding habitat.

* Status Key:
K = Species is known to occur within the project area based on sighting, tracks, or other strong evidence.
S = Species is suspected to occur within the project area because suitable habitat exists or area is within range of species occurrence.
NS = Species is not suspected to occur within the project area due to lack of suitable habitat or project area is outside the species' range. There would be no impact on these species and further analysis is not required (see project file).
**Determination Key:
No Impact = Species is not suspected to occur with the project area or proposed activities would not impact suitable habitat and/or result in disturbance to individuals.
May Impact = May impact individuals or their habitat but will not likely contribute to a trend toward federal listing or cause a loss of viability the population or species.

Bald Eagle

Introduction

Bald eagles are year-round residents of the KNF and are generally associated with the large bodies of water found on the Forest. Nesting habitat is typically associated with mature forest stands in close proximity (less than 1 mile) to large bodies of water and eagles usually construct their nests in a live dominant tree. Eagles generally continue to use the same nest stand, and often same nest, for many years demonstrating a fidelity to these sites. In western Montana, eagles use the same nest for about 14 years on average (MBEWG 1991). Eagles frequent these large open bodies of water, including lakes and fourth order streams, which provide an adequate prey base of fish and waterfowl. They will also forage in upland areas and along roadways for other food sources such as small mammals or carrion.

The Habitat Management Guide for Bald Eagles in Northwestern Montana (MBEWG 1991) identified four objectives for bald eagle habitat management: 1) maintaining prey bases, 2) maintaining forest stands currently used or suitable for nesting, roosting, and foraging, 3) planning for future potential nesting, roosting, and foraging habitat, and 4) minimizing disturbance from human activities in nest territories at communal roosts and important feeding sites. The first three objectives are interconnected in that management that appropriately treats the forest stand for the desired vegetative conditions would promote characteristics for current and future bald eagle use. Compliance with the fourth objective is directed by law. Although bald eagles were delisted from the threatened species list of the Endangered Species Act, federal and state laws continue to prohibit the "take" of bald eagles which includes disturbance to individuals such that it disrupts normal behavior or results in nest abandonment or reduced productivity (MBEWG 2010, USFWS 2015). This primarily applies to human activities around known nest sites (ibid) where eagle presence is expected to occur and impacts would also be the most disruptive to reproductive success.

Bald eagle habitat use, therefore, is associated with certain features and structural characteristics that provide for their nesting, roosting, and foraging needs in potential habitat (i.e., areas within one mile of large water bodies). These features and structural characteristics include forested stands in a more open condition that support the growth and development of large trees and snags with open views and flightpaths. The open stand conditions also encourage understory vegetative growth that provides for a variety of potential terrestrial prey species. Therefore, proposed vegetation management that promotes the retention and development of large trees and the improvement of foraging habitat is a main focus of the bald eagle analysis. Because impacts to the nest tree and disturbance to bald eagles during the breeding season could severely impact the reproductive success for a nesting pair, activities occurring within or adjacent to known nest stands and their impacts to bald eagle use and success is also discussed in detail. Similarly, those activities that could result in mortality to individuals (e.g., shooting, electrocution or motor vehicle collision) would be addressed.

Summary of Conclusions

Implementation of any the OLY project's action alternatives would result in a determination of **may impact individuals or their habitat, but will not likely contribute to a trend toward federal listing or cause a loss of viability to the population or species** for the bald eagle. Intermediate harvest and fuels treatments, including prescribed fire, would maintain or promote future nesting habitat by encouraging the growth of the larger, dominant trees left within the

stands by thinning out the understory. Through the retention of healthy, relic early seral tree species (e.g., western larch, western white pine, and ponderosa pine), proposed regeneration harvest would initiate the development of stand structure and composition better suited for both nesting and upland foraging habitat for bald eagles than what currently exists. Alternatives 2 and 3 propose similar amounts of vegetation treatments and would provide more long-term opportunities for bald eagle use within the analysis area. In summary, within the primary nesting and foraging habitat along the Kootenai and Yaak Rivers, upland foraging opportunities would be improved with increased forage for big game and other potential terrestrial prey species and activities would not occur in the nest stand at Kilbrennan Lake.

Regulatory Framework

2015 Forest Plan

The 2015 Forest Plan provides overall guidance for the management of the lands on the KNF. It describes the goals, desired conditions, and objectives toward which the management of the land should be directed. And it establishes standards and guidelines to help achieve or maintain the desired condition or conditions, to avoid or mitigate undesirable effects, or to meet applicable legal requirements.

The plan components which provide specific bald eagle resource direction relevant to this project include:

- FW-DC-WL-06
- FW-GDL-WL-02
- FW-GDL-WL-03
- FW-GDL-WL-04

There are other 2015 Forest Plan components that provide resource direction for a range of wildlife species or habitat conditions that are not specific to bald eagles, but still are applicable to eagle management. The full list of the plan components applicable to bald eagle management are found in the “Regulatory Framework Findings” section of this analysis.

Resource Indicators and Measures

The Montana Bald Eagle Management Plan (MBEWG 1994) states that the Plan will “… serve as the conservation and management plan when bald eagles are delisted.” The Montana Bald Eagle Management Guidelines (MBEWG 2010) is an addendum to the 1994 Management Plan and provides more protective management guidelines for Montana than the national guidelines (USFWS 2007a). Therefore, the guidelines from these two documents provide the resource elements, indicators, and measures for bald eagle habitat management and disturbance impacts on the KNF (see Table 155).

Bald eagle nesting habitat has been divided into three management zones based on the type and level of use by eagles and their resultant sensitivity to habitat alteration and disturbance (MBEWG 1991, 1994). The nest site occurs within a ¼ mile of the existing and alternate nests. Eagles are most sensitive to activities and changes in this area. The primary use area occurs between ¼ and ½ miles of the nests and is where much of eagle use occurs away from the nest (e.g., roosting and foraging). Eagles may be more tolerant of human activities in this area, depending on nature of the activity and season of use. Finally, the home range occurs beyond ½ mile. Human activities and habitat alterations are generally tolerated within the home range as

along they do not disrupt the use of specific areas, such as roosts or important feeding areas. A full description of each zone and associated management objectives and guidelines can be found in MBEWG 1991 and MBEWG 1994.

Therefore, for the bald eagle analysis, the resource indicators will be the occurrence of vegetation management or development activities, and associated disturbance, proposed within the nest site and primary use area where eagles are most sensitive (Table 155). The overall assessment of bald eagle habitat also considers other activities or conditions that can affect the potential risk of mortality for bald eagles within the analysis area.

Table 155. Resource Indicators and Measures for Assessing Effects

Resource Element	Resource Indicator	Measure	Used to Address: P/N*, or Key Issue?	Source
Nest Site	Vegetation management or development occurring within approximately ¼ mile from known nest sites.	Acres treated resulting in the maintenance or promotion of important structural characteristics; impacts to the nest or any associated roost trees?	No	Bald and Golden Eagle Protection Act; Migratory Bird Treaty Act; State Management Guidelines; KNF Forest Plan FW-GDL-WL-03, Bald Eagle; KNF Forest Plan FW-GDL-WL-04, Bald Eagle
Primary Use and Foraging Habitats	Vegetation management or development occurring beyond approximately ¼ mile from known nest sites.	Acres treated resulting in the maintenance or promotion of important structural characteristics for roosting and foraging; impacts to known roost trees?	No	Bald and Golden Eagle Protection Act, Migratory Bird Treaty Act, State Management Guidelines, KNF Forest Plan FW-GDL-WL-03, Bald Eagle
Nest Site	Disturbance within approximately ¼ to ½ mile from known nest sites.	Assessment of current nesting activity, existing tolerance to human activities, nature of potential disturbance, and occurrence of visual screen between nest and the proposed activity.	No	Bald and Golden Eagle Protection Act, Migratory Bird Treaty Act, State Management Guidelines, KNF Forest Plan FW-GDL-WL-02, Bald Eagle

*P/N = Purpose and Need

Methodology

Potential bald eagle habitat is expected to occur within approximately 1 mile of large water bodies like lake and large streams or rivers. For the OLY project area, water bodies that eagles are known and expected to use include the Kootenai and Yaak Rivers that border the project area as well as Alvord and Kilbrennan Lakes located within the project area. Through the use of GIS spatial data, a distance of 1 mile was established around these waterbodies and the acres of potential habitat area were calculated.

Data Sources

Detailed bald eagle population ecology, biology, habitat description and relationships identified by research are described in MBEWG (1991), MBEWG (1994), USFWS (1995), USFWS (1999), USFWS 2007a, and MBEWG 2010. These provided guidance in evaluating potential habitat and potential effects to bald eagles, and are incorporated by reference.

Eagle use and occurrence data comes from recent District wildlife surveys and observation records, NRIS wildlife database, and other agency records (USFWS, MFWP).

Assumptions and Limitations

Bald eagles may forage anywhere carrion may be present and, therefore, may use upland areas some distance from a large body of water. However, most foraging occurs near water where their primary prey is available and the presence of an eagle in areas beyond 1 mile from a water body is unlikely. Therefore, the identification of potential habitat was restricted to the area within 1 mile from large bodies of water.

Affected Environment

Spatial and Temporal Context for Effects Analysis

The analysis boundary for direct and indirect project impacts to individuals and their habitat and making the effects determination is all suitable bald eagle habitat associated with the project area. This includes the contiguous area of suitable habitat within 1 mile of the project area boundary because an eagle's territory may include both sides of the Yaak and Kootenai Rivers. The primary potential effect of activities to bald eagles is impacts to nesting success. Since nesting and primary forage habitat occurs within approximately 1 mile of waterbodies, this area is appropriate for analysis of the bald eagle. Contribution toward viability is assessed at the KNF.

Temporal boundaries for the bald eagle analysis include both short-term and long-term effects. Short-term effects are those that are expected to last between a few days to a season. Although the chances of an eagle being found within a given treatment unit during implementation is low, eagle use of upland areas within their home range may be impacted during implementation of activities. However, as a result of vegetation management treatments, greater foraging opportunities may be available by the next season. Long-term effects are those that expected to last longer than a season or two. Eagles demonstrate high fidelity to the nest site and tree. If vegetation management or development occurring within the nest site results in the loss of the nest or significantly alters the stands conditions such that it is no longer suitable for nesting, it could negatively impact the nesting success of the resident pair for years until they establish a new nest or territory. The loss of the forested condition through conversion to agriculture or infrastructure development would permanently result in the loss of that habitat for eagle use.

Existing Condition

Introduction

The bald eagle was officially removed from the threatened species list on August 8, 2007 (USFWS 2007b). It was immediately placed on the Forest Service Northern Region's sensitive species list for a period of at least 5 years, after which a status review was to be made to determine the need to remain on or be removed from that list. It is currently still on the Region's sensitive species list.

Bald Eagle Occurrence

Bald eagles are year-round residents of Montana and have exceeded the goals identified in the original 1983 Recovery Plan. As of 2010, the number of bald eagle nesting territories grew from 31 in 1980 (DuBois 2010) to 550 (MNHP 2015). In 2009, 367 of the territories were active and 284 of them successfully fledged 503 eaglets (DuBois 2010).

Bald eagles occur as both seasonal migrants and year-round residents within the boundaries of the KNF. Nesting attempts on the KNF have increased significantly over the last two decades. Only one active nest was known to occur in 1978, whereas 35 active nests (15 on NFS lands and 20 on private land) were known and monitored in 2008. Nest success for active nests in 2008 was 41 fledglings. This is above the 20 year average of 24.5 fledges calculated for the last KNF monitoring reporting period (1988-2007, USFS 2008). In addition, four new nest territories have been documented on this District alone since 2008 including two within the analysis area's potential habitat. The KNF supports about 564,558 acres (242,965 acres on NFS lands, 275,470 on private lands, and 46,123 acres of water) of potential bald eagle habitat.

Wintering bald eagle numbers have fluctuated over the years depending on food sources (fish from open waters and dead animals along roads and railroad tracks) and winter conditions (open versus frozen water for foraging habitat). Mid-winter bald eagle counts have averaged 91 bald eagles over the past 25 years (1990-2014, KNF bald eagle monitoring records in the project file).

Description of the Analysis Area

About 41,097 acres of potential bald eagle habitat occurs on NFS lands within the OLY project's analysis area. Nesting habitat is typically associated with mature forest stands in close proximity (less than 1 mile) to large bodies of water, including lakes and fourth order streams, which provide an adequate prey base. The west and southern boundaries of the project area are bounded by rivers that flow through generally forested habitats; therefore, this area would be expected and is known to support several bald eagle nests and territories. In fact, there are currently three active and two inactive nests located along the portion of the Kootenai River that bounds the project area. In addition, there is one active bald eagle nest and territory near Kilbrennan Lake.

Existing foraging habitat consists of lakes, rivers, wetlands and meadows which provide open flight paths, perches and adequate prey. It also includes road and railroad corridors (especially in the winter) where carrion may be present. Existing winter habitat is generally dictated by the presence and abundance of food, open water, and secure night roost sites (MBEWG 1994). The Kootenai River and lower reaches of the Yaak River generally do not freeze over during the winter and, therefore, provide a consistent opportunity for prey throughout the year. In contrast, Kilbrennan Lake often ices over during the winter months and the resident pair would rely more on upland habitats or spend more time near the rivers to forage during this time.

Existing Sources of Bald Eagle Mortality

The Montana Bald Eagle Management Plan (MBEWG 1994) identifies bald eagle mortality risks as shooting, accidental trapping, poisoning, diseases, and electrocution. On the KNF, bald eagles have also died from collisions with motor vehicles and trains. No trains are found in the analysis area and reduced speeds on most of the project area roads lowers the mortality risk due to motor vehicles in the area. Highway 2 and Yaak Highway 508 are located immediately adjacent to the project area and are the main access routes in the vicinity of Troy, Montana. These high speed routes have the potential to result in the mortality of eagles whose territories would include a portion of the analysis area; few known mortalities have been documented. Segments of both the

Bonneville Power Administration and Northern Lights power lines are also found in the analysis area. However, no known bald eagle mortalities have resulted from these segments of power lines.

Environmental Consequences

Alternative 1 – No Action

A range of fire severity, from non-lethal to stand replacing crown fires, historically played a role in developing the vegetative characteristics in the OLY project area. Although the type and frequency of fire experienced varies within a given area and vegetation type (based on biophysical setting), with some being more prone to infrequent stand replacing fire, the vegetation types within the project area have historically experienced low and/or mixed severity fires at least periodically. These natural disturbance regimes favor fire tolerant species, including older and larger diameter seral tree species such as western larch, western white pine, and ponderosa pine. The exclusion of low to moderate severity fires through fire suppression has altered the amount of shade-tolerant species in the understory of these forested stands as well as increased fuel loadings in the form of ladder fuels and downed woody materials. Fewer fires have also reduced the amount of natural openings, structural diversity, and the number/size of patches across the landscape. Fire suppression has not yet resulted in a departure from historic ranges for all stands within the project area (especially those with naturally longer fire return intervals), although they too are trending towards a departure. Due to the denser fuel conditions, resulting stand replacing fires in these stands often kill many of the overstory trees which historically survived mixed-severity wildfires. Past vegetation management practices that targeted these old, large trees removed the relic seral species and further altered tree size and composition; this in turn has promoted the development of climax species and conditions. This has also influenced the persistence of root disease in now Douglas-fir dominated stands as the seral species, such as western larch and ponderosa pine, are more resistant to these diseases. Planting of non-native ponderosa pine before breeding zones were understood has resulted in unhealthy stands that are not adapted to the local growing conditions. In addition, the close proximity to Troy, MT influenced the removal of valuable western larch, western white pine, and ponderosa pine trees and snags in the lower elevation sites that supported local development and supplies (e.g., firewood). In general, the resultant stand patch sizes and occurrence, species composition, stand structure, and fire frequency and severity are departing from desired vegetative conditions based on historic range of variability within the project area. See the Fuels Management and Forest Vegetation sections for more detail.

Bald eagles nest and perch in large, dominant trees on the landscape and forage in upland areas on small mammals and carrion. Without periodic low to mixed severity fires in this area, depending on habitat type, there is reduced development of large diameter trees or the creation of openings that provide forage for big game and other species. Also, the potential for stand replacing wildfire to spread into the more moist sites is likely to increase due to uncharacteristic vegetative conditions and would result in changes in the availability and distribution of suitable habitat within the project area.

For Alternative 1 (No Action), no active management would occur within identified potential bald eagle habitat. Therefore, no direct effects to nesting, roosting, or foraging habitat would occur from proposed federal actions. However, with continued fire suppression and lack of active management, the indirect effects of this alternative would include a continued trend towards uncharacteristic vegetative conditions and increased potential for high severity fire behavior

within the project area (see the Fuels Management and Forest Vegetation sections) which would reduce foraging and nesting/roosting opportunities in the future.

Alternatives 2, 3, and 4 – Direct and Indirect Effects

Management activities that focus on restoring and/or developing the desired condition for the habitat types would generally benefit bald eagles and their habitat. Treatments that open up the overstory while retaining and promoting the development of large, fire and disease tolerant tree species like western larch and ponderosa pine would maintain or improve upon the availability of suitable nesting trees and upland foraging habitat for bald eagles. There is potential to negatively impact eagles and their habitat through reduction of large structural components within the nest stands and primary use area (e.g., physical removal of potential nesting, perching or roosting trees) and by activity disturbance to eagles at important habitat sites (e.g., known nest, perch or roost trees or important feeding locations) occurring in known eagle use areas. However, identification and avoidance of known use areas and/or implementation of timing and activity restrictions would minimize if not eliminate these effects. Other potential effects include an increase in road kill and an increased risk of eagle/vehicle collisions from project traffic. Table 156 and Table 157 below summarize the impacts of the three action alternatives to identified nesting and potential bald eagle habitat in the analysis area and potential disturbance causing activities within approximately ½ mile of active nest trees, respectively.

Project Design Features and Mitigation Measures

There are two design features identified to minimize potential effects to the nesting bald eagles near Kilbrennan Lake, see Chapter 2 Design Features. The design features would include seasonal restrictions and a restriction on the use of helicopter to ignite Fuels Unit 5. These design features will be discussed in more detail in the following effects discussion.

Vegetation Management and Development – Changes to Potential Habitat

Bald eagles are regularly observed along the Yaak and Kootenai Rivers as well as in the vicinity of Kilbrennan Lake. Nests have been documented both within and immediately adjacent to the project area. Bald eagles generally choose the older, larger, and tallest trees in the stands for nest sites (MBEWG 1994). Harvest and fuel treatments have been proposed with the OLY project's bald eagle habitat consisting of four general treatment types: intermediate harvest, regeneration harvest, prescribed burning, and other fuels reduction treatments. No activities would occur within a ¼ mile of an active eagle nest and no roosts have been identified within the treatment units. Therefore, there would be no impacts to the suitability of the nest stands, the existing nest trees, or established roost sites and the project would be consistent with guidelines FW-GDL-WL-03 and FW-GDL-WL-04.

Just over 500 acres of intermediate harvest is proposed under all action alternatives (see Table 156). Intermediate harvest would retain the overstory, dominant trees and security cover to varying degrees that would help buffer potential nest trees from existing disturbances such as roads or campgrounds. These units would maintain or promote future nesting habitat by encouraging the growth of the larger, dominant trees left within the stands. Existing potential nesting and roosting opportunities would be maintained through the retention snags as well as the existing large diameter western larch and ponderosa pine located within the units. Also, because of the more open condition of these stands they currently provide forage and cover opportunities for a range a species that bald eagles could hunt or scavenge on. Retention and enhancement of

this open canopy condition and understory vegetative structure would continue to provide future upland foraging opportunities.

Compared to intermediate harvest, regeneration harvest units would remove the majority of the trees available for potential nesting as well as the screening cover that would provide security to nests. Alternative 2 proposes approximately 1,252 acres of regeneration harvest within potential bald eagle habitat (see Table 156). Remnant large diameter seral tree species such as western larch and western white pine are located within these proposed units and could provide nesting opportunities. Also, large snags are available within the stands. However, nesting habitat must also provide an adequate prey base and suitable structural conditions, such as open flight paths and perches, which allow for maneuverability during hunting. Although variable, many of these acres have a high density of cedar/hemlock or grand fir trees which provide little foraging opportunities for prey species and limits bald eagle use (i.e., limited maneuverability) where prey does exist. Regeneration harvest of these stands would retain the healthy, relic western larch and western white pine and some ponderosa pine as well as develop foraging opportunities for big game and other prey species. Tree cover would return in approximately 15 years and begin providing greater security for nesting opportunities. Alternatives 3 and 4 are similar to Alternative 2 but have fewer acres of proposed regeneration harvest (1,198 and 968 acres, respectively). This may suggest that these alternatives offer less future opportunity for bald eagle use especially for upland foraging and scavenging. However, many of the harvest acres have been converted to a fuels treatment to address other resource concerns for these alternatives. Treatments would still occur that would trend the stand towards the same desired condition. Overall, Alternative 3 would treat nearly the same amount of acres as Alternative 2. Alternative 4 would treat the fewest acres overall.

Prescribed fire, like intermediate harvest, would help to promote growth of the existing healthy trees by thinning out the understory as well as rejuvenate the existing shrubs, grasses, and forbs. All action alternatives propose some form of prescribed fire treatment on similar amount of acres, approximately 554 to 558 acres, within bald eagle habitat (see Table 156). These are lower elevations sites that are in close proximity to the Kootenai and Yaak Rivers and Alvord and Kilbrennan Lakes and are winter range for one or more big game species. Maintaining and/or creating more open stand conditions with big game foraging opportunities and larger trees in close proximity to these waterbodies provides greater nesting opportunities as well as winter foraging and scavenging opportunities for bald eagles in the area. Other fuels treatments would occur on an additional 27, 42, and 58 acres for Alternative 2, Alternative 4, and Alternative 3, respectively. Although these treatments would not experience the benefit of fire (e.g., stimulation of growth and productivity of understory vegetation), slashing of the small diameter trees would help to maintain an open understory that would similarly benefit bald eagles.

Winter foraging habitat is generally associated with ice-free bodies of water where fish and waterfowl are available (MBEWG 1994). Therefore, the Kootenai and Yaak River corridors found along the boundary of the project area provides the primary winter habitat for bald eagle use. These sections of river generally do not ice over and provide a consistent source of prey species during the winter months. Bald eagles will use upland areas in winter and intermediate harvests and prescribed burns may create open areas and flight paths for eagles to use as foraging areas. Therefore, treatments occurring in areas near the rivers, such as in the Sears Flat area or to the north along the East Side Road, would be expected to improve the potential for use by bald eagles. Proposed activities would not occur within the riparian habitat of either river and would not reduce the foraging opportunities occurring in the rivers themselves.

For all action alternatives, the primary effect of the proposed vegetation management activities would be the maintenance and/or improvement of bald eagle potential nesting and foraging habitat within the analysis area. This includes the retention of existing large diameter early seral tree species as well as the future development of these species. By maintaining the open canopy in the drier habitat types and opening the canopy and encouraging understory development in the moister habitat types, this would provide more upland foraging opportunities for eagles. Trending the vegetative condition towards the desired conditions within potential bald eagle habitat would be benefit local eagles and be consistent with the 2015 Forest Plan desired conditions for promoting large diameter trees within eagle nesting territories (FW-DC-WL-06) and providing habitat for native fauna adapted to open forests and early seral habitat or whose life/natural history and ecology are partially provided by those habitats (FW-DC-WL-19). Intermediate harvest and fuels treatments would result in immediate benefits while regeneration harvest would promote increased potential for bald eagle use of the area in the long-term. Alternatives 2 and 3 would treat nearly the same amount of acres within bald eagle habitat and would provide more future opportunities than Alternative 4 (Table 156).

Table 156. Comparison of Acres of Vegetation Management Treated within Potential Bald Eagle Habitat

Resource Element	Measure	Treatment Type	Alt 2 (acres)	Alt 3 (acres)	Alt 4 (acres)	Comment
Nest Site	Acres treated; impacts nest or roost trees?	NA	0	0	0	No activities within the nest site; no impacts to the nest tree and no known roost trees in activity areas.
Primary Use and Foraging Habitats	Acres treated; impacts roost trees?	Intermediate Harvest	506	503	506	No known roost trees in the activity areas.
Primary Use and Foraging Habitats	Acres treated; impacts roost trees?	Regeneration Harvest	1,252	1,198	968	No known roost trees in the activity areas.
Primary Use and Foraging Habitats	Acres treated; impacts roost trees?	Prescribed Fire	558	554	558	Edge of Fuels Unit F5 at approximately ¼ mile from active nest; no known roost trees in the activity areas.
Primary Use and Foraging Habitats	Acres treated; impacts roost trees?	Other Fuels Treatments	27	58	42	No known roost trees in the activity areas.

Resource Element	Measure	Treatment Type	Alt 2 (acres)	Alt 3 (acres)	Alt 4 (acres)	Comment
Primary Use and Foraging Habitats	Acres treated; impacts roost trees?	All Treatments Total	2,343	2,313	2,074	NA

Disturbance to Nesting or Roosting Eagles

To protect eagles and their nests, the MBEWG (2010) suggests seasonal timing restrictions and/or distance buffers (e.g., provision of visual screening) to protect eagles from human disturbance at nest sites. The primary recommendation is to apply a timing restriction to activities within ¼ to ½ mile of an active nest such that activities generally do not occur during the more sensitive times of the nesting period, approximately February 1 through August 15. However, application of these measures is also dependent on the existing human use of the surrounding area and demonstrated eagle tolerance of those activities, and existing vegetative cover that would shield the activity from the eagles at the nest.

No known roost sites are known to occur within proposed activity areas; therefore, there would be no disturbance to eagles at active roost sites. Most proposed activities would not occur within sight of or in close proximity to the active bald eagle nests found within the analysis area. However, recreational improvements and a prescribed fire are proposed adjacent to Kilbrennan Lake and in the vicinity of the active eagle nest (see Table 157). Kilbrennan Lake experiences regular recreational activity throughout the year and especially during the spring and summer months. Human activities include motorized access along the open road located along the eastern shoreline, camping at the north end of the lake, swimming, motorized and non-motorized boat use facilitated by the existing native surface boat ramp, and fishing both from boats and along the eastern shoreline. The resident eagles have tolerated this type and level of human activity and have continued to nest and successfully reproduce here over the years.

Proposed recreational improvements include replacing the existing native surface boat ramp either with concrete or a floating structure and widening of existing pullouts along the access road. Both improvements are intended to facilitate existing recreational use of the lake and no increase in the level or type of use is expected from these activities. Although these activities are located approximately ½ mile from the active nest, they are located along the open shoreline and are more visible to an eagle using the area and potentially from the nest. Therefore, a timing restriction has been identified for these activities and implementation would not occur between February 1 and July 15. See Design Features in Chapter 2. District monitoring records for this nest indicate that the young of the year have fledged by the end of June or early July. Based on this and the type and level of human activity on the lake in mid-summer, it was determined to not be necessary to extend the timing restriction to the full recommended period of August 15.

Only one prescribed burn unit, Fuels Unit F5, is planned near the active eagle nest at Kilbrennan Lake. To successfully achieve the desired burn conditions and vegetative result, implementation of this burn would need to take place during the spring during the recommended timing restriction of approximately February 1 through August 15. The western boundary of this unit is about ¼ mile from the active nest; however, this distance includes the width of the lake as well as the access road and the burn would not occur within the nest stand. Access to this unit would be via the open road and human activities would be limited to the roadway and burn unit. Active burning would only be expected to last a day, with post-burn monitoring spread out over several

days and requiring even fewer individuals and vehicles. Also, the stand proposed for treatment is composed of mature ponderosa pine and Douglas-fir that provides vegetative cover that would visually screen most of the prescribed burn activities from the eagles in the nest located on the opposite shoreline. Therefore, implementation of prescribed burn during the spring period would not be expected to result in a type or level of activity noticeably different than what occurs for recreational use and this activity has been excluded from the timing restriction for this nest. This unit would be thinned through the use of chainsaws 1 to 2 years prior to the burn. Although chainsaw use for thinning is a similar activity to firewood cutting that the eagles would experience in the area, multiple chainsaws running over several days may result in an increased level of noise above what is normally experienced. Therefore, the timing restriction of February 1 through July 15 would be applied to this activity due to its potential for disturbance and to reduce the number of proposed activities occurring during this sensitive period. Also, the use of a helicopter on this burn would result in a type of activity not normally experienced by the eagles at the Kilbrennan nest site; therefore, ignition would occur by hand and monitoring would be limited to on-the-ground checks and observations.

In general, there could be the potential for short-term disturbance and avoidance of foraging habitat (e.g., near the Kootenai and Yaak Rivers and in open forested areas) in proximity to activity areas due to the increased human activity, equipment, and noise. However, not all proposed harvest units would be active at once and although an eagle may be disturbed by activities in one area it would not be displaced from the entire habitat area. Only one active nest is known to occur within the analysis area. Timing and activity restrictions have been identified to minimize and/or avoid disturbance to the nesting pair and young based on distance from the nest, type of activity compared to existing recreational use, and availability of cover and the project would be consistent with FW-GDL-WL-02. The proposed prescribed burn activities at Fuels Unit F5 would not be expected to result in the disturbance of nesting eagles or their young such that they may be displaced from the nest or impact reproductive success.

Table 157. Potential for Disturbance Associated with Vegetation Management and/or Developments within Approximately One-Half Mile of Active Nest Sites

Resource Element	Resource Indicator	Measure	Alt 2	Alt 3	Alt 4
Nest Site	Disturbance within approximately ¼ to ½ mile from known nest sites	Assessment of current nesting activity, existing tolerance to human activities, nature of potential disturbance, and occurrence of visual screen between nest and the proposed activity	Proposed recreational improvements and implementation of prescribed burn, Fuels Unit F5 within approximately ½ mile of the active nest at Kilbrennan Lake. No known roost trees in the activity areas.	Same as Alternative 2	Same as Alternative 2

Increased Risk of Mortality

None of the action alternatives would add to bald eagle mortality risk. No power lines would be installed nor would motorized access (e.g., road construction, speed limits, increased potential for carrion along roadways) change with implementation of any of the action alternatives.

Cumulative Effects

Introduction

The "Existing Condition" section describes the existing suitable habitat within the analysis area, primarily nesting habitat within close proximity to large bodies of water. This cumulative effects section summarizes the past actions as well as further describes ongoing and other reasonably foreseeable contributions potentially impacting bald eagle habitat.

Spatial and Temporal Context for Cumulative Effects Analysis

The cumulative effects analysis area would be the same as that described for the direct and indirect analysis under the section "Data Sources, Methods, Assumptions, Bounds of Analysis." This includes all suitable bald eagle habitat associated with the project area, including contiguous areas of suitable habitat that fall within one mile of the project area boundary along the Kootenai and Yaak Rivers. Because the primary effect of activities to bald eagle is nest success, this area encompasses the potential territories associated with the known active nests along the Kootenai River and other potential nesting habitat and, therefore, was chosen as the appropriate scale for bald eagle cumulative effects analysis. In addition, habitat throughout the project area was evaluated for potential impacts related to foraging and winter habitats (including perch and roost sites) and mortality risks. There are no apparent conditions within the project area that would cumulatively contribute negative effects to bald eagle nesting habitat.

Similarly, temporal boundaries for the cumulative effects analysis would be the same as for the direct and indirect effects. Short-term effects are those that are expected to last between a few days to a season, such as potential disturbance to eagles using activity sites in upland habitats within primary use areas. Long-term effects are those that are expected to last longer than a season or two and would be expected to occur in association with habitat changes or disturbances at important sites, especially at the nest site.

Past, Present, and Reasonably Foreseeable Activities Relevant to Cumulative Effects Analysis

Past Actions

The primary measure of habitat suitability is changes to potential nesting and foraging habitat. Table 156 of this analysis summarizes the existing condition which reflects the acres of primary bald eagle habitat which is located within one mile of the project area boundary associated with the Kootenai and Yaak Rivers. Harvest has occurred in the project area since the 1930s and included regeneration harvest and loss of snags, large old trees, and reductions in riparian habitats. These would have resulted in a reduction in nesting habitat and success as well as roosting habitat in upland areas. Associated road construction and development of private lands along the southwestern boundary of the project area contributed to the loss of suitable eagle habitat. Detailed description of previous vegetation management activities are found at the beginning of Chapter 3, including Table 32 and Table 33, as well as Appendix F of this document. In unharvested areas, natural disturbances such as wildfire would have contributed to a mosaic of habitats and forage conditions. In contrast, fire suppression since the early 1900s has contributed to the alteration of stand structure and composition resulting in more homogenous stands with greater canopy closure in some areas, which has in turn reduced big game forage and scavenging opportunities on some sites.

Since the 1990s, application of Forest Plan direction has resulted in the retention of snags and protection of riparian habitats. Similarly, direction provided in the 2015 Forest Plan would continue this direction and continue to promote the suitability of habitat for eagle use as well as protect eagles at their nest. Greater reliance on intermediate harvest that leaves more forest structure (including large old trees), snags, and cover has since provided for both nesting and upland foraging opportunities. Also, prescribed fire that maintains open conditions and development of large trees has improved nesting and foraging opportunities. Application of management guidelines that limit the type or occurrence of activities around know nest sites, such as timing restrictions and minimum distances from the nest, have further reduced impacts to nesting success. Cumulatively, management activities in the past two decades have improved the protection of reproductive opportunities and success as well as maintenance and/or improvement of foraging habitats.

Alternatives 2, 3, and 4 – On-going and Reasonably Foreseeable Actions

Reasonably foreseeable actions include those federal, state, or private activities that are ongoing or scheduled to occur, independent of this federal action. Table 34, located at the beginning of Chapter 3, identifies those current and foreseeable actions in the project area that were determined to be appropriate for inclusion in the analysis of environmental effects.

Ongoing federal actions have been considered and included when formulating the existing condition of this analysis area. This includes a small portion of the Rocky Pine Fuel Reduction Project that still needs to be completed. About six harvest units, one precommercial thin, and one prescribed burn (Burn B) were implemented just west of the Yaak River within OLY's suitable habitat analysis area. Additional acres of intermediate harvest within this area would provide more foraging opportunities for big game in winter range. Similarly, prescribed fire in the area would reduce conifer encroachment and maintain foraging opportunities. Both would retain the healthy, large diameter trees that would provide future nesting habitat. Potential disturbance associated with implementation of the Rocky Pine units have dissipated and there would be no overlap in disturbance effects related to the two projects. No known active nests are located within this overlapping area of suitable habitat. Neither project proposes activities within riparian areas or other prime nesting habitats while both would improve foraging habitats. Proposed activities would not increase the potential effects to this species. Cumulatively, there would be an improvement to upland foraging habitat that would be beneficial to bald eagles in the long-term.

To provide a suitable site to study the growth of western white pine, regeneration harvest was implemented in a small area of Ferrell Flats. Like for the Rocky Pine treatments, this managed area is located just west of the Yaak River within OLY's suitable habitat analysis area. Harvest did not occur near an active nest, nor would the pre-existing habitat condition or location suggest its probable use as a nest stand. The regeneration harvest and subsequent planting of western white pine resulted in an open stand conditions that could benefit potential prey species and provide upland foraging habitat for eagles. Cumulatively, this contributes to the availability of foraging habitat for bald eagles within the analysis area.

Kilbrennan Lake and Campground is a popular recreational spot on the District. Management and maintenance of the campground is an ongoing activity that varies from simple fee collection, to removal of hazard trees in the spring, to more intensive campground improvements. No activities occur within close proximity of the nest site. The eagles that nest towards the south end of the lake demonstrate tolerance to these activities that occur during the breeding season. Proposed vegetation management and recreation improvements along the lake's shorelines are expected to be minor due to the type of activity and implementation of seasonal restrictions for some of the

activities. Given the pair's demonstrated tolerance to the existing management and recreational use of the area and the minor effects expected from OLY's proposed activities, cumulative effects related to potential disturbance to the pair and nesting success are also expected to be minor.

Approximately 15,732 acres (38 percent) of the bald eagle habitat within the analysis area is privately owned including small landowners, State lands, and private timber companies. The development of homes, construction of roads, and conversion of forested habitat into pastures or agricultural fields has reduced the suitability of nesting and foraging habitat especially in riparian habitat along the rivers. However, development in the past 10 years would suggest minimal change in the private land for the next 10 years. Also, conservation easements on Stimson Lumber Company lands and some private lands would prevent future subdivision. In addition, most of the suitable bald eagle habitat is located on NFS lands and some State lands (approximately 59 percent) which generally would remain in a forested condition. Therefore, cumulative effects to nesting habitat and success from development on private lands would be minimal.

Based on the nature and magnitude of potential cumulative effects to bald eagles independent of this project, there are no cumulative effects anticipated that would change the effects determination to the eagles from implementation of the action alternatives.

Regulatory Framework Findings

2015 Forest Plan

The 2015 Forest Plan provides desired conditions, objectives, standards, and guidelines for bald eagle within the Wildlife Resource. The following are applicable to the actions in this project[20]:

Forestwide Direction

- p. 28, **GOAL-WL-02**: The KNF manages and schedules activities to avoid or minimize disturbance to sensitive species and manages habitat to promote their perpetuation into the future.

  Proposed harvest and fuels treatments would result in the retention of remnant large tree species, better approximation of stand patch size and species composition, protection of riparian habitats, improved stand health, and general movement towards the desired vegetative condition based on historic range of variation with the stands for this area. This would promote the development of large diameter trees as well as provide upland foraging opportunities within potential bald eagle habitat. Project design features (see Chapter 2, Design Features) include both timing and activity restrictions for proposed activities near Kilbrennan Lake to reduce and avoid potential disturbance effects to bald eagles nesting at Kilbrennan Lake. See the "Direct and Indirect Effects" discussion. Therefore, the OLY project would contribute to progress toward achieving GOAL-WL-02.

- p. 28, **FW-DC-WL-01**: Nests and den sites and other birthing and rearing areas for terrestrial threatened, endangered, proposed, or sensitive species are relatively free of human disturbance during the period they are active at these sites.

[20] Goals, desired conditions, objectives, standards, and guidelines can be found on noted pages in the 2015 ForestPlan.

Only one active nest is located near proposed activities. Timing and activities restrictions would be applied to activities occurring near Kilbrennan Lake to reduce or avoid the potential for disturbance during the nesting period. See "Direct and Indirect Effects" and Chapter 2, Design Features. Therefore, the OLY project would contribute to progress toward achieving FW-DC-WL-01.

- p. 29, **FW-DC-WL-06**: Large-diameter trees are available within potential bald eagle nesting habitat adjacent to large lakes and major rivers. Forested stand are managed to promote large diameter trees within eagle nesting territories, especially in the area between the nest site and the adjacent water body.

  Existing potential nesting and roosting opportunities would be maintained through the retention of snags as well as the existing large diameter western larch and ponderosa pine located within the units. The development of large trees would be promoted through harvest and fuels treatments that open the canopy, reduce competition for light and nutrients, and encourage the establishment of early seral species more likely to be used for nesting and roosting by bald eagles. See the "Direct and Indirect Effects" discussion. Therefore, the OLY project would contribute to progress toward achieving FW-DC-WL-06.

- p. 30, **FW-DC-WL-19**: By trending towards the desired conditions for vegetation, habitat is provided for native fauna adapted to open forests and early seral habitats, or whose life/natural history and ecology are partially provided by those habitats.

  Although bald eagles are not obligates of open forests or early seral habitat, these conditions or a mosaic of these habitats provide structural conditions suitable for eagle use and include the development of large diameter trees for nesting and roosting, open flight paths for travel routes and hunting, and upland conditions that provide for potential terrestrial prey species. Proposed harvest and prescribed burn units move treated stands towards desired vegetative conditions for the sites which would promote these structural conditions. See "Introduction" and "Direct and Indirect Effects." Therefore, the OLY project would contribute to progress toward achieving FW-DC-WL-19.

- p. 30, **FW-OBJ-WL-01**: The outcome is the maintenance or restoration of wildlife habitat on 1,000 to 5,000 acres of NFS lands, annually, with an emphasis on restoration of habitats for threatened and endangered listed species and sensitive species.

  Implementation of proposed harvest and fuels treatments that result in movement towards the desired vegetative condition based on historic range of variation would contribute to the maintenance or restoration of habitat for bald eagles. Depending on the action alternative, timber harvest would occur on approximately 1,474 to 1,758 acres with additional fuels treatments occurring on 585 to 612 acres within the analysis area. See GOAL-WL-02 above and FW-DC-WL-19 above, as well as the "Direct and Indirect Effects" discussion. Therefore, the OLY project would contribute to attainment of FW-OBJ-WL-01.

- p. 31, **FW-GDL-WL-02**. Bald Eagle: Management activities should avoid or minimize impacts to bald eagles on known occupied nest sites and roost sites, including known winter communal night roost areas, with timing and distance buffers based on the best available information.

Activities occurring within approximately ½ mile from the active nest at Kilbrennan Lake were considered for timing and activity restrictions. Recreational improvements and slashing within prescribed burn Fuels Unit F5 would occur outside the most sensitive period from February 1 through July 15, based on visibility and potential for increased disturbance compared to existing levels. No helicopters would be used to ignite this unit as this is a usual activity for this area. See Design Features in Chapter 2 and "Direct and Indirect Effects." Therefore, the OLY project was designed in accordance with this guideline.

- p. 31, **FW-GDL-WL-03. Bald Eagle**: Management activities should not result in the loss of existing nest trees or established roost trees.

  No activities would occur within known nest stands and there would be no impacts to nest trees. Similarly, no roost trees are known within activity areas and would not be impacted by proposed activities. See "Direct and Indirect Effects." Therefore, the OLY project was designed in accordance with this guideline.

- p. 31, **FW-GDL-WL-04. Bald Eagle**: Management activities should maintain or enhance nest site habitat suitability within existing nest territories (refer to FW-DC-VEG-03, FW-DC-VEG-07, FW-STD-VEG-01, FW-GDL-VEG-01, FW-GDL-VEG-02, FW-GDL-VEG-04, FW-GDL-VEG-05, and FW-DC-WL-13).

  No activities would occur within nest stands. Proposed vegetation management treatments occurring within primary use areas near nest stands would promote structural characteristics that would provide current and /or future nesting and roosting opportunities. Suitability of the active nest stands would be maintained. See "Direct and Indirect Effects." Therefore, the OLY project was designed in accordance with this guideline.

Federal Law

National Forest Management Act (NFMA)

The project would comply with NFMA direction to provide for diverse populations of plant and animal communities through compliance with the 2015 Forest Plan.

Bald and Golden Eagle Protection Act of 1940 (16 U.S.C. 668-668c)

Without being permitted, it is illegal to "take" a bald eagle, including their parts, nest, or egg, and subsequent possession, transport, trade, etc. Also, the term "take" comprises a range of actions including but not limited to collection, injury or death, or disturbance.

Activities would not alter the vegetative conditions of the known nest sites and would not result in the possession of an individual, feathers, nest, or eggs. Activities occurring in the vicinity of the Kilbrennan Lake nest would be similar in nature to existing human use and would not result in an increased level of disturbance beyond what is normally experienced by the nesting pair. Also, a combination of topography, distance, vegetative cover, and application of seasonal and activity restrictions would further reduce the potential for disturbance to the pair. See the "Direct and Indirect Effects" discussion.

Migratory Bird Treaty Act of 1918 (16 U.S.C. 703-712), as Amended

Implemented to protect migratory birds and includes treaties between the U.S. and Great Britain (for Canada), Mexico, Japan, and the Soviet Union (now Russia). Without being permitted it is illegal to "pursue, hunt, take, capture, kill, attempt to take, capture or kill, possess, offer for sale, sell, offer to purchase, purchase, deliver for shipment, ship, cause to be shipped, deliver for transportation, transport, cause to be transported, carry, or cause to be carried by any means whatever, receive for shipment, transportation or carriage, or export, at any time, or in any manner, any migratory bird, included in the terms of this Convention . . . for the protection of migratory birds . . . or any part, nest, or egg of any such bird." (16 U.S.C. 703)

As stated above for the Bald and Golden Eagle Protection act, no activities would result in the possession of an individual, feathers or other parts, nest, or egg of a bald eagle. Activities would not occur at known nest or roost sites or result in the development of structures (e.g. power lines) which could result in the injury or death of an eagle. No increased risk of injury or mortality is expected (see the “Direct and Indirect Effects” discussion).

Executive Orders

Migratory Birds, EO 13186 of January 10, 2001

Executive Order 13186 makes it illegal to take, kill, or possess migratory birds. Furthermore, this Executive Order requires federal agencies to evaluate the effects of federal actions on migratory birds through environmental analyses.

The project complies with Executive Order #13186 and associated Memorandum of Understanding by evaluating the effects of federal actions on bald eagles as part of the NEPA process and promoting conservation of and minimizing adverse impacts to the species.

State and Local Law

Nongame and Endangered Species Act (MCA 87-5) of Montana

This Act has similar language to the Migratory Bird Treaty Act such that it is unlawful to collect, kill, possess, transport, trade, etc. any bird, part of a bird, egg, or destruction of nest of a wild bird unless under an issued certificate, license, or permit.

As described for the Bald and Golden Eagle Protection Act, there would be no impacts to the nest site or the possession of an eagle or their parts. Potential disturbance is not expected to impact the daily or reproductive activities of the nesting pair.

Other Guidance or Recommendations

Guidance for the management of bald eagles and their habitat in Montana is provided by “Habitat Management Guide for Bald Eagles in Northwestern Montana” (MBEWG 1991), “Montana Bald Eagle Management Plan” (MBEWG 1994), and “Montana Bald Eagle Management Guidelines: An Addendum to Montana Bald Eagle Management Plan” (MBEWG 2010) which have been incorporated into this analysis. The KNF has been documenting bald eagle nests and reproductive success in cooperation with the State of Montana since at least 1978. Also, mid-winter eagle counts occur in early January to get an estimate of the number of individuals residing on the Forest during the winter period. These efforts have been occurring since 1980 for a similar timeframe as the regular nest monitoring.

Statement of Findings

Alternative 1 (No Action) **may impact individuals or their habitat, but will not likely contribute to a trend toward federal listing or cause a loss of viability to the population or species** for bald eagles. The No Action Alternative would maintain existing nesting, roosting, and foraging habitat. The current trend is that stand characteristics and function are departing from historic conditions. Lack of management and treatment in these stands would further continue this trend which includes increased potential for high severity fire conditions within the project area. This would result in the continued loss of nesting, roosting, and foraging habitats especially if a severe wildfire occurred along the Kootenai and Yaak River corridors or in the vicinity of Alvord or Kilbrennan Lakes.

Alternatives 2, 3, and 4 **may impact individuals or their habitat, but will not likely contribute to a trend toward federal listing or cause a loss of viability to the population or species** for bald eagles. This determination is based on: 1) limited potential for disturbance at the Kilbrennan Lake nest and activities are not expected to result in the displacement of nesting pair or their young, 2) the proposed vegetation management treatments are designed to trend the existing condition towards desired conditions for the area, 3) this would increase the availability of forage for both small mammals and big game species which would increase upland foraging and scavenging opportunities for bald eagles, 4) also, remnant large diameter early seral species would be retained within treatments units, providing for existing and/or future potential nesting and roosting opportunities, and 5) winter foraging opportunities would not be reduced along the Kootenai and Yaak Rivers.

Other Agencies and Individuals Consulted

Chris Hammond, MFWP Non-Game Biologist

Communications consisted of the type of proposed actions occurring near Kilbrennan Lake, the potential for disturbance, concerns, and needs for timing restrictions for proposed activities.

Bighorn Sheep

Introduction

Rocky Mountain bighorn sheep are the largest of several species of mountain sheep in North America. They are a very social species and segregate into two group types for most of the year: 1) mature males only or 2) females, lambs, and immature males. Primarily, they eat grasses and forbs, although herds in Northwest Montana eat more shrubs than herds in other areas. The most important habitat requirement for the species is suitable escape habitat consisting of steep (greater than or equal to 60 percent slopes) and open terrain with rocky outcroppings. This habitat component is necessary for them to escape from predators (MFWP 2010). This escape terrain, with adjacent foraging areas, must be found in all of their seasonal ranges in order for the habitat to be usable by bighorn sheep. This includes winter ranges which occur on south-facing slopes in lower elevation areas, providing a relatively snow free (less than or equal to 10 inches) (ibid) and warmer environment (Shackleton et al. 1999 cited in NatureServe 2013).

Wildfire is a natural disturbance process that occurs within bighorn sheep ranges which helps maintain the open habitat conditions used for foraging and escape. Without wildfire, tree and shrub encroachment into open areas is reducing the availability of forage opportunities for bighorn sheep within their range. The deterioration of bighorn sheep habitat in Northwest Montana is attributed, in part, to effective fire suppression over the past 50 years (MFWP 2010). Analysis of this resource is directly related to the project Purpose and Need to "Provide forage opportunities while maintaining wildlife security . . . through access management."

The greatest threat to bighorn populations is from disease. The animals are susceptible to pneumonia and a population involved in a pneumonia outbreak would see a significant number of animals die. As a result, reproduction and recruitment would be reduced for several years. The reasons for disease outbreaks are unclear. However, there is evidence to suggest that contact with domestic sheep or goats can play a role (MFWP 2010).

The draft Montana Sheep Conservation Strategy (MFWP 2010) states "the primary issues affecting bighorn sheep habitat were deterioration, loss, and fragmentation." This could occur from forest succession associated with fire suppression as described above or the development of infrastructure such as roads or homes. Therefore, proposed activities that influence the availability and quality of bighorn sheep habitat is a main focus of this analysis. For most Forest planned projects occurring in bighorn sheep habitat, this would include vegetation management that promotes the maintenance or improvement of early seral and open timbered habitat types with native grass and forb understories. The analysis also considers any proposed activities that would occur on winter range or lambing habitats, during their period of use, when sheep may be more susceptible to human disturbance. Also, any activities that could introduce disease into the local herd through contact with domestic sheep or goats would be addressed.

Summary of Conclusions

Implementation of the OLY project's action alternatives result in a determination of **may impact individuals or their habitat, but will not likely contribute to a trend toward federal listing or cause a loss of viability to the population or species** to bighorn sheep. The Kootenai Falls range provides year round habitat for bighorn sheep use including areas within the OLY project area. The reduction of early seral and open habitat conditions has reduced the suitability of sheep habitat, especially in the highly productive and timbered habitat types found in Northwest Montana. Implementation of vegetation management treatments that trend toward the desired

vegetative conditions for the site would result in the increase of these open habitats and would improve bighorn sheep habitat within the project area.

Regulatory Framework

2015 Forest Plan

The 2015 Forest Plan provides overall guidance for the management of the lands on the KNF. It describes the goals, desired conditions, and objectives toward which the management of the land should be directed. And it establishes standards and guidelines to help achieve or maintain the desired condition or conditions, to avoid or mitigate undesirable effects, or to meet applicable legal requirements.

The plan components which provide specific bighorn sheep resource direction relevant to this project include:

- FW-DC-WL-16
- FW-GDL-WL-08
- FW-GDL-WL-09
- FW-GDL-WL-11
- GA-DC-WL-LIB-03

There are other 2015 Forest Plan components that provide resource direction for a range of wildlife species or habitat conditions that are not specific to bighorn sheep, but still are applicable to sheep management. The full list of the plan components applicable to bighorn sheep management are found in the “Regulatory Framework Findings” section of this analysis.

Resource Indicators and Measures

The effects analysis for bighorn sheep habitat is based on State management challenges and objectives for the individual herds as well as direction provided in the 2015 Forest Plan. A primary problem associated with habitat management of bighorn sheep in Northwest Montana is the reduction of open habitat conditions. Therefore, two resource elements listed in Table 158 address changes to the suitability and availability of habitat within the sheep range: increased foraging opportunities and infrastructure development. These are related to the 2015 Forest Plan desired conditions to provide habitat for native ungulates (FW-DC-WL-16) and for species adapted to open forest and early seral habitats (FW-DC-WL-19). The acres treated by vegetation management and/or lost through development will be the measures for effects to compare alternatives. A third resource element is the occurrence of activities on winter range and lambing habitat where sheep may be more sensitive to disturbance during these periods of use. The overall assessment of bighorn sheep habitat also considers the potential risk for the introduction of disease through contact with domestic sheep or goats.

Table 158. Resource Indicators and Measures for Assessing Effects

Resource Element	Resource Indicator	Measure	Used to Address: P/N*, or Key Issue?	Source
Increased Foraging Opportunities	Changes to early successional habitat or the maintenance of open forest conditions resulting from timber harvest and fuels treatments	Acres treated	Purpose and need	KNF Forest Plan FW-DC-WL-16 and FW-DC-WL-19; Montana Sheep Conservation Strategy (MFWP 2010)
Infrastructure Development	Proposed construction or other land conversion within sheep range	Acres lost to development; potential impacts to movement?	No	Montana Sheep Conservation Strategy (MFWP 2010)
Winter Range and Lambing Habitat	Activities occurring on winter range or lambing habitat during their period of use	Potential for disturbance and displacement of sheep during these periods?	No	GOAL-WL-02; FW-DC-WL-01; FW-GD-WL-08; Big Game; FW-GDL-WL-09, Big Game; FW-GDL-WL-11, Big Game
Domestic Sheep or Goats	Presence of domestic sheep or goats within the herd range	Changes to the potential for interaction with domestic sheep or goats?	No	Montana Sheep Conservation Strategy (MFWP 2010)

*P/N = Purpose and Need

Methodology

Bighorn sheep ranges for each of the herds found on the KNF have been identified for the 2015 Forest Plan. Based on discussions with State wildlife biologists, the extent of the sheep range may be adjusted based on local observations. The mapped ranges provide for yearlong sheep use are used to identify expected areas of sheep use and potential foraging habitat. Through the use of GIS spatial data, the location of proposed units with respect to the sheep range were identified and the acres of vegetation management treatments were calculated for each action alternative.

Data Sources

Bighorn sheep population ecology, biology, habitat description and relationships identified by research are described in NatureServe (2013), Geist (1971), Buechner (1960), and Couey (1950). That information is incorporated by reference.

Bighorn sheep use and occurrence data comes from recent District wildlife surveys and observation records, NRIS wildlife database, and other agency records (MFWP).

Assumptions and Limitations

There are no assumptions or limitations associated with this resource analysis.

Affected Environment

Spatial and Temporal Context for Effects Analysis

The analysis boundary for direct effects is the OLY project activity areas, since activities in this area could result in habitat alteration, disturbance, and displacement to bighorn sheep. The boundary for indirect effects to individuals and their habitat is the herd range associated with the project area. Although bighorn sheep rams are known to make some excursions outside the established range, due to the need for escape terrain, bighorn sheep would generally not be expected to travel long distances through unsuitable habitat to other locations outside of the identified range. Contribution toward viability is assessed at the KNF.

Temporal boundaries for the bighorn sheep analysis include both short-term and long-term effects. Short-term effects are those that are expected to last between a few days to a season or portion of two seasons. Generally, once disturbance causing activities like prescribed burns and harvest have been completed sheep can move back into and use the area. As a result of vegetation management treatments, greater foraging opportunities likely would be available by the next season. Long-term effects are those that expected to last longer than a season or two. For example, vegetation management that reduces the tree cover and encourages the development and productivity of understory grasses and forbs would improve foraging opportunities within an open, safer environment for sheep. Following harvest, especially regeneration harvest, it is expected that foraging would be available for up to approximately 15 years. The benefits of such treatments for sheep would last longer if maintenance activities such as thinning and fire (natural or prescribed) are continued within the treated stand. Long-term effects could also include the loss of habitat due to land development or the risk to herd health if domestic sheep or goats were introduced into sheep ranges.

Existing Condition

Introduction

Forest-wide there are 90,880 acres of bighorn sheep habitat. Its distribution is patchy, found only in a few small, isolated pockets of more open habitat that includes steep, rocky terrain. There are four herds of bighorn sheep within the boundaries of the KNF. Two of the herds (Ural-Tweed and Galton) are native herds, totaling approximately 90 individuals. The Kootenai Falls and Cabinet (Berray Mountain) herds are both introduced herds that have been established or reestablished by the relocation of sheep from other populations (MFWP 2010).

Bighorn Sheep Occurrence

The Kootenai Falls herd which uses a portion of the OLY project area was established in the mid-1950s through the introduction of 16 sheep from Wild Horse Island in Flathead Lake. The population initially grew to a peak of about 150-200 animals by the mid-1980s then began showing signs of decline. Due to a period of low counts and low lamb recruitment rates, MFWP decided to augment the existing population with additional sheep. Augmentation events have occurred in 2000, 2003, 2004, and 2008 for a total of 61 transplanted individuals (MFWP 2010). More recently, 32 sheep were transplanted into the Kootenai Falls herd through an effort to control the population on Wild Horse Island (MFWP 2014). As of 2014, a minimum estimate of 80 sheep make up the Kootenai Falls herd and, based on good recruitment (i.e., lamb production and survival) in 2015, herd numbers are expected to be good in 2016 (Chilton-Radandt 2015a).

Description of the Analysis Area

Approximately 60 percent of the Kootenai Falls herd range occurs within the OLY project area. This portion of the bighorn range is found in the southeastern corner of the project area and bordered by the Kootenai River. This area has a southern exposure that includes steep topography with open, rocky outcrops and sparsely timbered stands that provide good escape terrain as well as heavier timbered areas within stream drainages lower in the canyon. The landscape becomes more heavily timbered farther upslope, but patches of open habitat conditions, either naturally open or open as a result of recent disturbance events, and rocky outcrops continue to be found. This area is known as the Kootenai Face and it provides year round range for sheep, including winter range and lambing areas in the lower elevation sites and summer use throughout the range where visibility is good.

Foraging Opportunities

Bighorn sheep ranges in northwest Montana are heavily timbered shrub-dominated communities compared to ranges found elsewhere in the state that provide grassland vegetation types (MFWP 2010). Also, productive growing conditions encourage the establishment of trees into openings and open timbered stands. Therefore, maintenance of foraging habitat in this area is highly dependent on disturbance processes that result in or maintain early seral conditions.

Foraging habitat is most consistently found within the sparsely timbered or open timbered stands associated with the drier habitat types found on the south-facing steep and rocky terrain lower in the Kootenai River Canyon. Although these habitat types are also susceptible to tree encroachment and stand conversion, the harsher conditions slow this process even with the lack of recent disturbance. Similar foraging habitat is found elsewhere in the Kootenai Falls range, but tends to be patchier in nature and requires movement through heavier timbered areas to access. Within more moist habitats that tend to develop heavily timbered stands, past vegetation management and fire events often result in short-term foraging habitats that become less effective over time as trees reestablish on the sites unless maintenance treatments occur. However, a large fire event in the China Basin/Flagstaff Mountain area in 1994 resulted in early seral, sparsely timbered conditions where tree establishment and recovery has been slow which has maintained open conditions for a longer period of time than expected. Bighorn sheep use of this area likely increased following the fires and use would be expected to continue until tree growth and cover limits visibility and foraging opportunities. In summary, other than the large area of consistent foraging habitat located closer to the Kootenai River bighorn sheep foraging habitat is patchy (e.g., smaller in size and surrounded by heavier timber) and/or short-lived due to habitat types, productive growing conditions, and lack of disturbance processes to maintain early seral conditions.

Infrastructure Development

Little human development has occurred on the Kootenai Falls herd range due to a combination of limited private land ownership and rugged topography that makes development difficult. Human infrastructure within the OLY project area is limited to a single open road system (NFSR 4445) that traverses the Kootenai Face along the upper edge of the more suitable sheep habitat. Outside the project area, development of the private land located in the far eastern part of the range includes home and associated construction. Bighorn sheep are often observed using some of the lawns and old orchards around the homes. Also, the Bonneville Power Administration power line is located in the flat along the Kootenai River. Only a small segment crosses the very southeast corner of the project area as most occur to the east on the adjacent Libby Ranger District.

Availability of Winter Range and Lambing Habitat

Steep and rocky conditions provide escape terrain which is an important component of both winter range and lambing habitat. Escape terrain in combination with the lower elevation sites and southern exposure, limits snow accumulations to provide suitable winter range. Suitable lambing habitat is also found in the lower elevation portions of the herd range as the proximity of escape terrain with the Kootenai River provides important resources for ewes and young lambs during this period.

Presence of Domestic Sheep or Goats

The presence of domestic sheep or goats increases the potential risk for interaction and transmission of diseases harmful to bighorn sheep. No grazing allotments are found on NFS land within the OLY project area or in the vicinity of this herd (MFWP 2010). Domestic goats are known to occur on hobby farms throughout the area; sheep may encounter these goats during their use of the range or during occasional excursions from their normal range (ibid) which increases their risk for exposure to potential fatal diseases.

Environmental Consequences

Alternative 1 – No Action

A range of fire severity, from non-lethal to stand replacing crown fires, historically played a role in developing the vegetative characteristics in the OLY project area. Although the type and frequency of fire experienced varies within a given area and vegetation type (based on biophysical setting), with some being more prone to infrequent stand replacing fire, the vegetation types within the project area have historically experienced low and/or mixed severity fires at least periodically. These natural disturbance regimes favor fire tolerant species, including older and larger diameter seral tree species such as western larch, western white pine, and ponderosa pine. The exclusion of low to moderate severity fires through fire suppression has altered the amount of shade-tolerant species in the understory of these forested stands as well as increased fuel loadings in the form of ladder fuels and downed woody materials. Fewer fires have also reduced the amount of natural openings, structural diversity, and the number/size of patches across the landscape. Fire suppression has not yet resulted in a departure from historic ranges for all stands within the project area (especially those with naturally longer fire return intervals), although they too are trending towards a departure. Due to the denser fuel conditions, resulting stand replacing fires in these stands often kill many of the overstory trees which historically survived mixed-severity wildfires. Past vegetation management practices that targeted these old, large trees removed the relic seral species and further altered tree size and composition; this in turn has promoted the development of climax species and conditions. This has also influenced the persistence of root disease in now Douglas-fir dominated stands as the seral species, such as western larch and ponderosa pine, are more resistant to these diseases. Planting of non-native ponderosa pine before breeding zones were understood has resulted in unhealthy stands that are not adapted to the local growing conditions. In addition, the close proximity to Troy, MT influenced the removal of valuable western larch, western white pine, and ponderosa pine trees and snags in the lower elevation sites that supported local development and supplies (e.g., firewood). In general, the resultant stand patch sizes and occurrence, species composition, stand structure, and fire frequency and severity are departing from desired vegetative conditions based on historic range of variability within the project area. See the Fuels Management and Forest Vegetation sections for more detail.

In association with escape terrain, bighorn sheep utilize non-forested or open timbered habitat types for foraging. Without periodic low to mixed severity fires in these areas, tree encroachment into openings and forest succession results in a reduction of available forage species and reduced visibility to identify potential predators. No active management would occur within the Kootenai Falls herd range for Alternative 1 (No Action). Therefore, there would be no direct effects to foraging habitat from the proposed federal actions. Also, there would be no direct effect to the existing conditions for sheep utilizing winter range, lambing habitat, or potential risk to contract harmful diseases. However, with continued fire suppression and lack of active management, the indirect effects of this alternative would include a continued trend towards uncharacteristic vegetative conditions (see the Fuels Management and Forest Vegetation sections) and deterioration of foraging habitat within the project area into the future. The continued deterioration of forage habitat reduces the suitability of winter range and lambing habitat for bighorn sheep.

Alternatives 2, 3, and 4 – Direct and Indirect Effects

As described above, one of the problems associated with habitat management for bighorn sheep in northwest Montana is the reduction of open habitat conditions that provides forage opportunities and/or escape terrain. Management activities that maintain or improve upon existing range use, including availability and quality of forage habitat and escape terrain, would benefit bighorn sheep.

Project Design Features and Mitigation Measures

There are no design features or mitigation measures for bighorn sheep at this time.

Increased Foraging Opportunities

A primary issue affecting bighorn sheep habitat has been identified as the deterioration which has occurred, in part, due to forest succession. Currently, the percentage of forested habitat within the OLY project area in an early seral condition (e.g., consisting of trees in the seedling/sapling size class) is at the low end of the desired range. Within 5 years, 8 percent of these acres would move into the small size class with a corresponding shift in the percentage of the seedling/sapling stands to fall below the desired condition. A purpose and need of this project is to trend the vegetation towards desired conditions which includes approximately 16 to 31 percent of the habitat in an early seral condition. Implementation of the proposed actions would result in an increased distribution of seedling/sapling habitats within the OLY project area to approximately 22 to 23 percent which falls within the desired range. See the Forest Vegetation section for more details.

Proposed vegetation management would occur within a concentrated area of the Kootenai Falls bighorn sheep herd range located off of open NFSR 4445. Alternatives 2 and 3 propose a total of approximately 341 acres of harvest, with the majority (approximately 321 acres) to occur as regeneration harvest. See Table 159 below. Regeneration harvest of these units would remove most of the existing trees and result in an early seral, open habitat condition that would promote the development and growth of grass and forb species that would provide increased foraging opportunities for bighorn sheep. This is consistent with trending towards the desired conditions for vegetation as described above that would provide a mosaic of forage and cover for native ungulates, including bighorn sheep, and be consistent with wildlife desired conditions FW-DC-WL-16. Also, this is a benefit to a species that is adapted to open forest and early seral habitats (FW-DC-WL-19).

The availability of these forage acres is likely affected by their location on the landscape and association with existing foraging habitat and escape terrain. For example, Harvest Units 4, 73, and 74 would likely experience more bighorn use due to their adjacency to existing open habitats and escape terrain where bighorn sheep are often observed. Harvest Units 68, 69, 70, and 71 are farther removed from the high quality escape terrain and use by bighorn may be more limited to only a few individuals on an irregular basis. However, harvest of these units would occur in close proximity to smaller areas of existing open habitats and would add to the mosaic of habitat conditions. This would increase the amount of forage habitat within the sheep range as well as provide increased visibility, allowing for greater potential for sheep movement and connectivity within this range. This is consistent with FW-DC-WL-17 which states that forest management contributes to wildlife movement within and between national forest parcels.

Three of the proposed regeneration harvest units are greater than 40 acres in size. Bighorn sheep are adapted to open environments and larger units would be beneficial for a couple of reasons. First, larger units increase the amount of forage habitat available within a treated area where succession and lack of management has contributed to the deterioration of sheep habitat. Second, in areas that do not contain or are not closely associated with classic escape terrain, larger openings would encourage use by bighorn sheep by allowing for greater visibility to watch for predators. This also contributes to FW-DC-WL-16 and FW-DC-WL-19.

Harvest treatments proposed for Alternative 4 are the same as for Alternatives 2 and 3, except unit size has been reduced to keep openings created through regeneration harvest to 40 acres or less in size. This reduces total treatments by about 65 acres for a total of approximately 276 acres (see Table 159). Of this, approximately 257 acres would occur as regeneration harvest. The smaller unit size decreases the availability of forage within a treatment area and would not provide the larger expanse of open terrain that would provide visibility to spot predators.

All action alternatives propose to implement prescribed fire within the open habitat found on the south-facing slopes of Kootenai Mountain (see Table 159). This would occur in Fuels Unit F19 which is bounded along the southern edge by NFSR 4445 and adjacent escape terrain found below the road where bighorn sheep rams are often observed during the summer months. Fuels Unit F19 would treat approximately 339 acres of sparsely timbered Douglas-fir stands with heavy shrub development in the understory. The prescribed fire would maintain the open timbered conditions, reduce the existing shrub cover, and rejuvenate the understory grass and forbs. This would enhance the existing forage opportunities for sheep that already utilize the area. Also, because of the unit's size and location, it would help to maintain connectivity with other areas of open habitat for sheep movement and use within their range. As for harvest, the prescribed burning would be consistent with desired conditions FW-DC-WL-16, FW-DC-WL-17, and FW-DC-WL-19.

Table 159. Resource Indicators and Measures for the Action Alternatives

Resource Element	Resource Indicator	Measure	Alt 2	Alt 3	Alt 4
Increased Foraging Opportunities	Changes to early successional habitat or the maintenance of open forest conditions resulting from timber harvest and fuels treatments	Acres treated	680 acres	680 acres	616 acres
Infrastructure Development	Proposed construction or other land conversion within sheep range	Acres lost to development; potential impacts to movement?	0 acres, no impacts to movement	0 acres, no impacts to movement	0 acres, no impacts to movement
Winter Range and Lambing Habitat	Activities occurring on winter range or lambing habitat during their period of use	Potential for disturbance and displacement of sheep during these periods?	No	No	No
Domestic Sheep or Goats	Presence of domestic sheep or goats within the herd range	Changes to the potential for interaction with domestic sheep or goats?	No	No	No

Infrastructure Development

The OLY project does not propose the development of infrastructure or improvement of existing infrastructure within the bighorn sheep range. Therefore, there would be no direct or indirect effects from this type of activity to bighorn sheep habitat or use of the area by bighorn sheep.

Winter Range and Lambing Habitat

In addition to the alteration and/or loss of habitat that would be discussed above in the sections "Increased Foraging Opportunities" and "Infrastructure Development," disturbance associated with human activities occurring on winter range and lambing habitat during their period of use could displace resident sheep from suitable habitat. Forced use of less suitable or unsuitable habitats could result in reduced winter body condition of individual sheep or impact reproductive success of the herd for the year.

Winter range and lambing habitat is generally found in the lower elevations of the sheep range, closer to the Kootenai River and associated with escape terrain. None of the proposed harvest or prescribed fire units would occur within lambing habitat; therefore, there would be no effects to ewes or lambs during this important period of use. This is consistent with FW-GDL-WL-11 which describes minimizing or avoiding disturbance to native ungulates during the birthing/parturition period. Similarly, no activities are proposed within winter range. It is possible that during a mild winter, sheep may utilize a larger area of their range including habitats within

proximity of the proposed treatment units. However, none of the proposed harvest units would occur during the winter months and there would be no potential for disturbance to sheep on winter range or during the winter period (FW-GDL-WL-08 and FW-GDL-WL-09). This is also consistent with GA-DC-WL-LIB-03, which describes a desired condition to maintain low levels of disturbance for bighorn sheep in the Kootenai Falls area.

Implementation of prescribed burn Fuels Unit F19 would likely occur during the early spring months to achieve the desired prescription and vegetative response. Rams would be more likely to follow the spring green-up of vegetation (Chilton-Radandt 2015b) and, therefore, could be found within vicinity of the burn area during the time of implementation. The fire would likely be ignited through the use of a helicopter and require a single day of use. Pre-ignition flights around the unit boundary would be expected to move any rams out of the area or into rocky escape terrain where they would be protected from the fire. The rams would be expected to move back into the burn area quickly following the completion of the burning activities. The potential for disturbance would be minor, as the disturbing activities would be short-term and affect only a small group of individuals.

Domestic Sheep or Goats

The OLY project area does not provide range allotments for domestic sheep or goats and there are no proposals to provide range for these species. Similarly, goats have not been used or are planned to be used in the project area to reduce or control populations of noxious weeds. Therefore, there would be no direct or indirect effects related to the increased potential for the interaction of bighorn sheep and domestic sheep or goats or risk of diseases being introduced into the Kootenai Falls herd as a part of the OLY project.

Cumulative Effects

Introduction

The “Existing Condition” section describes the location and types of habitats found within the Kootenai Falls bighorn sheep range. This includes foraging and escape habitat that contributes to habitat requirement for different seasons and periods of use. This cumulative effects section summarizes the past actions as well as further describes ongoing and other reasonably foreseeable contributions potentially impacting bighorn sheep habitat.

Spatial and Temporal Context for Cumulative Effects Analysis

The cumulative effects analysis area would be the Kootenai Falls herd range which is the same as that described for the indirect analysis under the section “Data Sources, Methods, Assumptions, Bounds of Analysis.” Although only a portion of the Kootenai Falls herd range is located within the project area, this range provides for year round bighorn sheep use and effects to sheep or their habitat in one part of their range may influence habitat suitability and sheep use throughout their range. Therefore, the herd’s range was chosen as the appropriate scale for cumulative effects analysis.

Similarly, temporal boundaries for the cumulative effects analysis would be the same as for the direct and indirect effects. Short-term effects are those that are expected to last between a few days to a season, such as potential disturbance to sheep using area proposed for vegetation management treatments. Long-term effects are those that expected to last longer than a season or two, such as increased foraging opportunities in open habitats especially those that are maintained through continued vegetation management.

Past, Present, and Reasonably Foreseeable Activities Relevant to Cumulative Effects Analysis

Past Actions

A major problem associated with bighorn sheep management in Northwest Montana is the reduction of open habitat conditions that provide foraging and escape terrain. Harvest has occurred in the project area since the 1930s and included regeneration harvest which would have contributed to the creation of early seral conditions and foraging habitat and benefitted bighorn sheep. However, the local habitat types are prone to quickly regenerate with trees and become heavily timbered again without continued maintenance such as thinning and/or underburning. Harvest associated road construction and other infrastructure development has contributed to reduced security within important sheep ranges. Detailed description of previous vegetation management activities are found at the beginning of Chapter 3, including Table 32 and Table 33, as well as Appendix F of this document. In unharvested areas, natural disturbances such as wildfire would have contributed to a mosaic of habitats and forage conditions. In contrast, fire suppression since the early 1900s has contributed to the alteration of stand structure and composition resulting in reduced bighorn sheep forage on some sites.

Activities affecting bighorn sheep habitat have changed in recent years. Open road densities have dramatically dropped in the past several years as a result of restricting/reclaiming roads through decisions intended to facilitate grizzly bear recovery. This has reduced human access into the Kootenai Falls herd range and improved security for sheep as well. Effective fire suppression has contributed to the reduction of foraging habitat for bighorn sheep; however, 2015 Forest Plan direction encourages the use of wildland fire to help trend the vegetation towards desired conditions (FW-DC-FIRE-03) which would benefit bighorn sheep in the drier habitats types that would have experienced more frequent, lower severity fires historically. Cumulatively, there is a mosaic of habitat conditions with the sheep range that has and will continue to change in its suitability for bighorn sheep use with a relatively consistent area of use associated with the steep, rocky slopes above the Kootenai River.

Alternatives 2, 3, and 4 – On-going and Reasonably Foreseeable Actions

Reasonably foreseeable actions include those federal, state, or private activities that are ongoing or scheduled to occur, independent of this federal action. Table 34 located at the beginning of Chapter 3, identifies those current and foreseeable actions in the project area that were determined to be appropriate for inclusion in the analysis of environmental effects.

Few ongoing and reasonably foreseeable actions are located within the Kootenai Falls bighorn sheep range. This is partly due to limited motorized access within the range, but also the steep and rugged topography of much of the range and management areas (i.e., MA5a and IRAs) that limit the type of management/activities that are available to pursue within the range.

A district wide thinning project of previously harvested units (Timber Stand Improvement 2010-2015) would occur within the sheep range near OLY's proposed harvest units. Treatments would consist of approximately 17 acres of thinning and the proposed treatments are limited to daylighting around western white pine due to their location within the China LAU. These units provided potential foraging habitat following harvest, but are or are becoming areas of increased cover with reduced foraging opportunities. Existing and future use of these stands as foraging areas depends on the density of trees. Given that these stands have been identified for thinning, they are likely dense enough with young trees that visibility is limited which means reduced

security against predators and, therefore, limited use by bighorn sheep. Daylighting of the pine in these stands would maintain some foraging opportunities, but likely would not result in open enough conditions to be readily used by bighorn sheep. However, the adjacency of most of these stands to more open habitats may allow for continued use of the foraging opportunities at least on the shared edge of the stands. Planned units would be accessed via open roads and foot travel. Work would be completed by hand through the use of chainsaws within a short activity period. The effects to bighorn sheep may include short-term disturbance and avoidance of the immediate area during activity, but they would be expected to be able to use stands during inactive periods such as evenings and weekends as well as following completion of the thinning work. Cumulatively, potential effects related to disturbance would be minor and thinning would maintain some foraging opportunities for sheep although likely limited in use.

Regulatory Framework Findings

2015 Forest Plan

The 2015 Forest Plan provides desired conditions, objectives, standards, and guidelines for bighorn sheep within the Wildlife Resource. The following are applicable to the actions in this project[21]:

Forestwide Direction

- p. 28, **GOAL-WL-02**: The KNF manages and schedules activities to avoid or minimize disturbance to sensitive species and manages habitat to promote their perpetuation into the future.

  Proposed harvest and fuels treatments would result in the retention of remnant large tree species, better approximation of stand patch size and species composition, protection of riparian habitats, improved stand health, and general movement towards the desired vegetative condition based on historic range of variation within the stands for this area. This would promote the creation of early seral habitats and open forest conditions that would provide increased foraging opportunities for bighorn sheep within their range of use. Proposed units would not occur within winter range or lambing habitat; therefore, timing restrictions were not identified to minimize or avoid potential disturbance during these sensitive periods. See “Increased Foraging Opportunities” and “Winter Range and Lambing Habitat.” Therefore, the OLY project would contribute to progress toward this forestwide goal.

- p. 28, **FW-DC-WL-01**: Nests and den sites and other birthing and rearing areas for terrestrial threatened, endangered, proposed, or sensitive species are relatively free of human disturbance during the period they are active at these sites.

  No activities are proposed within lambing habitat that is located in the lower elevation sites of the range near the Kootenai River. No human disturbance would occur within this habitat as a part of the OLY project. See “Winter Range and Lambing Habitat.”

[21] Goals, desired conditions, objectives, standards, and guidelines can be found on the noted pages in the 2015 Forest Plan.

Therefore, the OLY project would be neutral with regard to progress toward FW-DC-WL-01.

- p. 29, **FW-DC-WL-16**: Habitat for native ungulates (elk, deer, moose, bighorn sheep, and mountain goat) is managed in coordination with state agencies. Cover and forage are managed according for FW-DC-EG-01, FW-DC-VEG-02, FW-DC-VEG-04, FW-DC-VEG-05, and FW-DC-VEG-11).

  Planning of proposed actions as well as discussions of potential concerns and habitat use were coordinated with MFWP's wildlife biologist for the Libby area. See "Other Agencies and Individuals Consulted," below, as well as the project file. Proposed treatments were identified and designed to trend vegetation towards the desired conditions for the project area. This would increase the early seral and open habitat conditions that would result in a mosaic of forage habitats, in association with existing open habitats, which would benefit bighorn sheep within this range. See "Increased Forage Opportunities" and the Forest Vegetation analysis. Therefore, the OLY project would contribute to progress toward this forestwide desired condition.

- p. 29, **FW-DC-WL-17**. Forest management contributes to wildlife movement within and between national forest parcels.

  Through the creation of early seral, open habitat conditions, bighorn sheep movement would be facilitated within the herd range on NFS lands. See "Improved Forage Opportunities." Therefore, the OLY project would contribute to progress toward this forestwide desired condition.

- p. 30, **FW-DC-WL-19**: By trending towards the desired conditions for vegetation, habitat is provided for native fauna adapted to open forests and early seral habitats, or whose life/natural history and ecology are partially provided by those habitats.

  Bighorn sheep require open habitats that provide visibility to view for predators while foraging. Proposed regeneration harvest would trend stands towards desired vegetative conditions and would result in the creation of early seral habitat on approximately 257 to 321 acres within the Kootenai Falls bighorn range. In addition, prescribed fire would be used to return fire's role to the landscape on approximately 339 acres in Fuels Unit F19. The introduction of fire would maintain the open timbered conditions, reduce the existing shrub cover, and rejuvenate the understory grass and forbs. The proposed treatments would improve bighorn sheep habitat within the western portion of the herd's range. Therefore, the OLY project would contribute to progress toward FW-DC-WL-19.

- p. 30, **FW-OBJ-WL-01**: The outcome is the maintenance or restoration of wildlife habitat on 1,000 to 5,000 acres of NFS lands, annually, with an emphasis on restoration of habitats for threatened and endangered listed species and sensitive species.

  Implementation of proposed harvest and fuels treatments that result in movement towards the desired vegetative condition based on historic range of variation would contribute to the maintenance or restoration of habitat for bighorn sheep. Depending on the action alternative, timber harvest would occur on approximately 276 to 341 acres with additional fuels treatments occurring on 339 acres within the analysis area. See GOAL-

WL-02 above and FW-DC-WL-19 above, as well as the "Direct and Indirect Effects" discussion. Therefore, the OLY project would contribute to achieving this forestwide objective.

- p. 31, **FW-GDL-WL-08**. Big Game: Management activities should avoid or minimize disturbance to native ungulates on winter range between December 1 and April 30, with the exception of routes identified on MVUM as open to motor vehicle use. Management activities that occur on winter range during the winter period should concentrate activities to reduce impacts to native ungulates.

  Proposed activities would not occur within winter range and would have no effect to bighorn sheep on winter range. See "Winter Range and Lambing Habitat." Therefore, this project is designed in accordance with this guideline.

- p. 31, **FW-GDL-WL-09**. Big Game: Management activities should be avoided on native ungulate winter range areas during the critical mid-winter period (January and February) when now depth most likely influence movement and availability of forage.

  Proposed activities would not occur within winter range and would have no effect to bighorn sheep on winter range. See **FW-GDL-WL-08** above and "Winter Range and Lambing Habitat." Therefore, this project is designed in accordance with this guideline.

- p. 31, **FW-GDL-WL-11**. Big Game: Management activities should avoid or minimize disturbance to native ungulates during the birthing/parturition period.

  Proposed activities would not occur within lambing habitat and would have no effect to bighorn sheep during this period of use. See "Winter Range and Lambing Habitat." Therefore, this project is designed in accordance with FW-GDL-WL-11.

Geographic Area Direction

- GA-DC-WL-03: Habitat conditions with low levels of disturbance are provided for big game on key summer ranges . . . for bighorn sheep in the Kootenai Falls area.

  Proposed activities would not occur in the vicinity of Kootenai Falls and would not result in disturbance to sheep using this area. See "Winter Range and Lambing Habitat." Therefore, the OLY project would be neutral with regard to progress towards this desired condition.

Federal Law

National Forest Management Act (NFMA)

The project would comply with NFMA direction to provide for diverse populations of plant and animal communities through compliance with the 2015 Forest Plan.

Other Guidance or Recommendations

The Montana Sheep Conservation Strategy (MFWP 2010) provides management plans for each of the bighorn sheep herds within Montana. These plans provide "a comprehensive history of the population, habitat and population objectives, and strategies for meeting the objectives." The

Management Challenges section describes some of the main concerns and need regarding habitat management for the herd that can be used to plan projects to benefit the bighorn population.

Statement of Findings

Alternative 1 (No Action) **may impact individuals or their habitat, but will not likely contribute to a trend toward federal listing or cause a loss of viability to the population or species** for bighorn sheep. The No Action Alternative would not impact sheep on winter range or lambing habitats and would maintain the existing condition of foraging habitat. However, the current trend is that stand characteristics and function are departing from historic conditions. This includes the reduction of early seral and open habitat conditions due to tree encroachment and forest succession. Lack of management and treatment in these stands would further continue this trend which would reduce foraging opportunities for bighorn sheep within the project area. This also would not contribute towards State objectives to improve the availability of forage habitat for sheep within timber dominated Northwest Montana.

Alternatives 2, 3, and 4 **may impact individuals or their habitat, but will not likely contribute to a trend toward federal listing or cause a loss of viability to the population or species** for bighorn sheep. This determination is based on: 1) the proposed vegetation management treatments are designed to trend the existing condition towards desired conditions for the area, 2) this would increase the availability and productivity of forage species for bighorn sheep use, 3) and would improve connectivity to other open habitats within the sheep range, 4) there is limited potential for disturbance of sheep during implementation, 5) also, there would be no activities or potential for disturbance to sheep on winter range or lambing habitats, 6) no increased potential for interaction with domestic sheep or goats that could introduce harmful diseases into the bighorn sheep herd, and 7) proposed activities would contribute towards meeting State identified objectives for this herd.

Other Agencies and Individuals Consulted

Tonya Chilton-Radandt, MFWP Wildlife Biologist

Communications consisted of the type of proposed actions occurring within the Kootenai Falls bighorn sheep range, suggestions for additional treatments, potential for disturbance, concerns regarding the level of past management in the area, timing and location of lambing within the range, and any needs for timing restrictions for the proposed activities.

Black-backed Woodpecker

Introduction

The black-backed woodpecker inhabits boreal and montane forests and specializes in the use of early post-fire habitats. These burned forest conditions provides high quality habitat for the woodpecker's primary food source, woodborer beetles and their larvae, which increase following large-scale tree mortality. Therefore, burned forests also provide high quality foraging habitat for black-backed woodpeckers and they are most abundant where wildfires have recently occurred. Extensive areas of other natural disturbance processes, such as blowdown, disease, and/or insect outbreaks can also provide for increased levels of the woodpeckers. Otherwise, black-backed woodpecker occurrence is widespread at endemic population levels in low-quality, general forest habitat where the beetles can be found in small patches of disturbance or old growth stands. Bonn et al. (2007) provides a literature review which summarizes black-backed woodpecker ecology and habitat use.

Because black-backed woodpeckers demonstrate a high preference for early post-fire forests, proposed vegetation management that results in a reduction of early post-fire conditions is the main focus of the black-backed woodpecker analysis. The analysis will also include a brief discussion of the type of activities occurring within general forest habitat.

Summary of Conclusions

Implementation of the OLY project's proposed action alternatives result in a determination of **may impact individuals or their habitat, but will not likely contribute to a trend toward federal listing or cause a loss of viability to the population or species** for the black-backed woodpecker. High quality habitat is practically non-existent within the project area due to lack of recent wildfire and the black-backed woodpecker population would be maintained at endemic levels through the availability of general forest habitat.

Regulatory Framework

2015 Forest Plan

The 2015 Forest Plan provides overall guidance for the management of the lands on the KNF. It describes the goals, desired conditions, and objectives toward which the management of the land should be directed. And it establishes standards and guidelines to help achieve or maintain the desired condition or conditions, to avoid or mitigate undesirable effects, or to meet applicable legal requirements.

The plan components which provide specific black-backed woodpecker resource direction relevant to this project include:

- FW-DC-WL-14
- FW-GDL-WL-05

There are other 2015 Forest Plan components that provide resource direction for a range of wildlife species or habitat conditions that are not specific to black-backed woodpeckers, but still are applicable to the management of their habitat. The full list of the plan components applicable to black-backed woodpecker habitat management are found in the "Regulatory Framework Findings" section of this analysis.

Resource Indicators and Measures

High quality black-backed woodpecker habitat is defined as recent (less than or equal to 8 years old) mixed-lethal or stand-replacement fire areas where an abundance of snags are available. Fire-created black-backed woodpecker habitat provides the best conditions for 2-3 years following the fire then begins to decline as tree moisture content decreases and wood borer larvae decline (Bonn et al. 2007). Fire-killed trees generally do not provide insect food sources beyond 5-7 years (Caton 1996, Murphy and Lehnhausen 1998); however, secondary mortality from fire and insect attacks often extend the availability of quality habitat. Hoyt and Hannon (2002) documented black-backed woodpecker use of fire areas up to 8 years after a fire occurred. Low quality, general forest habitat provides pockets of tree mortality where woodborer beetles can be found such as within old growth stands.

Because of the black-backed woodpecker strong association with recently burned forest habitat, the resource indicator for this analysis will be the acres of vegetation management that reduce the availability of early burned forest conditions (see Table 160). In addition to the acres removed, the analysis would also consider whether the planned activities would retain a mosaic of burned forest and treated acres resulting in a diversity of habitat conditions within the burn area that represents both the pre- and post-fire conditions. The overall assessment discusses the type of activities occurring within general forest habitat and how it affects the structural components used by black-backed woodpeckers.

Table 160. Resource Indicators and Measures for Assessing Effects

Resource Element	Resource Indicator	Measure	Used to Address: P/N*, or Key Issue?	Source
Burned Forest Habitat	Reduction of early post-fire, burned forest habitat	Acres removed	No	KNF Forest Plan FW-DC-WL-14 and FW-GDL-WL-05

*P/N = Purpose and Need

Methodology

Black-backed woodpecker habitat was identified using GIS layers on past fire events, forest type, stand age/size, and Forest fire history summaries (NRCC 2007-2015, see project file). High-quality habitat was determined for the first 8 years post-fire. General forest habitat maintains low population numbers during non-fire years and consists of a variety of forest types that provide snags for nesting and foraging and/or areas of large down woody debris for foraging. General forest habitat includes pole sized stands or larger, including old growth, consisting of tree species noted for nesting and foraging use (i.e., aspen, Douglas-fir, ponderosa pine, lodgepole pine, western larch, and grand fir (Bonn et al. 2007, ERG 2012). Also, discussion of effects to general forest habitat relies on the other habitat analyses in this document (i.e., Forest Vegetation and Old Growth).

The ability of an analysis area to support breeding black-backed woodpeckers depends on the quality of habitat available. For example, territories found within high quality habitat could be as small as about 175 acres whereas territories found within low quality habitat could be as large as about 800 acres (Bonn et al. 2007, Cherry 1997). These values were used to determine an appropriate boundary for the cumulative effects analysis and the expected level of occupancy of black-backed woodpeckers within an analysis area.

Data Sources

Detailed black-backed woodpecker population ecology, biology, habitat description, and relationships identified by research are described in Bonn et al. (2007), O'Connor and Hillis (2001), Powell (2000), Cherry (1997) and Hutto (1995). These provided guidance in evaluating potential habitat and potential effects to black-backed woodpeckers, and are incorporated by reference.

Black-backed woodpecker occurrence data comes from recent District wildlife observation records, surveys, Forest historical data (NRIS Wildlife Database) and other agencies (MFWP, MNHP).

Assumptions and Limitations

There are no assumptions or limitations associated with this resource analysis.

Affected Environment

Spatial and Temporal Context for Effects Analysis

The analysis boundary for direct effects to individuals and their habitat is OLY's proposed activity areas and their association with either burned forest or general forest habitats. The potential for effects (e.g., habitat alteration, disturbance, and displacement) and level of effect to black-backed woodpeckers is largely dependent on the habitats in which activities occur. The boundary for indirect effects to individuals and their habitat is the project area. In addition, the indirect effects analysis considers the availability of post-fire habitat on the KNF as black-backed woodpeckers can move long distances in response to disturbances (Dixon and Saab 2000) to take advantage of new and increased food resources which would occur beyond the activity areas. Contribution toward viability is assessed at the KNF.

Temporal boundaries for the black-backed woodpecker analysis include both short-term and long-term effects. Short-term effects are those that are expected to last between a few days to a season or portion of two seasons. For black-backed woodpeckers, this is generally limited to disturbance causing activities like prescribed burns and harvest occurring within general forest habitat. Once completed, woodpeckers can move back into and use the area. Long-term effects are those that are expected to last longer than a season or two. The reduction of high quality habitat associated with regeneration harvest would negatively affect the availability of this important habitat for up to 8 years. However, this also contributes to a longer trend where the availability of high quality habitat resulting from wildfires has been affected through fire suppression activities. Once the benefits of early post-fire habitats have deteriorated or have been removed through salvage logging, these stands would not provide foraging and nesting opportunities as general forest habitat for the minimum of 40 years it has been estimated for a stand to develop trees of a suitable size.

Existing Condition

Introduction

Across the Forest Service Northern Region, the black-backed woodpecker is considered secure in terms of persistence (Samson 2006a, 2006b). The Northern Region Black-backed Woodpecker Overview (Bonn et al. 2007) shows region-wide populations are increasing and high-quality habitat is on the rise due to large wildfire activity since 2000. Forest-wide, wildfires over the last

8 years ranged from 11 to 4,723 acres per year and created a total of about 7,807 acres of high quality habitat (NRCC 2007-2014, see project file). As of October 2015, approximately 32,724 acres of wildfire burned across the KNF during the 2015 fire season. This is the largest fire year since 2000 that would benefit the black-backed woodpecker population. Small areas of insect, disease, other natural disturbances, and prescribed ecosystem burns would provide low quality habitat within the general forest habitat.

A KNF status summary of the black-backed woodpecker was documented by Johnson (2004). The summary shows that mapped suitable habitat occurs across all eight planning units. This is not surprising, as within the general forest habitat black-backed woodpeckers can use a variety of forest types and stand size/age. High quality habitat, however, is constantly in a state of change as the quality, amount, and location of burned forest habitat will change with time since disturbance and the occurrence and severity of new wildfire events.

ERG (2012) analyzed burned forest habitat currently available on the KNF as well as five decades into the future based on different management scenarios. Although black-backed woodpeckers will use areas of insect and disease, they are not tied to this habitat as they are to post-fire habitats. Therefore, ERG (2012) limited their efforts to analyze for post-fire habitat. Forest-wide, this habitat is relatively uncommon compared to existing acres available for other species, at the time it was mapped it estimated there were approximately 29,582 acres of high quality burned forest habitat (ibid). Initially, there is a decline in acres due primarily to wildfire suppression but also management activities under the 2015 Forest Plan that would reduce wildfire severity within the first 10 years of implementation. However, by decade three, an increase in the acres of burned forest habitat is expected that continues into the future despite management treatments due to fuels accumulations and insect outbreaks. The ERG (2012) report concludes that despite the initial decrease in available habitat due to management activities, natural processes and wildfire events would result in an increase in high severity fires and “substantial burned forest habitat” on the KNF.

Black-Backed Woodpecker Occurrence

Documented observations of black-backed woodpeckers within the project area are limited to a single observation in 1995. The observation was of a single adult along the Pulpit Mountain trail. Large wildfires occurred within the OLY project area in 1991, 1994, and 2000 that would have created injured and subsequently bug infested trees and snags for up to 8 years post-fire. It is assumed that black-backed woodpecker use of these burned areas increased following the fires. However, black-backed woodpeckers are not a readily recognized species and the higher elevation and remote locations of the burns may have limited human use of the burn areas during the post-fire period. Both of these reasons may have contributed to the lack of observations in the project area. No active black-backed woodpecker nest sites are known within the project area.

Description of the Analysis Area

Burned Forest Habitat

The last large fire occurring within the project area occurred in 2000. Over 8 years have passed since these fires created the high quality habitat sought by these woodpeckers. Habitat quality in these areas would now be very low for as the young, regenerating trees would not yet be susceptible to beetle attacks or large enough to provide nesting habitat. Also, because woodborer use of trees is dependent on moisture content, any remaining fire-killed snags and down woody debris would have dried out such that they no longer support woodborer development (Bonn et al.

2007 and Werner and Post 1985 cited within). Since 2000, only two small wildfires from 2008 and 2009 have occurred within the project area and together totaled approximately 52 acres (see Table 161). Due to the small size of the fires, they would not have provided much opportunity for black-backed woodpecker use above endemic levels. Also, due to the length of time since these disturbances, they likely have or are nearing the end of their lifetime for providing any high quality habitat to black-backed woodpeckers. As such, there are no large areas of high quality habitat due to lack of fires outbreaks in the last 8 years.

General Forest Habitat

In the project area, black-backed woodpecker habitat consists primarily of lower quality general forest habitat with small scattered patches of unhealthy trees and snags produced by insects, disease, and blowdown; no extensive outbreaks of insect and disease occurs within the project area. Also, old growth conditions provide habitat for endemic populations due to the presence of snags, large old dying trees (decadence), and large log component that could attract woodborer beetles. See the Forest Vegetation analysis for more details regarding the existing vegetative condition of the project area that is contributing to general forest habitat. This lower quality habitat maintains low populations of resident black-backed woodpeckers until events that create abundant snags occur. Approximately 23,833 acres of general forest habitat were identified on NFS lands in the project area.

Table 161. Resource Indicators and Measures for the Existing Condition

Resource Element	Resource Indicator	Measure	Existing Condition (Alternative 1)
Burned Forest Habitat	Reduction of early post-fire, burned forest habitat	Acres removed	52 acres available, none removed

Environmental Consequences

Alternative 1 – No Action

A range of fire severity, from non-lethal to stand replacing crown fires, historically played a role in developing the vegetative characteristics in the OLY project area. Although the type and frequency of fire experienced varies within a given area and vegetation type (based on biophysical setting), with some being more prone to infrequent stand replacing fire, the vegetation types within the project area have historically experienced low and/or mixed severity fires at least periodically. These natural disturbance regimes favor fire tolerant species, including older and larger diameter seral tree species such as western larch, western white pine, and ponderosa pine. The exclusion of low to moderate severity fires through fire suppression has altered the amount of shade-tolerant species in the understory of these forested stands as well as increased fuel loadings in the form of ladder fuels and downed woody materials. Fewer fires have also reduced the amount of natural openings, structural diversity, and the number/size of patches across the landscape. Fire suppression has not yet resulted in a departure from historic ranges for all stands within the project area (especially those with naturally longer fire return intervals), although they too are trending towards a departure. Due to the denser fuel conditions, resulting stand replacing fires in these stands often kill many of the overstory trees which historically survived mixed-severity wildfires. Past vegetation management practices that targeted these old, large trees removed the relic seral species and further altered tree size and composition; this in turn has promoted the development of climax species and conditions. This has also influenced the persistence of root disease in now Douglas-fir dominated stands as species such as western larch

and ponderosa pine are more resistant to these diseases. Planting of non-native ponderosa pine before breeding zones were understood has resulted in unhealthy stands that are not adapted to the local growing conditions. In addition, the close proximity to Troy, MT influenced the removal of valuable western larch, western white pine, and ponderosa pine trees and snags in the lower elevation sites that supported local development and supplies (e.g., firewood). In general, the resultant stand patch sizes and occurrence, species composition, stand structure, and fire frequency and severity are departing from desired vegetative conditions based on historic range of variability within the project area. See the Fuels Management and Forest Vegetation sections for more detail.

No direct effects from federal actions would occur. The No Action alternative would maintain the existing vegetative condition on the landscape and would maintain/allow the natural aging, insect, and disease processes to occur. In the short-term, general forest conditions for foraging opportunities would remain low quality and would continue to provide small scattered patches of unhealthy trees and snags produced by disturbances.

With continued fire suppression and lack of active management, the indirect effects of this alternative would include a continued trend towards uncharacteristic vegetative conditions and increased potential for severe fire behavior within the project area. If a high severity wildfire occurs, especially over a large expanse, potentially drastic changes in the availability and distribution of high quality and general forest habitat across the project area could occur. High quality black-backed woodpecker habitat would be created and local populations would experience immediate growth as woodborer beetles increased. The species would benefit in the short-term; however, this population boom would only last perhaps up to 8 years until beetle populations declined and general forest habitat would not be available within these burned areas for 40 years or more. Although large, high severity wildfire has occurred within this area in the past, mixed severity fires would have also played a role in creating a mosaic of high quality and general forest habitat. A mosaic of habitat conditions that continues to include general forest habitat would maintain a black-black woodpecker population at endemic levels within the project area while burned areas recovered.

Alternatives 2, 3, and 4 – Direct and Indirect Effects

Because black-backed woodpeckers are closely tied to burned forests, management activities like salvage harvest that reduce this habitat type would have the most impact to black-backed woodpecker occurrence and population levels. Vegetation management within general forest habitat may alter characteristics of the forested condition, but would not measurably change its ability to support endemic levels of black-backed woodpeckers.

Project Design Features and Mitigation Measures

Only one black-backed woodpecker observation has been documented within the project area. Also, due to the large size of a pair's home range with general forest habitat the potential to encounter a black-backed woodpecker at any given time would be low. Also, there are no known active nests within the project area. However, a general wildlife design feature has been identified that would ensure protection for active black-backed woodpecker nests discovered during planning or project implementation (see Design Features in Chapter 2). Therefore, this project would be consistent with FW-GDL-WL-21.

Burned Forest Habitat

Since 2000, only two small fires have occurred within the project area that resulted in a small amount of burned forest habitat. The approximately 52 acres of burned habitat resulting from these fires offered little high quality habitat to begin with and, due to the length of time, the quality of the habitat has also diminished. No harvest would occur within the burned habitats (see Table 162) for any alternative and the existing structure and quality for black-backed woodpecker use would be maintained and would be consistent with FW-GDL-WL-05, Wildfire Areas.

High severity fire is a natural disturbance process that has occurred historically within the project area. Certain wildlife species, such as the black-backed woodpecker discussed in this analysis, have developed a close association to the habitat conditions created from fire. Because of demonstrated benefits to ecosystem function and resilience and by providing high quality habitat to certain wildlife species, DellaSala and Hanson (2015) and Hutto (2008), for example, advocate the need to both acknowledge the role of moderate and high severity fire on the landscape as well as to allow for its continued occurrence on the landscape.

A purpose and need of this project is to reduce the potential for high severity fires in the WUI; however, the proposed activities are not intended nor expected to eliminate all fires from the project area, especially high severity fires. For example, although wildfire activity did not occur within the project area in 2015; an increase in fire activity occurred on the KNF as approximately 32,724 acres were burned this past year. This is 24,917 acres more than what was reported in the past 8 years combined. This includes the Tepee Fire which is within a couple of air miles from OLY's western boundary that burned approximately 1,018 acres. This increase in fire activity is consistent with those expected in Bonn et al. 2007 and ERG 2012 and would benefit black-backed woodpeckers across the KNF. Also, 2015 Forest Plan direction encourages the use of wildland fire to help trend the vegetation towards desired conditions (FW-DC-FIRE-03). Under the right seasonal conditions, those natural wildland fires allowed to burn within more remote areas of the OLY project area (e.g., backcountry MAs or IRAs) would create mosaics of burned and general forest conditions that would also benefit black-backed woodpeckers by creating high quality foraging habitat.

Table 162. Resource Indicators and Measures for Alternatives 2, 3 and 4

Resource Element	Measure	Alt 2	Alt 3	Alt 4	Comments
Burned Forest Habitat	Acres removed (% of total)	0	0	0	No activities would occur within the few acres of burned forest habitat found within the project area.

General Forest Habitat

The OLY project proposes both harvest and fuels treatments within general forest habitat which are designed to trend the local vegetation towards the desired vegetative condition based on historic range of variation for this area. For both treatment types, this includes the increased establishment and growth of early seral species like western larch and ponderosa pine that black-backed woodpeckers prefer for foraging and cavity habitat. Proposed harvest would occur on approximately 2,326 to 2,806 acres depending on alternative. In addition, implementation of prescribed fire, both as post-harvest underburns or non-harvest fuels treatments, would create some potential for use by black-backed woodpeckers. Approximately 1,500 to 1,873 acres of

underburning and 1,321 to 1,351 acres of prescribed fire would be implemented depending on the alternative. Table 163 displays the acres of harvest, post-harvest underburning, and prescribed fire occurring within general forest habitat for reference. Prescribed fire normally does not create extensive secondary mortality and would be limited to individual trees or small patches of trees and, therefore, would not provide the amount or longevity of high quality habitat for long-term use. However, the creation of a few new snags or the deterioration of existing snags would provide elements of burned forest habitat that would benefit associated bird species in an area where this habitat type is currently limited. This is consistent with FW-DC-WL-14 which is a desired condition to have a diversity of patch sizes of fire-killed trees to primary habitat for species whose habitat requirements include this structural component. Post-harvest underburning in harvested stands could create additional forage trees, although it is not expected to greatly increase the quality of the habitat within the project area.

In summary, proposed vegetation management treatments would not occur within or remove extensive areas of insect or disease outbreaks and would retain structural components like standing trees and snags, coarse woody debris, and old growth characteristics. See the Forest Vegetation and Old Growth sections for discussions on how these structural components would be retained within treated stands which would continue to support endemic populations of black-backed woodpeckers within the project area. Also, see the Migratory Bird analysis for a more detailed description of activities within general forest habitat. The effect to black-backed woodpeckers could be a reduction of individual nest trees or localized patches of disease infestation and potential disturbance to individuals or pairs during project implementation.

Table 163. Proposed Vegetation Management Occurring within General Forest Habitat

Treatment	Alternative 2 (acres)	Alternative 3 (acres)	Alternative 4 (acres)
Harvest	2,806	2,757	2,326
Post-Harvest Underburns	1,873	1,774	1,500
Prescribed Fire	1,351	1,347	1,321

Cumulative Effects

The Existing Condition section describes the potential black-backed woodpecker habitat within the project area, including both high quality burned forest habitat and low quality general forest habitat. This cumulative effects section summarizes the past actions as well as further describes ongoing and other reasonably foreseeable contributions potentially impacting black-backed woodpecker habitat.

Spatial and Temporal Context for Cumulative Effects Analysis

As described for indirect effects under the section “Spatial and Temporal Context for Effects Analysis,” the project area was chosen as the appropriate scale for black-backed woodpecker cumulative effects analysis due to the species specialized habitat and their mobility to locate and use burned forest habitat. Although this area is lacking high quality habitat, the amount of general forest habitat is capable of providing for many pairs of black-backed woodpeckers based on the largest documented home range of approximately 800 acres. The cumulative effects analysis considers the availability of post-fire habitat on the KNF as black-backed woodpeckers can move long distances in response to disturbances (Dixon and Saab 2000), especially wildfire, which

provide their primary food source. Boundaries of insect, disease, wildfire, and other disturbance areas are likely to occur beyond the project area boundary. Activities which reduce these disturbed areas would influence the availability of quality habitat as well as black-backed woodpecker movement across the landscape. There are no apparent conditions adjacent to the project area that would cumulatively contribute negative effects to black-backed woodpecker habitat or use within the project area.

Temporal boundaries for the black-backed woodpecker analysis include both short-term and long-term effects as were described for the direct and indirect effects analysis. Short-term effects are those that are expected to last between a few days to a season or portion of two seasons and are generally limited to potential disturbance. Long-term effects can last for a minimum of 40 years. Initially, salvage logging or other reduction of areas which have experienced fire disturbance would reduce the high quality habitat that would have been available for about 8 years. With regeneration, it is estimated that it could take a minimum of 40 years for the stand to produce trees of a size to support black-backed woodpecker nesting.

Past, Present, and Reasonably Foreseeable Activities Relevant to Cumulative Effects Analysis

Past Actions

Timber harvest has occurred in the project area since the 1930s and, up until the early 1990s, included salvage logging of burned areas that would have eliminated most if not all high quality habitat for black-backed woodpeckers. Also, high grading of large old trees and snags of early seral species preferred by black-backed woodpeckers would have reduced the ability of general forest habitat to support this species. Successful fire suppression since the early 1900s has contributed to the reduction of wildfire and fire severity within the project area and reduced the potential for high quality habitat. Detailed descriptions of previous vegetation management activities are found at the beginning of Chapter 3, including Table 32 and Table 33, as well as Appendix F of this document. Also, since the mid-1990s there has been more reliance on restoration focused treatments that result in the maintenance of desired tree species composition and stand structure (e.g., large, old trees and snags) and now desired conditions and guidelines to maintained burned forest habitat for associated species.

Alternatives 2, 3, and 4 – On-going and Reasonably Foreseeable Actions

Reasonably foreseeable actions include those federal, state, or private activities that are ongoing or scheduled to occur, independent of this federal action. Table 34 located at the beginning of Chapter 3, identifies those current and foreseeable actions in the project area that were determined to be appropriate for inclusion in the analysis of environmental effects.

Ongoing federal actions have been considered and included when formulating the existing condition of this project area. Potential cumulative effects are limited to impacts to general forest habitat. With respect to black-backed woodpeckers and general habitat use, most on-going federal activities within the project area are limited to maintenance activities such as the removal of hazard trees or snags in campgrounds or along roads and trails. Similarly, other vegetation management activities are small in scope and limited to the removal of small diameter trees (e.g., a post and pole sale and pre-commercial thinning). These small diameter trees are generally not expected to provide nesting or foraging habitat. Therefore, the removal of single trees or small areas of small diameter trees associated with these activities would not measurably change the existing habitat condition for black-backed woodpecker use. Potential effects would be negligible

within the project area. Similarly, public firewood cutting would remove snags and would reduce nesting and foraging habitat availability along open roads. The decrease in habitat would be limited to areas within about 150-200 feet of open roads. Effects would include removing site-specific, individual trees, and would not be expected to adversely affect black-backed woodpecker use of the project area.

Continued development of private land is anticipated within the project area. However, private property makes up a small portion of the project area (approximately 13,825 acres or 20 percent) and development has not and is not expected to occur within high quality burned forest habitat. Depending on the type of development, it would reduce general forest habitat or structural components within general forest habitat by varying levels. Also, these lands were not included in the identification of the general forest for the project area. Cumulatively, expected effects would be negligible as private property makes up a small portion of the area, growth is slow, has not impacted high quality habitat, and NFS lands would remain forested and provide ample forage and nesting habitat for endemic populations.

The existing condition provides abundant general forest habitat for black-backed woodpeckers with the lower and mid-elevation areas within the project area in the absence of high quality habitat. Proposed vegetation management activities would not reduce the availability of burned forest habitat and have negligible impacts to general forest habitat. Based on the nature and magnitude of potential cumulative effects to black-backed woodpeckers independent of this project, there are no cumulative effects anticipated that would change the effects determination to the woodpeckers from implementation of the action alternatives.

Regulatory Framework Findings

2015 Forest Plan

The 2015 Forest Plan provides desired conditions, objectives, standards, and guidelines for migratory birds within the Wildlife Resource. The following are applicable to the actions in this project[22]:

Forestwide Direction

- p. 28, **GOAL-WL-02**: The KNF manages and schedule activities to avoid or minimize disturbance to sensitive species and manages habitat to promote their perpetuation into the future.

  Proposed harvest and fuels treatments would result in the retention of remnant large tree species, better approximation of stand patch size and species composition, protection of riparian habitats, improved stand health, and general movement towards the desired vegetative condition based on historic range of variation with the stands for this area. No activities would occur within burned forest habitat and activities within general forest habitat would promote the development of early seral tree species preferred by black-backed woodpeckers in the long-term (see “Burned Forest Habitat” and “General Forest Habitat” sections). Only one black-backed woodpecker observation has been documented within the project area. Also, due to the large size of a pair’s home range with general forest habitat the potential to encounter a black-backed woodpecker at any given time

[22] Goals, desired conditions, objectives, standards, and guidelines can be found on the noted pages in the 2015 Forest Plan.

would be low. Also, there are no known active nests within the project area. Therefore, no timing or area restrictions specific to black-backed woodpeckers have been identified at this time. However, a general wildlife design feature has been identified that would ensure protection for active black-backed woodpecker nests discovered during planning or project implementation. See "Project Design Features." Therefore, the OLY project would contribute to progress toward achieving GOAL-WL-02.

- p. 28, **FW-DC-WL-01**: Nests and den sites and other birthing and rearing areas for terrestrial threatened, endangered, proposed, or sensitive species are relatively free of human disturbance during the period they are active at these sites

  No active black-backed woodpecker nest sites are known within the project area; however, a general wildlife design feature has been identified that would ensure protection for active black-backed woodpecker nests discovered during planning or project implementation. See "Black-Backed Woodpecker Occurrence" and "Project Design Features." Therefore, the OLY project would be neutral with regard to progress toward achieving FW-DC-WL-01.

- p. 29, **FW-DC-WL-14**: A diversity of patch size of fire-killed trees (either natural or prescribed burned and where not a safety concern) exists to provide primary habitat for population expansions for species whose habitat requirements include this structural component.

  Few acres of burned forest habitat are found within the project area and these acres would not be impacted by proposed activities. Prescribed fire and post-harvest underburning would contribute individual or small groups of burned trees for black-backed woodpecker use. See "Burned Forest Habitat" and "General Forest Habitat." Therefore, the OLY project would contribute to progress toward achieving FW-DC-WL-14.

- p. 31, **FW-GDL-WL-05, Wildfire Areas**: Maintain unlogged conditions in some portion of areas burned by wildfires for 5 years post-fire. A well distributed diversity of patch sized and burned conditions, based on fire characteristics and pre-fire forest conditions, should be left to provide habitat for species whose habitat requirements include recently burned forest (black-back woodpecker, etc.).

  Few acres of burned forest habitat are found within the project area and these acres would not be impacted by proposed activities. See "Burned Forest Habitat." Therefore, the OLY project would contribute to progress toward achieving FW-GDL-WL-05.

- p. 32, **FW-GDL-WL-21**: Management activities on NFS lands should avoid/minimize disturbance at known active nesting or denning site for other sensitive, threatened or endangered species not cover under other forestwide guidelines.

  There are no known active nests within the project area. Therefore, no timing or area restrictions specific to black-backed woodpeckers have been identified at this time. However, a general wildlife design feature has been identified that would ensure protection for active black-backed woodpecker nests discovered during planning or project implementation. See "Black-Backed Woodpecker Occurrence" and "Project Design Features." Therefore, the OLY project was designed in accordance with this guideline.

Federal Law

National Forest Management Act

The project would comply with NFMA direction to provide for diverse populations of plant and animal communities through compliance with the 2015 Forest Plan.

Migratory Bird Treaty Act of 1918 (16 U.S.C. 703-712), as Amended

Implemented to protect migratory birds and includes treaties between the U.S. and Great Britain (for Canada), Mexico, Japan, and the Soviet Union (now Russia). Without being permitted it is illegal to "pursue, hunt, take, capture, kill, attempt to take, capture or kill, possess, offer for sale, sell, offer to purchase, purchase, deliver for shipment, ship, cause to be shipped, deliver for transportation, transport, cause to be transported, carry, or cause to be carried by any means whatever, receive for shipment, transportation or carriage, or export, at any time, or in any manner, any migratory bird, included in the terms of this Convention . . . for the protection of migratory birds . . . or any part, nest, or egg of any such bird." (16 U.S.C. 703)

Proposed activities would not result in the possession of an individual, feathers or other parts, nest, or egg of a black-backed woodpecker. Potential effects would be incidental to the implementation of the activities and may impact individuals but would not affect a population.

Executive Orders

Migratory Birds, EO 13186 of January 10, 2001

Executive Order 13186 makes it illegal to take, kill, or possess migratory birds. Furthermore, this Executive Order requires federal agencies to evaluate the effects of federal actions on migratory birds through environmental analyses.

The project complies with Executive Order #13186 and associated Memorandum of Understanding by evaluating the effects of federal actions on black-backed woodpeckers as part of the NEPA process and promoting conservation of and minimizing adverse impacts to this species.

Statement of Findings

Alternative 1(No Action) **may impact individuals or their habitat, but will not likely contribute to a trend toward federal listing or cause a loss of viability to the population or species** for black-backed woodpeckers. The no action alternative would maintain existing general forest habitat which provides scattered small patches of natural disturbance, old growth, and snag habitat. However, uncharacteristic vegetative conditions due to fire suppression increase the potential for high severity wildfire within the project area rather than the mixed-severity fires which occurred historically. This could result in a population boom post-harvest; however, if a high severity wildfire occurred over a large expanse, the availability of general forest habitat capable of supporting even endemic population levels within the project area would be reduced until general forest habitat recovered within the burn areas.

Alternatives 2, 3, and 4 **may impact individuals or their habitat, but will not likely contribute to a trend toward federal listing or cause a loss of viability to the population or species** for black-backed woodpeckers. This determination is based on: 1) minor alteration of general forest habitat, including the potential reduction of individual nest trees or localized patches of disease

and 2) the potential for temporary disturbance during activities; however, 3) there would be no reduction of high quality habitat, 4) wildfires have and would continue to occur over-time and provide areas of high quality habitat despite fire suppression activities, and 5) effects would be to individuals or pairs and would not be expected to adversely affect the black-backed woodpecker population within the project area.

Coeur d'Alene Salamander

Regulatory Framework

2015 Forest Plan

Desired Condition

FW-DC-WL-10. A mosaic of aquatic and riparian habitats, with a low level of disturbance, is available for associated species.

FW-DC-AQH-04. Rare and unique aquatic habitats, such as waterfalls and rock outcrops, are healthy and provide for associated native plant and animal communities.

Guideline

FW-GDL-WL-21. Management activities on NFS lands should avoid/minimize disturbance at known active nesting or denning sites for other sensitive, threatened, or endangered species not covered under other forestwide guidelines. Use the best available information to set a timeframe and a distance buffer around active nests or dens. Individual animals that establish nests and den sites near areas of pre-existing human use, inconsistent with the timeframes and distances in the other forestwide wildlife guidelines or in the best available information, are assumed to be accepting of that existing higher level of human use at the time the animals established occupancy. In those instances, as long as the individual animals continue to use the site, the higher intensity, duration, and extent of disturbance could continue but would not be increased beyond the level existing at the time the animals established occupancy.

Data Sources, Methods, Assumptions, Bounds of Analysis

- Coeur d'Alene salamander population ecology, biology, habitat description and relationships identified by research are described in Cassierer et al. (1994), Maxell (2000), and Werner et al. (2004). That information is incorporated by reference. The Coeur d'Alene salamander is black or dark brown with a yellow, orange, or red stripe extending down its back onto the tail. Body length of adults is 1.7 to 2.5 inches. They are a lungless salamander and respire entirely through their skin. Because their skin is very porous, making them vulnerable to desiccation, they live in cool, damp environments such as springs, seeps, and waterfall spray zones. During the day they remain underground and at night they come out to feed upon beetles, stoneflies, mayflies, and spiders (Werner et al. 2004).
- Coeur d'Alene salamander occurrence data comes from recent district wildlife observation records, Forest historical data (NRIS Wildlife), and other agencies.
- The Conservation Assessment for Coeur d'Alene salamanders (Cassirer et al. 1994) identifies threats to populations and provides some management recommendations for timber harvest, watershed management, and prescribed fire. These recommendations focus on maintaining high-quality habitat conditions at known locations (site protection, canopy retention of at least 60 percent, timing restrictions for activities, maintenance of 100-foot streamside protection zones, no fire within 100 feet) and watershed management (maintain water quality and temperature, minimize harvest activities in headwater sub-drainages, road construction, use/maintenance, and sediment runoff). Maxell et al. (2009)

identifies similar threats and management recommendations in the state-wide conservation Plan for amphibians and reptiles.

- Occupied sites are protected from management activities by RHCAs required by the 2015 Forest Plan and by water quality standards. Therefore, measurement indicators for effects to Coeur d'Alene salamanders will be a qualitative discussion of potential effects of proposed activities to site-specific conditions at known occupied sites.
- Due to the dispersed and specialized habitat used by Coeur d'Alene salamanders and their restricted mobility, project impacts would occur at the local scale within or adjacent to these habitats. Therefore, the analysis boundary for direct effects would be the activity sites. Indirect and cumulative effects to individuals and their habitat is the OLY project area. The boundary for determining contribution toward viability is the Kootenai National Forest.

Affected Environment/Existing Condition

Within the project area, district and state (MNHP) Coeur d'Alene salamander observation and monitoring data indicates that multiple mature and immature individuals were found in 1987, 1988, and 2012 above and below FSR 4445 at Surprise Gulch and Koot Creek. Another individual was observed in a fractured rock slope along the Eastside Road, north of proposed Harvest Unit 62. Individuals were found on steep, wet, rocky or mossy slopes.

Johnson (2004) shows Coeur d'Alene salamander presence confirmed in five of eight planning units on the Kootenai National Forest at 29 different sites. Total population size on the Kootenai National Forest is unknown and direct measures of population trend are not available. Due to the specific habitat requirements of this salamander, the existing populations are physically isolated from one another by miles of unsuitable habitat (Maxell et al. 2003).

Past Actions and their Effects on Current Conditions

The measure of habitat suitability is alterations to the mapped suitable riparian habitat described in the Affected Environment/Existing condition section of this analysis. Timber harvest has occurred in the project area since the 1950s and, up until the early 1990s, harvest occurred within riparian habitats resulting in alterations and reduction of riparian habitat. Also, high levels of road construction to facilitate harvest occurred through the 1980s and resulted in sedimentation into streams. Detailed descriptions of previous vegetation and road management activities are found at the beginning of Chapter 3 (Table 33 and Table 34) as well as Appendix F of this document.

Since the 1990s, application of Forest Plan standards has resulted in the protection of riparian habitats, less road construction and road closures, and BMP work on existing roads to reduce sedimentation.

Applications of these standards and management trends results in greatly improved protection of suitable known and potential Coeur d'Alene salamander habitat.

Environmental Consequences

Direct and Indirect Effects

Proposed management activities have the potential to affect Coeur d'Alene salamander habitat and occupied sites by altering habitat conditions through vegetation management, prescribed fire,

and by decreasing water quality through changes in sediment loads and stream temperatures. Coeur d'Alene salamanders, along with many other amphibians, are sensitive to changes in their surrounding environments. Altered site habitat or water quality could affect individuals; however, protection of RHCAs and implementation of BMPs on roads reduce potential effects.

No Action Alternative

Under Alternative 1 no active management would occur within identified suitable Coeur d'Alene salamander habitat. Therefore, no direct effects from proposed federal actions would occur. However, with continued fire suppression and lack of active management, the indirect effects of this alternative would include a continued trend towards uncharacteristic vegetative conditions and increased potential for severe fire behavior within the project area.

Existing Coeur d'Alene salamander habitat would continue to be available on the KNF portions of stream banks and within seeps and springs. However, the potential for severe wildfire to spread into the more moist sites is likely to increase due to increased fuels accumulations. This could result in alteration of the environmental conditions of these sites (forested cover, temperature, sedimentation, etc.) through the reduction of vegetation adjacent to these sites.

Any existing roads which fall below BMP standards would continue to channel surface flow and sediment to the streams. Undersized and aging culverts could periodically plug and wash out, resulting in pulsed delivery of sediment to stream channels and aquatic habitat degradation for many years to come. Removing these crossings and the associated risk they pose to aquatic organism habitat in the project area is an important component of the watershed improvement/road stabilization work proposed under all action alternatives that would not be implemented under Alternative 1.

Action Alternatives

Maxell (2000) reviews the risk factors relevant to this species. Timber harvest, fire, road and trail development and maintenance, vehicle use on roads, and isolation are critical factors. In this project harvest and prescribed fire units have been designed with riparian buffers sufficient to protect salamanders and their habitat from adverse effects associated with timber harvest and fire. This contributes to FW-DC-AQH-04 and FW-DC-WL-10. Proposed road reconstruction, construction, storage, and decommissioning work would not occur in known active salamander habitat. Proposed BMP road improvements on haul routes would occur in the vicinity of known salamander habitat, however, there would be minimal to no disturbance to these sites by this activity. Therefore, the proposed activities of the action alternatives meet FW-GDL-WL-21.

Under Alternatives 2 and 3, there would be 4.32 miles of temporary and permanent road construction, and re-routes and re-construction of roads. There would be 2.32 miles of those activities under Alternative 4. All action alternatives propose to actively decommission 1.6 miles of road and to actively store 11.1 miles of road. All combined, 58 stream crossings exist in the vicinity of proposed road activities, with 30 of those proposed for active treatments for watershed improvement (see Table 42, Aquatic Habitat and Species section).

Incidental mortality to Coeur d'Alene salamanders in other undocumented suitable habitat could result from the proposed road reconstruction, construction, storage, and decommissioning activities due to temporary disturbance and equipment operation at stream crossings. Culvert installation or removal could result in incidental mortality if salamanders are present and could contribute sediment to respective habitat. However, BMP improvements to haul routes will likely

improve stream water quality by reducing road derived sediment contribution. Although there is a low risk that individuals could be impacted during work at stream crossings, all other activities would avoid suitable habitat so there would be minimal effect on the overall population. Therefore project activities would not affect the continued viability of the Coeur d'Alene salamander.

Recreation

Under all action alternatives the Kilbrennan Lake Campground boat ramp would be improved using concrete to replace the native material. In addition, the stream crossing on Trail 196 on Prospect Creek would be improved for recreation and watershed improvement. Both improvements are small scale projects which would produce minimal sediment in the short term but should reduce sediment contribution to the respective waterbodies in the long term. In any case, neither site is suspected to be suitable salamander habitat.

Cumulative Effects

Past Actions

Timber harvest has occurred in the project area since the 1950s and, up until the 1980s and early 1990s, harvest and road construction occurred within riparian habitat resulting in sedimentation, habitat alteration and reduction of potential aquatic habitat. Since the 1990s, application of Forest Plan standards has resulted in the protection of riparian habitats, less road construction and road closures, and BMP work on existing roads to reduce sedimentation. Applications of these standards and management trends results in improved protection of suitable known and potential Coeur d'Alene salamander habitat.

Ongoing and Reasonably Foreseeable Actions

Normal road and trail maintenance activities that occur on a regular basis have the potential to increase sediment and decrease water quality where suitable habitat occurs. No activities or stream crossings would occur within known or suitable habitat. In addition, improved BMP standards and stabilizing roads before placing them into intermittent stored service has reduced road related sources of sedimentation. Proposed and ongoing roadwork in the project area may contribute minimal amounts of sedimentation into streams. Cumulatively, there has been an improvement in the protection of riparian habitats within recent years.

Effects associated with private lands included riparian harvest, conversion of floodplains to pasture and hayfields, removal of large wood from the stream, grazing impacts to riparian areas, diversion of stream flow for irrigation, and the installation of undersized structures at road/stream crossings. Alterations of water dynamics, potential loss of seeps/springs, and increased sediment sources likely removed or changed potential suitable habitat that may have provided connectivity between salamander populations in the past. However, development in the past 10 years would suggest minimal change in the private land for the next 10 years. Future development is not expected to impact known Coeur d'Alene salamander sites nor impact potential movement between suitable habitats on NFS lands. Cumulatively, private land development would have negligible effects to the known salamander population and availability of suitable habitat within the project area.

None of the action alternatives would impact known sites in the project area with minimal potential short term effects from proposed watershed work at stream crossings. Based on the

nature and magnitude of potential cumulative effects to Coeur d'Alene salamanders independent of this project, there are no cumulative effects anticipated that would change the effects determination to the salamanders from implementation of any of the action alternatives.

2015 Forest Plan Consistency of the Action Alternatives

FW-DC-WL-10. A mosaic of aquatic and riparian habitats, with a low level of disturbance, is available for associated species.

> Implementation of RHCAs and BMPs, as well as watershed improvements, would maintain the mosaic of aquatic and riparian habitat, thereby protecting salamander habitat. Therefore, the OLY project would contribute to progress toward achieving this desired condition.

FW-DC-AQH-04. Rare and unique aquatic habitats, such as waterfalls and rock outcrops, are healthy and provide for associated native plant and animal communities.

> Rare and unique aquatic habitats, such as waterfalls and rock outcrops, are protected by implementation of RHCAs and therefore will remain healthy and provide for salamander habitat. Therefore, the OLY project would contribute to progress toward achieving this desired condition.

FW-GDL-WL-21. Management activities on NFS lands should avoid/minimize disturbance at known active nesting or denning sites for other sensitive, threatened, or endangered species not covered under other forestwide guidelines. Use the best available information to set a timeframe and a distance buffer around active nests or dens. Individual animals that establish nests and den sites near areas of pre-existing human use, inconsistent with the timeframes and distances in the other forestwide wildlife guidelines or in the best available information, are assumed to be accepting of that existing higher level of human use at the time the animals established occupancy. In those instances, as long as the individual animals continue to use the site, the higher intensity, duration, and extent of disturbance could continue but would not be increased beyond the level existing at the time the animals established occupancy.

> With the exception of BMP improvements, the proposed actions would not occur at documented Coeur d'Alene salamander locations. BMP improvements will not likely disturb known salamander habitat in the short-term, and will improve conditions in the long-term by reducing sedimentation. Therefore, the OLY project would contribute to progress toward achieving this guideline.

National Forest Management Act:

The project complies with NFMA direction to provide for diverse populations of plant and animal communities by compliance with Kootenai Forest Plan (2015).

Statement of Findings

The proposed action is ***may impact individuals or habitat, but will not likely result in a trend toward federal listing or cause a loss of viability to the population or the species for*** Coeur d'Alene salamander. This determination is based on:

- No known populations in the vicinity of the proposed activity,
- Streamside buffers will be in place to maintain streamside communities,

- Road construction, reconstruction, decommissioning, storage, and maintenance activities may impact individual Coeur d'Alene salamanders,
- Active stream crossing treatments may impact individual Coeur d'Alene salamanders.

Common Loon

Introduction

Common loons are seasonal residents of large water bodies that contain fish, their main prey item. Loons generally use and nest on lakes or reservoirs greater than 25 acres in size and at least 20 feet deep. Aquatic vegetation is required for nesting material and artificial nesting platforms are occasionally used when suitable nesting structures or materials are not available. They can be extremely sensitive to disturbances, particularly during the nesting season.

Skaar (1990), Dolan (1994), and Evers (2004) provided the first management recommendations for common loons and focused on the protection of individuals and suitable habitat from human disturbance during the nesting season. These disturbances included recreation and development activities and did not specifically address other forest activities such as vegetation management. More recently, the Conservation Plan for the Common Loon in Montana (Hammond 2009) expanded upon these previous documents and provides BMPs to guide the implementation of various types of activities, including vegetation management, which could affect Montana's common loons or their habitat. By adhering to seasonal restrictions (between approximately April 1 – July 15), varying buffer distances, and considerations of site specific elements such as visibility, security, and existing disturbance conditions, activities may be implemented that avoid or minimize disturbances during critical reproductive periods and continue to protect loons and their habitat.

Common loon occurrence is tied directly to the availability of suitable lakes near proposed activity areas. The suitability of these lakes for common loon use is influenced by human activity as well as the vegetative conditions along the shoreline. Because common loons are known to be sensitive to disturbances, proposed activities that result in a change in the type or level of human activity near common loon nests is a main focus of the common loon analysis. Also, those activities that result in an alteration to the shoreline vegetation which could affect the availability of nesting materials or screening from human activities, for example, is also discussed in detail. Activities occurring beyond ¼ mile from the shoreline of an identified loon lake would not be considered for effects.

Summary of Conclusions

Implementation of the OLY project's proposed alternatives results in a determination of **may impact individuals or their habitat, but will not likely contribute to a trend toward federal listing or cause a loss of viability to the population or species** for the common loon. Suitable habitat is limited to the waters and associated shorelines of Alvord, Kilbrennan, Skinner, and Slee Lakes. Proposed activities would not impact the lakes' capabilities to support common loons (e.g., provision of prey species) or the vegetative conditions of the surrounding area. Also, activity areas would remain outside the recommended activity buffers and several features, both existing and designed, would minimize the potential for disturbance effects to common loons.

Regulatory Framework

2015 Forest Plan

The 2015 Forest Plan provides overall guidance for the management of the lands on the KNF. It describes the goals, desired conditions, and objectives toward which the management of the land should be directed and it establishes standards and guidelines to help achieve or maintain the

desired condition or conditions, to avoid or mitigate undesirable effects, or to meet applicable legal requirements.

The plan components which provide specific common loon resource direction relevant to this project includes:

- FW-GDL-WL-20

There are other 2015 Forest Plan components that provide resource direction for a range of wildlife species or habitat conditions that are not specific to common loons, but still are applicable to loon management. The full list of the plan components applicable to common loon management are found in the "Regulatory Framework Findings" section of this analysis.

Resource Indicators and Measures

The sensitivity of common loons to disturbance or vegetation management depends on a number of factors including the type of loon use occurring at the lake, the distance from key use areas, the type of activity proposed, and the season during which the activity would be implemented. Sensitivity is also influenced by the existing human use and activity level near active nests. Proposed activities similar in nature to existing activities or conditions are not as likely to disturb a loon compared to a change in conditions. A full description of the recommended BMPs based on these conditions can be found in Hammond (2009).

There are two resource indicators for the common loon analysis. The first resource indicator addresses the potential for changed or increased level of disturbance associated with proposed activities and how these effects are being minimized based on the consideration and application of recommended BMPs. The second resource indicator considers how vegetation management within 500 feet of the shoreline affects the suitability of the lake and shoreline habitat for common loon use as well at its influence on human access and associated disturbance. This measure also considers the recommended BMPs which are intended to minimize potential effects to common loons. See Table 164 below for the resource indicators and measures used for assessing effects.

Table 164. Resource Indicators and Measures for Assessing Effects

Resource Element	Resource Indicator	Measure	Used to Address: P/N*, or Key Issue?	Source
Territorial or Critical Foraging Lake	Development or human activity occurring on or within approximately 500 feet of the lake	Changes in the type or level of human activity on the lake or within approximately 500 feet of the shoreline; application of recommended BMPs to minimize potential disturbance	No	KNF Forest Plan FW-DC-GDL-20; Conservation Plan for the Common Loon in Montana

Resource Element	Resource Indicator	Measure	Used to Address: P/N*, or Key Issue?	Source
Shoreline of Territorial or Critical Foraging Lake	Vegetation management occurring within approximately 500 feet of the lake	Acres of vegetation management which results in changes in the suitability of the lake to support loons; application of recommended BMPs to minimize potential impacts to vegetative funtion	No	KNF Forest Plan FW-DC-GDL-20; Conservation Plan for the Common Loon in Montana

*P/N = Purpose and Need

Methodology

Determination of common loon lake territories and classification of suitability for use was based on information provided in Hammond (2009) and District loon monitoring records (located in District files). Depending on characteristics of the lake and observed loon use, monitoring has occurred for many years and has provided information regarding loon occupancy, nesting success, and habitat maintenance. Hammond (2009) determined common loon habitat by identifying all lakes or reservoirs in Montana for which loon data had been collected and subsequently classified based on current and historic loon use. This included all but one lake in the OLY project area with known loon use. The omitted lake has only recently been identified as having loon use, including documented nesting and reproductive success within the past few years.

Recommendations for lakes coded with the highest values, due to the availability of suitable habitat and consistency of nesting attempts over the past 5 years, are more stringent. Management recommendations of such lakes include greater distance buffers and considerations of other habitat characteristics such as screening/visibility, security, and access changes than those receiving a lower classification. Through the use of GIS spatial data, each proposed activity located within ¼ mile of occupied lakes was evaluated for its occurrence within the recommended buffer distances from key use areas and the lake's shoreline.

Data Sources

Detailed population ecology, biology, habitat description and relationships identified by research are described in Hammond (2009), Evers (2004), Dolan (1994), and Skaar (1990). These provided guidance in evaluating potential effects to loons and their habitat, and are incorporated by reference. The current status and distribution of common loons in Western Montana can be found in the Conservation Plan for the Common Loon in Montana (Hammond 2009). This document also establishes goals, objectives, and strategies for maintaining nesting habitat and stable population levels and describes the conservation of the common loon.

Common loon use and occurrence data comes from recent District wildlife monitoring and observation records, NRIS wildlife database, and other agency records (MFWP).

Assumptions and Limitations

There are no assumptions or limitations associated with this resource analysis.

Affected Environment

Spatial and Temporal Context for Effects Analysis

The analysis area boundaries for direct and indirect effects to loons and their habitat are the shorelines within 500 feet of nesting loons (Dolan 1994, Evers 2004, Hammond 2009) as well as the waters of territorial or critical foraging lakes. This is appropriate because any direct and indirect effects to loons or their habitat would be limited to these lakes and their shorelines. Contribution towards viability would be assessed at the KNF.

Temporal boundaries for the common loon analysis include both short-term and long-term effects. Short-term effects are those that are expected to last for a few days and are related to potential increases in human activity during the implementation of proposed activities. Long-term effects are those that are expected to last longer than a season or two and, potentially, for many years. Common loons demonstrate a high fidelity to the nest lakes and sites. Activities that maintain or improve upon the suitability of the lakes for loon use would benefit loons as long as those conditions are in place. Conversely, activities that negatively affect the suitability of a lake to support loons in its full capacity could result in a lake no longer being occupied by loons. For those lakes with a low probability of occupation, once the lake becomes unoccupied it is unlikely that it would once again be occupied by a territorial pair (Hammond 2009).

Existing Condition

Introduction

Johnson (2004) summarizes available common loon habitat across the KNF and loons have been observed in all eight planning units. In Western Montana, since the formation of the Common Loon Working Group in 1999, the total number of lakes surveyed has stabilized while the total number of adult loons counted each year has ranged between 150 and 200. Annual variability in adult counts could be attributed to changing population size or possibly to survey conditions or efforts, particularly on large reservoirs and lakes (Bissell 2004). The Montana Loon Society (ibid) loon count data shows the total number of loons in Northwest Montana has remained relatively stable over the six year period prior to the report. However, for the last five years of this data it shows rather wide fluctuations in the number of chicks produced. Causes for lower production in some years include weather (e.g., flooding) and competition among nesting pairs. The most recent status and distribution of common loons in Western Montana can be found in the Conservation Plan for the Common Loon in Montana (Hammond 2009).

Common Loon Occurrence

Common loons have been documented to use four lakes within the OLY project area. Territorial pairs occupy Alvord, Kilbrennan, and Slee Lakes. All three breeding pairs have successfully reproduced and reared chicks in recent years. Additionally, loons have regularly been observed foraging on Skinner Lake. The history of loon occupancy and nesting success records, by lake, are on file at the Three Rivers Ranger District office.

Description of the Analysis Areas

As just mentioned, three lakes within the project area provide suitable foraging and nesting habitat while a fourth provides additional foraging opportunities for local breeding pairs or individuals moving through the area. The following descriptions include observations based on

District monitoring and unpublished notes from Hammond (unknown date) which describe the suitability of the lakes for loon use and potential for occupancy.

The majority of Alvord Lake's shoreline is vegetated and provides several sites suitable for nesting. Ownership includes NFS lands and a small area of private lands which has recently been purchased by a land conservation agency. Therefore, the type of future land use practices and development are limited along the shoreline of this lake. The lake provides recreational opportunities in the form of a day-use area which includes a boat ramp, dock, outdoor classroom, and non-motorized hiking trail around the lake. In addition, a "no wake" restriction has been adopted to reduce the potential for disturbance and impacts to the nest from motorized boat use. Although popular, use levels and sources of disturbance are moderate with lower levels near the nest.

Nesting opportunities at Kilbrennan Lake are more limited due to steep and un-vegetated slopes along the west shore and the presence of the access road along the east shore. The lake is located entirely within NFS lands and is a popular yearlong recreation destination for camping, boating, fishing, and swimming. The recreational opportunities provided, as well as the close proximity town and maintained road conditions, likely influence this high level of use. Although seemingly high, this level of use for these particular activities has been tolerated by the territorial pair. Also, a "no wake" restriction has been adopted to reduce the potential for disturbance and impacts to the nest from motorized boat use.

District knowledge and documentation of common loon use of Slee Lake has only occurred within the past few years. This lake is privately owned by a single landowner and details regarding the lake and its condition are limited to the information provided by the landowner and publicly available satellite imagery. The lake is relatively small in size, but appears to have abundant nesting habitat along the entire shoreline and it has provided enough prey to support a nesting pair and their young each of the past few years.

Observations at Skinner Lake have been regular, but usually limited to single individuals and nesting attempts have not been documented. Although the lake provides foraging opportunities, the limited availability and quality of nesting habitat limits the probability of colonization (Hammond, unknown date). Private property is found along the western shoreline and includes a single residence. Recreational use of the lake has not been observed and, although possible, is not readily expected due to the limited and difficult access. As for Slee Lake, additional development of the private land around this lake is unlikely and the potential for human use and disturbance is low. Table 165 displays the resource indicators and measures for the existing condition.

Table 165. Resource Indicators and Measures for the Existing Condition

Resource Element	Resource Indicator	Measure	Existing Condition (Alternative 1)
Territorial or Critical Foraging Lake	Development or human activity occurring on or within approximately 500 feet of the lake	Changes in the type or level of human activity on the lake or within approximately 500 feet of the shoreline; application of recommended BMPs to minimize potential disturbance	Four territorial and foraging lakes found within the project area; all experience development and human activity of varying types and levels

Resource Element	Resource Indicator	Measure	Existing Condition (Alternative 1)
Shoreline of Territorial or Critical Foraging Lake	Vegetation management occurring within approximately 500 feet of the lake	Acres of vegetation management which results in changes in the suitability of the lake to support loons; application of recommended BMPs to minimize potential impacts to vegetative function	NFS lands found along all or part of Alvord, Kilbrennan, and Skinner Lakes' shorelines that could be proposed for vegetation management treatments

Environmental Consequences

Shoreline human related disturbances within 500 feet of a known loon nest, especially during the most sensitive part of the breeding/nesting/foraging season (approximately April 15 to July 15), could prevent or disrupt loon nesting and affect reproductive success (Dolan 1994, Evers 2004, Hammond 2009). Effects of human related disturbance include causing loons to flush from the nest by approaching too close, creating boat wakes that result in flooding the nest, and alteration of suitable habitat. Causes of disturbances could include developments (e.g., homes or campgrounds), docks, trail construction and maintenance, road (re)construction and maintenance, timber harvest, burning, recreational activities, or other human-related disturbances in the vicinity of the nest.

Alternative 1 – No Action

A range of fire severity, from non-lethal to stand replacing crown fires, historically played a role in developing the vegetative characteristics in the OLY project area. Although the type and frequency of fire experienced varies within a given area and vegetation type (based on biophysical setting), with some being more prone to infrequent stand replacing fire, the vegetation types within the project area have historically experienced low and/or mixed severity fires at least periodically. These natural disturbance regimes favor fire tolerant species, including older and larger diameter seral tree species such as western larch, western white pine, and ponderosa pine which occur in the forest types around the area's loon lakes. The exclusion of low to moderate severity fires through fire suppression has altered the amount of shade-tolerant species in the understory of these forested stands as well as increased fuel loadings in the form of ladder fuels and downed woody materials. Due to the denser fuel conditions, resulting stand replacing fires in these stands often kill many of the overstory trees which historically survived mixed-severity wildfires. In general, the resultant stand structure, fire frequency, and severity are departing from desired vegetative conditions based on historic range of variability within the project area. See the Fuels Management and Forest Vegetation sections for more detail.

Under Alternative 1 no active management would occur on loon lakes or associated riparian and upland habitats. Therefore, there would be no direct or indirect effects to the suitability of the lake to support common loons from proposed federal actions. However, with continued fire suppression and lack of active management, the indirect effects of this alternative would include a continued trend towards uncharacteristic vegetative conditions and increased potential for severe fire behavior within the project area (see the Forest Vegetation and Fuels Management sections). This means there is an increased potential for wildfire to remove most if not all vegetation around loon lakes, including the moister riparian and wetland habitats along the shoreline, which could result in changes in habitat availability and suitability of the lakes for common loons. For example, the alteration or reduction of vegetation could negatively impact the availability of

nesting materials or result in an increase in sedimentation due to run-off from adjacent lands that could affect lake function and foraging opportunities.

Alternatives 2, 3, and 4 – Direct and Indirect Effects

Because common loons are tied to lakes and susceptible to disturbance, management activities (e.g., recreation or vegetation management) that change the type or level of human access and disturbance on or adjacent to lakes with loons would have the most impact to common loon occupation and success. The potential for effects depends on the types of activities proposed as well as the type and level of disturbance the loons already experience and tolerate. Also, the capability of each lake to support loons is different resulting in different classifications and, therefore, different management guidelines apply.

Project Design Features and Mitigation Measures

There are three design features identified to minimize potential effects to nesting common loons using Alvord and/or Kilbrennan Lakes, see Chapter 2 Design Features. First, with the exception of prescribed burning of Fuels Unit F5 adjacent to Kilbrennan Lake, implementation of proposed activities at both lakes could not occur between March 1 and July 15 to minimize disturbance during the critical nesting, rearing, and foraging periods. Additional design features for Kilbrennan Lake include: 1) Ignition of Fuels Unit F5 would occur by hand rather than through the use of a helicopter; and 2) Boating use would be monitored following the replacement of the boat ramp at the Kilbrennan Lake Campground with additional management features to be identified, if necessary, to protect the nesting loons. These design features are consistent with FW-DC-WL-01 and FW-GDL-WL-20 and will be described in more detail in the following effects discussion.

Potential Disturbance and Habitat Alteration at Territorial or Critical Foraging Lakes

No activities are proposed within ¼ mile of Skinner or Slee Lakes. Therefore, there is no potential for effects to loons or their habitat and these lakes will not be discussed further. Proposed activities (i.e., fuels treatments and recreational improvements) would occur within 500 feet of Alvord and Kilbrennan Lakes' shorelines in existing areas of human use. The potential effects of disturbance and habitat alteration are summarized in Table 166 and Table 167, respectively, and will be discussed separately for each affected lake.

Table 166. Proposed Development or Human Activity Occurring On or Within 500 Feet of Common Loon Territorial or Critical Foraging Lakes within the OLY Project Area for All Action Alternatives

Resource Indicator	All Action Alternatives – Alvord Lake	All Action Alternatives – Kilbrennan Lake	All Action Alternatives – Skinner Lake	All Action Alternatives – Slee Lake
Development or human activity occurring on or within approximately 500 feet of the lake; application of recommended BMPs to minimize potential disturbance	Yes -- Proposed activities include recreational improvements and a roadside fuels treatment (Fuels Unit F15) along/near the northwestern shoreline, however, activities are over ¼ mile from the nest site and rearing areas of the lake; timing restriction applied to the implementation of activities	Yes – Proposed activities include recreational improvements and a prescribed burn (Fuels Unit F5) along the eastern shoreline, however, distance is approximately 500 feet or more from the nest site and rearing areas of the lake; timing restriction applied to the implementation of activities and monitoring of future boating use	No proposed activities occurring within ¼ mile of the lake; application of BMPs not necessary	No proposed activities occurring within a ¼ mile of the lake; application of BMPs not necessary

Table 167. Proposed Acres of Vegetation Management that Influences the Suitability of Common Loon Territorial or Critical Foraging Lakes within the OLY Project Area for All Action Alternatives

Resource Indicator	All Action Alternatives – Alvord Lake	All Action Alternatives – Kilbrennan Lake	All Action Alternatives – Skinner Lake	All Action Alternatives – Slee Lake
Acres of vegetation management which results in changes in the suitability of the lake to support loons; application of recommended BMPs to minimize potential impacts to vegetative function	0 acres; timing restriction applied to the implementation of activities	0 acres; use of helicopter is restricted for implemenation of the prescribed burn unit	NA*; application of BMPs not necessary	NA*; application of BMPs not necessary

*NA = Not Applicable

Alvord Lake

Proposed recreational improvements and a roadside fuels treatment would occur within 500 feet of Alvord Lake along the northwestern shore. Both are greater than a ¼ mile from the nest site and rearing areas located at the southern end of the lake which minimizes the potential for disturbance to the loons. However, in order to avoid the potential for disturbance associated with

the implementation of these activities, neither could occur between March 1 and July 15 of the year. This means that activities would take place when the loons would be less susceptible to disturbance or are not present at the lake.

The proposed recreational improvements at Alvord Lake are funding dependent and may not occur. If they do, they would be located within the existing day-use site and are intended to meet Americans with Disabilities Act (ADA) standards through improvements to existing access routes and trail on the northwest side of the lake. Improvements include paving a portion of the Alvord Lake trail to the Outdoor Classroom and possibly just beyond to the dock. The improvements are not expected to result in a change in the type or level of recreational use on the lake, especially at the southern end where the loons are generally found, and the potential for an increased level of disturbance is minor compared to the existing condition. The loons would be expected to continue their existing use of the lake.

Fuels Unit F15 would treat approximately 5 acres along the edge of a gated road to allow for safer travel in the event of a fire. The treatment is limited to the selective slashing of understory trees less than 6 inches diameter at breast height which would not result in a change in the composition or overstory structure of the treated area. Although this road parallels the north half of the western shoreline of Alvord Lake, there is a small ridgeline of heavily timbered forest between the lake and the road. This strip of forest provides a buffer to any human activities and noise currently experienced on the road and would continue to do so both during and post-treatment. Adherence to the design feature which restricts implementation during the loons' most sensitive period (see Chapter 2) would avoid any potential disturbance to loons from this proposed activity. Also, the road is restricted to general public motorized use which limits most human use to non-motorized recreational use; this would not change as part of the OLY project. Therefore, the small size, limited treatment, and location of this unit would not alter the vegetative cover/shoreline characteristics of Alvord Lake, increase the visibility of the shoreline or nest site, or increase recreational access. No disturbance or change in habitat suitability would occur from this activity; therefore, there are no expected impacts associated with the implementation of the proposed fuels treatment.

Kilbrennan Lake

Proposed recreational improvements and a prescribed ecosystem burn would occur within a ¼ mile of Kilbrennan Lake along the eastern shore. However, both are more than 500 feet from the nest site and rearing areas located at the southern end of the lake which minimizes the potential for disturbance to the loons. Also, in order to avoid or further minimize the potential for disturbance associated with the implementation of these activities to the resident loons, three timing/activity restrictions have been identified for activities occurring near Kilbrennan Lake.

The proposed recreational improvement at Kilbrennan Lake is funding dependent and may not occur. If it does, it would be located within the campground's day-use site and includes the replacement of the existing native material boat ramp either with concrete or a floating structure. Implementation of this activity could not occur between March 1 and July 15 of the year to avoid the potential for disturbance during the loons' most sensitive period of use. In addition, replacement of the existing boat ramp is not expected to result in a change in the type or level of boating use on the lake. The ramp would not be enlarged or improved upon to allow for larger boat use. Also, the existing wake restriction would remain in effect which limits the size of motor used and speed of travel on the lake. Therefore, the potential for an increased level of activity and associated disturbance is minor compared to the existing condition and the loons would be expected to continue their existing use of the lake. Following the replacement of the boat ramp,

boat use and levels of disturbance would be monitored to detect if any changes have occurred to the extent they are negatively impacting loon use and success. If a response is detected from the loons, additional management features would be identified to mitigate the effect(s) and reduce the disturbance back to a level tolerated by the territorial pair (see Design Features, Chapter 2).

It has also been proposed that the existing pullouts along the road be widened. This improvement is limited to the availability of land within the narrow road shoulder and this activity is not expected to be measurably different than routine road maintenance activities. No impacts due to improvements on the Kilbrennan Lake road would be expected.

One prescribed burn unit (Fuels Unit F5) would occur on the opposite side of the open road from Kilbrennan Lake. To achieve the desired burn conditions and vegetative response, it is likely that this unit would be burned in the spring during the nesting and early rearing/foraging periods. Because of the resource's need to burn during the spring, this activity is exempt from the timing restriction described for the other activities. Therefore, disturbance from noise and activity could occur. However, several features, both existing and designed, would minimize the potential for disturbance to the loons from this activity. First, the open road, campground, and lake experience a high level of existing recreational use that the loons tolerate and have become accustomed to. The territorial pair has successfully nested and produced chicks on this lake despite the human use and disturbance. Second, the proposed activities associated with this burn would be similar in nature to this existing human use. Activities would be limited to ground based activities and the use of a helicopter for ignition would not be allowed for this burn unit (see Design Features, Chapter 2). This design feature was identified to avoid additional sources of disturbance when it is feasible to ignite this unit by hand. Ground based activities, including fire personnel and vehicles, would be limited to the open road and the timbered stand to the east. An increased level of human activity would only be expected for a day or two during active burning of the stand. Post-burning monitoring levels would be similar to existing recreational use. Third, the existing tree cover provided by the mature forest stand would be maintained during and post-burn which would provide a visual screen between the loons and the activities occurring off of the road. And finally, there would be no new routes for human access or changes to existing human access associated with this activity. Therefore, the location and vegetative condition of the unit and similar nature of the activities compared to the existing human use of the area minimizes the potential for disturbance related effects to loons using the nearby lake. The minor temporary increase in human activity is not expected to result in a level of disturbance that would negatively impact the use or reproductive success of the loons on Kilbrennan Lake and the suitability of the lake for loon occupancy would be maintained.

Summary of Effects

Effects of the proposed activities would be minimal to common loons using Alvord and Kilbrennan Lakes. The main effect would be a potential temporary increase in disturbance due to noise and activity associated with prescribed burning of Fuels Unit F5 adjacent to Kilbrennan Lake as this activity is likely to occur in the spring during the nesting and early rearing/foraging periods. However, this activity area would remain just outside the recommended buffers and potential effects to loons would be minimized due to the type and level of existing recreational use, through application of an activity restriction, and maintenance of vegetative cover between the activities and loons on the lake. The other activities would take place outside the periods of increased sensitivity as well as well beyond the 500 feet considered for disturbance effects. None of the proposed activities are expected to result in a post-project increase in human activity or disturbance.

Cumulative Effects

Introduction

The Existing Condition section describes the potential common loon habitat, including existing human sources and levels of disturbance, within the project area. This Cumulative Effects section summarizes the past actions as well as further describes ongoing and other reasonably foreseeable contributions potentially impacting common loon habitat.

Spatial and Temporal Context for Cumulative Effects Analysis

The analysis area for cumulative effects is a 6 mile area surrounding the occupied lakes within the project area. Although adult loons show a high fidelity to their breeding territories, loons may use other lakes within a few miles as stop overs to their territories, as additional foraging opportunities, and as dispersal opportunities for young from their natal lakes. From their territorial lake, 6 miles is the approximate distance loons may utilize other lakes for additional foraging opportunities (Hammond 2009) and these lakes may not be located within the project area boundary. Currently, there are no apparent conditions within the analysis area that would cumulatively contribute effects to loon use of occupied lakes within the project area.

Temporal boundaries for the cumulative effects analysis would be the same as for the direct and indirect effects. Short-term effects are those that are expected to last for a few days related to an increase in human activity during the implementation of proposed activities. Because of the fidelity common loons demonstrate towards their nest lakes and sites and the characteristics that influence a lake's suitability, the effects of proposed activities (both positive and negative) could last for years and into perpetuity. Therefore, long-term effects are those that are expected to last longer than a season or two and potentially for many years.

Past, Present, and Reasonably Foreseeable Activities Relevant to Cumulative Effects Analysis

Past Actions

Timber harvest has occurred in the project area since the 1930s and, up until the early 1990s, included activities within riparian habitats. This resulted in habitat alterations and/or reduction within riparian and wetland habitat along lake shores as well as adjacent upland habitats associated with loon occupied lakes. Since the 1990s, there has been better protection of these habitats through RHCA protections. Also, application of management guidelines has limited the type, location, and timing of activities around suitable lakes which has reduced the potential for cumulative effects. Detailed descriptions of previous vegetation management activities are found at the beginning of Chapter 3, including Table 32and Table 33, as well as Appendix F of this document. Existing human activities and level of disturbance on territorial and foraging lakes are the result of past private and/or public development and recreational use.

Alternatives 2, 3, and 4 – On-going and Reasonably Foreseeable Actions

Reasonably foreseeable actions include those federal, state, or private activities that are ongoing or scheduled to occur, independent of this federal action. Table 34 located at the beginning of Chapter 3, identifies those current and foreseeable actions in the project area that were determined to be appropriate for inclusion in the analysis of environmental effects.

Ongoing federal actions have been considered and included when formulating the existing condition of this analysis area. No ongoing or reasonably foreseeable federal activities are planned near known loon lakes within the cumulative effects area that have not been addressed within the analysis area. Therefore, there are no cumulative effects associated with other federal actions.

With population growth and development, it is reasonable to assume that some corresponding increase in human use of NFS lands is likely to occur. This increase is likely to be gradual and incremental, and tend to be focused on areas along or near roads open to motorized traffic. Open roads provide public access to both Alvord and Kilbrennan Lakes which experience consistent and moderate to high levels of recreational use, respectively, throughout the spring and summer periods when loons occupy the lakes. However, the past and existing types and levels of disturbance appear to be at a tolerable level for loon use as both territorial pairs having successfully produced chicks over the years. The implementation of proposed activities is not expected to result in a change or measurable increase in human access or activity at these lakes and the potential for cumulatively increasing the level of disturbance that would negatively affect loons is minor.

A small portion Alvord Lake is privately owned. This land is now a community forest that restricts the potential for development and other land uses along the lake's shoreline. Maintaining the vegetative cover and limited non-motorized human access would help to maintain the existing low level of disturbance experienced on the southern end of the lake where loon use generally occurs. This action would result in cumulatively minor but beneficial effects related to the long-term management of the lake and its suitability for occupancy by loons.

Based on the nature and magnitude of potential cumulative effects to common loons independent of this project, there are no cumulative effects anticipated that would change the effects determination to common loons from implementation of the proposed federal action.

Regulatory Framework Findings

2015 Forest Plan

The 2015 Forest Plan provides desired conditions, objectives, standards, and guidelines for common loons within the Wildlife Resource. The following are applicable to the actions in this project[23]:

Forestwide Direction

- p. 28, **GOAL-WL-02**: The KNF manages and schedules activities to avoid or minimize disturbance to sensitive species and manages habitat to promote their perpetuation into the future.

  Proposed recreation improvements and fuels treatments would maintain the existing suitability of Alvord and Kilbrennan Lakes for loon occupancy. Project design features (see Chapter 2, Design Features) include both timing and activity restrictions for proposed activities in order to reduce and/or avoid potential disturbance effects to nesting

[23] Goals, desired conditions, objectives, standards, and guidelines can be found on the noted pages in the 2015 Forest Plan.

common loons. See the "Direct and Indirect Effects" discussion. Therefore, the OLY project would contribute progress toward achieving this goal.

- p. 28, **FW-DC-WL-01**: Nests and den sites and other birthing and rearing areas for terrestrial threatened, endangered, proposed, or sensitive species are relatively free of human disturbance during the period they are active at these sites.

  Proposed activities are occurring near two loon occupied lakes where nesting attempts and successful reproduction has occurred over the past several years. Timing and activity restrictions have been applied to activities occurring near Alvord and Kilbrennan Lakes to reduce and/or avoid the potential for disturbance during the critical nesting, rearing, and foraging periods. See "Project Design Features and Mitigation Measures" within the "Direct and Indirect Effects" discussion, as well as Design Features in Chapter 2. Therefore, the OLY project would contribute progress toward achieving this desired condition.

- p. 32, **FW-GDL-WL-20, Common Loon**: Management activities should avoid or minimize disturbance near known active nests based on the best available information.

  Design features were identified to avoid and/or minimize potential disturbance associated with proposed activities were based on District records, the type of loon use occurring at these lakes, existing type and level of human activity at these lakes, and application of recommended BMPs based on lake classification described in Conservation Plan for the Common Loon in Montana (Hammond 2009). See "Methodology," "Data Sources," "Existing Condition," and "Direct and Indirect Effect" discussions. Therefore, the OLY project was designed in accordance with this guideline.

Federal Law

National Forest Management Act (NFMA)

The project would comply with NFMA direction to provide for diverse populations of plant and animal communities through compliance with the 2015 Forest Plan.

Migratory Bird Treaty Act of 1918 (16 U.S.C. 703-712), as Amended

Implemented to protect migratory birds and includes treaties between the U.S. and Great Britain (for Canada), Mexico, Japan, and the Soviet Union (now Russia). Without being permitted it is illegal to "pursue, hunt, take, capture, kill, attempt to take, capture or kill, possess, offer for sale, sell, offer to purchase, purchase, deliver for shipment, ship, cause to be shipped, deliver for transportation, transport, cause to be transported, carry, or cause to be carried by any means whatever, receive for shipment, transportation or carriage, or export, at any time, or in any manner, any migratory bird, included in the terms of this Convention . . . for the protection of migratory birds . . . or any part, nest, or egg of any such bird." (16 U.S.C. 703)

Proposed activities would not result in the possession of an individual, feathers or other parts, nest, or egg of a common loon. Potential effects would be incidental to the implementation of the activities and would impact individuals and not a population.

Executive Orders

Migratory Birds, EO 13186 of January 10, 2001

Executive Order 13186 makes it illegal to take, kill, or possess migratory birds. Furthermore, this Executive Order requires federal agencies to evaluate the effects of federal actions on migratory birds through environmental analyses.

The project complies with Executive Order #13186 and associated Memorandum of Understanding by evaluating the effects of federal actions on common loons as part of the NEPA process and promoting conservation of and minimizing adverse impacts to this species.

Other Guidance or Recommendations

The most recent status and distribution of common loons in Western Montana can be found in the Conservation Plan for the Common Loon in Montana (Hammond 2009). This document also establishes goals, objectives, and strategies for maintaining nesting habitat and stable population levels and describes the conservation of the common loon.

Statement of Findings

Alternative 1 (No Action**) may impact individuals or their habitat, but will not likely contribute to a trend toward federal listing or cause a loss of viability to the population or species** for common loons. The no action alternative would maintain existing nesting, rearing, and foraging habitat. However, uncharacteristic vegetative conditions due to fire suppression increase the potential for severe wildfire within the project area rather than the low and mixed-severity fires which occurred historically. This could result in a loss of nesting habitat and/or impairment of rearing and foraging habitat should a severe wildfire occur near Alvord and Kilbrennan Lakes.

Alternatives 2, 3, and 4 **may impact individuals or their habitat, but will not likely contribute to a trend toward federal listing or cause a loss of viability to the population or species** for common loons. This determination is based on: 1) the application of timing and/or activity restrictions which would avoid or minimize the potential for an increased level of project related disturbance, 2) all activities would occur outside the recommended buffer distances, 3) there would be no alteration of suitable nesting or foraging habitat, 4) there would also be no changes in the type or level of recreational activities or access, and 5) the proposed activities are not expected to result in an increase in human related disturbances.

Other Agencies and Individuals Consulted

Chris Hammond, MFWP Non-Game Biologist

Communications consisted of the type of proposed actions occurring near Alvord and Kilbrennan Lakes, the potential for disturbance, concerns, and needs for timing and activity restrictions for proposed activities.

Fisher

Introduction

Fishers were historically found throughout the montane and boreal forest across North America in Canada and extending south into the United States to New England, the Great Lakes area as far south as Tennessee, and along the Appalachian, Rocky, and Pacific Coast Mountains. The contemporary continental distribution has contracted compared the presumed historical range in some areas, although fisher distribution in the United States Northern Rocky Mountains is thought to be similar to the presumed historic range (USFWS 2011a). Although fisher distribution in the Northern Rockies is similar to historic distribution (ibid), they are thought to be one of the lowest density carnivores in Montana (Vinkey 2003). For example, Vinkey's (2003) work in the Cabinet and West Cabinet Mountains of Northwest Montana only documented 11 records of fishers during three winters (2001-2003) of fieldwork. Similarly, surveys for fishers in the Northern Rockies since 2004 has only detected fishers at 222 out of 4,813 snares deployed in 8 years (Schwartz et al. 2006, USFS 2012).

Fishers are low density, year-round residents of the KNF. They use a diverse range of habitat types and successional stages, but prefer moist environments with a higher proportion of mid to late seral forests. Complex forest structure such as large snags, large down wood material, and high canopy cover are important components of fisher habitat. Live trees are used most often for resting, although snags and coarse woody debris are also used. Cavities in both live and dead trees are vitally important for denning females with young. Structures used for these activities are generally larger than other available trees in the vicinity. Fishers are opportunistic predators, primarily of small forest mammals (e.g., snowshoe hares, voles, squirrels, and mice) and birds; carrion and plant material may also be consumed. Therefore, fishers have been shown to use a greater variety of forest habitats, including younger stands, when foraging. Riparian areas have been suggested to be important habitat for travel, resting, and denning. However, riparian areas often contain the structural complexity just described and use may simply be a reflection of its suitability; upland habitats with similar characteristics may be just as important for fisher use. This summary as well as detailed fisher population ecology, biology, habitat description, and relationships identified by research are described in Jones (1991), Vinkey (2003), Lofroth et al. (2010), USFWS (2011a), Raley et al. (2012), Schwartz et al. (2013), Olson et al. (2014), Sauder and Rachlow (2014), and Sauder and Rachlow (2015).

Fisher habitat use, therefore, is associated with specific structural characteristics that provide for their denning, resting, travel, and foraging needs. Proposed vegetation management that trends towards the desired vegetative conditions for the project area (i.e., promote the retention and development of large trees, snags, and down woody materials and a mosaic of structural conditions) is a main focus of the fisher analysis. The analysis also considers the potential for disturbance to fishers during the implementation of activities. Those activities that would not alter the vegetative conditions of these mesic habitat types within the project area, e.g., proposed watershed improvement work, would generally not be discussed.

Summary of Conclusions

Implementation of the OLY project's action alternatives result in a determination of **may impact individuals or their habitat, but will not likely contribute to a trend toward federal listing or cause a loss of viability to the population or species** for fisher. Although a small amount of fisher yearlong habitat would be affected by proposed regeneration harvest, the treatment would

maintain existing elements of complex forest structure (e.g. large diameter trees, snags, coarse woody debris) and areas of greater canopy cover where available. This would encourage winter foraging use of this new young forest habitat in the near future. Also, all proposed vegetation management treatments would trend vegetative conditions towards historic range of variation which includes a diversity of habitat types and seral stages while maintaining an abundance of mesic, mature habitat selected for by fishers within the project area.

Regulatory Framework

2015 Forest Plan

The 2015 Forest Plan provides overall guidance for the management of the lands on the KNF. It describes the goals, desired conditions, and objectives toward which the management of the land should be directed. And it establishes standards and guidelines to help achieve or maintain the desired condition or conditions, to avoid or mitigate undesirable effects, or to meet applicable legal requirements.

There are no plan components which provide specific fisher habitat resource direction relevant to this project. However, because fishers are associated with large forest structure, resource direction relevant to the maintenance and/or promotion of these characteristics is important for managing fisher habitat and includes:

Forestwide Direction

- FW-DC-WL-10
- FW-DC-WL-11
- FW-DC-WL-12
- FW-DC-WL-13

Also, there are other 2015 Forest Plan components that provide resource direction for a range of wildlife species or habitat conditions that are not specific to fishers, but still are applicable to the management of fisher habitat. The full list of the plan components applicable to fisher habitat management are found in the “Regulatory Framework Findings” section of this analysis.

Resource Indicators and Measures

Fishers are noted for their association with mesic, riparian like habitats consisting of large trees, snags, and high canopy cover conditions, although they have also been known to use young forest stands as foraging habitat during the winter months especially if remnant large structures remain within the stands. Management that maintains and developments large structural conditions within the mesic habitat types, including a mosaic of mature and young forest conditions, would be beneficial for fisher use now and into the future. Therefore, for the fisher analysis, a resource indicator is the availability of yearlong habitat that provides suitable structural conditions that provide for fisher denning, resting, travel, and foraging habitat requirements. The measure for this resource will be the change in the percent composition of yearlong habitat compared to the total acres of fisher habitat as a result of regeneration harvest treatments. A second resource indicator will be the availability of winter foraging habitat that is also measured as the percent change in composition compared to the total acres of fisher habitat. A third resource indicator considers how large forest structure (i.e., trees, snags, and down woody materials) are being maintained and/or promoted within the treated stands and potential effects to mesic old growth and riparian habitats

that are generally considered to exhibit these characteristics. The changes in the availabilities of these habitat types and structural conditions will be used to evaluate the degree of habitat change, both in the amount and quality of habitat, occurring within the project area. Also, these changes will qualitatively be discussed in relation to the desired vegetation conditions for the project area, the historic levels of fisher habitat including its spatial arrangements and patterns, and fisher use of the area. See Table 168 below for a summary of the resource indicators and measures.

Table 168. Resource Indicators and Measures for Assessing Effects

Resource Element	Resource Indicator	Measure	Used to Address: P/N*, or Key Issue?	Source
Yearlong Habitat	Vegetation management occurring in mature forests within mesic habitat types	Acres of yearlong habitat (percent composition)	No	KNF Forest Plan FW-DC-WL-11, FW-DC-WL-12, and FW-DC-WL-13; ERG (2012); e.g., Lofroth et al. (2010)
Winter Foraging Habitat	Vegetation management occuring in mature and/or young forests within mesic habitat types	Acres of winter foraging habitat (percent composition)	No	KNF Forest Plan FW-DC-WL-19; ERG (2012); e.g., Lofroth et al. (2010)
Forest Structure	Availability of large structural components, including trees,snags, coarse woody materials, and old growth and riparian habitats	Maintenance or promotion of these structural characteristics and habitat that exhibit these characteristics	No	KNF Forest Plan FW-DC-WL-10, FW-DC-WL-11, FW-DC-WL-12, and FW-DC-WL-13

*P/N= Purpose and Need

Methodology

Fisher habitat was identified using GIS layers on biophysical setting, stand age (as an indicator of size), forest type, and canopy cover. Recently, research by Sauder and Rachlow (2014) and Schwartz et al. (2013) indicate that tree size and canopy height are better indicators of mature habitat used by fishers than canopy cover. Using stand age and estimates of tree size, this habitat was separated into two categories based on their current and/or future ability to provide for fisher needs. Yearlong habitat consists of those stands that currently provide large trees and other large structural components like snags and down woody debris that can support denning, resting, and foraging fishers. Winter habitat consists of those stands within the appropriate biophysical setting and habitat type, but do not yet provide the large structural conditions for fisher denning and resting. These areas include young regenerating stands which could develop into yearlong habitat in the future, but currently provide winter foraging opportunities. Although fishers are not dependent on old growth habitats, old growth would provide the structural conditions suitable for fisher use. Therefore, discussion of effects to fisher habitat relies on the other habitat analyses in this document (i.e., Forest Vegetation and Old Growth).

Fisher home ranges in Montana and Idaho are among the largest home ranges reported for fishers, with females averaging 10,000 acres and males averaging approximately 22,000 acres (Jones 1991). More recently, fisher research in nearby north-central Idaho found these averages to be slightly larger with female home ranges averaging about 12,182 acres and males averaging about 24,315 acres (Sauder and Rachlow 2014). Again, the home ranges for male fishers appear to be about twice the size as observed for females. Therefore, conservatively, an area of approximately 24,710 acres is expected to be able to support a reproductive group of one adult male and two to three adult female. Both male and female fishers are considered because their home range sizes differ and home ranges between sexes overlap extensively (Powell and Zielinski 1994, and Aubrey et al. 2004). These values were used to determine an appropriate boundary for the cumulative effects analysis and the potential for fisher use within the analysis area.

Data Sources

Detailed fisher population ecology, biology, habitat description, and relationships identified by research are described in Jones (1991), Vinkey (2003), Lofroth et al. (2010), USFWS (2011a), Raley et al. (2012), Schwartz et al. (2013), Olson et al. (2014), and Sauder and Rachlow (2014), Sauder and Rachlow (2015). These provided guidance in evaluating potential habitat and effects to fisher, and are incorporated by reference.

Vinkey (2003) summarizes historical observations and fisher introductions into the Purcell Mountains (1959) and Cabinet Mountains (1990-1991) on the KNF. Fisher occurrence data comes from recent District wildlife observation records, NRIS wildlife database, Region 1 database, and other agencies (MFWP, MNHP).

Assumptions and Limitations

Fishers prefer moist environments with complex forest structure which is generally associated with the warm/moist biophysical setting (see the Forest Vegetation section for a more detailed description). Therefore, all forest types within the warm/moist biophysical setting were considered (e.g., see ERG 2012). Vegetative types grouped within this biophysical settings display a range of moisture conditions from those on the drier end to those that are very moist. This categorization of habitat conditions also means there are likely to be inclusions of areas of drier habitat types, including Douglas-fir vegetation types, within the broader area of warm/moist habitat types. Therefore, the existing habitat condition likely overestimates the amount of habitat routinely used by fishers within the project area. However, fishers would be expected to use habitats within the footprint of this biophysical setting due to the mosaic of habitat conditions and network of streams and riparian habitats that provide for habitat requirements, including travel habitat throughout the project area.

The effects analysis initially considered all proposed vegetation management treatments occurring within the mapped existing habitat. Then, based on a combination of forest type, site specific biophysical setting identified by the project silviculturist, and field observations the acres of proposed treatments that would be expected to impact fishers were refined to include only those occurring within the preferred warm/moist habitat types.

Affected Environment

Spatial and Temporal Context for Effects Analysis

The analysis boundary for direct effects to individuals and their habitat is the OLY project activity areas, since activities in this area could result in disturbance and displacement effects to fishers. The boundary for indirect effects is the project area as fisher home ranges are larger than the activity areas and the proposed activities could impact a fisher's existing use of their home range. Contribution toward viability is assessed at the KNF.

Temporal boundaries for the fisher analysis include both short-term and long-term effects. Short-term effects are those that are expected to last between a few days to a couple of seasons. Generally, once disturbance causing activities like harvest and prescribed burns have been completed fishers can move back into and use the area. Long-term effects are those that are expected to last longer than a season or two. Within yearlong habitat, regeneration harvest that results in the removal of the majority of the overstory canopy would create open conditions generally not used by fisher. The development of sapling sized trees in about 15 years would begin to provide winter foraging opportunities for fishers whereas the development of large structural conditions for fisher denning and resting use could take 100 years or more.

Existing Condition

Introduction

In June 2011, the USFWS determined that listing the fisher as threatened or endangered was not warranted at the time (USFWS 2011a). This finding was in response to a petition to list a distinct population segment of the fisher in its U.S. Northern Rocky Mountain range, including portions of Montana, Idaho, and Wyoming. The USFWS determined that fishers in the Northern Rocky Mountains met the definition of a distinct population segment because they are geographically separated from other fisher populations, and because the loss of this population would result in a significant gap in the range of the species and the loss of a unique genetic identity found nowhere else within the range of the species. Based on the existence of fisher throughout much of its historic range in Montana and Idaho, including "an increase in number and distribution since their perceived extirpation in the 1920s" (USFWS 2011a, pg. 38515), and no indications that other natural or anthropogenic factors are likely to significantly threaten the existence of this distinct population segment of fisher (pg. 38531), the USFWS concluded that the distinct population segment "is not now, or in the foreseeable future, threatened by other natural or anthropogenic factors affecting its continued existence, or that these factors act cumulatively with other potential threats, to the extent that listing under the Act as an endangered or threatened species is warranted at this time" (USFWS 2011a, pg. 38531).

Ruediger et al. (1994) provided a regional hierarchical approach to addressing fisher habitat and identified the KNF as a primary habitat area for fisher. Forest-wide, fisher habitat is abundant at about 703,423 acres and exceeds the upper range of historic variation of approximately 671,150 acres (ERG 2012). This appears to be due to the lack of disturbance processes in the recent past, especially wildfire.

Fisher Occurrence

Johnson (2004) shows fisher presence confirmed in five of the eight planning units on the KNF, including the planning unit in which the project area is located. State harvest records and

Regional monitoring data indicate that fishers have been documented within and immediately adjacent to the project area several times between 2001 and 2009 (USFS 2012 and project record). The locations of these observations are associated with drainages, such as the Kootenai River and O'Brien Creek. Fishers are not regularly observed species, especially during the summer when they tend to be active at twilight and through the night (NatureServe 2011). This generally limits incidental observations of fishers by District employees or recreational users. Some of the records available as part of the Regional monitoring effort noted that both male and female fisher were documented within the project area.

Description of the Analysis Area

Although fisher are found within landscapes that have high levels of contiguous cover and mid to late seral conditions, their home ranges include a diversity of forest successional stages and plant communities (Lofroth et al. 2010, Raley et al. 2012). Some studies have shown positive association with young successional stages such as pole-sapling and young forest (e.g., Jones 1991), possibly because of prey resources associated with these environments. In particular, Jones (1991) observed fisher shifting their use of habitat seasonally, with mature and old-growth forests being used in the summer and young forest cover types used more in the winter. More recent research looking at fisher habitat selection is consistent with these findings. While fishers generally avoid openings, their home ranges include a variety of forested and even non-forested conditions as well as structural diversity within stands of mature forest (Schwartz et. al 2013, Sauder and Rachlow 2014).

In summary, although mature forests are beneficial in that they provide most of the structural complexity necessary for resting and denning (e.g., large trees with cavities, mistletoe brooms, and complex branch systems), young forests may provide more foraging opportunities during winter. Therefore, a combination and mosaic of these habitat types appear to be important in providing annual resources for fishers and both were considered as providing habitat for fisher within the project area. Approximately 16,235 acres (30 percent) of mature forest stands ("yearlong habitat") are available for fisher use within the project area as well as approximately 5,873 acres (11 percent) of young successional forest habitat ("winter foraging habitat") created through past harvest or recent natural disturbance such as wildfire. Considering both habitat conditions, approximately 22,108 acres of fisher habitat is available on NFS lands within the OLY project area which is about 41 percent of the total NFS acres. When considering the relative composition of yearlong and winter foraging habitats compared to the total fisher habitat found within the project area, about 73 percent occurs as yearlong habitat and 27 percent as winter habitat (see Table 169). Based on Jones (1991), the level of fisher habitat available within the project area would be able to support a reproductive group of fishers that includes approximately two adult females and one adult male.

The relative abundance of fisher habitat within the OLY project area is due to the availability of mesic habitat types, including riparian areas, which appear to be important habitat for travel, resting, denning, and foraging as these habitats often provide the complex forest structure desired by fishers. The majority of the project area (about 52 percent) falls into the warm/moist biophysical setting which consists of the more mesic and productive habitat types used by fishers, including an abundance of trees in the medium to large size classes (see Forest Vegetation section). Also, there is an abundance of streams and associated riparian areas throughout the project area that can provide for fisher travel within and between suitable habitat types. Although fishers are not dependent on old growth habitat, old growth found within the project area would provide the important structural elements used by fishers and, therefore, makes up a portion of the

available fisher habitat. As discussed in the Old Growth section of this document, approximately 11 percent of the forest habitat within the OLY project area is old growth. The majority of these old growth acres (about 67 percent) are within the warm/moist biophysical setting.

Large snags and coarse woody debris are important structural characteristics of fisher habitat, whether occurring within old growth or riparian habitats or identified as yearlong or winter foraging habitats for the purpose of this analysis. The following summary of the existing condition for snags and down coarse woody debris is from the Forest Vegetation section. Bollenbacher et al. (2009) provides an estimate of snag densities for Western Montana Forests, including the KNF, based on three habitat groups which correspond closely to the biophysical settings used in the 2015 Forest Plan. The warm/moist biophysical setting has the highest density of snags of all size classes due to the increased productivity of these sites and the occurrence of periodic mixed severity fire events between stand replacing fires. These conditions support the establishment and growth of large trees that become future snags. Except in roaded areas closer to the town of Troy, Montana, snag densities within the OLY project area are expected to be similar to the conditions described for the Forest. Regarding the availability of coarse woody debris, the Forest Vegetation analysis states that "Existing tons/acre of coarse woody debris generally exceed the 2015 Forest Plan guideline and the level is currently being met mostly in the form of smaller diameter coarse woody debris with larger coarse woody debris, especially those greater than 16 inches, having greater occurrence within some units than others." Any deficiencies noted tended to be in the warm/dry biophysical setting rather than the warm/moist biophysical setting.

In addition to displaying the acres of fisher yearlong and winter foraging habitats within the OLY project area, Table 169 summarizes the availability of old growth and riparian habitats and associated large forest structure that contribute to the suitability of fisher habitat here.

Table 169. Resource Indicators and Measures for the Existing Condition

Resource Element	Resource Indicator	Measure	Existing Condition (Alternative 1)
Yearlong Habitat	Vegetation management occurring in mature forests within mesic habitat types	Acres of yearlong habitat (percent composition)	16,235 acres (73%)
Winter Foraging Habitat	Vegetation management occuring in mature and/or young forests within mesic habitat types	Acres of winter foraging habitat (percent composition)	5,873 acres (27%)

Resource Element	Resource Indicator	Measure	Existing Condition (Alternative 1)
Forest Structure	Availability of large structural components, including trees,snags, coarse woody materials, and old growth and riparian habitats	Maintenance or promotion of these structural characteristics and habitat that exhibit these characteristics	An abundance of mesic habitat types which influences the availability of large trees, snags, and coarse woody materials as well as the relative proportion of old growth habitat suitable for fisher use. Also, there is an abundance of streams and associated riparian habitats

Landscape Arrangement and Fisher Use

In general, the location of fisher habitat is associated with stream corridors and often along stream bottoms or on north-northwest facing slopes. These patches of suitable habitat are interspersed with drier habitat types in the lower elevation areas or on south facing aspects or colder subalpine habitats in the higher elevation areas. Although these areas are generally not considered suitable for prolonged fisher use, these habitat types and broad physical arrangement occurred historically within the project area which has continued to support recent fisher occurrence and use. The abundance of streams and riparian habitats associated with the upland mesic habitats within the project area not only provides suitable fisher habitat, but would also facilitate movement between patches of fisher habitat. Also, the distances between suitable habitats are relatively short and within the movement capabilities of a wide-ranging species with large home ranges.

Although riparian and other mesic habitats are relatively abundant, fire exclusion has reduced the scope of mixed-severity fires which would have introduced vegetative diversity into the landscape and within stands. Stands are becoming more homogenous in patch size, pattern, and age class/size and the existing conditions are beginning to trend away from desired conditions for these mesic habitat types (see the Forest Vegetation section). Within fisher habitat, past harvest activities have introduced most of the structural diversity although did not capture the larger patch sizes of natural wildfire disturbance events (ibid, also see project file). Therefore, the conditions of fisher habitat (e.g., type, age, composition, patch size, and arrangement) are expected to be moving away from historical conditions within the project area as well.

Environmental Consequences

Alternative 1 – No Action

A range of fire severity, from non-lethal to stand replacing crown fires, historically played a role in developing the vegetative characteristics in the OLY project area. Although the type and frequency of fire experienced varies within a given area and vegetation type (based on biophysical setting), with some being more prone to infrequent stand replacing fire, the vegetation types within the project area have historically experienced low and/or mixed severity fires at least periodically. These natural disturbance regimes favor fire tolerant species, including older and larger diameter seral tree species such as western larch, western white pine, and ponderosa pine. The exclusion of low to moderate severity fires through fire suppression has altered the amount of shade-tolerant species in the understory of these forested stands as well as

increased fuel loadings in the form of ladder fuels and downed woody materials. Fewer fires have also reduced the amount of natural openings, structural diversity, and the number/size of patches across the landscape. Fire suppression has not yet resulted in a departure from historic ranges for all stands within the project area (especially those with naturally longer fire return intervals), although they too are trending towards a departure. Due to the denser fuel conditions, resulting stand replacing fires in these stands often kill many of the overstory trees which historically survived mixed-severity wildfires. In addition, the close proximity to Troy, MT influenced the removal of snags and down woody materials in the lower elevation sites. In general, the resultant stand patch sizes and occurrence, species composition, stand structure, and fire frequency and severity are departing from desired vegetative conditions based on historic range of variability within the project area. See the Fuels Management and Forest Vegetation sections for more detail.

Under Alternative 1 no active management would occur within fisher habitat. Therefore, no direct effects to travel, resting, denning, or foraging habitat would occur from proposed federal actions. However, with continued fire suppression and lack of active management, the indirect effects of this alternative would include a continued trend towards uncharacteristic vegetative conditions and increased potential for severe fire behavior within the project area (see the Fuels Management and Forest Vegetation sections).

Complex forest structure such as large snags, large coarse woody debris, and high canopy cover are important structural components of fisher habitat. The highly productive nature of the mesic habitat types found in the project area has produced large trees and coarse woody debris. However, it has also resulted in dense, homogenous stands with little to no understory vegetation and diversity for prey species in these habitat types. Historically, periodic mixed severity fires introduced internal diversity within regenerating stands that developed following large stand-replacing fires (see the Forest Vegetation section). Without this smaller periodic type of natural disturbance, there is no development of smaller pockets of habitat diversity across the landscape. Also, the potential for high severity wildfire to spread into these more moist habitats is likely to increase due to uncharacteristic vegetative conditions and could result in changes in habitat availability and suitability for fishers over very large areas. Past stand-replacing fires in these habitat types in the project area resulted in patches sizes from approximately 5 to 2,000 acres (see the Forest Vegetation section) and have greater potential for consumption of existing large structural components of fisher habitat.

Alternatives 2, 3, and 4 – Direct and Indirect Effects

Vegetation management can simulate natural processes and create conditions that encourage the development of large structural components and open up dense stands that improve conditions for fisher prey species. Management activities are restricted in riparian corridors by the 2015 Forest Plan direction and generally remain un-fragmented and available as habitat for fishers. By adhering to 2015 Forest Plan direction, proposed vegetation management activities would maintain the important structural elements of fisher habitat (e.g., retain large trees, snags, coarse woody debris, and mosaics of cover and forest structure) as well as connectivity within and among yearlong, winter, and other habitat types. The development of a mosaic of stand structure and composition that is more resilient to natural disturbance processes would benefit fisher use in the long-term.

Project Design Features and Mitigation Measures

Fishers have been documented within the project area; however, there are no known dens or resting sites. Therefore, there are no design features or mitigation measures for fishers at this

time. However, a general wildlife design feature has been identified that would ensure protection for active fisher dens sites discovered during planning or project implementation (see Design Features in Chapter 2). Also, see the "Potential Disturbance' discussion below. This is consistent with FW-DC-WL-01 which has a desired condition to keep den sites relatively free of human disturbance during their active period. This also addresses guideline FW-GDL-WL-21.

Availability of Yearlong and Winter Foraging Habitats

Fishers evolved in forest types where fire frequency and intensity was mixed and windthrow was common, resulting in complex and intricate landscape mosaic of young, mixed-age, and late-seral components (Jones 1991). In areas where natural disturbance processes such as wildfire have been reduced or altered, vegetation management may provide a means to simulate and re-introduce these natural processes. Timber harvest can improve foraging and denning/resting opportunities for fisher by influencing the abundance and spatial arrangement of habitat types (e.g., canopy cover, seral age, edge) provided through a mosaic of mature forest and more open, younger forest conditions. Regeneration harvest is generally the most appropriate and efficient treatment to achieve these types of desired results in the mesic habitat types preferred by fishers. See Table 170 for the type and amount of vegetation management proposed within fisher habitat.

Table 170. Acres of Proposed Vegetation Management Treatments within Fisher Yearlong and Winter Foraging Habitats

Vegetation Management Treatment	Existing Condition (Alternative 1)	Alt 2	Alt 3	Alt 4
Regeneration Harvest	0 acres	Yearlong: 1,034 acres Winter: 60 acres	Yearlong: 1,005 acres Winter: 58 acres	Yearlong: 776 acres Winter: 58 acres
Intermediate Harvest	0 acres	Yearlong: 48 acres Winter: 0 acres	Yearlong: 48 acres Winter: 0 acres	Yearlong: 51 acres Winter: 0 acres
Fuels Treatments	0 acres	Yearlong: 28 acres Winter: 1 acre	Yearlong: 43 acres Winter: 4 acres	Yearlong: 35 acres Winter: 4 acres
Total Treatments	0 acres	Yearlong: 1,110 acres Winter: 61 acres	Yearlong: 1,096 acres Winter: 62 acres	Yearlong: 862 acres Winter: 62 acres

Yearlong Habitat

Regeneration harvest is proposed in fisher habitat. Within this mesic forest type, the vegetation type is dominated by western red cedar/western hemlock and some grand fir. In general, these stands have high canopy closure and contain little to no ground, shrub, or small conifer cover in the understory which may not be optimal for fishers due to a reduced potential for the availability of prey species. Regeneration harvest would, in general, remove most trees except the existing healthy early seral species. This would result in an early seral community, both in structure and species composition. Tree species composition and health is variable among and/or within stands and although categorized as regeneration harvest, a range of overstory structure and canopy cover would be retained where available. Post-harvest retention would range from few trees per acre to portions resembling an intermediate harvest. In all units, where feasible, retained trees would be grouped together in clumps of 4-12 or more trees especially in those areas with fewer, quality leave trees available and along open roads. This is intended to better protect the leave trees as well as provide small areas of forested habitat for wildlife use, including use by fishers. Fishers

using younger or more open forests selected sites that provided greater amounts of large diameter trees, snags, and down coarse woody debris or shrub cover (Jones and Garton 1994, reviewed in Lofroth et al. 2010).

Alternative 2 proposes a total of 1,034 acres of regeneration timber harvest within fisher yearlong habitat which would reduce the amount of this habitat to 15,201 acres. This would result in an approximately 4 percent change in composition in the two types of habitats within the project area. Regeneration harvest would temporarily convert existing fisher habitat into non-habitat. However, shrub cover would be expected within 5 years which would begin to provide foraging opportunities and cover for fisher. Within 15-20 years conifers would have re-established to a size and density to provide winter habitat for snowshoe hares which are a fisher prey species (see the "Winter Foraging Habitat" discussion below, as well as Canada lynx analysis for project impacts to lynx and snowshoe hare habitat). As mentioned above, higher canopy cover would be kept in areas of healthy desired tree species, additional clumps of large trees showing signs of existing wildlife use (e.g. old pileated woodpecker nest cavities) or disease would be left for wildlife use and cover, and desired levels of snags and down coarse woody debris would be retained as well. These remnant structural components would encourage post-harvest use of these stands by fishers.

This alternative proposes unit sizes greater than 40 acres. These large patch sizes and shape mimic natural disturbance processes like wildfire and allow greater flexibility to work around and maintain features like hardwood patches, wet areas, or patches of leave trees, where available, that would increase within stand diversity in the greater cut area boundary and an increased potential for a variety and abundance of prey species. Also, edge habitat would be created along the boundary of the units. Larger unit boundaries are adjacent to different types of habitat (e.g., numerous RHCAs which were excluded from units, past harvested areas, unharvested areas, and old growth) resulting in a mosaic of habitat types and seral stages (e.g., greater interspersion of winter foraging habitat with yearlong habitat) and connectivity would remain between drainages. Also, in the long-term, larger patch sizes would provide more interior forested habitat as these patches go through the successional stages and subsequent vegetation management treatments.

Because Alternative 3 proposes about 30 acres of regeneration harvest less than Alternative 2, the effects of regeneration harvest in Alternative 3 would be similar to those described for Alternative 2. Similarly, this alternative also includes harvest units over 40 acres in size. In contrast, Alternative 4 keeps units size to 40 areas or less and proposes about 258 less acres of regeneration harvest (see Table 170 above). Because of the size constraints set for this alternative, the proposed units are patchier in nature on the landscape and there would not be as much within stand variability. Alternatives 2 and 3 would result in the greatest change towards meeting desired vegetative conditions for the project area which includes increasing habitat diversity while maintaining structural components such as large trees, snags, and down coarse woody debris. Also, larger units require fewer periods of vegetation management related disturbance and displacement effects and would provide greater amounts of secure interior habitat and connectivity within and between this interior habitat in the future for this greater treated area.

Table 171 displays the changes in acres and percent composition of fisher habitat that would result from each alternative. Alternative 1 (No Action) represents the existing condition.

Table 171. Resource Indicators and Measures for Alternatives 2, 3, and 4

Resource Element	Resource Indicator	Measure	Existing Condition (Alternative 1)	Alt 2	Alt 3	Alt 4
Yearlong Habitat	Vegetation management occurring in mature forests within mesic habitat types	Acres of yearlong habitat (percent composition)	16,235 acres (73%)	15,201 acres (69%)	15,230 acres (69%)	15,459 acres (70%)
Winter Foraging Habitat	Vegetation management occuring in mature and/or young forests within mesic habitat types	Acres of winter foraging habitat (percent composition)	5,873 acres (27%)	6,907 acres (31%)	6,878 acres (31%)	6,649 acres (30%)

Proposed intermediate harvest and fuels treatments (in general) would occur in healthy stands where the desired species composition and structure is available. As shown in Table 170, relatively few acres of intermediate harvest and fuels treatments are proposed within yearlong fisher habitat and the amount is similar among all alternatives. Few acres are proposed within yearlong habitat because these treatments generally would not achieve the desired conditions for species composition, forest structure, tree size, and patch size within the mesic habitat types. For these units, the existing vegetation type likely falls on the lower end of the moisture range for this biophysical setting and species composition and structure is more like stands that fall within the warm/dry biophysical setting. The goal of the proposed treatments within these stands would be to thin the overstory and/or understory conifers in order to maintain the desired conditions and encourage continued tree growth, understory vegetation diversity, and stand health. Improved development of the understory would provide a variety of micro-habitat sites for fisher prey species while increased growth in the overstory would provide escape cover, denning, and resting habitats. The proposed treatments would not result in an overall change in the existing structure and would maintain the existing type and level of fisher use while promoting a potential increase in future use.

Winter Foraging Habitat

Within winter foraging habitat, regeneration harvest would re-set stand structure back to an early seral structural stage. Within a few years, fishers would once again be able to use this habitat for winter foraging opportunities in addition to those provided within yearlong habitat and the proposed treatment would not markedly change its current use by fishers. Relatively few acres of regeneration harvest are proposed within winter foraging habitat with a similar amount proposed for each alternative, with about 58 to 60 acres (see Table 170).

Regeneration harvest within yearlong habitat would contribute to an increase in the percent contribution of winter foraging habitat within approximately 15 to 20 years. Alternative 2 proposes approximately 1,304 acres of regeneration harvest in yearlong habitat which would increase the availability of winter foraging habitat within the project area from 5,873 to 6,907 acres. This would result in an approximately 4 percent change in composition in the two types of

habitats within the project area (see Table 171 above). Similarly, Alternative 3 would result in an approximately 4 percent change with 1,005 acres of regeneration harvest proposed. Alternative 4 would have the smallest increase in future winter foraging habitat with a 3 percent increase and totaling approximately 6,649 acres. This would increase the composition of winter foraging habitat to about 30 percent of the total fisher habitat within the project area compared to 31 percent for both Alternatives 2 and 3. See Table 171 for a summary of acres occurring within winter foraging habitat and changes to the percent composition of fisher habitat.

No intermediate harvest would occur within winter foraging habitat given the mesic habitat type and younger age of the stand. Approximately 1 to 4 acres of fuels treatments are proposed within winter foraging habitat for Alternative 2 and Alternatives 3 and 4, respectively (see Table 170). These stands tend to be on the drier end of the warm/moist biophysical setting and the small amount of thinning would not change the structural characteristics of the stand for fisher use.

Forest Structure

Trees and Snags

Healthy trees of the desired species would be kept within harvest units where available, with emphasize placed on keeping the larger diameter trees. This includes trees that exhibit existing wildlife use which would be kept for current and future cavity habitat. Keeping these large trees on site helps contribute to both current and future structural diversity within the stand as standing live trees and future snags and coarse woody debris. Similarly, all snags would be left standing on site where they do not pose a safety hazard as they also contribute to the structural diversity of the stand. Silvicultural prescriptions would incorporate recommendations for the number of snags based on the biophysical setting. Proposed post-harvest girdling of mistletoe infected western larch, especially in stands where snags are limited, would increase snag densities within those units. This would consistent with vegetation desired conditions for snags to provide for wildlife use. The desire is to maintain a range of existing large snags throughout the forest and, over time, increase the number of large-diameter snags (20-inches diameter at breast height or greater) through the retention of large live trees for future snags (i.e., FW-DC-VEG-07, FW-GDL-VEG-04, and FW-GDL-VEG-05) for wildlife use. See the Forest Vegetation section for more information.

The retention of large healthy trees and snags would maintain this structural component important for fisher use. In intermediate and fuel treatment stands that would continue to provide high canopy cover, this structure would continue to be available for denning and rest sites. In regeneration harvest units, the retention of these large structural characteristics improves the potential for fisher use of the young stands as winter foraging habitat as they provide a means by which to escape predators. By opening up the canopy and reducing competition, more sunlight, nutrients, and water are available to the remaining trees. These improved growing conditions would promote the development of large diameter trees and future snags over time. Therefore, proposed treatments would be consistent with FW-DC-WL-12 which states a desired condition for trees and snags greater than 20-inch diameter at breast height to be available throughout the Forest.

Down Wood

As for snags, the 2015 Forest Plan desired size and levels of coarse woody debris would be incorporated into the silvicultural prescriptions. During harvest, emphasis would be placed on retaining the larger materials based on availability which are more beneficial to wildlife species,

including fishers. As a result of harvest and prescribed burning, there generally is a short-term reduction in the availability of smaller sized down material that is piled and/or consumed by fire whereas larger materials generally are not fully consumed while underburning the unit. Generally the desired level of coarse woody debris can be met within mesic habitat types due to the existing level of coarse woody debris as well as additional materials generated through harvest. Also, snags fallen for safety would be left on site and the girdling of western larch infected with mistletoe would result in the creation of snags that eventually would provide additional coarse woody debris over time. This would be consistent with vegetation desired conditions for down wood to provide for wildlife use. The desire is to maintain a range of existing amounts, sizes, species, and stages of decay as appropriate for the biophysical setting and future coarse woody debris would be recruited by leaving trees and snags that fall or are felled during vegetation management activities on site (i.e., FW-DC-VEG-08, FW-GDL-VEG-03, and FW-GDL-VEG-06) for wildlife use. See the Forest Vegetation section for more information.

Forestwide desired condition FW-DC-WL-13 describes a desired condition that down wood, especially logs, are available throughout the forest for terrestrial species whose habitat requirements include this component. Overall this level is generally being exceeded within the proposed units, especially within the more mesic habitat types, and this would be expected within other more recently harvested stands that were implemented following prior Forest Plan direction as well as unharvested stands. In addition, through silvicultural prescriptions, implementation, and future recruitment the proposed stands would continue to contribute to the availability of large down coarse woody debris levels throughout the Forest for fisher use. As stated above for trees and snags, the retention of these large structural characteristics improves the potential for fisher use of the young stands as winter foraging habitat as they provide a means by which to escape predators. This would be consistent with FW-DC-WL-13.

Old Growth Habitat

Small scale disturbances such as fire, windthrow, insects, and disease create gaps in stands or result in tree mortality that increase structural diversity including multi-age and size classes, canopy layers, snags, and down coarse woody debris (Lofroth et al. 2010). However, mesic old growth habitats within the project area are experiencing a departure from desired conditions due to the lack of mixed severity fire which has resulted in higher stand densities and an increased abundance of shade tolerant species. By improving the stands' resistance and resiliency to disturbances and stressors, the existing old growth characteristics would be maintained longer into the future. Proposed vegetation management would occur within a very few acres of old growth in the mesic habitat types preferred by fishers, including approximately 14 acres of intermediate harvest and 21 acres of fuels treatments. The maintenance and improved development of the large structural components of these sites would benefit fisher use longer into the future. Impacts to old growth habitat are disclosed in the Old Growth section. Maintenance of old growth habitat interspersed with riparian, other forest, and edge habitats would continue to provide denning, resting, travel, and foraging habitat for fisher use and would be consistent with FW-DC-WL-11.

Effects of the action alternatives could result in short-term disturbance and avoidance of old growth areas during implementation within the old growth stand or adjacent stands. However, these activities are not expected to reduce fisher denning, resting, or forage habitat in old growth as important characteristics (quantity of large trees and logs per acre) would be retained.

Riparian Habitat

Within the analysis area, RHCA corridors would not be treated and are located outside of harvest and prescribed fire unit boundaries. Proposed recreation improvements and watershed work would occur within riparian habitat near lake shores or at stream crossing restoration sites, respectively, but these activities would not alter the riparian vegetation of the site. Riparian habitat would remain available for fisher use as a primary use area and/or for travel. These activities would occur within areas of previous disturbance and would not change the existing condition of the riparian habitat. This would be consistent with the 2015 Forest Plan desired condition to provide a mosaic of aquatic and riparian habitat with a low level of disturbance for associated species (FW-DC-WL-10).

Landscape Characteristics and Fisher Use

The OLY project area provides a high level of mesic habitat types and riparian areas with large structural components that are important for denning, resting, and foraging opportunities for fishers. Although this habitat type is generally considered to provide suitable habitat for fishers, other characteristics of these habitats with which fishers evolved with are beginning to depart from historical conditions. A variety of factors have contributed to this departure; however, fire suppression has played a key role across biophysical settings and forest types. This includes an over-abundance of late seral species like western red cedar and western hemlock and below desired levels of early seral species like western larch within mesic habitat types. Also, the Forests Vegetation section states "across the project area, there has been a homogenization and simplification of landscape patterns for forest structure. Landscapes have increasingly become dominated by large patches of medium size trees and there is less variability in internal structure or composition of these medium size patches. Meanwhile, the patches of the smallest and largest size classes are fragmented into smaller patches with more edge and less interior area (2015 Forest Plan p. 85)." See the Forest Vegetation section for more details.

Sauder and Rachlow (2015) looked at fisher habitat selection within the core use areas of their home ranges. In contrast to fishers' selection of mature forest and large structural characteristics at both the larger landscape and smaller site scales, habitat heterogeneity is important for fisher selection within their home ranges. For fishers, habitat heterogeneity means intermediate amount of high canopy cover areas and edge habitats. The abundance of mature forested habitat within the project area currently provides for fisher selection at the landscape and site scales; however, based on the trend towards homogeneity in patch size and structure, the available habitat may be becoming less suitable for fisher habitat selection and use within the core area of their home ranges. This and other recent findings (e.g., Schwartz et al. 2013, Sauder and Rachlow 2014, and Olson et al. 2014) is consistent with Lofroth et al. (2010), which describe fishers' home ranges as being composed of a mosaic of forested habitats and successional stages and that they appear to be flexible in their use of these vegetative conditions.

Therefore, vegetation management that trends the existing condition towards the desired vegetative condition for the habitat would benefit fishers in the long-term. Mature mesic forested habitat preferred by fishers would be treated through proposed timber harvest and fuels treatments (see Table 170 above). For all treatments, existing large forest structure would be maintained where available and the development of large structure would be promoted which would provide for existing and future fisher use. In general, the regeneration harvest units have high canopy closure and contain little to no ground, shrub, or small conifer cover in the understory. Although these stands provide the large structural components important for denning and resting, fisher use of these stands for foraging may be limited under the current condition.

Regeneration harvest would trend towards desired vegetative conditions by increasing the amount of early seral conditions and tree species composition on the landscape. Although fishers are not highly associated with these early seral conditions, the occurrence of these habitats do appear to contribute to the suitability of fisher home ranges and the proposed treatments would be consistent with FW-DC-WL-19 which describes a desire to provide habitat for native fauna whose life/natural history and ecology are partially provided by those habitats. Harvest would occur in a range of unit sizes (e.g., less than 10 acres to over 100 acres, depending on the alternative) that would introduce a mosaic of patch sizes, edge habitats, and structural diversity within both the overstory and understory vegetation in areas of homogenous mature stands or mixed areas that also provide older past harvest units. Overtime, continued management through thinning would provide a diversity of within stand structural diversity by promoting the development and growth of multi-aged stands for fisher use in the future. This is consistent with the results of Schwartz et al. (2013) in which fishers showed a preference for mature stands with both large and smaller trees. Intermediate harvest and fuels treatments would occur in stands that exhibit desired vegetative conditions and treatments would maintain and/or improve upon the desired conditions. In addition, treatments improve the potential for harvest units to serve as future fuel breaks in the event that a severe wildfire moves through the area. By breaking up the continuous fuels, it may influence the behavior of a fire such that a mosaic of wildfire severity occurs that creates a variety of habitat types (e.g., seral stages) while better maintaining old growth and riparian habitats as it would have under natural disturbance patterns.

Proposed activities would have minor impacts on fishers and their habitats under all action alternatives. Although the change includes a minor reduction in yearlong habitat, there would be an improvement in the species composition of the stands, patch size, edge, and mosaic of conditions that would provide for the range of fisher habitat needs in the long-term. This minor reduction in yearlong fisher habitat and shifting location of occurrence on the landscape is consistent with results analyzed for the KNF (ERG 2012). Analyzed habitat levels for the KNF demonstrates that fisher habitat would remain within historic ranges under the 2015 Forest Plan management direction over the next five decades and that the driving forces behind habitat change is due to natural disturbance processes, especially wildfire. Also, the results showed that habitat does not remain fixed in locations on the landscape and that 2015 Forest Plan management direction provides more habitat over time than other scenarios due to a reduction in acres burned and wildfire severity (ibid). In addition, the USFWS (2011a) listing decision notes that fisher populations have increased in numbers and distribution despite the effects of anthropogenic activities. Management activities implemented to protect other species, including grizzly bears, Canada lynx, and bull trout likely benefit fishers as well (see appropriate analyses). Finally, the listing decision concludes that “the best scientific and commercial information available does not indicate that current or future forest management practices and timber harvest threaten the fisher now, or in the foreseeable future” (USFWS 2011a, pg. 38251). For all action alternatives, the proposed regeneration harvest would result in a minor reduction in yearlong habitat and a corresponding increase in the amount of young forested conditions within fisher habitat that would provide structural diversity, for both stand structure and the creation of edge.

Potential for Disturbance

Fisher denning and early kit rearing season occurs from late February through early June. Project design does not include specific timing constraints for the fisher. However, due to timing restrictions for grizzly bear (no harvest activity April 1-June 15) and other resources (e.g. soils) most activities would be limited during this timeframe. Timber harvest could take place June 16-March 31. However, due to decreased snow cover and the lack of freezing soil conditions, winter

logging would be expected to generally end in February if not before in the OLY area. This would reduce the effects to fisher during the important breeding, denning, and rearing period.

The primary effects of the proposed timber harvest, primarily regeneration harvest, to fishers would be the alteration of the current distribution of habitat types and use of these habitats within a home range, reduced use of stands with little remaining cover until the understory recovers, and temporary disturbance during activities. However, because potential disturbance would occur on a maximum of 1,110 acres which represents less than 7 percent of the entire fisher denning habitat available within the project area and available fisher habitat is capable of supporting roughly two female home ranges, it is unlikely that a female fisher would be denning in the treated areas. If, however, denning should be disturbed, the disturbance would only be for one operating season, affecting one reproductive season, and resulting in effects to individuals and not the fisher population. Suitable, undisturbed nearby denning habitat would be available for the next denning season.

Proposed ecosystem burns would not occur within the more mesic habitats within fisher habitat; however, the increase in human activity and/or the use of a helicopter to ignite proposed units may result in temporary disturbance to fishers occupying adjacent stands. This activity would be of short duration, as burns are expected to be completed within a day or two. Timing is weather dependent but spring burns could begin in April or May, during the breeding, denning, and rearing period. Because activities would not occur within the more mesic habitats that would likely provide the most suitable denning habitat conditions, the potential for disturbance during this period is expected to be minor and activities would not be expected to result in the displacement of denning fishers. The effects of the proposed burns would be short-term disturbance due to increased human presence but also long-term maintenance of habitat diversity that includes more open stand conditions in the drier habitat types. Other fuels treatments involve hand and/or machine work (i.e., slashing, scattering, grinding, and piling) along open roads. The potential for disturbance would be minor compared to the existing disturbance associated with the road use.

Cumulative Effects

The Existing Condition section describes relevant past and present factors affecting fisher habitat conditions in the project area. This cumulative effects section summarizes the past actions as well as further describes ongoing and other reasonably foreseeable contributions potentially impacting fisher habitat.

Spatial and Temporal Context for Cumulative Effects Analysis

Although the level of fisher habitat within project area could support both adult male and female fishers based on home range sizes identified in Jones (1991), the level of habitat is about 2,600 acres less than the approximate size identified by Sauder and Rachlow (2014) and used for the Regional Assessment. Therefore, the cumulative effects analysis area was expanded slightly to include combined boundaries of the three planning areas that make up the project area to capture potential activities that may impact fisher use of home ranges within the project area. This cumulative effects analysis area provides approximately 26,555 acres of fisher habitat with the majority (about 76 percent) occurring as yearlong habitat and would, conservatively, be expected to provide suitable habitat for a reproductive group of fishers.

Temporal boundaries for the fisher cumulative effects analysis are the same as for those described for the direct and indirect effects analysis. In summary, short-term effects are those that are

expected to last between a few days to a season or portion of two seasons. Long-term effects are those that expected to last longer than a couple of seasons as they are generally associated with loss or future development of forest structure that supports fisher use. Winter foraging habitat would developed within approximately 15 years following a vegetative disturbance event whereas the development of large structural conditions for fisher denning and resting use could take 100 years or more.

Past, Present, and Reasonably Foreseeable Activities Relevant to Cumulative Effects Analysis

Past Actions

Fisher will use a variety of habitat types, although mesic forest stands with moderate to high canopy cover that provide complex forest structure (including old growth) are important. The relative composition of fisher habitat, either as yearlong or winter foraging, is a result of past disturbance events both natural and human caused. Table 169 of this analysis summarizes the existing condition which reflects these past influences on fisher habitat in the OLY project area portion of the analysis area; the Spatial and Temporal Context for Cumulative Effects Analysis section describes the existing condition within the cumulative effects analysis area. Harvest has occurred in the analysis area since the 1950s. Prior to the 1990s, harvest resulted in the loss of overstory cover, old growth and riparian habitats, and large structural components found within other mesic habitats. Road construction that facilitated public motorized use increased the loss of snags and downed coarse woody debris for firewood. Detailed description of previous vegetation and road management activities are found at the beginning of Chapter 3, including Table 32 and Table 33, as well as Appendix F of this document. Historically, natural disturbances such as wildfire resulted in the development of complex forest structure and habitat diversity used by fishers. In contrast, fire suppression since the early 1900s has altered stand structure resulting in more homogenous stands lacking vegetative and structural diversity which has likely negatively influenced the availability and association of foraging habitat and prey species with denning and resting requirements.

Since the 1990s, application of Forest Plan direction has resulted in the retention of snags and coarse woody debris as well as protection of old growth and riparian habitats. Also, there has been greater emphasis on the restoration of habitats based on the existing condition as compared to the desired vegetative conditions for the habitat type, which influences the types of treatments proposed and the resulting vegetative conditions across the landscape. Application of management direction and trends has since provided better protection and maintenance of fisher habitat.

Alternatives 2, 3, and 4 – On-going and Reasonably Foreseeable Actions

Reasonably foreseeable actions include those federal, state, or private activities that are ongoing or scheduled to occur, independent of this federal action. Table 34, located at the beginning of Chapter 3, identifies those current and foreseeable actions in and adjacent to the project area that were determined to be appropriate for inclusion in the analysis of environmental effects.

Ongoing federal actions have been considered and included when formulating the existing condition of this analysis area. The potential for cumulative effects from other federal activities is limited as most either do not involve vegetation management or the proposed treatments are small in scope and limited to the removal of individual trees, such as hazard trees in campground, or small diameter trees (e.g., pre-commercial thinning). A portion of the District-wide Timber Stand

Improvement Project has yet to be completed within the analysis area and includes approximately 423 acres of pre-commercial thinning activities within winter foraging habitat. Treatments consist of removing small diameter conifers within previously harvested stands while any remaining large diameter trees, snags, and down woody debris would not be removed or altered by the treatments. The proposed thinning would encourage the growth of the remaining trees and help develop a diversity of tree ages and size within the stand over time. Cumulatively, effects to fisher habitat would be minor as the activities would not measurably change the existing characteristics of the stand at this time. However, the proposed treatments would help develop the structural diversity important to fishers that in time would provide for all fisher habitat requirements of denning, resting, foraging, and travel habitats.

Within the project area, future development opportunities are limited to approximately 3,802 acres (or about 5 percent) of private land not within corporate ownership. An additional 502 acres are located within the cumulative effects analysis area, to the west of the project area boundary. These lands are generally located in the lower elevation sites of the analysis area along the Kootenai and Yaak Rivers. Development of these lands likely altered and reduced some fisher habitat in these lower elevation riparian and mesic habitats. Habitat loss associated with home building and road construction or other habitat alterations would be negligible compared to the amount of riparian, old growth, and other upland mesic habitat available on NFS lands. Cumulatively, when other activities including the harvest on federal lands discussed under the proposed action alternatives and all past, present, and reasonably foreseeable activities are considered, habitat on federal lands is considered to provide sufficient mesic habitats with large structural characteristics to maintain a species whose life requirement are, at least in part, dependent on these habitat attributes.

Ongoing trapping activities are regulated by MFWP. The Forest Service influences hunter access through road management. There would be no changes in public motorized access under any of the action alternatives and there is no expected increase in trapping activities. In addition, the listing decision concluded that the distinct population segment of fishers is not threatened by overutilization for commercial, recreational, scientific, or educational purposes to the extent that listing under the act as an endangered or threatened species is warranted at this time (USFWS 2011a, pg. 38526). Therefore, potential cumulative effects related to trapping pressure or mortality would be negligible.

Based on the nature and magnitude of potential cumulative effects to fishers independent of this project, there are no cumulative effects anticipated that would change the effects determination to the fisher from implementation of the proposed federal actions.

Regulatory Framework Findings

2015 Forest Plan

The 2015 Forest Plan provides desired conditions, objectives, standards, and guidelines for fisher within the Wildlife Resource. The following are applicable to the actions in this project[24]:

[24] Goals, desired conditions, objectives, standards, and guidelines can be found on the noted pages in the 2015 Forest Plan.

Forestwide Direction

- p. 28, **GOAL-WL-02**: The KNF manages and schedules activities to avoid or minimize disturbance to sensitive species and manages habitat to promote their perpetuation into the future.

  Proposed harvest and fuels treatments would result in the retention of remnant large tree species, better approximation of stand patch size and species composition, protection of riparian habitats, improved stand health, and general movement towards the desired vegetative condition based on historic range of variation with the stands for this area. This would promote the development of large diameter trees and structural diversity that fishers appear to select for within their home ranges (see "Landscape Characteristics and Fisher Use"). Since fisher denning or resting sites are not known within the project area, there are currently no project design features specific to fishers. However, a general wildlife design feature has been identified that would ensure protection for active fisher dens discovered during planning or project implementation. Also, soil conditions and an activity timing restriction for grizzly bears would limit the amount of harvest related activities occurring during the denning and early rearing period. See "Project Design Features" and "Potential for Disturbance." Therefore, the OLY project would contribute progress toward achieving GOAL-WL-02.

- p. 28, **FW-DC-WL-01**: Nests and den sites and other birthing and rearing areas for terrestrial threatened, endangered, proposed, or sensitive species are relatively free of human disturbance during the period they are active at these sites.

  No fisher den sites are known within the project area; therefore, no specific timing or area restrictions have been identified at this time. However, a general wildlife design feature has been identified that would ensure protection for active fisher dens discovered during planning or project implementation. Due to the large home range size and low density of this species, it is unlikely that a female fisher would be denning in the treated areas. Also, activity timing restrictions for grizzly bears would reduce the potential for disturbance at these sites during their period of use. See "Project Design Features" and "Potential for Disturbance." Therefore, the OLY project would contribute progress toward achieving FW-DC-WL-01.

- p. 29, **FW-DC-WL-10**: A mosaic of aquatic and riparian habitats, with a low level of disturbance, is available for associated species.

  Proposed activities are limited within riparian habitat. Those activities found within riparian habitat would occur in areas of previous disturbance and either would not change the existing condition of the site or would result in the improvement of the site for species like fishers that utilizes riparian habitats. See "Riparian Habitat." Therefore, the OLY project would contribute progress toward achieving FW-DC-WL-10.

- p. 29**, FW-DC-WL-11**: Old growth, or other stands having many of the characteristics of old growth, exists for terrestrial species associated with these habits.

  Proposed treatments are planned within old growth habitats in the project area, including approximately 35 acres within mesic old growth habitats. The proposed treatments are designed to maintain the existing old growth characteristics, encourage further development of these characteristics, while also making them more resistant to natural

disturbances. See the "Old Growth" discussion above as well as the Old Growth analysis. Therefore, the OLY project would contribute progress toward achieving FW-DC-WL-11.

- p. 29, **FW-DC-WL-12**: Trees and snags greater than 20-inch DBH are available throughout the forest. Wildlife species associated with the warm dry biophysical setting find large-diameter ponderosa pine, Douglas-fir, and other species of snags for nesting.

  Vegetation desired conditions direct that snags and large healthy trees of the desired species would be retained within the treatments units where available for wildlife use. Growing conditions would be improved by opening up the canopy and reducing competition which would promote the development of large diameter trees and future snags over time. See the "Trees and Snags" discussion above as well as the Forest Vegetation analysis. Therefore, the OLY project would contribute progress toward achieving FW-DC-WL-12.

- p. 29, **FW-DC-WL-13**: Down wood, especially down logs, are available throughout the Forest for terrestrial mollusks, reptiles, amphibians, small mammals, and other species who habitat requirements include this component.

  There is a vegetation desired condition to provide coarse woody debris for wildlife use. Silvicultural prescriptions would incorporate the desired size and levels of coarse woody debris based on biophysical setting. Retention of this material would depend on the existing availability, although generally the desired level of coarse woody debris can be met within mesic habitat types due to the existing level of coarse woody debris as well as additional materials generated through harvest. For all harvest units, the retention of live trees, snags, felled snags, and girdled western larch would additionally contribute to coarse woody debris recruitment over time. See the "Description of the Analysis Area" and "Down Wood" discussions as well as the Forest Vegetation analysis. Therefore, the OLY project would contribute progress toward achieving FW-DC-WL-13.

- p. 30, **FW-DC-WL-19**: By trending towards the desired conditions for vegetation, habitat is provided for native fauna adapted to open forests and early seral habitats, or whose life/natural history and ecology are partially provided by those habitats.

  The OLY project area is currently is not meeting desired conditions for forest structure associated with early seral conditions. Proposed vegetation management treatments would increase the amount of early seral habitats and trend towards the desired levels which would increase the amount of structural diversity within fisher habitat. See the "Landscape Characteristics and Fisher Use" discussion as well as the Forest Vegetation analysis. Therefore, the OLY project would contribute progress toward achieving FW-DC-WL-19.

- p. 30, **FW-OBJ-WL-01**: The outcome is the maintenance or restoration of wildlife habitat on 1,000 to 5,000 acres of NFS lands, annually, with an emphasis on restoration of habitats for threatened and endangered listed species and sensitive species.

  Implementation of proposed harvest and fuels treatments that result in a movement towards the desired vegetative condition based on historic range of variation would contribute to the maintenance of habitat for fishers by retaining large structural components of stands and introducing more landscape and within stand habitat diversity in an area that has become more homogenous due to fire suppression. See GOAL-WL-02

above as well as the "Direct and Indirect Effects" discussion. Therefore, the OLY project would contribute to the attainment of FW-OBJ-WL-01.

- p. 32, **FW-GDL-WL-21**: Management activities on NFS lands should avoid/minimize disturbance at known active nesting or denning sites for other sensitive, threatened or endangered species not cover under other forestwide guidelines.

  No fisher den sites are known within the project area; therefore, no specific timing or area restrictions have been identified. However, a general wildlife design feature has been identified that would ensure protection for active fisher dens discovered during planning or project implementation. Also, soil conditions and an activity timing restriction for grizzly bears would limit the amount of harvest related activities occurring during the denning and early rearing period. See "Project Design Features" and "Potential for Disturbance" as well as GOAL-WL-02 and FW-DC-WL-01, above. Therefore, the OLY project was designed in accordance with this guideline.

Federal Law

National Forest Management Act (NFMA)

The project would comply with NFMA direction to provide for diverse populations of plant and animal communities by applying Forest Plan Desired Conditions, Standards, and Guidelines.

Statement of Findings

Alternative 1 (No Action) **may impact individuals or their habitat, but will not likely contribute to a trend toward federal listing or cause a loss of viability to the population or species** for fishers. Although no management activities would take place that would reduce the availability of yearlong habitat or result in displacement/disturbance effects, the vegetative conditions would continue to trend away from desired conditions. This includes an increase in stand density that could lead to high severity, uncharacteristic wildfires throughout the project area. Such a wildfire could greatly reduce fisher habitat in the OLY area for a long period of time as few legacy, large structural components would remain in the resultant early seral landscape.

Alternatives 2, 3, and 4 (action alternatives) **may impact individuals or their habitat, but will not likely contribute to a trend toward federal listing or cause a loss of viability to the population or species** for fishers. This determination is based on: 1) a minor reduction in the availability of yearlong habitat and 2) a potential for short-term disturbance spread out through time and space; however, 3) there would no loss of fisher habitat within the project area, 4) the level of fisher habitat would remain within historic range of variation for the KNF over the next 50 years of vegetation management treatments (ERG 2012), 5) proposed treatments would maintain existing large structural components and encourage the development of characteristic vegetation and landscape patterns, including increased habitat diversity, 6) the minor increase in winter foraging habitat contributes to this diversity, 7) timing restrictions for grizzly bears limits the type and amount of activity occurring during the important fisher denning and rearing periods and reduces the potential for impacts to fishers during this time, 8) and potential effects would be to individuals and not the population.

Flammulated Owl

Introduction

Flammulated owls are cavity-dependent owls that inhabit mostly mature to old ponderosa pine and ponderosa pine/Douglas-fir stands with low to medium stem densities. They are migratory and are found on the KNF from May to mid-October. These small owls use large-diameter trees (generally 18 inches diameter at breast height or more), especially for nesting habitat, and prefer open stands with understory grass species for hunting moths and other insects. Areas of dense understory conifer thickets are important for roosting, thermal and escape cover.

Flammulated owl habitat use, therefore, is associated with specific forest types and structural characteristics that provide for their nesting, roosting, and foraging needs. Proposed vegetation management that impacts the availability and structural condition of stands providing dry ponderosa pine/Douglas-fir habitats is the main focus of the flammulated owl analysis. The analysis also considers the potential for disturbance to nesting pairs during the breeding season. Those activities that would not alter the vegetative conditions of these dry habitat types within the analysis area, e.g., proposed watershed improvement work, would not be considered for analysis.

Summary of Conclusions

Implementation of the OLY project's proposed actions results in a determination of **may impact individuals or their habitat, but will not likely contribute to a trend toward federal listing or cause a loss of viability to the population or species** to flammulated owls. Management of the OLY project area provides an opportunity to improve flammulated owl habitat which is relatively rare on the District. Proposed vegetation management would trend towards desired conditions for the warm/dry habitat type which would help maintain and improve the suitability of flammulated owl habitat within the project area.

Regulatory Framework

2015 Forest Plan

The 2015 Forest Plan provides overall guidance for the management of the lands on the KNF. It describes the goals, desired conditions, and objectives toward which the management of the land should be directed. And it establishes standards and guidelines to help achieve or maintain the desired condition or conditions, to avoid or mitigate undesirable effects, or to meet applicable legal requirements.

There are no plan components which provide specific flammulated owl habitat resource direction relevant to this project. However, there are other 2015 Forest Plan components that provide resource direction for a range of wildlife species or habitat conditions that are not specific to flammulated owls, but still are applicable to their management. The full list of the plan components applicable to flammulated owl management are found in the "Regulatory Framework Findings" section of this analysis.

Resource Indicators and Measures

Flammulated owls are noted for their association with ponderosa pine habitats consisting of large trees and open habitat conditions, although they have also been known to use dry Douglas-fir forest types with similar structural conditions. Management that maintains and/or restores the

characteristics of the dry habitat types, including the presence of ponderosa pine where suitable, the development of large overstory trees, and maintenance of an open understory with pockets of conifer thickets, would be beneficial for flammulated owl use now and into the future. Therefore, for the flammulated owl analysis, the resource indicators will be the maintenance or restoration of tree species composition and structure within suitable and potential future flammulated owl habitat as a result of proposed vegetation management (see Table 172). The overall assessment of flammulated owl habitat also considers other activities or conditions that can affect the potential risk of disturbance to owls within suitable habitat during the pair formation and nesting period, from May 1 through July 31.

Table 172. Resource Indicators and Measures for Assessing Effects

Resource Element	Resource Indicator	Measure	Used to Address: P/N* or Key Issue?	Source
Suitable Habitat	Maintenance and/or restoration of existing conditions that provides ponderosa pine, large trees, and open forest conditions	Acres treated; impacts to any known nests?	Purpose and Need	KNF Forest Plan FW-DC-WL-01, FW-DC-WL-12, FW-DC-WL-19, and FW-GDL-WL-16
Potential Habitat	Maintain and/or improve ponderosa pine composition while further developing imporant structural conditions of the stand	Acres treated	Purpose and Need	KNF Forest Plan FW-DC-WL-12 and FW-DC-WL-19

*P/N = Purpose and Need

Methodology

Flammulated owl habitat was identified using GIS layers on forest type, biophysical setting, and stand age/size as well as field review of the project area. All identified habitat includes forest types of either ponderosa pine or Douglas-fir which are found within or in close association with the warm/dry biophysical setting. Using stand age and estimates of tree size, this habitat was separated into two categories based on their current and/or future ability to provide for flammulated owl needs. Suitable habitat consists of those stands that currently provide large trees and open stand conditions that can support nesting flammulated owls. Potential habitat consists of those stands within the appropriate habitat type, but do not yet provide the structural conditions for consistent flammulated owl use. These areas include young regenerating stands of ponderosa pine which could develop into suitable habitat in the future. Although flammulated owls are not dependent on old growth habitats, old growth would provide the structural conditions suitable for flammulated owl use. Therefore, discussion of effects to flammulated owl habitat relies on the other habitat analyses in this document (i.e., Forest Vegetation and Old Growth).

Hayward and Verner (1994) identified 40 acres as the approximate home range size for flammulated owls. This value was used to determine an appropriate boundary for the cumulative effects analysis and the potential for flammulated owl use within the analysis area.

Data Sources

Detailed flammulated owl population ecology, biology, habitat description and relationships identified by research are summarized in Hayward and Verner (1994). More recent research on nesting, food habits, home range and territories, and habitat quality conducted in Colorado, Idaho, and Montana is discussed in Linkhart (2001), Linkhart and Reynolds (1997), Linkhart et al. (1998), Groves et al. 1997, Powers et al. (1996), Wright (1996) and Wright et al. (1997). These provided guidance in evaluating potential habitat and potential effects to flammulated owls, and are incorporated by reference.

Flammulated owl occurrence data comes from recent District wildlife observation records, surveys, Forest historical data (NRIS Wildlife Database) and other agencies (MFWP, MNHP).

Assumptions and Limitations

Flammulated owls prefer ponderosa pine forests and habitat types. However, no ponderosa pine habitat types are found within the OLY project area. Here ponderosa pine is found within the drier Douglas-fir habitats either as scattered trees or as the dominant species (i.e., forest type) depending on site conditions and past disturbance processes. Therefore, all stands identified as having a Douglas-fir forest type within a Douglas-fir habitat type were identified as contributing to flammulated owl habitat. This may result in an overestimation of habitat as ponderosa pine may not be found within all of these stands. However, the footprint of the area identified would encompass the habitat conditions necessary for potential flammulated owl use even if not on every acre. Also, where ponderosa pine is known to be a dominant species within the stand based on field review, these stands were changed from Douglas-fir to ponderosa pine suitable habitat for analysis.

Affected Environment

Spatial and Temporal Context for Effects Analysis

The analysis boundary for direct effects is the OLY project activity areas within suitable and potential habitat, since activities in these areas could result in habitat alteration, disturbance, and displacement to flammulated owls. The boundary for indirect effects to individuals and their habitat is the project area which includes all of the proposed treatment areas that could influence flammulated owl use. The boundary for determining contribution toward viability is the KNF.

Temporal boundaries for the flammulated owl analysis include both short-term and long-term effects. Short-term effects are those that are expected to last between a few days to a couple of seasons. Generally, once disturbance causing activities like harvest and prescribed burns have been completed flammulated owls can move back into and use the area. Long-term effects are those that are expected to last longer than a season or two. Within suitable habitat, vegetation management that results in the reduction of conifer encroachment and maintenance of more open conditions improves stand sustainability and suitability for flammulated owls. Without fire or maintenance activities, encroachment would be evident again within about 15 years. However, with continued maintenance activities or by allowing naturally occurring wildfire to burn in these areas the benefits to owls would continue much longer into the future. Restoration of unhealthy stands that currently do not provide suitable flammulated owl habitat, through the establishment of ponderosa pine and improved growing conditions, could develop suitable habitat within a hundred years.

Existing Condition

Introduction

A KNF status summary of the flammulated owl was documented by Johnson (2004). The summary shows that mapped habitat occurs across all eight planning units. Forest-wide, this habitat type is relatively uncommon and there are currently 23,984 acres of suitable habitat (ERG 2012). In all, there is approximately 72,265 acres of ponderosa pine/Douglas-fir habitat types that provide habitat for flammulated owls with the difference in the two values consisting of stands that currently have a higher canopy cover than preferred by flammulated owl on the Forest (ibid). These may be providing for some flammulated owl use which would be improved if treated to open up the canopy.

The population size on the KNF is unknown, but Forest-wide surveys in 2008 (n=159 points) documented 72 flammulated owl detections on 19.5 percent of the points, higher than any of the six Forests surveyed (Smucker and Cilimburg 2008).

Flammulated Owl Occurrence

Flammulated owl presence has been confirmed through surveys for two of the three planning areas that encompass the OLY project area (Johnson 2004). Although flammulated owl habitat is found within the project area, the availability of ponderosa pine dominated stands which flammulated owls prefer is limited. Based on this and the fact that flammulated owls have not yet been documented here, flammulated owl surveys which use taped owl calls to elicit a response from nesting birds have generally not been conducted within the project area. However, based on observations within similar habitats immediately to the west and south, flammulated owl surveys were conducted within suitable habitat during the springs of 2013 and 2014. Survey efforts were hampered by access, weather, and seasonal conditions (e.g., high stream levels contributing to background noise levels), especially in 2013. No flammulated owl responses were recorded (see project file).

Description of the Analysis Area

As described for the Forest, dry ponderosa pine/Douglas-fir habitat types are relatively rare on the District. In addition, early seral species like ponderosa pine were often preferentially selected during the early years of harvest activities especially in areas close to town. So although the OLY project area provides more of this habitat type than other areas on the District, the presence of ponderosa pine is well below the desired condition for this area which may currently limit flammulated owl use (see the Forest Vegetation section). In general, flammulated owl habitat is found within the lower elevation sites of the project area to mid-elevation sites with southern exposures.

Approximately 10,155 acres of suitable habitat are found here (see Table 173). This primarily occurs as Douglas-fir forest types as only about 1,564 acres are dominated by ponderosa pine (see project file) which is preferred by flammulated owls. These stands provide the tree size and species composition for flammulated owl use. However, although flammulated owls have been documented to use areas of greater canopy cover, they prefer more open stand conditions. Therefore, flammulated owl may be more limited in stands that have become denser over the years due to the lack of natural disturbance processes or past management compared to more open stands. Approximately 22 percent of the old growth occurring within the project area is found within the warm/dry biophysical setting which also contributes to flammulated owl habitat.

As for the mature forest acres, this old growth is dominated by Douglas-fir forest types (about 98 percent). See the Old Growth section for more details about the existing condition of old growth within the project area.

Potential habitat comprises approximately 2,876 acres of the total flammulated owl habitat in the project area (see Table 173). This makes sense as the seedling/sapling and small size classes are below or at the low end of the desired range for both the warm/dry biophysical setting and the project area as a whole (see the Forest Vegetation section). These stands may currently provide for some foraging opportunities, but due to their small size would not provide nesting or roosting opportunities for flammulated owls. The greatest percentage of trees is found within the large size class which contributes to flammulated owl suitable habitat.

Table 173. Resource Indicators and Measures for the Existing Condition

Resource Element	Resource Indicator	Measure	Existing Condition (Alternative 1)	Comments
Suitable Habitat	Maintenance and/or restoration of existing conditions that provides ponderosa pine, large trees, and open forest conditions	Acres treated; impacts to any known nests?	10,155 acres	No known nests within the project area
Potential Habitat	Maintain and/or improve ponderosa pine composition while further developing important structural conditions of the stand	Acres treated	2,876 acres	--

Environmental Consequences

Alternative 1 – No Action

A range of fire severity, from non-lethal to stand replacing crown fires, historically played a role in developing the vegetative characteristics in the OLY project area. Although the type and frequency of fire experienced varies within a given area and vegetation type (based on biophysical setting), with some being more prone to infrequent stand replacing fire, the vegetation types within the project area have historically experienced low and/or mixed severity fires at least periodically. These natural disturbance regimes favor fire tolerant species, including older and larger diameter seral tree species such as western larch, western white pine, and ponderosa pine. The exclusion of low to moderate severity fires through fire suppression has altered the amount of shade-tolerant species in the understory of these forested stands as well as increased fuel loadings in the form of ladder fuels and downed woody materials. Fewer fires have also reduced the amount of natural openings, structural diversity, and the number/size of patches across the landscape. Fire suppression has not yet resulted in a departure from historic ranges for all stands within the project area (especially those with naturally longer fire return intervals), although they too are trending towards a departure. Due to the denser fuel conditions, resulting stand replacing fires in these stands often kill many of the overstory trees which historically survived mixed-severity wildfires. Past vegetation management practices that targeted these old, large trees removed the relic seral species and further altered tree size and composition; this in turn has promoted the development of climax species and conditions. This has also influenced the

persistence of root disease in now Douglas-fir dominated stands as the seral species, such as western larch and ponderosa pine, are more resistant to these diseases. Planting of non-native ponderosa pine before breeding zones were understood has resulted in unhealthy stands that are not adapted to the local growing conditions. In addition, the close proximity to Troy Montana influenced the removal of valuable western larch, western white pine, and ponderosa pine trees and snags in the lower elevation sites that supported local development and supplies (e.g., firewood). In general, the resultant stand patch sizes and occurrence, species composition, stand structure, and fire frequency and severity are departing from desired vegetative conditions based on historic range of variability within the project area. See the Fuels Management and Forest Vegetation sections for more detail.

Under Alternative 1 no active management would occur within mapped flammulated owl habitat. Therefore, no direct effects from proposed federal actions would occur. However, with continued fire suppression and lack of active management, the indirect effects of this alternative would include a continued trend towards uncharacteristic vegetative conditions and increased potential for severe fire behavior within the project area (see the Forest Vegetation and Fuels Management sections).

Existing flammulated owl habitat would continue to be available within warm/dry ponderosa pine/Douglas-fir forest types on the KNF. However, continued fire suppression would result in higher canopy cover, increased density of understory conifers, and stand conversion away from the ponderosa pine forest type or occurrence within Douglas-fir forest types without active management treatments (e.g., thinning or prescribed fire). This change in stand structure and tree species would reduce the suitability of these habitats for the owl over time. This includes decreased habitat for prey species and reduced maneuverability for foraging (Illg and Illg 1994). Also, the potential for severe wildfire is likely to increase due to increased fuels accumulations in habitat types that generally experienced more frequent, low to moderate severity fires historically. This could result in the loss of suitable habitat within the project area for many years.

Alternatives 2, 3, and 4 – Direct and Indirect Effects

Vegetation management activities that trend towards the desired conditions for the warm/dry habitat types would benefit flammulated owl use within the project area in the long-term. Maintenance and/or restoration activities include an increased amount of ponderosa pine, reduced tree densities and improved growing conditions fosters the development of old large trees, and open forest conditions resulting from managed wildfire or application of prescribed fire. The need for increased treatments within flammulated owl habitat is consistent with findings in the ERG (2012) report. The Forest-level ERG analysis suggests that despite an increase in the amount of large trees due to forest growth and increased occurrence of wildfire, the associated increase in stand density and canopy cover potentially limits use by flammulated owls. Restoration focused treatments would improve the suitability of these stands for flammulated owls.

Project Design Features and Mitigation Measures

Flammulated owls have yet to be documented within the project area and there are no known active nests. However, a general wildlife design feature has been identified that would ensure protection for active flammulated owl nests discovered during planning or project implementation (see Design Features in Chapter 2). Also, see the “Potential Risk of Disturbance’ discussion below. This is consistent with FW-DC-WL-01 which has a desired condition to keep nest sites relatively free of human disturbance during their active period. This also addresses guideline FW-GDL-WL-16.

Vegetation Management within Suitable Habitat

Harvest

A variety of vegetation management treatments are proposed within the drier habitat types found within the project area. Both intermediate and regeneration harvest is proposed depending on the existing health of the stand. Regeneration harvest would occur in Douglas-fir dominated stands experiencing mortality due to root disease. Although these unhealthy stands generally provide open grown timber conditions and an understory shrub and grass community, their current condition (e.g., lack of growth and mortality) would not allow for development of large trees and large snags which are desired vegetative conditions of the 2015 Forest Plan (see Forest Vegetation section) and important characteristics for flammulated owl use. Although it will take years before these stands could provide suitable conditions for flammulated owl use, they do not currently provide suitable conditions nor are they expected to do so on their own in the future. In contrast, the proposed treatments would establish healthy more tolerant trees, increase the proportion of early seral species like ponderosa pine within the project area, and foster good growing conditions for the development of large trees and open stand conditions for use by flammulated owls in the long-term. This would be consistent with FW-DC-WL-09, FW-DC-WL-12, and FW-DC-WL-19.

Intermediate harvest would occur in healthy stands where the desired species composition and structure is available. The goal of treatment within these stands would be to maintain these desired conditions and encourage continued tree growth, understory vegetation diversity, and stand health. Treating these stands would meet a purpose and need of the project, address desired vegetative conditions, and improve the conditions of the stands in the long-term for species such as flammulated owls that utilize open forest and early seral habitats (FW-DC-WL-19).

Alternatives 2 and 3 propose 32 and 30 regeneration harvest units, respectively, that would create openings greater than 40 acres in size, either on their own or in combination with an adjacent unit. Tree species composition and health is variable among and/or within stands and although categorized as regeneration harvest, a range of overstory structure and canopy cover would be retained where available. Post-harvest retention would range from few trees per acre to portions resembling an intermediate harvest. In all units, where feasible, retained trees would be grouped together in clumps of 4-12 or more trees especially in those areas with fewer, quality leave trees available and along open roads. This is intended to better protect the leave trees as well as provide small areas of forested habitat for wildlife use, including use by flammulated owls. Also, the establishment of forbs, shrubs, and conifers within a few years following harvest would provide foraging opportunities for those species that utilizes open forest communities. These large patch sizes and shape mimic natural disturbance processes like wildfire and allow greater flexibility to work around and maintain features like hardwood patches, wet areas, or patches of leave trees, where available, that would increase within stand diversity in the greater cut area boundary. Also, because flammulated owls' home ranges are approximately 40 acres in size the larger areas provide more interior habitat for flammulated owl use compared to Alternative 4 which would keep the opening size to 40 acres or less.

Fuels Treatments

Low to moderate fire applied through prescribed burning in unharvested stands or larger ecosystem burns would be most similar to historical conditions created by mixed-severity fire. Implementation of these burns is intended to restore fire's role as a natural process used to maintain the open timbered conditions and improve the ecological function of a site. This would

benefit flammulated owls that are adapted to these open forest types and would be consistent with FW-DC-WL-09 and FW-DC-WL-19. Implementation would result in some reduction of habitat components in the short-term, but in a mosaic fashion that would retain areas of existing vegetation. Where the herbaceous and shrub layer was burned, it would be expected to return to pre-fire conditions within a few years and potentially improve the understory vegetation conditions as more light becomes available to the forest floor in the long-term. Therefore, prescribed fires could have short-term (possibly 2-3 years) effects on the availability of habitat for prey species depending on the amount of understory vegetation that is reduced. To minimize this potential short-term reduction in foraging habitat, burn plans would be designed, where feasible to result in a mosaic of burn severity that would retain thickets of young conifer in the understory to maintain foraging habitat post-treatment (see project file).

Other non-harvest fuels treatments were identified for a variety of reasons and vary among alternatives. The majority of units initially identified for these treatments are located adjacent to private property where fuels reduction would improve safety to and from the property in the event of a fire, but timber harvest was not feasible due to the types of materials being treated. Some units include stands where prescribed fire was desired but not feasible due to terrain and location of adjacent non-NFS ownership (i.e., ability to hold the fire to NFS lands). Still other units include stands where harvest was initially identified as the desired treatment, but due to other resource concerns treatment was changed to a fuels treatment. All of these units involve the slashing of understory trees with a diameter at breast height of 6 inches or less and subsequent treatment of the resultant ground fuels depends on the amount of trees being cut and other resource concerns, and includes grinding, lop and scatter, and grapple or hand piling where the piles would then be burned. This would result in a reduction in understory tree density, but would not impact any shrubs found within the stand or the overstory tree species composition and structure and would help maintain the existing suitability of the stand for flammulated owls.

Old Growth

For all action alternatives, approximately 155 acres of harvest treatments and 376 acres of fuels treatments are proposed in old growth. An additional 34 and 164 acres of harvest and fuels treatments, respectively, would occur within recruitment potential old growth. The proposed vegetation management treatments are designed to maintain the existing old growth characteristics and further encourage development of these characteristics, especially in the recruitment potential stands, while making them more resistant to natural disturbances such as wildfire and insect and disease outbreaks. See the Old Growth section for more detail. Maintenance and improvement of existing and recruitment potential old growth would be consistent with FW-DC-WL-11. The proposed old growth treatments which would occur in dry habitat types, would improve conditions for those species such as flammulated owls that are adapted to open forests with large trees. Therefore, the proposed treatments would also be consistent with FW-DC-WL-19.

Summary

All action alternatives would result in a trend towards 2015 Forest Plan desired conditions for this habitat type. Intermediate harvest, prescribed fire, and other fuels treatments would thin stands that exhibit the desired vegetation conditions and improve upon the growth and development of the structural characteristics suitable for flammulated owl use. All alternatives propose nearly the same amount of acres under these treatments with approximately 487 acres of intermediate harvest, a little over 1,200 acres of prescribed fire, and about 70 acres of other fuels treatments within suitable flammulated owl habitat. Regeneration harvest would re-establish stand health

within deteriorating Douglas-fir stands and increase the composition of ponderosa pine that would improve the expected use of these stands by flammulated owl in the future. Alternatives 2 and 3 propose a similar amount of regeneration harvest at over 340 acres. Alternative 4 proposes about 90 less acres of regeneration harvest and the lack of treatment would maintain stand characteristics that are not preferred by flammulated owls (e.g. tree species composition and tree size); therefore, this alternative would not trend towards future conditions that would benefit flammulated owl use (see Table 174).

Table 174. Acres of Proposed Vegetation Management Occurring within Flammulated Owl Suitable Habitat for Alternatives 2, 3 and 4

Treatment	Alt 2 (acres)	Alt 3 (acres)	Alt 4 (acres)	Comments
Intermediate Harvest	487	487	487	Occurs within both ponderosa pine and Douglas-fir forest types
Regeneration Harvest	349	343	256	All but a few acres occur within Douglas-fir forest types
Prescribed Fire	1,205	1,201	1,205	Occurs within both ponderosa pine and Douglas-fir forest types
Other Fuels Treatments	68	75	74	Occurs within both ponderosa pine and Douglas-fir forest types

Vegetation Management within Potential Habitat

Harvest

Much of the proposed harvest occurring within flammulated owl potential habitat is focused on the treatment of ponderosa pine plantations resulting from past regeneration harvest treatments. These plantations were planted with pine from outside the local area. In general, these pines are not adapted to the local conditions and have experienced poor growth and productivity over the years. This is especially true in the more moist sites in which ponderosa pine can be found. As described for the unhealthy Douglas-fir dominated stands within suitable habitat, these sites provide open grown timber conditions that flammulated owl prefer but they are currently lack existing large trees and snags as well as the potential for development of these structural conditions. Regeneration harvest is planned here to reintroduce native pine and other early seral species that would be better adapted to the site conditions and, therefore, would be more responsive to the growing conditions and resistant to potential diseases. Overtime, these stands would provide better opportunities for flammulated owl use. In the drier sites, these out of area pine have fared better in that they appear healthier, more disease resistant, and are larger in size compared to their counterparts in the more moist sites. Thinning the overstory would improve upon these existing conditions and encourage the continued development of these stands over time that would provide for future flammulated owl use. As for suitable habitat, the acres of proposed harvest within potential habitat are the same for Alternatives 2 and 3 with approximately 175 acres of intermediate harvest and 362 acres of regeneration harvest. Alternative 4 proposes fewer acres of regeneration harvest (see Table 175).

Fuels Treatments

The application of prescribed fire within potential habitat is intended to help achieve the desired stand conditions that are being maintained through the use of prescribed fire within suitable

habitat. Relatively few acres would occur within potential habitat as compared to suitable habitat and would occur within a combination of young ponderosa pine stands and sparsely timbered, naturally open Douglas-fir stands. All alternatives proposed approximately 292 acres of prescribed fire within potential flammulated owl habitat (see Table 175 below).

Summary

Proposed treatments and desired outcomes within potential habitat are the same as for those occurring within suitable habitat. The primary difference is that these treatments are occurring in younger stands with smaller trees that likely do not experience much flammulated owl use currently due to the lack of large structural characteristics and open habitat conditions preferred by flammulated owls. As described for harvest and fuels treatments occurring within suitable habitat, proposed treatments within potential habitat would trend towards the desired condition for the warm/dry habitat type and increase the amount of suitable flammulated owl habitat in the future. Therefore, these treatments would also be consistent with the 2015 Forest Plan direction (FW-DC-WL-09, FW-DC-WL-12, and FW-DC-WL-19). In general, more time and continued management would be required to achieve the desired results compared to many of the activities proposed within suitable habitat.

Table 175. Acres of Proposed Vegetation Management Occurring within Flammulated Owl Potential Habitat for Alternatives 2, 3 and 4

Treatment	Alt 2 (acres)	Alt 3 (acres)	Alt 4 (acres)	Comments
Intermediate Harvest	175	175	175	Majority of the acres occurs within the ponderosa pine forest type
Regeneration Harvest	362	362	287	Majority of the acres occurs within the ponderosa pine forest type
Prescribed Fire	292	292	292	Occurs within both ponderosa pine and Douglas-fir forest types
Other Fuels Treatments	0	0	0	NA

Potential Risk of Disturbance

Activities occurring within suitable flammulated owl habitat during the spring and summer months when flammulated owl are found on the Forest could result in disturbance and displacement to individuals or nesting pairs depending on the timing of activities. The pair formation and nesting period for flammulated owls is between May 1 and July 31. Implementation of harvest activities could not occur until after June 15th due to timing restrictions to protect grizzly bears during their spring use period (see Design Features, Chapter 2). This would eliminate the potential for effects during the pair formation period and reduce the potential for effects during the nesting period. No flammulated owl nests are known to occur within the project area and, due to the large home range of a nesting pair, there would be a low probability of coming across an active nest during implementation. In addition, the large snags and ponderosa pine trees that flammulated owls use for nesting would be retained on site where available to provide cavity habitat and to maintain the desired early seral tree species that are currently lacking within the project area. The retention of these structural components of the stand further reduces the potential to impact nesting owls. Proposed activities, therefore, may result in

disturbance to owls using the stand but the potential is low and effects would be to individuals and not to the population.

Due to the low elevation location and western/southern exposures of the prescribed burn units, these units would likely be free of snow earlier in the spring in most years compared to other areas. Also, spring burns in these drier habitat types generally provides better burn conditions to achieve the desired vegetative response. As a result, it is likely that ignition of many of these units would occur in the spring as early as April or May depending on suitable burning and air quality conditions. Therefore, there is potential for disturbance to flammulated owls during the spring pair formation and nesting periods associated with increase human activity during implementation. However, implementation would be of short duration and likely only result in one to two days of increased activity in these areas. As for harvest activities, the potential to affect flammulated owls would be low and effects would be to individuals and not the population.

Flammulated owls appear tolerant of human activity and nest abandonment is rare (Hayward and Verner 1994); therefore, implementation of proposed harvest activities and prescribed fire is not likely to negatively impact breeding or nesting potential. Also, the persistence of flammulated owl populations may be more dependent on adult survival than nesting success within a given year (ibid) and harvest or a spring burn would not be expected to result in adult mortality. In the long term, tree composition and stand structure would be maintained and habitat for prey species would be maintained and/or increased due to the vigorous shrub/forb layer that would result from the proposed activities, especially fire. These activities would benefit flammulated owls (Illg and Illg 1995), including any individuals or dispersing young that may use the area. Therefore, these activities would be consistent with FW-DC-WL-01 and FW-GDL-WL-16.

Cumulative Effects

Introduction

The Existing Condition section describes the suitable habitat within the project area, specifically the warm/dry ponderosa pine forest type and Douglas-fir habitat types. This cumulative effects section summarizes the past actions as well as further describes ongoing and other reasonably foreseeable contributions potentially impacting flammulated owl habitat.

Spatial and Temporal Context for Cumulative Effects Analysis

As described for indirect effects under the section “Spatial and Temporal Context for Effects Analysis,” the project area was chosen as the appropriate scale for flammulated owl cumulative effects analysis due to the species specialized habitat associations and increased efforts to restore these habitat types in recent years. The cumulative effects analysis considered effects to the suitability of habitat in adjacent planning areas as flammulated owls are seasonal migrants to the district and KNF and they could be impacted by activities occurring adjacent to the project area. However, there are no apparent conditions adjacent to the project area that would cumulatively contribute negative effects to flammulated owl habitat or use within the project area.

Temporal boundaries for the flammulated owl cumulative effects analysis include both short-term and long-term effects as were described for the direct and indirect effects analysis. Short-term effects are those that are expected to last between a few days to a season or portion of two seasons and are generally limited to potential disturbance. Long-term effects can last for a minimum of 15 years before understory encroachment would be evident without any maintenance activities. Restoration efforts that are just establishing potential habitat could take up to 100 years

to develop the large structure used by flammulated owls, but the resultant benefits would extend for years beyond that.

Past, Present, and Reasonably Foreseeable Activities Relevant to Cumulative Effects Analysis

Past Actions

Timber harvest has occurred in the project area since the 1930s and, up until the early 1990s, included regeneration harvest, high grading of large old trees, and loss of snags that resulted in alterations and deterioration of flammulated owl habitat. Fire suppression since the early 1900s has generally resulted in stand conversion from open ponderosa pine/Douglas-fir to more shade intolerant species, smaller tree growth and higher stem density, higher canopy cover, and a reduction in productive understory vegetation. Detailed descriptions of previous vegetation management activities are found at the beginning of Chapter 3, including Table 32 and Table 33, as well as Appendix F of this document.

Since the mid-1990s there has been more reliance on restoration focused treatments that result in the maintenance of desired tree species composition and stand structure (e.g., large, old trees and snags) characteristic of this habitat type, seeding with early seral species to improve species composition, as well as implementing timing and activity restrictions where appropriate to reduce impacts to individuals and nesting success. Application of these directions and management trends has resulted in better protection and improvement of suitable and potential flammulated owl habitat.

Alternatives 2, 3, and 4 – On-going and Reasonably Foreseeable Actions

Reasonably foreseeable actions include those federal, state, or private activities that are ongoing or scheduled to occur, independent of this federal action. Table 34 located at the beginning of Chapter 3, identifies those current and foreseeable actions in the project area that were determined to be appropriate for inclusion in the analysis of environmental effects. Ongoing federal actions have been considered and included when formulating the existing condition of this project area.

A portion of the District-wide Timber Stand Improvement Project has yet to be completed within the project area and includes approximately 14 acres of pre-commercial thinning activities within potential flammulated owl habitat. As for the OLY project's fuels treatment units occurring with potential habitat, the objective of these treatments to maintain the desired tree species, reduce competition, and improve the growth and health of the remaining trees by providing more nutrients, light, and space. Thinning would improve the potential for these stands to develop the large structural characteristics preferred by flammulated owls in the future.

Continued growth, development, and vegetation management is expected on private lands. Due to the low elevation sites of these lands, the majority of the private acres likely occurs within the warm/dry habitat type and provides flammulated owl habitat. Past actions that resulted in land development or habitat conversion (e.g., from forest to pastureland) with the dry ponderosa pine/Douglas-fir forest types would have resulted in a reduction of flammulated owl habitat. Other vegetation management, such as thinning or prescribed fire, that maintained and/or improved on the forested condition would have benefitted flammulated owls. Continued growth and development on private lands is expected to be slow and likely occurring in areas that have already experienced some level of development. Also, OLY's proposed treatments would not

result in the additional loss of habitat. Therefore, there would be no cumulative effects associated with future land development or conversion on private lands. Vegetation management such as the proposed harvest occurring on Stimson Lumber Company lands on Yaak Mountain would alter conditions for flammulated owl use compared to the existing condition. However, flammulated owls could continue to use these lands although possibly in a changed or reduced capacity. The habitat acres calculated to evaluate the effects of the OLY project were for NFS lands only which currently could support several pairs of flammulated owls based solely on the suitable ponderosa pine forest type available. Despite the activities that may occur on private lands within the project area, NFS lands would remain forested and proposed treatments would result in restored habitat conditions that would provide forage and nesting habitat both now and into the future. The potential for cumulative effects to flammulated owls from activities on private lands is minor when considered in the context of the amount and conditions of lands available on NFS lands.

Based on the nature and magnitude of potential cumulative effects to flammulated owls independent of this project, there are no cumulative effects anticipated that would change the effects determination to the owls from implementation of any of the action alternatives.

Regulatory Framework Findings

2015 Forest Plan

The 2015 Forest Plan provides desired conditions, objectives, standards, and guidelines for flammulated owls within the Wildlife Resource. The following are applicable to the actions in this project[25]:

Forestwide Direction

- p. 28, **GOAL-WL-02**: The KNF manages and schedules activities to avoid or minimize disturbance to sensitive species and manages habitat to promote their perpetuation into the future.

  Proposed harvest and fuels treatments would result in the retention of remnant large tree species, better approximation of stand patch size and species composition, protection of riparian habitats, improved stand health, and general movement towards the desired vegetative condition based on historic range of variation with the stands for this area. This would increase the amount of ponderosa pine available within the project area as well as promote the development of large diameter trees within the warm/dry habitat types used by flammulated owls. See the “Direct and Indirect Effects” discussion. No active nests are known to occur within the project area and flammulated owls are considered to be tolerant of human activities. However, a general wildlife design feature has been identified that would ensure protection for active flammulated owl nests discovered during planning or project implementation. See “Project Design Features and Mitigation Measures” and “Potential Risk of Disturbance.” Therefore, the OLY project would contribute to progress toward achieving GOAL-WL-02.

[25] Goals, desired conditions, objectives, standards, and guidelines can be found on the noted pages in the 2015 Forest Plan.

- p. 28, **FW-DC-WL-01**: Nests and den sites and other birthing and rearing areas for terrestrial threatened, endangered, proposed, or sensitive species are relatively free of human disturbance during the period they are active at these sites.

  No active nests are known to occur within the project area; however, a general wildlife design feature has been identified that would ensure protection for active flammulated owl nests discovered during planning or project implementation. See "Project Design Features and Mitigation Measures" and "Potential Risk of Disturbance." Therefore, the OLY project would be neutral with regard to progress toward achieving FW-DC-WL-01.

- p. 29, **FW-DC-WL-09**: Productive plant communities, with a mosaic of successional stages, structures, and species, are available for migratory landbirds. These habitats support nesting activities or use during bird migration across the Forest. The use of fire, both planned and unplanned ignitions, improves and maintains this mosaic of habitats.

  Proposed regeneration harvest would result in an increase in early seral tree species as well as improve forest stand health where disease and non-native genetics are influencing growth and productivity. Intermediate harvest would occur in healthy stands where the desired species composition and structure is available. Similarly, prescribed fire would be used in stands to maintain healthy stand conditions. See harvest and prescribed fire discussions under "Vegetation Management within Suitable Habitat" and "Vegetation Management within Potential Habitat." Therefore, the OLY project would contribute to progress toward achieving FW-DC-WL-09.

- p. 29, **FW-DC-WL-11**: Old growth, or other stands having many of the characteristics of old growth, exists for terrestrial species associated with these habits.

  Proposed treatments would occur within dry habitat types where past disturbance, such as wildfire, contributed to the development of old growth characteristics. The proposed treatments are designed to maintain the existing old growth characteristics and encourage further development of these characteristics while also making them more resistant to natural disturbances. See "Old Growth." Therefore, the OLY project would contribute to progress toward achieving FW-DC-WL-11.

- p. 29, **FW-DC-WL-12**: Trees and snags greater than 20-inch DBH are available throughout the forest. Wildlife species associated with the warm dry biophysical setting find large-diameter ponderosa pine, Douglas-fir, and other species of snags for nesting.

  Snags and large healthy trees of the desired species would be retained within the treatments units where available. Growing conditions would be improved by opening up the canopy and reducing competition which would promote the development of large diameter trees and future snags over time. See "Potential Risk of Disturbance" and the "Direct and Indirect Effects" discussions above, also the Forest Vegetation section. Therefore, the OLY project would contribute to progress toward achieving FW-DC-WL-12.

- p. 30, **FW-DC-WL-19**: By trending towards the desired conditions for vegetation, habitat is provided for native fauna adapted to open forests and early seral habitats, or whose life/natural history and ecology are partially provided by those habitats.

The OLY project area is currently is not meeting desired conditions for tree species composition and forest structure associated with early seral conditions. Proposed vegetation management treatments would increase the amount of early seral habitats and species, maintain the open conditions within open forest habitats, and trend towards the desired levels. See the "Description of the Analysis Area" and the summary sections under "Direct and Indirect Effects." Therefore, the OLY project would contribute to progress toward achieving FW-DC-WL-19.

- p. 30, **FW-OBJ-WL-01**: The outcome is the maintenance or restoration of wildlife habitat on 1,000 to 5,000 acres of NFS lands, annually, with an emphasis on restoration of habitats for threatened and endangered listed species and sensitive species.

  Implementation of proposed harvest and fuels treatments that result in movement towards the desired vegetative condition based on historic range of variation would contribute to the maintenance or restoration of habitat for flammulated owls. Vegetation management treatment proposed acres are very similar for all alternatives, except Alternative 4 which proposes fewer acres of regeneration harvest in flammulated owl habitat. In all, timber harvest would occur on approximately 1,210 to 1,373 acres with additional fuels treatments occurring on 1,565 to 1,571 acres within the analysis area. See GOAL-WL-02 and FW-DC-WL-19 above, as well as the "Direct and Indirect Effects" discussion, Table 174, and Table 175. Therefore, the OLY project would contribute to the attainment of FW-OBJ-WL-01.

- p. 32, **FW-GDL-WL-16, Raptors**: Management activities on NFS lands should avoid/minimize disturbance at known active raptor nests, including owls.

  There are no known active nests within the project area; however, a general wildlife design feature has been identified that would ensure protection for active flammulated owl nests discovered during planning or project implementation. See "Project Design Features and Mitigation Measures" and "Potential Risk of Disturbance." Therefore, the OLY project was designed in accordance with this guideline.

Federal Law

National Forest Management Act (NFMA)

The project would comply with NFMA direction to provide for diverse populations of plant and animal communities through compliance with the 2015 Forest Plan.

Migratory Bird Treaty Act of 1918 (16 U.S.C. 703-712), as Amended

Implemented to protect migratory birds and includes treaties between the U.S. and Great Britain (for Canada), Mexico, Japan, and the Soviet Union (now Russia). Without being permitted it is illegal to "pursue, hunt, take, capture, kill, attempt to take, capture or kill, possess, offer for sale, sell, offer to purchase, purchase, deliver for shipment, ship, cause to be shipped, deliver for transportation, transport, cause to be transported, carry, or cause to be carried by any means whatever, receive for shipment, transportation or carriage, or export, at any time, or in any manner, any migratory bird, included in the terms of this Convention . . . for the protection of migratory birds . . . or any part, nest, or egg of any such bird." (16 U.S.C. 703).

Proposed activities would not result in the possession of an individual, feathers or other parts, nest, or egg of a flammulated owl. Potential effects would be incidental to the implementation of the activities and would impact individuals and not a population. See the "Direct and Indirect Effects" discussion.

Executive Orders

Executive Order 13186 makes it illegal to take, kill, or possess migratory birds. Furthermore, this Executive Order requires federal agencies to evaluate the effects of federal actions on migratory birds through environmental analyses.

The project complies with Executive Order #13186 and associated Memorandum of Understanding by evaluating the effects of federal actions to flammulated owls as part of the NEPA process and promoting conservation of and minimizing adverse impacts the species.

Statement of Findings

Alternative 1 (No Action) **may impact individuals or their habitat, but will not likely contribute to a trend toward federal listing or cause a loss of viability to the population or species** for flammulated owls. Although no management activities would take place that would alter or reduce flammulated owl habitat or result in displacement/disturbance effects, lack of site appropriate management would continue the trend towards uncharacteristic vegetation conditions and an increased potential for high severity fires. Large scale loss due to severe wildfire would reduce the potential for flammulated owl use for many years in the OLY project area.

Alternatives 2, 3, and 4 **may impact individuals or their habitat, but will not likely contribute to a trend toward federal listing or cause a loss of viability to the population or species** for flammulated owls. This determination is based on: 1) proposed vegetation management would trend towards desired conditions for the warm/dry habitat type, including an increase in the amount of ponderosa pine within the project area, a decrease in stand density, improved stand health, and improved development of large trees and snags, 2) which would improve upon existing and future flammulated owl habitat, 3) with minor potential for disturbance and displacement during the implementation of activities, and 4) effects would be to individuals that would not be expected to negatively impact breeding or nesting success within the project area.

Gray Wolf

Introduction

Gray wolves are year-round residents of the KNF. They exhibit no particular habitat preference except for the presence of native ungulates within their territory on a year-round basis. Pack activity is centered on the den site and nearby rendezvous sites from late April until September (MFWP 2003). Pack territories are dynamic and change from year to year depending on prey availability, wolf populations, and relationships with neighboring packs (MNHP and MFWP 2015). Montana wolf pack territories average around 200 square miles in size and can be 300 square miles or larger. Dispersal distances in the Northern Rockies average about 60 miles, but dispersals over 500 linear miles have been documented (ibid).

Gray wolf habitat use is, therefore, closely tied to the availability of ungulate (prey) species and areas of relatively low human activity, particularly where den and rendezvous sites are located. Consequently, the suitability of the project area to support prey species, primarily big game, as influenced by vegetation management is a main focus of the gray wolf analysis. Because human activity can impact reproductive success and wolf survival, proposed activities that result in a change in human access is also discussed in detail. Those activities that do not involve vegetation management or a measurable change in human access will not be discussed.

Summary of Conclusions

Implementation of the OLY project's action alternatives would result in a determination of **may impact individuals or their habitat, but will not likely contribute to a trend toward federal listing or cause a loss of viability to the population or species** for gray wolves. Although pack members may avoid activity areas during implementation, the increased forage opportunities created by the proposed activities would benefit the local prey population on both summer and winter ranges. Therefore, the proposed alternatives would enhance habitat conditions for the local prey base while providing security both at home sites and throughout the project area for the O'Brien wolf pack.

Regulatory Framework

2015 Forest Plan

The 2015 Forest Plan provides overall guidance for the management of the lands on the KNF. It describes the goals, desired conditions, and objectives toward which the management of the land should be directed. And it establishes standards and guidelines to help achieve or maintain the desired condition or conditions, to avoid or mitigate undesirable effects, or to meet applicable legal requirements.

The plan components which provide specific gray wolf resource direction relevant to this project include:

Forestwide Direction

- FW-DC-WL-08
- FW-DC-WL-18
- FW-GDL-WL-18

There are other 2015 Forest Plan components that provide resource direction for a range of wildlife species or habitat conditions that are not specific to gray wolves, but still are applicable to wolf management. The full list of the plan components applicable to gray wolf management are found in the "Regulatory Framework Findings" section of this analysis.

Resource Indicators and Measures

For the gray wolf analysis, the following three resource indicators have been identified which were considered key habitat components within the Wolf Recovery Plan (USFWS 1987):

- Sufficient, Year-Round Prey Base for Big Game or Alternate Prey (Year-Round Prey Base): Wolves prey primarily on elk, deer, and moose. Wolves may also prey upon domestic livestock such as cattle and sheep and eat alternative prey, such as rodents, vegetation and carrion. Wolves commonly hunt in packs, but lone wolves and pairs are able to kill prey as large as adult moose (MNHP and MFWP 2015). Because big game species are the primary prey of wolves, this indicator focuses on the ability of the Project Area to support big game year-round.

- Suitable and Somewhat Secluded Denning and Rendezvous Sites (Denning and Rendezvous Sites): Individual gray wolves demonstrate varying levels of sensitivity to human disturbance near denning and rendezvous sites (or "homesites") with potential abandonment of the sites as a result of the disturbance (Claar et al. 1999, Thiel et al. 1998, Frederick 1991). Recommendations range from restricting human access near homesites (Frederick 1991) to managing the habitat integrity of such sites, including habitat security, in future planning activities (Sime 2002). If proposed actions are similar to past actions near the homesites (e.g. activity type, intensity, and season of implementation), the proposed actions would likely be tolerated. Restricting periods of operation to the fall or winter seasons when homesites are unoccupied would protect these locations from activity caused disturbance during their period of use. Evaluation of potential impacts would include analysis of how each alternative would maintain the habitat integrity of both denning and rendezvous sites.

- Sufficient Space with Minimal Exposure to Humans (Secure Habitat): This element is associated with reducing the risk of human-caused mortality to wolves. Human attitudes towards wolves, coupled with the accessibility of wolf habitat via open roads, create the potential for conflict (Frederick 1991). This element can generally achieved through adherence to 2015 Forest Plan direction to provide secure habitat for grizzly bears (FW-STD-WL-02) and elk (FW-GDL-WL-10, FW-OBJ-WL-02) as well as the desired condition to provide large remote areas with little human disturbance for wildlife use (e.g., MA1a,b,c-DC-WL-01 and MA5a,b,c-DC-WL-01).

Table 176 below summarizes the resource indicators and measures for the gray wolf analysis.

Table 176. Resource Indicators and Measures for Assessing Effects

Resource Element	Resource Indicator	Measure	Used to Address: P/N*, or Key Issue?	Source
Year-Round Prey Base	Availability of big game	Acres of vegetation management that would maintain/improve big game habitat	No	KNF Forest Plan FW-DC-WL-08
Denning and Rendezvous Sites	Activities occurring at or near known den and rendezvous sites	Potential for disturbance and displacement of wolves at these sites during their period of use?	No	KNF Forest Plan FW-DC-WL-18 and FW-GDL-WL-18
Secure Habitat	Human Access/Motorized Management	Changes in human access as influenced by motorized access?	Purpose and Need	Contributed by 2015 Forest Plan FW-OBJ-WL-02, FW-STD-WL-02, FW-GDL-WL-10

*P/N = Purpose and Need

Methodology

Wolf pack use of the project area, including any known den or rendezvous sites, was identified through the Montana Gray Wolf Conservation and Management Annual Reports as well as discussions with the wolf management specialist with MFWP. The suitability of the project area for wolf occupation is dependent on the occurrence and abundance of prey species, especially big game; therefore, consideration of this resource element relies on the Big Game analysis found in this FEIS. Similarly, the discussion of secure habitat references other species analyses that specifically address the amount, location, and status of roads (e.g., open or restricted to public motorized use) that influence the amount and effectiveness of this habitat.

Data Sources

Detailed information on gray wolf population ecology, biology, habitat description and relationships identified by research are described in USFWS (1987), MFWP (2003, 2004), Hanauska-Brown et al. (2012) and USFWS (2011b). Also, information for the Northwest Montana recovery area is provided by the Montana Gray Wolf Conservation and Management Annual Reports. These provided guidance in evaluating potential habitat and potential effects to wolves, and are incorporated by reference.

Gray wolf use and occurrence data comes from recent District wildlife surveys and observation records, NRIS wildlife database, and other agency records and monitoring reports (MFWP).

Assumptions and Limitations

There are no assumptions or limitations associated with this resource analysis.

Affected Environment

Spatial and Temporal Context for Effects Analysis

The analysis boundary for direct effects to the wolf packs and their habitat is the OLY project's activity areas since proposed activities could result in disturbance and displacement effects to wolves. The boundary for indirect effects is the project area as the proposed vegetation management treatment would influence big game occurrence and use throughout the treated area. Contribution toward viability is assessed at the KNF level.

Temporal boundaries for the gray wolf analysis include both short-term and long-term effects. Short-term effects are those that are expected to last between a few days to a season. Because of a wolf pack's large home range size, the chances of an individual wolf or pack being present within a given treatment unit during implementation is low. However, wolves may alter the use of their home range during implementation of activities. Long-term effects are those that expected to last longer than a season or two. As a result of vegetation management treatments, greater foraging opportunities would be expected to improve conditions for the local big game populations and, therefore wolves, for a minimum of 15 years until the vegetative conditions transition back to cover. Changes in access management, including the construction of new roads or decommissioning of unneeded roads, would generally result in long-term effects to gray wolves by influencing the availability of secure habitat and the potential for human disturbance at den and rendezvous sites.

Existing Condition

Introduction

The Northwest Montana recovery area was one of three wolf recovery areas identified for the Northern Rocky Mountain wolf population segment (Hanauska-Brown et al. 2011); the KNF is within this recovery area. Effective May 2011, the Northern Rocky Mountain distinct population of gray wolf was once again delisted as directed under the Department of Defense and Full Year Continuing Appropriations Act of 2011 (USFWS 2011b). Later, in August 2011, the constitutionality of this Congressional Act was upheld by the U.S. District Court in Missoula, Montana, citing precedent based on past case law. Upon delisting, legal management authority of wolves was transferred back to the State of Montana. The gray wolf was immediately placed on the Forest Service Northern Region's sensitive species list for a period of 5 years, after which a status review will be made to determine the need to remain on or be removed from that list.

Montana's Gray Wolf Conservation and Management Plan (MFWP 2003, 2004) is based on an adaptive management strategy with more management flexibility granted as the number of breeding pairs in Montana increases above the 15 pair benchmark. Potential management activities cover a range of concerns which include maintaining viable populations of wolves and their prey, resolving wolf-livestock conflicts, and assuring human safety.

Statewide, the Montana wolf count decreased by 73 individuals between 2013 and 2014, for a minimum total estimate of 554 wolves. Although this estimated minimum number of individuals decreased slightly from the previous year associated with increased mortality from hunter harvest, agency control, and other factors, there was an increase in the number of breeding pairs since 2013 and the overall number of packs has seemingly stabilized following annual increases since 2005 (Bradley at al. 2015). Minimum estimates for the Northwest Montana recovery area similarly experienced a decrease in the number of wolves (an estimated 74 wolves) since 2013.

The number of packs also decreased by 13 packs; however, the number of breeding pairs increased by 2 to a total of 17 (ibid).

The KNF is home to 24 resident packs (4 as breeding pairs) with the home ranges of several packs located along the border between the United States and Canada, the state line between Montana and Idaho, and adjacent NFS lands in Montana (Bradley et al. 2015). These packs had a minimum total of 64 wolves at the end of 2014 (ibid). An estimate of 83 wolves was recorded in 2012 (Bradley et al. 2013), for a reduction in numbers by 19 individuals. This includes the cumulative loss of two documented packs (Bradley et al. 2015).

MFWP continued a statewide general hunting season in 2015. In 2012, the MFWP Commission made changes to the wolf harvest regulations which included a longer hunting season, allowed for trapping of wolves as well as hunting, and increased the bag limit to three wolves per hunter/trapper. In 2013, the Commission once again increased the length of the general season as well as the bag limit which is now 5 wolves per person. For the 2014 wolf season, this resulted in 213 wolves being harvested across Montana, including 54 from resident packs within the KNF. This is about twice as many as were harvested from resident packs in 2012. A majority of the packs in the Northwest Montana recovery area have little to no livestock present within home ranges. Depredation of livestock was documented for one KNF area pack and three wolves were lethally removed. See Bradley et al. 2015 for more details.

Gray Wolf Occurrence

In the past, two wolf packs have been documented to use the OLY project area as part of their home range. The Pulpit wolf pack was believed to use the O'Brien and China Creek drainages within the project area from about 2006 to 2012 (Sime et al. 2011, Bradley et al. 2013). Since then, there has been no documentation of this pack and, in fact, the pack is considered to no longer exist as of 2014 (Bradley et al. 2015). The second wolf pack documented within the OLY project area is the O'Brien pack. This pack established their territory by 2010 (Sime et al. 2011) and has been known to use the southwestern portion project area within their home range. When first documented, the pack consisted of an adult and three pups. The pack size has been reduced to 2 individuals and is no longer considered a breeding pair. The reduction in pack numbers is due, in part, to legal harvest (Bradley et al. 2015).

Description of the Analysis Area

Year-Round Prey Base

The OLY project area supports year-round habitat for most big game species, with white-tailed deer being the most abundant found in the area. Other big game species include elk, mule deer, moose, and bighorn sheep. Together, this mix of species provides a year-round prey base for wolves. Little fire activity within the last 15 years coupled with a highly productive area for vegetative growth has resulted in limited foraging habitat for big game within much of the project area, especially within the moister habitat types. Natural open areas, such as higher elevation ridgelines or rockier sites with southern exposures, and some more recent harvest and prescribed fire activities have provided pockets of small openings or open stand conditions that provide foraging opportunities.

Currently, the availability of big game forage is low based on the general lack of naturally occurring openings and the existing low levels of early seral habitats. Foraging habitat will continue to decline as seedling/saplings stands move into a larger size class and the encroachment

of conifers continues into openings and the understories of forested stands. Also, there is less edge habitat as tree age/size and patch sizes becomes more homogenous which reduces the potential for the variety forage that this habitat provides as well as a less diverse landscape for big game use. Currently, the hunting district associated with the OLY project area remains open for big game harvest indicating that the big game populations are at least being maintained under the current conditions in this broad area. However, continued declines in available forage could lead to lower big game numbers in the future.

Denning and Rendezvous Sites

The O'Brien pack could not be located during 2015 (Dunne 2015) and no den or rendezvous sites are known. In the northern Rocky Mountains, den sites were characterized by hillside excavations with a greater amount of cover near the entrance to obscure them from view and generally located within 100 meters (328 feet) from water (Trapp et al. 2008). Ausband et al. (2010) identified habitat characteristics associated with rendezvous sites in Idaho and noted that wolves generally selected gentle terrain that holds water (e.g., wet meadows), but they have also been observed to select forested areas with slow moving streams. Based on these characteristics, habitat conditions within the OLY project area would be able to provide for both denning and rendezvous sites for a pack of wolves.

Secure Habitat

Areas that experience little to no human use reduce the potential risk for disturbance and mortality often associated with roads that facilitate human access into wolf habitat. Management direction to provide adequate amount of secure habitat for grizzly bears (FW-STD-WL-02) and elk (FW-GDL-WL-10, FW-OBJ-WL-02) would provide areas of secure habitat for wolves as well. Currently, grizzly bear Core is found on approximately 54 percent of the BMU which includes most of the project area except the area near Troy, Montana that is largely privately owned. This level of Core habitat is better than the standard for this bear management unit. Similarly, elk security habitat was evaluated for each of the three planning subunits that are found within the project area. The existing level of security habitat within two of the subunits are better than the 30 percent minimum desired level while the third is just below the desired level. The lower level within this latter planning subunit is influenced by the number of open roads associated with private property access near town. See the Grizzly Bear and Elk analyses for more detail.

Portions of these secure areas also coincide with backcountry management areas (MA5a and MA5c) and inventoried roadless areas (Flagstaff and Saddle Mountain IRAs) that contribute to secure habitat. Because these backcountry management areas tend to be large and remote, they generally have little human disturbance and, as such, have a desired condition to be retained and contribute to secure habitat for wildlife (MA5a,b,c-DC-WL-01). Motor vehicle use does not occur within MA5a and, therefore, it contributes to the effectiveness of security habitat within that management area. Although MA5c does allow for over-snow vehicle use, it does not allow for other motor vehicle use and contributes to security habitat during the fall hunting season. Roads could be built within an IRA in the future; however, it would have to meet certain criteria which would limit most construction. Similar to MA5a and MA5c, IRAs contribute to secure habitat as large, remote areas that are likely to have a lower amount of human presence due to the difficulties of access. Due to the steep nature of the terrain within parts of these MA and IRA designations, for example along the Kootenai Face, future road construction and associated motorized access would be limited.

Based on the existing open motorized road system, areas of secure habitat that experience little human disturbance are readily available within the project area except within close proximity to town. Also, because of the occurrence of steep country and more remote areas within the backcountry MAs and IRAs, especially those areas not associated with the non-motorized trail system, there are large areas where the potential for human disturbance is extremely low.

Environmental Consequences

Alternative 1 – No Action

A range of fire severity, from non-lethal to stand replacing crown fires, historically played a role in developing the vegetative characteristics in the OLY project area. Although the type and frequency of fire experienced varies within a given area and vegetation type (based on biophysical setting), with some being more prone to infrequent stand replacing fire, the vegetation types within the project area have historically experienced low and/or mixed severity fires at least periodically. These natural disturbance regimes favor fire tolerant species, including older and larger diameter seral tree species such as western larch, western white pine, and ponderosa pine. The exclusion of low to moderate severity fires through fire suppression has altered the amount of shade-tolerant species in the understory of these forested stands as well as increased fuel loadings in the form of ladder fuels and downed woody materials. Fewer fires have also reduced the amount of natural openings, structural diversity, and the number/size of patches across the landscape. Fire suppression has not yet resulted in a departure from historic ranges for all stands within the project area (especially those with naturally longer fire return intervals), although they too are trending towards a departure. Due to the denser fuel conditions, resulting stand replacing fires in these stands often kill many of the overstory trees which historically survived mixed-severity wildfires. Past vegetation management practices that targeted these old, large trees removed the relic seral species and further altered tree size and composition; this in turn has promoted the development of climax species and conditions. This has also influenced the persistence of root disease in now Douglas-fir dominated stands as species such as western larch and ponderosa pine are more resistant to these diseases. Planting of non-native ponderosa pine before breeding zones were understood has resulted in unhealthy stands that are not adapted to the local growing conditions. In addition, the close proximity to Troy Montana influenced the removal of valuable western larch, western white pine, and ponderosa pine trees and snags in the lower elevation sites that supported local development and supplies (e.g., firewood). In general, the resultant stand patch sizes and occurrence, species composition, stand structure, and fire frequency and severity are departing from desired vegetative conditions based on historic range of variability within the project area. See the Forest Vegetation and Fuels Management sections for more detail.

No direct effects from federal actions would occur. The No Action alternative would maintain the existing vegetative condition on the landscape which is providing for big game species. However, the occurrence of habitats that generally provide foraging opportunities for prey species is low and outside the desired conditions. Indirectly, as trees continue to encroach upon forage openings the acres of productive foraging habitat would continue to decline over time. Forbs, grasses, and other forage species, where present, may be less vigorous and productive in shaded rather than more open environments. Continued declines in available forage could lead to lower big game numbers in the future. Also, the increased tree density and continuous fuel profile from the ground up to the main canopy puts the area at risk of severe fire behavior (see the Fuel Management section). If severe wildfires occur, it could impact the suitability of current and potential denning and rendezvous sites and influence big game populations and use areas. This in

turn could influence the availability of the local prey base and potentially influence the pack's size, use of its existing home range, and interactions with neighboring packs.

Alternatives 2, 3, and 4 – Direct and Indirect Effects

Project Design Features and Mitigation Measures

There are no design features or mitigation measures specific to gray wolves at this time. However, a general wildlife design feature has been identified that would ensure protection for active wolf den sites (and associated rendezvous sites) discovered during planning or project implementation (see Design Features in Chapter 2). Therefore, this project would be consistent with FW-DC-WL-18 and FW-GDL-WL-18.

Introduction

Management activities have the potential to affect resident and transient wolf use of habitat due to the presence of human activity and noise. Risk of increased mortality is generally not directly associated with management activities itself; however, if the proposed management included an increase public access during activities then there would be potential for increased risks. Big game prey may also be affected by management activities due to disturbance, increased levels of road use (especially if currently restricted or barriered roads were opened to public motorized use), and habitat alteration. Impacts to the O'Brien pack will be considered due to their known use of the project area.

Year-Round Prey Base

Proposed harvest, prescribed fire, and non-harvest fuels treatments would trend towards the desired vegetation conditions which include an increase in the amount of early seral habitats consisting of seedling/sapling trees and open forest habitats. This also means a greater mosaic of habitat conditions across the landscape, an increase in vegetative and structural diversity within the stands, encouraged development of shrubs and other forage species in the understory, and an overall increase in the amount of early seral habitat. This would improve the quantity and quality of forage habitat within the project area which would benefit big game populations in the long term and, therefore, local prey conditions for resident and transient wolf use of this area. This would be consistent with FW-DC-WL-08.

In all, Alternatives 2 and 3 propose a similar amount of vegetation management within the OLY project area with approximately 4,843 and 4,813 acres, respectively. However, the type of management differs by alternatives. Alternative 2 proposes more regeneration harvest whereas Alternative 3 proposes to change some of the regeneration harvest acres to non-harvest fuels treatments to address resource concerns. See the Alternative 2 Harvest Unit Summary in Chapter 2 for more information. Alternative 4 would treat an intermediate amount of non-harvest fuels compared to Alternatives 2 and 3, but the fewest acres overall by keeping harvest generated opening sizes to 40 acres or less. Therefore, Alternative 2 would provide the most benefit to big game species and gray wolves while also protecting other resource values (see the Big Game analysis).

Den and Rendezvous Sites

No known den or rendezvous sites are known within the project area and no sites were identified during field review or unit preparation that would suggest their use as a den or rendezvous site. Vegetation management would not occur within riparian areas and watershed improvement

work/other road work would be limited to stream crossings. Therefore, proposed activities are unlikely to impact unknown rendezvous sites. Also, a general wildlife design feature has been identified that would ensure protection for active wolf den sites (and associated rendezvous sites) discovered during planning or project implementation (see Design Features in Chapter 2). Suitable habitat for these homesites would remain available during and post-project, including remote areas with little human activity. Implementation of the action alternatives would not prevent future establishment of den or rendezvous sites in the OLY project area and would be consistent with FW-DC-WL-18 and FW-GDL-WL-18.

Secure Habitat

Management direction for grizzly bears, elk, backcountry areas (MA5a, b, c) and IRAs would continue to maintain secure habitat within the project area for wolf use. For example, roads utilized for proposed harvest and watershed improvement activities that are currently closed to public motorized use would remain so during project implementation and there would be no increase in public motorized access at any time of the year. This would maintain the existing level of secure habitat for gray wolves and would contribute to FW-DC-WL-18. See the Grizzly Bear and Elk analyses for a more in depth discussion.

The effects of increased activity due to timber harvest, prescribed fire (including helicopter ignition), and watershed improvement work in areas that do not generally experience activity could result in temporary disturbance and possible avoidance of the activity area. In addition, an increase in hunting pressure due to road hunting along open roads adjacent to recently harvested units is not expected. Wolf use of areas close to roads is already limited and use would not be expected to increase during or post-harvest because of this known avoidance. Therefore, the potential for an increased risk of human-caused mortality would be negligible as a result of the proposed actions.

Cumulative Effects

Spatial and Temporal Context for Cumulative Effects Analysis

Wolves travel long distances in search of prey within large home ranges that are not confined to either the activity or planning area boundaries. However, the home range of the O'Brien pack is not known although past use is known to have occurred within the project area boundary. Therefore, as described for indirect effects under the section "Spatial and Temporal Context for Effects Analysis," the project area was also chosen as the appropriate scale for this cumulative effects analysis. This analysis area captures the effects of the proposed vegetation management that benefits big game which are the primary prey species of wolves.

Temporal boundaries for the gray wolf analysis include both short-term and long-term effects and were also described under "Spatial and Temporal Context for Effects Analysis." Short-term effects are those that are expected to last between a few days to a season or portion of two seasons, such as wolves moving back into a treatment area once the disturbing activities have been completed. Long-term effects are those that expected to last longer than a season or two and may include the improvement of foraging habitat for prey species or changes in access management.

Past, Present, and Reasonably Foreseeable Activities Relevant to Cumulative Effects Analysis

The Existing Condition section describes relevant past and present factors affecting the local prey base and human disturbance as influenced by motorized access management within the project area. This cumulative effects section summarizes the past actions as well as further describes ongoing and other reasonably foreseeable contributions potentially wolves and their habitat.

Past Actions

Harvest has occurred in the project area since the 1930s and has provided some variation in age classes and successional stages within the project area that has provided big game prey opportunities for wolves. Detailed description of previous vegetation management activities are found at the beginning of Chapter 3, including Table 32 and Table 33, as well as Appendix F of this document. Historically, natural disturbances such as wildfire resulted in a mosaic of habitats and forage conditions. In contrast, fire suppression since the early 1900s has altered stand structure resulting in more homogenous stands with greater canopy closure in some areas, which has in turn reduced forage production for prey species on some sites.

Activities affecting wolf habitat have changed in recent years. The amount of open roads has dramatically dropped in the past several years as a result of restricting/reclaiming roads through decisions intended to facilitate grizzly bear recovery. This has increased wolf security within the project area. Protection of water bodies and associated habitats maintain characteristics often used for denning and rendezvous sites. Also, since the mid-1990s there has been more reliance on restoration focused treatments that result in a greater mosaic of habitat conditions that provide improved forage and cover conditions within the same area for big game which then maintains or improves the prey base for wolves.

Alternatives 2, 3, and 4 – On-going and Reasonably Foreseeable Actions

Reasonably foreseeable actions include those federal, state, or private activities that are ongoing or scheduled to occur, independent of this federal action. Table 34, located at the beginning of Chapter 3, identifies those current and foreseeable actions in the project area that were determined to be appropriate for inclusion in the analysis of environmental effects.

A district wide thinning project of previously harvested units (Timber Stand Improvement 2010-2015) would occur within big game habitat. These units provided foraging habitat following harvest, but are or are becoming areas of hiding cover with reduced foraging opportunities. Planned units would be accessed via open or restricted roads and possibly by foot; restricted road use would not exceed administrative levels. Work would be completed by hand through the use of chainsaws within a short activity period. Wolves may avoid the immediate area during activity, but would be expected to continue using the stands during inactive periods such as nights and weekends. Cumulatively, effects would be minor. Although thinning of conifers may result in a low level of temporary disturbance, thinning would continue to provide open space for shrub and grass growth and productivity (foraging opportunities) within the stands for a greater length of time.

Stimson Lumber Company has proposed to harvest approximately 216 acres of their timbered lands located at the top of Yaak Mountain. The existing road ends at the Stimson and NFS lands boundary and access to the proposed harvest area would require the construction of approximately 1.6 miles of road of which approximately 0.2 mile would cross NFS lands. Construction and use of this proposed road segment would be a Forest Service permitted activity

based on approval. The new road would remain gated to public motorized use and, therefore, would have no impacts of the availability of secure habitat based on the Elk analysis. Proposed harvest includes of mixture of regeneration, overstory removal, partial harvest or commercial thin treatments that would result in a mosaic of habitat conditions in the west slope of Yaak Mountain. This would be expected to result in increased foraging opportunities for big game within secure habitat. Cumulatively, Stimson's proposed harvest in addition to OLY's proposed harvest, both entities' past harvest, and untreated areas would result in a greater mosaic of habitat types and conditions on Yaak Mountain for big game use. This would help maintain or improve the big game population which would benefit wolf use and their continued presence within the project area.

The relationship of this project to increased recreational use of the area centers on the potential for increased hunting and trapping pressure. Upon the delisting of gray wolves, management authority returned to the State of Montana and ongoing hunting and trapping activities are regulated by MFWP. During the 2014 hunting and trapping seasons, 140 wolves were harvested in the Northwest Montana recovery area. Hunting activities on state and private land vary by area, but access is limited and use levels are low. Also, three outfitters are currently permitted to operate with set service days for this area. All three currently do provide services for wolf hunting but are not permitted to provide services for wolf trapping. Areas used by the outfitters or other hunters and trappers may change as roads currently impassable due to vegetative growth are cleared; however, access would continue to be by non-motorized means as no new roads would be opened for public motorized use. There would be no change to the availability of secure habitat (see the Grizzly Bear and Elk analyses) and levels of hunting and trapping pressure would not be expected to increase. Hunting and trapping activities within the project area may influence areas used by wolves during the hunting/trapping seasons and could cumulatively contribute to minor, short-term disturbance and avoidance effects. These effects would vary with activity levels and specific area use; however, overall exposure to humans would remain low. Therefore, mortality risk and potential cumulative effects to gray wolves would be minimal within the project area.

Continued management and development of private land in the OLY project area is expected. Anticipated effects include species displacement, habitat alteration, and/or habitat loss. Many of the activities that may occur on the private property parcels can only be estimated and are outside the control of the Forest Service. Land development, timber harvest, hunting, and recreational use of the analysis area have the potential to affect the habitat suitability, prey availability, and mortality risk to wolves. Land development which includes road construction, vegetation clearing, and residential construction and improvements can create a variety of changes to the landscape. For example, new access to land parcels and/or residential structures increases road densities and potentially reduces the availability of secure habitat. Potential effects depend on the amount of private land on the landscape, the magnitude, type and location of developments and include the loss of secure habitat and localized disturbance on wolves and their prey species. In the OLY project area, future development opportunities are limited to approximately 3,802 acres (or about 5 percent) of private land not within corporate ownership. These lands are generally concentrated in the lower elevation sites of the project area near town. Past trends in land development here would suggest that development would continue to occur at a low rate. Also, the NFS lands within the project area would continue to provide adequate levels of secure habitat through management direction for grizzly bears and elk. Therefore, development of private lands would be expected to have minor cumulative impacts on wolves and their prey species within the project area over the next 10 years.

The resident pack must compete for prey with other predators found in the project area (e.g., grizzly and black bears, mountain lions, and coyotes). The action alternatives would increase the amount and quality of big game foraging habitat through treatments that trend the vegetative characteristics of the area towards desired historic conditions while maintaining high levels of secure habitat. Therefore, improvements in habitat condition that maintain and potentially increase the big game prey base would be expected to continue to provide suitable habitat with respect to the key resource elements for the O'Brien wolf pack in the project area: sufficient year-round prey base, secluded denning and rendezvous sites, and sufficient space with minimal exposure to humans (secure habitat).

Based on the nature and magnitude of potential cumulative effects to wolves independent of this project, there are no cumulative effects anticipated that would change the effects determination for wolves from implementation of the proposed federal actions.

Regulatory Framework Findings

2015 Forest Plan

The 2015 Forest Plan provides desired conditions, objectives, standards, and guidelines for gray wolves within the Wildlife Resource. The following are applicable to the actions in this project[26]:

Forestwide Direction

- p. 28, **GOAL-WL-02**: The KNF manages and schedules activities to avoid or minimize disturbance to sensitive species and manages habitat to promote their perpetuation into the future.

  Proposed harvest and fuels treatments would trend vegetation towards the desired conditions. This would improve foraging opportunities for big game and would, therefore, help maintain a year-round prey base for wolf use. Although there are no know denning and rendezvous sites, the project contains a design feature to protect these sites if found. See "Year-Round Prey Base" and "Den and Rendezvous Sites" within the "Direct and Indirect Effects" discussion. Therefore, the OLY project would contribute to progress toward achieving GOAL-WL-02.

- p. 28, **FW-DC-WL-01**: Nests and den sites and other birthing and rearing areas for terrestrial threatened, endangered, proposed, or sensitive species are relatively free of human disturbance during the period they are active at these sites.

  There are no known den or rendezvous sites within the project area or activity areas. However, protection measures would be taken if an active den or rendezvous site were discovered. See "Den and Rendezvous Sites" within the "Direct and Indirect Effects" discussion. Therefore, the OLY project would contribute to progress toward achieving FW-DC-WL-02.

[26] Goals, desired conditions, objectives, standards, and guidelines can be found on the noted pages in the 2015 Forest Plan.

- p. 28, **FW-DC-WL-02**: A forestwide system of large remote areas is available to accommodate species requiring large home ranges and low disturbances, such as some wide-ranging carnivores (e.g., grizzly bear).

  Large areas of secure habitat found within the project area that currently provide for grizzly bears and elk also provide security for gray wolves. These secure habitat areas are found in association with IRAs and MAs that provide non-motorized or limited motorized access during the year. Adherence to management direction for grizzly bears (FW-STD-WL-02) and elk (FW-GDL-WL-10, FW-OBJ-WL-02), backcountry areas (MA5a, b, c), and IRAs would continue to maintain secure habitat within the project area for wolf use. See "Secure Habitat" within the "Direct and Indirect Effects" discussion. Therefore, the OLY project would contribute to progress toward achieving FW-DC-WL-02.

- p. 29, **FW-DC-WL-08**: Habitat for native ungulates is available and well-distributed across the landscape to provide prey for carnivores.

  Proposed harvest, prescribed fire, and non-harvest fuels treatments would trend towards the desired vegetation conditions which would improve the quantity and quality of forage habitat within the project area. The long-term benefit of this activity to big game means the maintenance of the local prey conditions for resident and potential transient wolf use of this area. See "Year-Round Prey Base" within the "Direct and Indirect Effects" discussion. Therefore, the OLY project would contribute to progress toward achieving FW-DC-WL-08.

- p. 30, **FW-DC-WL-18**: Secure denning and rendezvous sites are available for wolf packs and avoided by management activities during critical biological periods (e.g., whelping, rearing).

  As stated for FW-DC-WL-01, there are no known den or rendezvous sites within the project area or activity areas. However, protection measures would be taken if an active den or rendezvous site were discovered. Riparian areas often selected for rendezvous sites would not be impacted by activities and large areas of secure habitat would remain available for establishment of these homesites. See "Den and Rendezvous Sites" and "Secure Habitat" within the "Direct and Indirect Effects" discussion. Therefore, the OLY project would contribute to progress toward achieving FW-DC-WL-18.

- p. 32, **FW-GDL-WL-18, Wolf**: Management activities would avoid or minimize disturbance to wolves near den and rendezvous sites during the times those sites are in use based on the best available information.

  As stated for FW-DC-WL-01 and FW-DC-WL-18, there are no known den or rendezvous sites within the project area or activity areas. However, protection measures would be taken if an active den or rendezvous site were discovered. See "Den and Rendezvous Sites" within the "Direct and Indirect Effects" discussion. Therefore, the OLY project is designed in accordance with FW-GDL-WL-18.

Management Area Direction

- p. 62, **MA5a, b, c (Backcountry)-DC-WL-01**: Large remote areas with little human disturbance such as those found in these MAs (in conjunction with MAs 1a, 1b, and 1c)

are retained and contribute habitats for species with large home ranges. Habitat conditions within these management areas contribute to wildlife movement within and across the Forest. These areas also provide foraging, security, denning, and nesting habitat for wildlife.

MAs 5a and 5c are found within the project area in association with grizzly bear Core and elk security habitat areas as well as Flagstaff and Saddle Mountain IRAs. These lands would continue to contribute to secure habitat for gray wolves with low levels of non-motorized human disturbance and largely natural vegetative conditions. See "Secure Habitat" within the "Direct and Indirect Effects" discussion. Therefore, the OLY project would make progress towards MA5a, b, c-DC-WL-01.

Federal Law

National Forest Management Act (NFMA)

The project would comply with NFMA direction to provide for diverse populations of plant and animal communities through compliance with the 2015 Kootenai Forest Plan.

Other Guidance or Recommendations

Montana's Gray Wolf Conservation and Management Plan (MFWP 2003, 2004) is based on an adaptive management strategy with more management flexibility granted as the number of breeding pairs in Montana increases above the 15 pair benchmark. Potential management activities cover a range of concerns which include maintaining viable populations of wolves and their prey, resolving wolf-livestock conflicts, and assuring human safety.

Statement of Findings

The No Action alternative **may impact individuals or their habitat, but will not likely contribute to a trend toward federal listing or cause a loss of viability to the population or species** for gray wolves. This alternative would maintain the existing secure habitat and prey base that currently supports the use of the project area by the O'Brien wolf pack. There would be no impacts to unknown denning and rendezvous sites that may be found within the project area. However, succession due to fire suppression is resulting in a more homogenous environment with high forested cover than what would have occurred under a mixed severity fire regime. As trees continue to encroach upon forage openings the acres of productive foraging habitat for big game species would decline over time. A reduction in prey availability would make the project area less able to continue to support the wolf in the future.

Alternatives 2, 3, and 4 **may impact individuals or their habitat, but will not likely contribute to a trend toward federal listing or cause a loss of viability to the population or species** for gray wolves. This determination is based on: 1) wolves may be disturbed and avoid activity areas during project implementation; however, 2) the action alternatives would continue to provide a sufficient level of secure habitat for gray wolves during and post-project through adherence to management direction for other species or land management areas; 3) the prey base in the area supports at least one known wolf pack and improved forage opportunities would benefit the prey species population numbers; 4) the alternatives would not affect known denning or rendezvous sites; 5) use of the majority of the project area could continue during project implementation; and 6) mortality risk to wolves is not expected to measurably increase during or post-implementation of proposed activities.

Other Agencies and Individuals Consulted

Brady Dunne, MFWP Wolf Management Specialist

Communications consisted of requests for information regarding known wolf packs occupying the project area.

Townsend's Big-eared Bat

Introduction

Townsend's big-eared bats are year-round residents of Montana and the KNF and are found in a variety of habitat types including grasslands, shrublands, and forested habitats across the United States. However, availability of suitable hibernating and/or roosting habitat influences local distribution and seasonal use by Townsend's big-eared bat populations. They are highly associated with caves or other cave-like rock structures for roosting. Following European settlement, in areas where this habitat is limited Townsend's big-eared bats have been documented to use man-made structures that provide cave-like features including abandoned mines, buildings, bridges, and concrete culverts. More recently, they have been documented to also use basal hollows of old growth redwoods for day and maternity roosts (Fellers and Pierson 2002, Mazurek 2004). Foraging habitat types are not as restrictive and use appears variable throughout its distribution. Primary foraging areas for bats, in general, are habitats associated with riparian areas and along edges of habitat types (Grindal 1996). This is true for Townsend's big-eared bats in California (Fellers and Pierson 2002), but they have also been found foraging in clear cuts adjacent to mature forested stands which were not used (Erickson and West 1996).

Conservation Assessments for Townsend's big-eared bats (Pierson et al. 1999, Gruver and Kenaith 2006) provide recommendations for forest management activities such as vegetative conversions and timber harvest. Primary concerns are for the protection of known and potential hibernating/roosting habitat, especially caves and abandoned mines, and maintenance or enhancement of foraging habitat within proximity of these sites. No specific prescriptions for vegetation management are provided as Townsend's big-eared bats forage in a variety of habitats and knowledge of local conditions that may influence use is limited. However, habitat edges (both forested and riparian), riparian corridors, and water quality appear beneficial and provide a suitable prey base, drinking opportunities, and movement areas.

Because Townsend's big-eared habitat use is centered on the availability of caves or cave-like structures that provide roosting habitat, proposed activities that maintain known roosting structures and limit disturbance to Townsend's big-eared bat at these sites is a main focus of the this analysis. Also, proposed vegetation management treatments that influence the availability of foraging habitat and additional potential roosting opportunities are also discussed in detail. Those activities that would not measurably impact known or potential roost sites or foraging habitat (e.g., proposed recreational improvements or watershed improvement activities) will not be discussed.

Summary of Conclusions

Implementation of the OLY project's action alternatives result in a determination of **may impact individuals or their habitat, but will not likely contribute to a trend toward federal listing or cause a loss of viability to the population or species** for Townsend's big-eared bats. Activities would maintain the characteristics of riparian and old growth habitats as well as encourage the trend towards the desired vegetative conditions within the project area. The creation of openings and edge habitat would improve foraging opportunities in treated areas for Townsend's big-eared bats.

Regulatory Framework

2015 Forest Plan

The 2015 Forest Plan provides overall guidance for the management of the lands on the KNF. It describes the goals, desired conditions, and objectives toward which the management of the land should be directed. And it establishes standards and guidelines to help achieve or maintain the desired condition or conditions, to avoid or mitigate undesirable effects, or to meet applicable legal requirements.

The plan components which provide specific Townsend's big-eared bat resource direction relevant to this project include:

- FW-GDL-WL-06
- FW-GDL-WL-07
- FW-GDL-WL-17

There are other 2015 Forest Plan components that provide resource direction for a range of wildlife species or habitat conditions that are not specific to Townsend's big-eared bats, but still are applicable to their management. The full list of the plan components applicable to Townsend's big-eared bat management are found in the "Regulatory Framework Findings" section of this analysis.

Resource Indicators and Measures

For the Townsend's big-eared bat analysis, the primary resource indicator will be the availability of preferred hibernacula or roost sites within the project area and whether proposed activities have the potential to negatively impact the site for bat use. Potential impacts could be physical alteration of site or the introduction of disturbance that results in the displacement from or abandonment of the site. A second resource measure is the maintenance of large trees and snags, especially western redcedar within the appropriate habitat type, which could potentially provide additional roosting opportunities for the bats. This includes the availability of old growth habitats where large diameter, old trees are available in a greater amount. Finally, a third resource measure considers the effects of vegetation management on maintaining and/or improving upon foraging opportunities within the project area, especially near any preferred hibernacula or roost sites. See Table 177 below for a summary of the resource indicators and measures.

Table 177. Resource Indicators and Measures for Assessing Effects

Resource Element	Resource Indicator	Measure	Used to Address: P/N*, or Key Issue?	Source
Preferred Hibernacula or Roost Sites	Availability of preferred sites (caves, mines, old buildings); activities occurring at or near known or potential sites	Impaired suitability or loss of the site; potential for disturbance?	No	KNF Forest Plan FW-GDL-WL-06, FW-GDL-WL-07, and FW-GDL-WL-17; Conservation Assessments

Resource Element	Resource Indicator	Measure	Used to Address: P/N*, or Key Issue?	Source
Potential Day or Maternity Roost	Vegetation management occurring within old growth cedar sites; retention of large trees/snags, especially fire scarred western redcedar	Acres of treatment within old growth cedar habitats; retention of large trees/snags?	No	KNF Forest Plan FW-DC-WL-11, FW-DC-WL-12, FW-DC-WL-15; Conservation Assessments
Foraging Habitat	Activities occurring within aquatic or riparian habitats; changes to early successional habitat, and creation of edge habitat, especially from regeneration harvest treatments; maintenance of existing open forest habitat characteristics	Protection of aquatic and riparian habitats; acres of regeneration harvest and miles of created edge habitat; acres of other vegetation management treatments	No	KNF Forest Plan FW-DC-WL-10 and FW-DC-WL-19

*P/N = Purpose and Need

Methodology

Potential preferred hibernacula or roost sites associated with abandoned mining activities, stream corridors, RHCAs, and old growth habitats available within the project area were identified through the use of GIS spatial data. For each action alternative, the acres of regeneration harvest and resultant creation of edge habitat were calculated. Only regeneration harvest was considered to result in the creation of edge habitat as intermediate harvest, prescribed fire, and other non-harvest fuels treatments are not expected to result in substantial change in habitat condition along the edge of the unit compared to the existing condition. Also, the location of the units was considered in relation to where Townsend's big-eared bats have been observed and the location of potential hibernacula or roost sites. Finally, consideration of effects to the structural attributes of Townsend's big-eared bat habitat relies on the other habitat analyses in this document (i.e., Forest Vegetation and Old Growth).

Data Sources

Detailed Townsend's big-eared bat population ecology, biology, habitat description and relationships identified by research, and described above, are summarized in Kunz and Martin (1982), Pierson et al. (1999), and Gruver and Kenaith (2006). These provided guidance in evaluating potential habitat and effects to Townsend's big-eared bats and are incorporated by reference.

Townsend's big-eared bat occurrence data comes from recent District wildlife observation records, NRIS wildlife database, and other agencies (MFWP, MNHP).

Assumptions and Limitations

In coastal California forests, Townsend's big-eared bats have been documented to use basal hollows (i.e., large fire scarred cavities) in old growth redwood trees as day and maternity roosts. Day use by individuals occurred in trees approximately 4-6 feet in diameter with hollow dimensions around 3 feet wide by 15 feet high (Fellers and Pierson 2002). Maternity roosts used by females and young are found in larger hollows of larger trees: trees 10-15 feet in diameter and hollows 3-10 feet wide and 14-26 feet high (Mazurek 2004). Therefore, it is assumed that old growth, fire scarred western red cedar found within the project area may provide hollows large enough for day roosts; however, it is unlikely that trees/hollows large enough to be used a maternity roosts would be found on the KNF.

Affected Environment

Spatial and Temporal Context for Effects Analysis

The analysis boundary for direct effects to individuals and their habitat is the OLY project activity areas, since activities in these areas could affect the suitability of roost sites and could result in disturbance and possible displacement effects to the bat. The boundary for indirect effects is the project area as bat use is not limited to the activity areas and vegetation management can improve foraging opportunities. The boundary for determining contribution toward viability is the KNF.

Temporal boundaries for the Townsend's big-eared bat analysis include both short-term and long-term effects. Short-term effects are those that are expected to last between a few days to a season or portion of two seasons. Generally, once disturbance causing activities like prescribed burns and harvest have been completed bats can move back into and use the area. Greater foraging opportunities would likely be available following the completion of activities depending on the remaining understory vegetation, edge habitat conditions, and insect use. Long-term effects are those that expected to last longer than a season or two. Townsend's big-eared bats are habitat generalists except for the requirement for hibernating and/or roosting structures which primarily includes caves and abandoned mines and, potentially, very large tree cavities. The loss or impaired suitability of preferred hibernacula and roosting sites could last for several years or into perpetuity depending on the type and length of action involved. Vegetation management treatments, especially those treatments resulting in openings and edge habitat, would increase the availability of foraging habitat that could persist for a minimum of 15 years or longer with continued maintenance. Therefore, long-term effects are those that are expected to last longer than a season or two and potentially for many years.

Existing Condition

Introduction

Surveys on the KNF from 1993-2007 by Hendricks et al. (1995, 1996) and others have documented the species on the Three Rivers District (Lenard et al. 2009) and in all planning units (Johnson 2004). No key roosting sites, winter hibernacula, or maternity roosts have been located on the Forest although suitable sites are available. Suitable sites are primarily in the form of human made structures, such as abandoned mines or old buildings, as only one natural cave is found on the Forest. The existing population size on the KNF is unknown.

Townsend's Big-Eared Bat Occurrence

Forest and MNHP observation and monitoring data for Townsend's big-eared bats indicate that one observation of the bat was made in the mid-1990s along the Yaak River on the northwestern boundary of the project area. The lack of observations of this species is not surprising given that they are a nocturnal species and, therefore, generally are active at night. Also, due to the lack of caves and only a single abandoned underground mine immediately adjacent to the project area the occurrence of this species is likely low here.

Description of the Analysis Area

There are no mines or caves known to exist within the project area and other historic mining activity only resulted in surface disturbance. One abandoned underground mine is believed to be located along the project area boundary on the far side of the Yaak River which is within close proximity to the documented observation of the bat from 1994. The mine could not be located in the field and the documentation questioned whether it may have been obliterated during construction of Yaak Highway 508 (see project file). However, if an opening to this mine still exists and leads to an underground cavern, it could provide suitable habitat for use as a hibernacula or roost by Townsend's big-eared bats. Also, because of its location any bats using this mine would likely use at least a portion of the project area as foraging habitat. There are no old buildings located on NFS lands that could provide suitable habitat for bat use; however, such buildings are likely to occur on private lands within the project area.

Townsend's big-eared bats have been documented to roost in large fire scarred hollows in California and old growth western redcedar, which can provide similar structural features, may provide day roost opportunities. As discussed in the Old Growth section of this document, approximately 11 percent of the forest habitat within the OLY project area is old growth. The western redcedar forest type is prevalent within these old growth acres due to the abundance of lands within the warm/moist biophysical setting that supports this species establishment and growth. As discussed above, Townsend's big-eared bats use a variety of habitats including non-forested habitats and are not dependent on old growth. However, many bats appear to use mature or old growth for roosting (Christy and West 1993, Erickson and West 1996, Grindal 1996) and this may be true for Townsend's big-eared bats especially in areas where caves or similar structures are limited (Fellers and Pierson 2002, Mazurek 2004). These stands likely provide the greatest opportunities for day roost sites within the project area. Refer to the Old Growth section of this document for additional information about old growth conditions in the project area.

A mosaic of habitat types and seral/structural conditions can be found within the project area with variability in forested habitats resulting from past natural disturbance events, vegetation management, and fire suppression. This mosaic also includes aquatic and riparian habitats associated with portions of the Kootenai and Yaak Rivers, numerous streams, and a handful of lakes. Forested stands within an early seral or open habitat condition, the aquatic habitats, and edges between these different habitat types provide foraging opportunities for the Townsend's big-eared bat. However, the OLY project area currently is not meeting desired conditions for forest structure and early seral habitat consisting of young seedling/sapling trees that provide open habitat types. The availability of stands exhibiting early seral conditions is at the low end of the desired range and will soon move outside of the range. With the increase in stand ages and density, there is also more homogeneity and less diversity of patches and available edge habitats. See the Forest Vegetation section for more details.

Environmental Consequences

Alternative 1 – No Action

A range of fire severity, from non-lethal to stand replacing crown fires, historically played a role in developing the vegetative characteristics in the OLY project area. Although the type and frequency of fire experienced varies within a given area and vegetation type (based on biophysical setting), with some being more prone to infrequent stand replacing fire, the vegetation types within the project area have historically experienced low and/or mixed severity fires at least periodically. The exclusion of low to moderate severity fires through fire suppression has altered the amount of shade-tolerant species in the understory of these forested stands as well as increased fuel loadings in the form of ladder fuels and downed woody materials. Fewer fires have also reduced the amount of natural openings, structural diversity, and the number/size of patches across the landscape. Fire suppression has not yet resulted in a departure from historic ranges for all stands within the project area (especially those with naturally longer fire return intervals), although they too are trending towards a departure. Due to the denser fuel conditions, resulting stand replacing fires in these stands often kill many of the overstory trees which historically survived mixed-severity wildfires. This includes large, fire scarred western redcedar that survived past fire events whose resultant cavities could potentially provide day roost sites for bats. In general, the resultant stand patch sizes and occurrence, species composition, stand structure, and fire frequency and severity are departing from desired vegetative conditions based on historic range of variability within the project area. See the Fuels Management and Forest Vegetation sections for more detail.

No direct effects from federal actions would occur within the project area. Natural successional processes would continue throughout both general forest and old growth which may be used by Townsend's big-eared bats as day roost habitat. In the short-term, the bats' use of this habitat would continue at current levels. However, the dense stands currently provide few openings or edge habitats which offer a more abundant prey base as well as flight maneuverability (Grindal 1996). Plant succession would continue in these stands, maintaining high canopy closure and dense forested conditions within a homogenous landscape that limits areas of important foraging habitat for Townsend's big-eared bats. Also, without periodic mixed severity fires in this habitat type there is reduced natural development of edge habitat or a mosaic of openings.

With continued fire suppression and lack of active management there would be an increased potential for severe fire behavior within the project area due to the continuing trend towards uncharacteristic vegetative conditions (see the Forest Vegetation and Fuels Management sections). Should a high severity fire occur within the project area, it could spread into the more moist sites including riparian areas and old growth habitat and potentially remove the existing vegetation within them completely. Also, this alternative would indirectly affect the availability of Townsend's big-eared bat foraging habitat by maintaining a lower than desired level of early seral habitats within the project area.

Alternatives 2, 3, and 4 – Direct and Indirect Effects

The primary concern associated with proposed activities is the potential to impact the availability and suitability of preferred hibernacula and roost habitats. Vegetation management that trends towards desired conditions would provide a landscape mosaic that includes a variety of habitats, patch sizes, species composition, and structure as would have occurred under natural disturbances processes and would be expected to provide suitable foraging habitat for Townsend's big-eared bats.

Project Design Features and Mitigation Measures

There are no design features or mitigation measures specific to the management of Townsend's big-eared bat habitat at this time.

Preferred Hibernacula or Roost Sites

There are no caves, mines, or tunnels present in the project area that would provide the most suitable habitat for a winter hibernacula or maternity roost. Some old buildings are likely present on private land within the project area that may provide summer roost opportunities; however, buildings found on private lands would not be affected by proposed activities. Based on historical documentation, an abandoned underground mine is believed to be located just beyond the western boundary of the project area. This mine has not been located and, therefore, it is not known if the mine provides hibernacula or roosting habitat for Townsend's big-eared bats or not. The mine is located across the Yaak River from proposed harvest units within the project area and at a distance greater than the minimum 500 feet recommended for timber harvest activities (Pierson et al. 1999). Therefore, proposed activities would not impact the availability or structural suitability of this potential site for bat use. Also, proposed activities are not expected to result in the disturbance or displacement of any bats that may be using this site due to the distance from the proposed harvest activities as well as the presence of the Yaak River and additional forested habitat that would provide a visual and noise barrier to the activities. This would be consistent with FW-DC-WL-01, FW-DC-WL-15, FW-GDL-WL-06 and FW-GDL-WL-17.

Old Growth Habitat and Other Potential Roosts Sites

Proposed vegetation management would not occur within old growth consisting of western redcedar forest types. Large fire scarred cedar may provide summer roosting habitat in areas such as the OLY project area where primary roosting sites (e.g., caves and mines) are limited or do not exist. Proposed harvest occurring adjacent to old growth stands may result in temporary disturbance and displacement to individuals in day roosts near the activity. However, harvest would be of short duration and would not be expected to negatively impact future use of these roost sites. In fact, suitability may increase for these potential roost sites because foraging habitat would now be in closer proximity which could reduce energetic costs associated with travel and navigating through heavily timbered stands (Erickson and West 1996, Grindal 1996). Maintenance of old growth habitat interspersed with riparian, forest, and edge habitats would provide potential roosting opportunities within close proximity of foraging and drinking habitats for Townsend's big-eared bats and would be consistent with FW-DC-WL-11.

Harvest and prescribed fuels treatments are proposed within old growth that historically experienced frequent low intensity wildfire with areas of mixed severity fires. Due to fire suppression and lack of similar disturbance processes, forest succession is occurring in the understory and competing for resources with the large old trees. This also increases the potential risk of insect and disease infestations, an increased risk of high severity fire due to the development of understory ladder fuels that could result in a stand replacing event, and impaired growth. The proposed vegetation management treatments are designed to maintain the existing old growth characteristics and further encourage development of these characteristics, especially in the recruitment stands, while making them more resistant to natural disturbances such as wildfire and insect and disease outbreaks. Although these stands are unlikely to provide large cedars that may be used for roosting, the open habitat conditions, corridors, and edge provided through the approximately 729 acres of treatment would maintain the suitability of the stands for

foraging by Townsend's big-eared bats. This would be consistent with both FW-DC-WL-11 and FW-DC-WL-19. See the Old Growth section for more information.

For all vegetation management treatments, healthy western larch, western white pine, Douglas-fir, and ponderosa pine would be kept within harvest units where available, with emphasis placed on keeping the larger diameter trees. Similarly, all snags would be left on site where they do not pose a safety hazard and also contribute to the structural diversity of the stand. Silvicultural prescriptions would incorporate recommendations for the number of snags based on the biophysical setting and existing availability of snags. The retention of large healthy trees and snags would help the trend towards the 2015 Forest Plan's desired condition for the area regarding species composition and forest structure. Therefore, proposed treatments would be consistent with FW-DC-WL-12 which states a desired condition for trees and snags greater than 20-inch diameter at breast height to be available throughout the Forest, with special consideration for those species associated with the warm dry biophysical setting. See the Forest Vegetation section for more information regarding the desired conditions for the development and retention of large snags.

Although harvest would not occur within western redcedar forest type old growth habitat, fire scarred legacy western redcedar may be found scattered throughout proposed units and used as summer roosting sites. Harvest has the potential to disturb and displace individuals utilizing these sites or reduce day roosting habitat if the trees were cut down. However, these trees likely exhibit other wildlife use and many would be kept for current and future cavity habitat as well as stand diversity especially in regeneration harvest units. Disturbance and displacement effects would be expected to be short-term and temporary and limited to the period of activity. Potential impacts would be to individuals or pairs and not to the population.

Foraging Habitat

Townsend's big-eared bats are considered to be terrestrial foraging habitat generalists. However, they appear to prefer riparian and forest edges for foraging as these habitats provide more prey opportunities and greater maneuverability. A limited amount of activities are proposed within aquatic and riparian habitats in the OLY project area. The activities would occur within areas of previous disturbance and either would not change the existing condition of the site or would result in the maintenance or improvement of the site for species that use aquatic and/or riparian habitats. This would be consistent with the 2015 Forest Plan desired condition to provide a mosaic of aquatic and riparian habitat with a low level of disturbance for associated species (FW-DC-WL-10).

Vegetation management, especially timber harvest, can improve foraging and roosting opportunities for Townsend's big-eared bats by influencing the abundance and spatial arrangement of habitat types (e.g., species composition, tree age/size, patch size, and edge habitats) provided through a mosaic of forested and open conditions. Treatments that trend towards the desired vegetative conditions for the OLY project area, including a desired increase in the amount of early seral habitat, would increase the amount of open and edge habitats and maintain existing open forest habitat conditions. Table 178 displays the acres of proposed regeneration harvest that would increase the amount of early seral open and edge habitats within the project area that would contribute foraging habitat for Townsend's big-eared bats. Table 178 also displays the acres of other proposed vegetation management treatments that would maintain existing desired vegetative conditions, including open forest and edge habitat conditions. The type and acres of treatments are displayed by alternative.

Table 178. Acres of Proposed Vegetation Management that would Maintain and/or Improve the Availability of Townsend's Big-Eared Bat Foraging Habitat within the OLY Project Area

Vegetation Management Treatment	Alternative 2 (acres)	Alternative 3 (acres)	Alternative 4 (acres)
Regeneration Harvest	2,116 70 miles edge	2,061 66 miles edge	1,569 63 miles edge
Intermediate Harvest	1,011	1,008	1,037
Non-Harvest Fuels Treatments	1,716	1,744	1,731
All Treatment Total Acres	**4,843**	**4,813**	**4,337**

Regeneration Harvest

Regeneration harvest is proposed within two general vegetation types: wetter vegetation types dominated by western redcedar/western hemlock and some grand fir and drier vegetation types dominated by unhealthy Douglas-fir and ponderosa pine. Within the wetter vegetation types, the stands currently have high canopy closure and contain little to no ground, shrub, or small conifer cover in the understory. In general, stands with high tree densities appear to negatively affect foraging use by Townsend's big-eared bats even when prey densities are high (Erickson and West 1996, Grindal 1996, Grindal and Bingham 1999). Therefore, existing use of these stands may be limited under the current condition and incidental mortality to individual bats is expected to be low. The reduction of the dense stand and creation of open and edge habitats is expected to improve bat foraging opportunities. Where regeneration harvest is the appropriate treatment for the stand condition, regeneration harvest provides the greatest opportunity to create these conditions. Alternative 2 proposes a total of 2,116 acres of regeneration timber harvest within dense and unhealthy forested habitats. Resulting edge habitat totals approximately 70 miles around the perimeter of the units. Alternative 3 proposes a similar amount of regeneration harvest acres and edge habitat, including approximately 2,061 acres of new openings and 66 miles of edge. Alternative 4 proposes the fewest acres of regeneration harvest acres at 1,596 acres. Although the resultant 63 miles of edge is not much different than that for Alternative 3, it is due to an increase in the number of units rather than the size of units. For Alternative 4, the units and associated edge are more self-contained in that there would not be as much within stand variability, fewer edge habitat combinations, and less contiguous miles of edge used as corridors for movement between different habitat types across the landscape.

Alternatives 2 and 3 propose 32 and 30 regeneration harvest units, respectively, that would create openings greater than 40 acres in size, either on their own or in combination with an adjacent unit. Tree species composition and health is variable among and/or within stands and although categorized as regeneration harvest, a range of overstory structure and canopy cover would be retained where available. Post-harvest retention would range from few trees per acre to portions resembling an intermediate harvest. In all units, where feasible, retained trees would be grouped together in clumps of 4-12 or more trees especially in those areas with fewer, quality leave trees available and along open roads. This is intended to better protect the leave trees as well as provide small areas of forested habitat for wildlife use, including use by Townsend's big-eared bats. Even in coastal California where Townsend's big-eared bats appeared to limit their use of open habitats, they were associated with scattered trees and shrubs when they did use interiors of open areas (Fellers and Pierson 2002). These large patch sizes and shape mimic natural disturbance processes like wildfire and allow greater flexibility to work around and maintain features like

hardwood patches, wet areas, or patches of leave trees, where available, that would increase within stand diversity in the greater cut area boundary. Also, edge habitat would be created along the boundary of the units. Larger unit boundaries are adjacent to different types of habitat (e.g., RHCAs which were excluded from units, past harvested areas, unharvested areas, and old growth) resulting in different combinations of edge habitat, proximity to potential roosting habitat, and greater movement corridors between. This all would result in the creation of a mosaic of habitat types and vegetation types as well as the creation of larger areas that provide more interior habitat and greater amounts of edge for Townsend's big-eared bats that utilize these habitat conditions compared to Alternative 4 which would keep the opening size to 40 acres or less.

Other Vegetation Management

Intermediate harvest and prescribed fire would occur in healthy stands where the desired species composition and structure is available. Intermediate harvest would open up suitable habitat by removing smaller trees, retaining larger fire tolerant species, and would maintain the edge between adjacent denser stands. Low to moderate fire applied through prescribed burning in unharvested stands or larger ecosystem burns would be most similar to historical conditions created by mixed-severity fire. Implementation of these burns is intended to restore fire's role as a natural process used to maintain the open timbered conditions and improve the ecological function of a site. Ultimately, the goal of treatment within these stands would be to maintain the existing desired conditions and encourage continued tree growth, understory vegetation diversity, and stand health. In addition, other non-harvest fuels treatments were identified to achieve some of the desired conditions that would have occurred with harvest or prescribed fire while addressing other resource concerns. Treatments within these units would involve the slashing of small diameter understory trees that would reduce the understory tree density but otherwise not impact the existing vegetative composition or structure of the stand. In all, these intermediate treatments propose between approximately 2,727 acres and 2,768 acres with Alternative 2 proposing the fewest acres and Alternative 4 with the greatest number of acres. See Table 178 for proposed treatment acres by alternative.

Summary

Proposed harvest, prescribed fire, and non-harvest fuels treatments would trend towards the desired vegetation conditions with a greater mosaic of habitat conditions across the landscape, an increase of the diversity within the stands, increased development of shrubs in the understory, and an overall increase in the amount of early seral and edge habitat for species adapted to these conditions. This would be consistent with forestwide wildlife desired condition FW-DC-WL-19 which describes the desire to provide habitat for native fauna adapted to open forest and early seral habitats. Excluded aquatic and riparian areas would continue to provide important foraging sites as well as function as movement corridors between habitat types (FW-DC-WL-10). The potential for the loss of day roosting habitat and disturbance to individuals is low as proposed activities would not occur within western red cedar forest type old growth habitat (FW-DC-WL-01, FW-DC-WL-15, and FW-GDL-WL-17). The effects of vegetation management treatments would be the creation and/or maintenance of open timbered stands on approximately 4,337 to 4,843 acres, depending on the alternative, and a mosaic of habitat types within the larger landscape which would provide more forage and movement opportunities for Townsend's big-eared bats. Also, by breaking up the continuous fuels, it may influence the behavior of a fire such that a mosaic of wildfire severity occurs that creates a variety of habitat types including openings, edges, and fire scarred but surviving western redcedar while better maintaining old growth and

riparian habitats as it would have under natural disturbance patterns. This mosaic could provide additional foraging and roosting opportunities for Townsend's big-eared bats in the future.

In all, Alternatives 2 and 3 propose a similar amount of vegetation management within the OLY project area with approximately 4,843 and 4,813 acres, respectively. The type of management differs by alternatives in that Alternative 2 proposes more regeneration harvest compared to Alternative 3 which proposes to change some of the regeneration harvest acres to non-harvest fuels treatments to address resource concerns. Alternative 4 would treat an intermediate amount of non-harvest fuels compared to Alternatives 2 and 3, but the fewest acres overall by keeping harvest generated opening sizes to 40 acres or less. Despite the slight differences in treatment types between Alternatives 2 and 3, they present the greatest potential for improved future Townsend's big-eared bat foraging habitat in the project area. See Table 178 above as well as Chapter 2 for the description of the proposed treatments and acres for each alternative.

Cumulative Effects

Introduction

The Existing Condition section describes the existing suitable habitat within the project area and includes the availability of potential hibernacula and roosting sites, riparian areas, old growth, and general forest habitat. This cumulative effects section summarizes the past actions as well as further describes ongoing and other reasonably foreseeable contributions potentially impacting Townsend's big-eared bat habitat.

Spatial and Temporal Context for Cumulative Effects Analysis

As described for indirect effects under the section Spatial and Temporal Context for Effects Analysis, the project area was chosen as the appropriate scale for the Townsend's big-eared bat cumulative effects analysis. These bats have been documented to move as far as 24 km, or approximately 15 miles, from hibernacula to foraging areas (Dobkin et al. 1995) which is the approximate distance from the known observation and potential roost sites to the southeast corner of the project area.

Similarly, temporal boundaries for the Townsend's big-eared bat cumulative effects analysis are the same as for those described for the direct and indirect effects analysis. In summary, short-term effects are those that are expected to last between a few days to a season or portion of two seasons and related to the potential for disturbance during activities. Vegetation management treatments, especially those treatments resulting in openings and edge habitat, would increase the availability of foraging habitat that could persist for a minimum of 15 years and longer with continued maintenance. Because of the dependence of Townsend's big-eared bats on suitable hibernacula and roosting sites, the effects of proposed activities to these sites could last for years and into perpetuity.

Past, Present, and Reasonably Foreseeable Activities Relevant to Cumulative Effects Analysis

Past Actions

Townsend's big-eared bats will use a variety of habitat types for foraging, especially along riparian and forested edges, but are highly associated with cave or cave-like habitats for roosting. No caves or abandoned underground mines are found within the project area on either NFS or

private lands. Therefore, there has been no past management affecting these structures and their suitability for bat use. Harvest has occurred in the project area since the 1930s. Prior to the 1990s, harvest resulted in the loss of old growth and riparian habitat. Past road construction contributed to a loss of old growth (i.e., potential loss of day roosts), but also resulted in an increase forest edge that created foraging habitat. Detailed description of previous vegetation activities are found at the beginning of Chapter 3, including Table 32 and Table 33, as well as Appendix F of this document. In unharvested areas, natural disturbances such as wildfire would have resulted in a mosaic of openings and forest edges as well as the development of large fire scarred western redcedar that survived repeated fires. In contrast, fire suppression since the early 1900s has altered stand structure resulting in more homogenous stands with increased stand densities and less early seral habitat/openings and edge habitat for foraging opportunities. Past development and the conversion of NFS lands has been minor within the project area, but contributed to both the loss of habitat (i.e., construction of buildings and roads) and the increase in permanent foraging habitat through the creation of open and edge habitat along the remaining forest boundary. The development and conversion of private lands would have had similar effects to the availability of foraging habitat, but to a greater extent.

Since the 1990s, application of Forest Plan direction has resulted in better protection of old growth and riparian habitats. More recently, vegetation management treatments are designed to trend vegetation towards the desired conditions including a greater proportion of early seral habitats, tree species composition appropriate to the sites, increase in patch size and distribution, retention and development of large trees, etc. that would improve foraging opportunities within the treated areas. Application of this management direction and trends has since provided better protection and maintenance of Townsend's big-eared bat foraging and potential roost habitat.

Alternatives 2, 3, and 4 – On-going and Reasonably Foreseeable Actions

Reasonably foreseeable actions include those federal, state, or private activities that are ongoing or scheduled to occur, independent of this federal action. Table 34, located at the beginning of Chapter 3, identifies those current and foreseeable actions in the project area that were determined to be appropriate for inclusion in the analysis of environmental effects.

A district wide thinning project of previously harvested units (Timber Stand Improvement 2010-2015) would occur within young densely timbered stands. These units had provided foraging opportunities in the form of open and edge habitat. However, with greater tree establishment and growth the stands become less suitable for Townsend's big-eared bats over time and may become hard to navigate due to the density of trees (Erickson and West 1996). Thinning the thick stand of conifers would continue to provide open space for bat maneuverability and foraging opportunities for a greater length of time. Work would be completed by hand through the use of chainsaws and would not occur within riparian or old growth habitats. Therefore, bats would not be expected to be utilizing these stands for roosting habitat due to the lack of suitable trees with large cavities and activities would not be expected to result in disturbance or risk of mortality to Townsend's big-eared bats. Cumulatively, effects would be minor but beneficial in the long-term by maintaining variability in habitat types and arrangement on the landscape.

Stimson Lumber Company has proposed to harvest approximately 216 acres of their timbered lands located at the top of Yaak Mountain. The existing road ends at the Stimson and NFS lands boundary and access to the proposed harvest area would require the construction of approximately 1.6 miles of road of which approximately 0.2 mile would cross NFS lands. Construction and use of this proposed road segment would be a Forest Service permitted activity based on approval. Construction of the new road would result in the creation of edge within the

forested habitat. Proposed harvest includes of mixture of regeneration, overstory removal, partial harvest or commercial thin treatments that would result in a mosaic of habitat conditions in the west slope of Yaak Mountain. This would be expected to result in a change to a greater mosaic of habitat types and conditions on Yaak Mountain for Townsend's big-eared bat use. Activities would result in similar effects to Townsend's big-eared bats as those described under the direct/indirect effects section above and are expected to have minimal cumulative effects to the bats and their habitat: no impact to key known or potential roosting sites, no activities in old growth habitat, harvest of high density stands would result in the creation of open and edge habitat and greater foraging opportunities, minimal potential for disturbance and displacement, and low risk of incidental mortality to individuals should a bat be in the area at the time of activity.

Other on-going federal activities within the project area (see Chapter 3) are not expected to increase the potential cumulative effects to this species.

Development of private land along the Yaak River likely altered and reduced some Townsend's big-eared bat habitat in the lower elevation lands along the project boundary. The existence of old buildings or other man-made structures may have created summer roosting sites; however, the availability and suitability of these sites is unknown. Cumulative effects would be minor as private property makes up a small portion of the area, there are no known mining adits on private property within the project area, growth is slow, and NFS lands would continue to provide an abundance of aquatic and riparian habitats and a mosaic of forested habitat conditions that would provide ample forage and potential day roost habitat.

Based on the nature and magnitude of potential cumulative effects to Townsend's big-eared bats independent of this project, there are no cumulative effects anticipated that would change the effects determination to the bat from implementation of the proposed federal action.

Regulatory Framework Findings

2015 Forest Plan

The 2015 Forest Plan provides desired conditions, objectives, standards, and guidelines for Townsend's big-eared bat within the Wildlife Resource. The following are applicable to the actions in this project[27]:

Forestwide Direction

- p. 28, **GOAL-WL-02**: The KNF manages and schedules activities to avoid or minimize disturbance to sensitive species and manages habitat to promote their perpetuation into the future.

  Proposed harvest and fuels treatments would result in the retention of remnant large tree species, better approximation of stand patch size and species composition, protection of riparian habitats, improved stand health, and general movement towards the desired vegetative condition based on historic range of variation with the stands for this area. This would promote the development of large diameter trees as well as provide an increase in foraging habitat for

[27] Goals, desired conditions, objectives, standards, and guidelines can be found on the noted pages in the 2015 Forest Plan.

Townsend's big-eared bats through the creation of open and edge habitats. There are no known hibernacula or roosts sites within the project area and a potential site would not be impacted by project activities. Therefore, there are no design features currently identified to minimize disturbance to the bats. See the "Direct and Indirect Effects" discussion. Therefore, the OLY project would contribute to progress toward achieving GOAL-WL-02.

- p. 28, **FW-DC-WL-01**: Nests and den sites and other birthing and rearing areas for terrestrial threatened, endangered, proposed, or sensitive species are relatively free of human disturbance during the period they are active at these sites.

  As described for GOAL-WL-02 above, there are no known hibernacula or roost sites within the project area. Also, the one potential site located just outside the project area boundary is at a sufficient distance from activities to be shielded from potential disturbance effects. Therefore, activities would not be expected to result in disturbance to individuals at this site. See "Preferred Hibernacula or Roost Sites." Therefore, the OLY project would contribute to progress toward achieving FW-DC-WL-01.

- p. 29, **FW-DC-WL-10**: A mosaic of aquatic and riparian habitats, with a low level of disturbance, is available for associated species.

  Proposed activities are limited in these habitat types and activities would occur within areas of previous disturbance and either would not change the existing condition of the site or would result in the maintenance or improvement of the site for species that use aquatic and/or riparian habitats. See "Foraging Habitat." Therefore, the OLY project would contribute to progress toward achieving FW-DC-WL-10.

- p. 29, **FW-DC-WL-11**: Old growth, or other stands having many of the characteristics of old growth, exists for terrestrial species associated with these habitats.

  Proposed vegetation management would not occur within old growth consisting of western redcedar forest types where large fire scarred cedar may provide summer roosting habitat for Townsend's big-eared bats. Therefore, there would be no impacts to the availability of this habitat for bat's use during and post-project. The proposed vegetation management treatments within old growth stands are designed to maintain the existing old growth characteristics which would continue to provide foraging habitat for Townsend's big-eared bats. See "Old Growth Habitat and Other Potential Roost Sites." Therefore, the OLY project would contribute to progress toward achieving FW-DC-WL-11.

- p. 29, **FW-DC-WL-12**: Trees and snags greater than 20-inch DBH are available throughout the forest. Wildlife species associated with the warm dry biophysical setting find large-diameter ponderosa pine, Douglas-fir, and other species of snags for nesting.

  Snags and large healthy trees of the desired species would be retained within the treatments units where available. Growing conditions would be improved by opening up the canopy and reducing competition which would promote the development of large diameter trees and future snags over time. See "Old Growth Habitat and Other Potential Roost Sites" discussion above, also the Forest

Vegetation section. Therefore, the OLY project would contribute to progress toward achieving FW-DC-WL-12.

- p. 29, **FW-DC-WL-15**: Caves, mines, and snags with loose bark provide areas for roosting, hibernation, or maternity sites for various species of bats.

  There are no known hibernacula or roost sites within the project area and there would be no impacts to the potential site located just outside the project area boundary. See "Preferred Hibernacula or Roost Sites." Also, snags would be retained within treatment units for wildlife use, where available and do not pose a safety hazard. See "Old Growth Habitat and Other Potential Roost Sites" Therefore, the OLY project would contribute to progress toward achieving FW-DC-WL-15.

- p. 30, **FW-DC-WL-19**: By trending towards the desired conditions for vegetation, habitat is provided for native fauna adapted to open forests and early seral habitats, or whose life/natural history and ecology are partially provided by those habitats.

  Although Townsend's big-eared bats are not obligates of open forests or early seral habitat, these conditions or a mosaic of these habitats provide structural conditions suitable for bat use and include the development of large diameter trees for roosting and open and edge habitats that allow for flight paths and foraging. Proposed vegetation management would move treated stands towards desired vegetative conditions for the sites which would promote these structural conditions. See "Foraging Habitat." Therefore, the OLY project would contribute to progress toward achieving FW-DC-WL-19.

- p. 31, **FW-GDL-WL-06, Townsend's Big-Eared Bat**: Bat gates or similar structures should be installed on abandoned mines with known bat use for human health and safety and bat protection. Bat use would be considered prior to any reclamation activity and would be maintained via the use of gates or similar structures where bat use occurs.

  No abandoned mines are located within the project area. The potential underground mine located just outside the project area boundary has not been located nor is it known to have bat use. The project would not impact this site or it potential suitability for bat use. See "Preferred Hibernacula or Roost Sites." Therefore, the OLY project would be neutral with regard to progress toward achieving FW-DC-WL-01.

- p. 31, **FW-GDL-WL-07, Townsend's Big-Eared Bat**: Buildings should be inspected prior to removal or demolition to identify bat use. If bats are present, avoid disturbance until they have left for the season or been removed.

  No old buildings occur on NFS lands within the project area that could provide suitable habitat for bat use; therefore, this guideline is not applicable to this project. See "Description of the Analysis Area."

- p. 32, **FW-GDL-WL-17, Townsend's Big-Eared Bat**: Avoid or minimize disturbance at known active roosts and hibernacula in caves, abandoned mines, or rock outcrops using the best available information.

> There are no known active roosts or hibernacula within or adjacent to the project area. The potential site located just outside the project area boundary is located beyond the 500 feet recommended buffer for timber harvest activities; therefore, proposed activities are not expected to result in the disturbance or displacement of any bats that may be using the site. See "Preferred Hibernacula or Roost Sites." Therefore, the OLY project was designed in accordance with this guideline.

Federal Law

National Forest Management Act (NFMA)

The project would comply with NFMA direction to provide for diverse populations of plant and animal communities through compliance with the 2015 Forest Plan.

Other Guidance or Recommendations

The Conservation Assessments for Townsend's big-eared bats (Pierson et al. 1999, Gruver and Kenaith 2006) provide recommendations for forest management activities such as vegetative conversions and timber harvest. Primary concerns are for the protection of known and potential hibernating/roosting habitat, especially caves and abandoned mines, and maintenance or enhancement of foraging habitat within proximity of these sites. No specific prescriptions for vegetation management are provided as Townsend's big-eared bats forage in a variety of habitats and knowledge of local conditions that may influence use is limited.

Statement of Findings

Alternative 1 (No Action) **may impact individuals or their habitat, but will not likely contribute to a trend toward federal listing or cause a loss of viability to the population or species** for Townsend's big-eared bats. Although no management activities would take place that would reduce potential habitat or result in disturbance/displacement effects, not addressing overstocked, homogenous, and unhealthy forests would continue to limit foraging opportunities in the project area. Also, the high fuels loads could lead to high severity, uncharacteristic wildfires throughout the project area. Such a fire could greatly reduce potential bat habitat, including riparian and old growth habitats, in the OLY area.

Alternatives 2, 3, and 4 **may impact individuals or their habitat, but will not likely contribute to a trend toward federal listing or cause a loss of viability to the population or species** for Townsend's big-eared bats. This determination is based on: 1) the potential short-term disturbance during harvest activities; however, 2) there would be no effect to known or potential key roosting or hibernation habitats, 3) no activities would occur within western redcedar old growth which may provide day roosting opportunities, 4) proposed treatments would encourage the development of characteristic vegetation and patterns which would improve foraging opportunities within the project area, 5) the potential for mortality is low, and 6) the potential effects would be to individuals rather than colonies.

Western Toad

Regulatory Framework

2015 Forest Plan

Desired Condition

FW-DC-WL-10. A mosaic of aquatic and riparian habitats, with a low level of disturbance, is available for associated species.

FW-DC-WL-13. Down wood, especially down logs, are available throughout the Forest for terrestrial mollusks, reptiles, amphibians, small mammals, and other species whose habitat requirements includes this component

OTHER DIRECTION RELATED TO DOWNED WOOD. (FW-GDL-VEG-03, FW-GDL-VEG-06, FW-DC-WTR-03, FW-DC-SOIL-01, FW-DC-SOIL-02, FW-DC-SOIL-03, FW-DC-RIP-05, FW-DC-AQH-05, FW-GDL-SOIL-02, FW-GDL-SOIL-03). The proposed activities are consistent with all Forest Plan direction related to downed wood. Please see the Vegetation, Soil, Aquatic Habitat and Species, and Water Sections in Chapter 3 for further information.

Data Sources, Methods, Assumptions, Bounds of Analysis

Western toad ecology, biology, habitat use, status and conservation are described and summarized in Maxell (2000) and Reichel and Flath (1995). That information is incorporated by reference. The western toad has dry warty skin that is olive, brown, or gray with a white stripe that runs down the middle of the back. They mate between May and July and lay eggs in clean standing water (pond, ditch, gravel pit, lake). Western toads wander miles from their breeding sites through coniferous forests and subalpine meadows (Werner et al. 2004). Western toad occurrence data comes from District wildlife observation records and Forest historical data (NRIS Wildlife Database) and other agencies (MNHP). The analysis boundary for project impacts and cumulative effects to individuals and their habitat is the OLY project area. The boundary for determining contribution toward viability is the Kootenai National Forest.

Affected Environment/Existing Condition

Western toads require over-wintering, breeding/rearing, and foraging habitat, and may also be dependent on habitats suitable for migration if the three required habitat types are isolated spatially (Maxell 2009). As summarized in Maxell (2000), over-wintering may take place in underground cavities or in rodent burrows; breeding/rearing takes place in aquatic sites such as shallow areas of large and small lakes or temporary ponds; and foraging habitat is largely terrestrial uplands. The highest elevation the species has been documented in Montana is 9,220 feet (Maxell et al. 2003).

A Kootenai National Forest status summary of the western toad was documented by Johnson (1999). The species has been found in seven of the eight planning units. The population size is unknown and direct measures of population trend on the Kootenai are not available (Ibid 1999). However, many surveys have been conducted on the Forest since 1993. Surveys conducted between 1993 and 1995 located only 63 adults. Of the 134 wetland sites surveyed during the 1993-94 field season, only 10 had evidence of successful breeding (Werner and Reichel 1994); five additional sites were confirmed during the 1995 field season (Werner and Reichel 1996).

Surveys of approximately 200 potential sites were conducted in the Bull River drainage during the 1997-98 field season, but evidence as a breeding site (tadpoles and eggs) were found at only eight sites (Corn et. at. 1998). Historic and active breeding sites by planning unit on the Kootenai National Forest are summarized by Johnson (1999). Forestwide, approximately 35 breeding sites were verified between 1995 and 1998 (ibid). As a result of toads being absent from a large portion of their historic range (Maxell 2000), the Regional Forester listed the Western toad as a sensitive species in the Northern Region.

Reasons for the decline of the western toad have not been defined with any degree of certainty. However, habitat alterations from timber harvest, grazing, recreation, and water development would likely "not be beneficial to long-term enhancement of western toad habitats" (Loeffler 1998). One hypothesis explaining the western toad decline concerns mortality caused by disease or some other widespread agent, such as the Chytrid fungus (ibid).

The primary risk factor for western toad populations is loss of breeding habitat. Indirect effects to breeding habitat have the potential to occur if there is increased sediment delivery to wetlands and waterways as a result of increased roads and tree removal. In the OLY project area, potential breeding habitat includes several lakes and ponds on private and Federal property, potholes and wetlands, small areas of standing water adjacent to springs, seeps and minor streams. Steep road cuts can be a barrier to toads moving between seasonal habitats and also a direct source of mortality from vehicles. Juvenile toads are also vulnerable to being killed by motorized vehicles when they are dispersing from their natal ponds.

Since toads utilize a variety of forested habitats, historical timber harvest and associated road building is thought to have had some impacts on toads in the form of occasional direct mortality from vehicles. Similar to this project, the effects of many of these events were likely short-term during the logging and fuels treatment phases, and surviving toads would have resumed normal activities afterward. Logging activity that resulted in large openings would likely have temporarily displaced use in those areas since toads have an affinity for forested cover in upland areas. However, these areas would have regenerated to the point where adequate cover and shade were provided within 5 to 10 years. Post-harvest fuels treatments, particularly broadcast burning during spring, may also present a risk of direct toad mortality. However, research has indicated that western toads may benefit from fuels reduction treatments and appear to be attracted to recently disturbed areas (Pilliod et al. 2006).

Within the OLY project area, one documented observation of a single juvenile occurred on Stimson property in 1995, along O'Brien Creek near the old Troy reservoir. Another documented observation occurred at the mouth of O'Brien Creek in 1977, age unspecified. Potential breeding habitat may occur in low gradient sections of project area streams, lakes, temporal ponds and road ditches. The terrestrial habitat within the project area is considered upland foraging habitat.

Criteria used to compare the alternative impacts on the western toad and its habitat includes:

- known breeding/rearing habitat impacted
- acres of upland foraging habitat harvested and burned
- acres of upland foraging habitat (prescribed burned only)

Past Actions and their Effects on Current Conditions

Maxell (2000) showed the effect of timber harvest on amphibians in Montana has been studied only once. A review of the available literature by Semlitsch (2000) in the United States indicates timber harvest and road construction activities can impact aquatic breeding habitat by altering the hydrological cycle of wetlands which can impair completion of larval metamorphosis through early pond drying (hydroperiod shortened), or through increased predation (if hydroperiod is lengthened). Aquatic habitat quality can also be reduced by sedimentation and increased water temperatures.

The effects of timber harvest on upland habitats are summarized in Semlitsch (2000) and include elimination of shade, increased surface temperatures, disruption and compaction of soil structure, reduction in soil moisture, removal of coarse woody debris, and sedimentation of aquatic habitats from logging roads. The fragmentation of natural habitats from timber harvesting and road building may impede dispersal and decreases the probability of wetland re-colonization (Semlitsch 2000).

Recommendations for buffer zones and terrestrial habitats for corridors of movement for amphibian species are discussed by several authors (Semlitsch 2003, Hannon et al. 2002). Western toads are considered to be more terrestrial generalists (deMaynadier and Hunter 1998), and tend to be more tolerant than salamanders of forest edges, tree harvests, and declining patch size (Renkin et al. 2004).

Environmental Consequences

Quantitative data regarding the western toad's use of upland and forested habitats is limited. Western toads are known to migrate between the aquatic breeding and terrestrial non-breeding habitats (TNC Database 1999). Movement of toads has been documented from 2.5 km to over 5 km between breeding sites (Corn et al. 1998, Bartelt and Peterson 1994). Movement in foraging areas was documented to be significantly influenced by the distribution of shrub cover, and toads may have avoided macro-habitats with little or no canopy and shrub cover (such as clearcuts) (Bartelt and Peterson 1994).

Underground burrows and debris were important components of toad selected micro-sites in a variety of macro-habitats. The western toad digs its own burrow in loose soil or uses those of small mammals, or shelters under logs or rocks, suggesting the importance of coarse woody debris on the forest floor (Ibid). Project activities (e.g. timber harvest, prescribed fire) that remove vegetation resulting in reduced canopy and/or shrub cover or reduced coarse woody debris are likely to impact western toad habitat and toad use patterns. Soil compaction from ground based logging machines may impact over-wintering habitat (burrow sites).

Direct and Indirect Effects

No Action Alternative

Under Alternative 1, no action, no timber harvest or prescribed burning would take place on Forest Service land. No direct effect to the western toad would be expected with this alternative. Plant succession would continue on the sites. Indirectly, this would result in an increase in canopy closure and density of understory conifers. Fuels would continue to accumulate on the upland sites. Due to continued fire suppression and lack of active management, the indirect effects of this alternative may include a continued trend towards uncharacteristic vegetative conditions and increased potential for severe fire behavior within the project area.

Existing Western toad habitat would continue to be available on the KNF portions of ponds, lakes, wetlands, potholes, stream banks and within seeps and springs. However, the potential for severe wildfire to spread into the more moist sites is likely to increase due to increased fuels accumulations. This could result in alteration of the environmental conditions of these sites (forested cover, temperature, moisture, sedimentation, etc.) through the reduction of vegetation adjacent to these sites

Any existing roads which fall below BMP standards would continue to channel surface flow and sediment to the streams. Undersized and aging culverts could periodically plug and wash out, resulting in pulsed delivery of sediment to stream channels and aquatic habitat degradation for many years to come. Removing these crossings and the associated risk they pose to aquatic organism habitat in the project area is an important component of the watershed improvement/road stabilization work proposed under all action alternatives that would not be implemented under Alternative 1.

Table 179 summarizes the direct and indirect changes in habitat acres due to each alternative.

Table 179. Western Toad Habitat Impacted by Alternative on NFS Lands in the OLY Project Area

Comparison Criteria	Existing Condition Alt. 1	Alt. 2	Alt. 3	Alt. 4
Known breeding/rearing habitat impacted	0	0	0	0
Acres upland foraging habitat harvested	0	3,126	3,069	2,606
Acres upland foraging habitat treated by prescribed burned only	0	1,716	1,744	1,731

Action Alternatives

Timber Harvest and Road Building

As mentioned, the primary risk factor for western toad populations is loss of breeding habitat. The proposed action alternatives would implement RHCA buffers adjacent to all aquatic habitat in the project area, thereby maintaining water temperatures and minimizing non-channelized sediment inputs related to timber harvest units. The lack of connectivity of the proposed, new, timber-related road work to the hydrologic regime within the project area will minimize, if not prevent, sediment contribution. In addition, BMP and reconstruction work on existing roads in the project area would improve surface drainage and reduce sediment contributions to stream channels.

The proposed timber harvest in upland foraging habitat is shown by alternative in Table 179. Larger openings would likely temporarily displace use in those areas since toads have an affinity for forested cover in upland areas. However, these areas would regenerate to the point where adequate cover and shade would be provided for toads within 5 to 10 years. Additionally, the retention of CWD in harvest units recommended in FW-DC-WL-13 would further maintain habitat suitability. This would provide some cover and microhabitat suitable for upland toad foraging habitat in harvest areas.

Physical alteration of habitats (trampling) may result in direct mortality from heavy machinery use but would likely have minor effects to overall population trends since suitable upland habitats

are found throughout the project area outside of harvest areas. Post-harvest fuels treatments may also present a risk of direct toad mortality. However, research has indicated that western toads may benefit from fuels reduction treatments and appear to be attracted to recently disturbed areas (Pilliod et al. 2006). Many of these events would likely be short-term during the logging and fuels treatment phases, and surviving toads would resume normal activities afterward.

Prescribed Fire

Non-timber related prescribed fire treatments proposed in upland foraging habitat are listed in Table 179. No harvest or fire ignition would occur within Streamside Management Zones or Riparian Habitat Conservation Areas. Direct or indirect effects on riparian habitat (potential breeding sites) associated with the western toad would be unlikely, meeting FW-DC-WL-10. There are currently no studies addressing the effects of fires on terrestrial amphibians in the Pacific Northwest (Bury et al. 2000). A review of the available literature by Russell et al. (1999) indicates that replacement of the fire-adapted vegetation by fire-intolerant associations indirectly leads to concomitant declines in overall herpetofaunal abundance and diversity. Without fire, species that use or can tolerate dense vegetation would be benefited, while those species that prefer open sites would continue to decrease over time.

There are few reports of fire-caused injury to herpetofauna even though many of these animals, particularly amphibians, have limited mobility (Russell et al. 1999). The resultant microsite variation within burns may account for observations that fire has little effect on herpetofaunal species (Lyon et al. 2000). Mortality may be associated with the direct and indirect effects of fire that alter prey availability or change shelter and microclimate (Lyon et al. 2000, Russell et al. 1999). Indirectly, although fire-induced disturbance may decrease herpetofauna within a particular patch, the prescribed burning should result in a mosaic of successional stages and habitat structure that should increase diversity on a broader scale (Russell et al. 1999). The risk of direct mortality to toads during burning is low, but it may occur. Toads typically seek refuge in moist habitats such as animal burrows and under rocks and logs where the fires would not burn (Russell et al 1999). While broadcast burning may present a risk of direct toad mortality, maintaining preferred or required habitat features presumably outweighs any fire-induced mortality that occurs (Russell et al 1999).

Watershed Improvement/Road Stabilization

Under all action alternatives approximately 11.1 miles of existing roads in the project area would be stabilized and placed in storage. Approximately 1.3 miles of road are proposed to be actively decommissioned. Both treatment types include, but are not limited to, removing undersized culverts and recontouring unstable sections of road. In combination this work would reestablish eight stream crossings in the O'Brien Creek watershed and stabilize several others thereby lowering road stream crossing densities and sediment contributions from these sites. See Chapter 2 for a full summary and description of watershed improvement and road stabilization treatments.

Culvert removals would not take place in any known Western toad habitat and most would take place in high gradient stream channels not suitable for toad breeding. The treatments described above could result in the incidental mortality of individuals and would create short-term sediment inputs into streams. However, the short-term impacts would be outweighed by the long term benefits of eliminating chronic sediment sources and re-establishing migration routes across recontoured road prisms.

Recreation

Under all action alternatives the Kilbrennan Lake Campground boat ramp would be improved using concrete to replace the native material. In addition, the stream crossing on Trail 196 on Prospect Creek would be improved for recreation and watershed improvement. Both improvements are small scale projects which would produce minimal sediment in the short term but should reduce sediment contribution to the respective waterbodies in the long term.

Cumulative Effects

Past Actions

Harvest has occurred in the project area since the 1950s and has created a variety of age classes and successional stages across the project area. In some cases, past harvests provided habitat conditions favorable for western toad foraging and overwintering habitat; however, it would have also reduced vegetative cover and down woody materials. Harvest and road construction occurred within riparian habitat resulting in sedimentation, habitat alteration, and loss of potential aquatic breeding habitat. In unharvested areas, natural disturbances such as wildfire would have contributed to this mosaic of habitats and forage conditions. In contrast, fire suppression since the early 1900s has altered stand structure resulting in more homogenous stands with greater canopy closure, reduced understory vegetation, greater fuels accumulations in some areas, and an increased potential for severe wildfire.

More recent regeneration harvest and prescribed fire implemented under 1987 forest plan direction would provide areas of shrub and small conifer cover as well as down CWD used by toads in upland habitats.

Ongoing and Reasonably Foreseeable Actions

A district wide thinning project of previously harvested units would occur within western toad upland forest habitat. These units have been providing shrub and small conifer cover that appear to be preferred by western toads. Work would be completed by hand through the use of chainsaws with negligible risk of mortality and activities would not occur within riparian habitats. Toads may seek cover if activities occur in the spring when they are more likely to be above ground. Cumulatively, effects would be minor. Although thinning of conifers would remove some existing cover it provides open space for shrub and forb maintenance within the stands for a greater length of time.

Routine maintenance and use of open and restricted roads are on-going activities. Through application of BMPs, these activities are not expected to have cumulatively measurable effects on aquatic habitat (due to potential increased sedimentation or changes in channel morphology) or mortality risk.

Development of private land along the O'Brien River likely altered and reduced some western toad habitat in the lower elevation lands along the project boundary. Future development opportunities are limited and further habitat alterations would be negligible compared to the amount of both aquatic and upland habitat available on NFS lands.

As described above, loss of western toad habitat due to past actions has occurred within the project area. However, potential habitat occurs throughout nearly all of the project area given the abundance of water, the toad's broad use of upland habitat, and their mobility. Also, changes in harvest methods and protection of riparian areas in recent years has maintained and/or created

potential breeding and upland foraging habitat. All action alternatives, when considered in association with the planned activities on both public and private lands, are not expected to have adverse cumulative effects that would impact western toads. Temporary disturbance and alteration of habitat is not likely to result in a declining population trend for this species.

Regulatory Framework Findings

2015 Forest Plan

FW-DC-WL-10. A mosaic of aquatic and riparian habitats, with a low level of disturbance, is available for associated species.

> Potential habitat occurs throughout nearly all of the project area given the abundance of water, the toad's broad use of upland habitat, and their mobility. Implementation of RHCAs and BMPs, as well as watershed improvements, would maintain the mosaic of aquatic and riparian habitat, thereby protecting breeding habitat. Therefore, the OLY project would contribute to progress toward achieving this desired condition.

FW-DC-WL-13. Down wood, especially down logs, are available throughout the Forest for terrestrial mollusks, reptiles, amphibians, small mammals, and other species whose habitat requirements includes this component (refers to FW-GDL-VEG-03, FW-GDL-VEG-06, FW-DC-WTR-03, FW-DC-SOIL-01, FW-DC-SOIL-02, FW-DC-SOIL-03, FW-DC-RIP-05, FW-DC-AQH-05, FW-GDL-SOIL-02, FW-GDL-SOIL-03).

> Retention of recommended tons/acre of CWD would be met by following Graham et al. (1994) and emphasizing the retention of larger diameter pieces where available and snags felled for safety. This would provide some cover and microhabitat suitable for upland toad foraging habitat in harvest areas. Therefore, the OLY project would contribute to progress toward achieving this desired condition.

National Forest Management Act:

The project complies with NFMA direction to provide for diverse populations of plant and animal communities by compliance with Kootenai Forest Plan (2015).

Statement of Findings

The proposed action is **may impact individuals or habitat, but will not likely result in a trend toward federal listing or cause a loss of viability to the population or the species** for the western toad. This determination is based on:

- the potential for direct mortality of individual toads due to trees falling, the use of equipment or fire,
- no impact on breeding habitat,
- suitable habitat available outside of project area,
- retention of riparian movement corridors.

Other Wildlife Species of Interest

Big Game

Introduction

Montana has a rich tradition of big game hunting, and has earned a well-deserved reputation for having some of the best big game hunting in North America. Big game species have high economic and social values and are a large contributor to the quality of life in Montana. For the KNF, this group includes mule deer, white-tailed deer, elk, moose, bighorn sheep, and mountain goat. Most of this group is wide-spread throughout North America, with mountain goat having the most restricted range and limited to the mountain ranges of western North America. All six are found on the KNF, with mountain goat again the most limited in distribution being limited mainly to the Cabinet and West Cabinet Mountains. Bighorn sheep are also a sensitive species for the Forest and they are analyzed separately within the Sensitive Species section.

Populations of big game species have varied over the decades as they were influenced by hunting, habitat changes, predator control/reintroduction of wolves, and weather. Deer and elk populations are large and stable enough to allow a general hunt on males, but limited hunting of females. Moose and mountain goats are trophy animals and not as abundant. Populations of moose and mountain goats are stable enough that the State allows limited harvest.

General habitat and life history information comes from www.natureserve.org/ (NatureServe Explorer 2015). The following is a summary of the habitat used by each species:

- Both species of deer browse on a variety of woody plants and graze on grasses and forbs. They occupy a variety of habitat types including forests, edges, and openings although white-tailed deer tend to demonstrate a higher association with cover than mule deer. They move to areas with less snow in the winter (generally low elevations).
- Moose generally browse on woody vegetation or aquatic vegetation. They prefer a mosaic of second-growth forest, openings, and aquatic habitat. They winter in areas with forested vegetation and summer where there is vegetation for shade or water to aid in cooling.
- Elk are primarily grazers of grasses and forbs, but also may browse on woody vegetation when grasses are unavailable. They are found in a variety of habitat types and structural conditions, including open areas, coniferous forests, and brushy clearcuts or forest edges. In winter, they moves to areas with less snow such as lower elevations or more opened exposed areas.
- Mountain goats graze on grasses, forbs, mosses/lichens, and browse on woody vegetation. They are commonly associated with alpine or subalpine areas at or above timberline where cliffs/rocky areas are available for escape and security habitat. Mountain goats may move to areas of lesser snow depths in winter to conserve energy.

As the brief description of the big game species' general habitat and life histories demonstrates, a range of habitat use exists from open environments (e.g. meadows), to a variety of structural stages within forested habitat types, to non-forested alpine habitats. Winter habitat requirements are also somewhat variable; however, all species demonstrate a need for winter ranges that, because of reduced snow depths, would continue to provide foraging opportunities throughout the winter while reducing energy expenditures. The availability and quality of these habitats for big

game are influenced through human activities on the landscape. This can include habitat reduction or alteration through infrastructure development or vegetation management, displacement of animals from important winter range during this critical time of the year, or an increased potential for mortality during the fall hunting season. Therefore, a main focus of the big game analysis is the effect of proposed vegetation management on the availability and quality of forage and cover. A second focus of this analysis is providing suitable winter range and secure habitat by managing activities and motorized access to maintain low levels of disturbance especially on important seasonal ranges during their period of use and during the fall hunting season.

Analysis of this resource is directly related to the project Purpose and Need to "Provide forage opportunities while maintaining wildlife security . . . through access management."

Summary of Conclusions

The action alternatives would trend the vegetation towards desired conditions for the project area while maintaining low levels of disturbance within important big game habitats and during critical periods the year. The increase in early seral, open forest, and edge habitats would improve the quantity and quality of foraging habitat found within a mosaic of forest types and structural conditions that also provide cover. In the long-term, the increase in habitat diversity would benefit big game and their use of the project area by creating conditions more similar to what these species evolved with here.

Regulatory Framework

2015 Forest Plan

The 2015 Forest Plan provides overall guidance for the management of the lands on the KNF. It describes the goals, desired conditions, and objectives toward which the management of the land should be directed. And it establishes standards and guidelines to help achieve or maintain the desired condition or conditions, to avoid or mitigate undesirable effects, or to meet applicable legal requirements.

The plan components which provide specific big game resource direction relevant to this project include:

- FW-DC-WL-16
- FW-DC-WL-19
- FW- GDL-WL-08
- FW-GDL-WL-09
- FW-GDL-WL-10
- FW- GDL-WL-11

There are other 2015 Forest Plan components that provide resource direction for a range of wildlife species or habitat conditions that are not specific to big game, but still are applicable to the management of their habitat. The full list of the plan components applicable to big game habitat management are found in the "Regulatory Framework Findings" section of this analysis.

Resource Indicators and Measures

For the big game analysis, the primary resource indicator will be the acres of vegetation management that trend vegetation towards the desired conditions (see Table 180). This reflects changes to the amount of early seral, open forest, and edge habitats that would provide an increased amount and quality of forage opportunities within a mosaic of cover conditions. A trend towards the desired vegetative conditions would also contribute to the connectivity of big game habitat within the project area and to surrounding areas. A second resource indicator is the occurrence of activities on winter range during its period of use and during the birthing/parturition period when big game may be more sensitive to disturbance. The overall assessment of big game habitat also considers potential effects to the level and quality of security habitat during the fall hunting season as influenced by a change in motorized access management.

Table 180. Resource Indicators and Measures for Assessing Effects

Resource Element	Resource Indicator	Measure	Used to Address: P/N, or Key Issue?	Source
Forage and Cover	Changes to early successional habitat or the maintenance of open forest conditions resulting from timber harvest and fuels treatments	Acres treated that result in open forest conditions, early seral habitat, and edge habitat	Purpose and Need	2015 Forest Plan FW-DC-WL-16 and FW-DC-WL-19
Winter Range and Birthing/Partuition Period	Activities occurring on winter range during its period of use or activities occurring during the birthing/partuition period	Potential for disturbance and displacement of big game during these periods?	No	2015 Forest Plan FW-GDL-WL-08; FW-GDL-WL-09; and FW-GDL-WL-11
Secure Habitat	Changes in Human Access/Motorized Management	Increased human access as influenced by motorized access, especially during the fall hunting season?	Purpose and Need	2015 Forest Plan FW-OBJ-WL-02, FW-STD-WL-02, and FW-GDL-WL-10

Methodology

Through the use of GIS spatial data, the type and amount of vegetation management treatments that would result in a trend towards the desired vegetative conditions can be compared by alternative. Also, the size and spatial arrangement of the treatments across the landscape were considered. Winter ranges for each of the big game species found on the KNF have been identified for the 2015 Forest Plan. All vegetation management activities occurring within mapped winter range were identified and checked for winter harvest requirements developed to protect other resources. These findings were discussed with the local State biologist to evaluate potential effects based on a joint field review of the general stand conditions and quality for the big game species in question, size of the units, distance to undisturbed stands, and average snow depths expected within the treatment areas. In addition, the extent of the winter ranges or quality

of habitat within those ranges may be adjusted based on local observations. Also, because the desired conditions for cover and forage are managed according to the desired conditions for vegetation, consideration of effects to these components of big game habitat relies heavily on the Forest Vegetation analysis. Similarly, the discussion of security habitat references other species analyses that specifically address the amount and location of roads that influence the availability of secure habitat.

Data Sources

NatureServe Explorer (2015) is an online resource that compiles information on the ecology, biology, habitat descriptions, and relationships identified in research. This information was referenced to provide the general habitat descriptions and use of white-tailed and mule deer, elk, moose, and mountain goat used in this analysis. More detailed descriptions of these big game species and their habitats are available through research. For example, Toweill and Thomas (2002) provide a comprehensive synthesis of elk habitat and relationships, MFWP 1998 and MFWP 2006 describe mule and white-tailed deer habitat and relationships in Montana, and Joslin (1980) developed a habitat management plan for mountain goats in Montana.

Big game use and occurrence data comes from recent District wildlife surveys and observation records, NRIS wildlife database, and other agency records (MFWP).

Assumptions and Limitations

There are no assumptions or limitations associated with this resource analysis.

Affected Environment

Spatial and Temporal Context for Effects Analysis

The analysis boundary for direct project impacts to individuals and their habitat is the proposed activity areas, as activities and alteration of the habitat would affect its suitability for different species. Also, activities could result in the loss of habitat or the disturbance or displacement of individuals utilizing the stands. The boundary for indirect effects is the OLY project area as the alteration of habitat could influence big game use of available habitats within the surrounding areas.

Temporal boundaries for the big game analysis include both short-term and long-term effects. Short-term effects are those that are expected to last between a few days to a season or portion of two seasons. Generally, once disturbance causing activities like prescribed burns, harvest, and watershed work have been completed big game can move back into and use the area. Big game species have been known to use harvest areas during periods of inactivity (e.g., nights and weekends), and sometimes even during operations on this District. As a result of vegetation management treatments, greater foraging opportunities may be available by the next season. Long-term effects are those that are expected to last longer than a season or two. For example, vegetation management can alter the availability of cover depending on the type of treatment. Following regeneration harvest, it is expected that tree cover would return within approximately 15 years. Similarly, vegetation treatments can result in long-term foraging opportunities for big game species especially if maintenance activities such as thinning and fire (natural or prescribed) are continued within the treated stand. Also, changes in access management (i.e., number of roads open to public motorized use during the hunting season) could result in long term effects to security habitat for big game.

Existing Condition

Big Game Species Occurrence

Mule deer, white-tailed deer, elk, and moose are found within the project area, with white-tailed deer being the most prevalent and often observed. There is a single recorded observation of a male mountain goat along the western boundary of the project area near the Yaak River from 1986. However, this was an unusual occurrence and noted as such within the record. In general, mountain goats would not be expected to be found within the project area due to low amounts of exposed cliff and rocky terrain in the higher elevation alpine or subalpine habitats. Therefore, mountain goats will not be discussed further. See the project file for observations records for these species within the project area.

Description of the Analysis Area

Forage and Cover

Deer, elk, and moose forage on a variety of vegetation including forbs, grasses, and shrubs which are found as ground cover, as understory components of forested stands, or as the dominant vegetative cover within more open environments. Although different plant species have different environmental requirements, the forage species often used by big game require sunlight for growth and productivity. Therefore, as the forest canopy becomes denser the variety, abundance, and productivity of the understory vegetation are reduced. Open (e.g., meadows or shrub fields), early seral, and open forested habitats generally offer greater forage opportunities for big game. Also, the variety and quantity of forage plants along the edge of two habitat types is often greater than either habitat type itself due to the mix of conditions.

The following description of the existing vegetative condition is summarized from the Forest Vegetation section; see this analysis for more detail. The majority of the project area (about 52 percent) falls into the warm/moist biophysical setting which consists of the more mesic and productive habitat types which encourages tree establishment and growth. Currently there is an abundance of trees in the medium to large size classes. In addition, decades of fire suppression has enabled increased development of understory trees into the general forest canopy. This has resulted in more multi-storied forested stands with a reduction of more open areas that were composed of grasses, forbs, and shrubs. Across the project area, there has been a homogenization and simplification of landscape patterns for forest structure. Landscapes have increasingly become dominated by large patches of medium size trees and there is less variability in internal structure or composition of these medium size patches. Meanwhile, the patches of the smallest and largest size classes are fragmented into smaller patches with more edge and less interior area (2015 Forest Plan p. 85). Consistent with the above description, the percentage of forested habitat within the OLY project area in an early seral condition (e.g., consisting of trees in the seedling/sapling size class) is at the low end of the desired range. Within 5 years, 8 percent of these acres would move into the small size class with a corresponding shift in the percentage of the seedling/sapling stands to fall below the desired condition.

What this means for big game is that with a departure from the desired conditions for vegetation there is also a departure from the relative abundance and quality of forage in relation to the amount of cover (more cover equals less forage). Without disturbance processes to maintain openings and early seral habitats, the productive growing environment within the project area is conducive for providing cover but not for maintaining good forage conditions. The availability of big game forage is low based on the general lack of naturally occurring openings and the existing

low levels of early seral habitats. Foraging habitat will continue to decline as seedling/sapling stands move into a larger size class and the encroachment of conifers continues into openings and the understories of forested stands. Also, there is less edge habitat as tree age/size and patch sizes becomes more homogenous which reduces the potential for the variety of forage that this habitat provides as well as a less diverse landscape for big game use. This is likely to influence areas of big game use as well as the suitability of the landscape to provide for big game movement between areas of high quality habitat or seasonal ranges.

Important Habitats or Seasons of Activity

Winter Range

The OLY project area provides winter range for mule and white-tailed deer, elk, and moose. Because of different winter range requirements and habitat use, the amount and location of winter range for each species varies. For example, moose winter range is expansive and includes most of the northern half of the project area as well as the major creek drainages within the central portion of the project area. Conversely, white-tailed deer winter range is found within lower elevations sites and includes the Kootenai and Yaak River bottoms. Mule deer and elk winter ranges are a little patchier in nature and tend to overlap with the ranges of both moose and white-tailed deer. While they do utilize lower elevation sites, they will also use mid-elevations that are more exposed such as south facing slopes and brush fields. Although the boundaries of identified winter ranges would not change dramatically over time, big game use is expected to shift somewhat as the suitability of winter range changes as a result of vegetative disturbance and succession.

Secure Habitat

Human activity can result in the disturbance of big game. High levels of disturbance or disturbance during critical times of the year could result in the displacement of game from their preferred habitats, potentially impacting health or reproductive success, or resulting in an increased risk of mortality. Human access and the type/level of activity are largely influenced by motorized access.

Management direction to provide adequate amount of secure habitat for grizzly bears (FW-STD-WL-02) and elk (FW-GDL-WL-10, FW-OBJ-WL-02) provides areas of secure habitat for big game species. Currently, grizzly bear Core is found on approximately 54 percent of the BMU which includes most of the project area except the area near Troy, Montana that is largely privately owned. This level of Core habitat is better than the standard for this BMU. Elk security habitat was evaluated for each of the three planning subunits that are found within the project area. The existing level of security habitat within two of the subunits are better than the 30 percent minimum desired level while the third is just below the desired level. The lower level within this latter planning subunit is influenced by the number of open roads associated with private property access near town. See the Grizzly Bear and Elk analyses for more detail.

Portions of these secure areas also coincide with backcountry management areas (5a and 5c) and inventoried roadless areas (Flagstaff and Saddle Mountain IRAs) that contribute to secure habitat. Because these backcountry management areas tend to be large and remote, they generally have little human disturbance and, as such, have a desired condition to be retained and contribute to security habitat for wildlife (MA5a,b,c-DC-WL-01). Motor vehicle use does not occur within 5a and, therefore, it contributes to the effectiveness of security habitat within that management area. Although 5c does allow for over-snow vehicle use, it does not allow for other motor vehicle use

and contributes to security habitat during the fall hunting season. Similar to 5a and 5c, IRAs contribute to elk security through the creation and maintenance of large, remote areas that are likely to have a lower amount of human presence due to the difficulties of access (see IRA section).

Based on the existing open motorized road system, areas of secure habitat that experience little human disturbance are readily available within the project area except within close proximity to town. Also, because of the occurrence of steep country and more remote areas within the backcountry MAs and IRAs, especially those areas not associated with the non-motorized trail system, there are large areas where the potential for human disturbance is extremely low.

Environmental Consequences

Alternative 1 – No Action

A range of fire severity, from non-lethal to stand replacing crown fires, historically played a role in developing the vegetative characteristics in the OLY project area. Although the type and frequency of fire experienced varies within a given area and vegetation type (based on biophysical setting), with some being more prone to infrequent stand replacing fire, the vegetation types within the project area have historically experienced low and/or mixed severity fires at least periodically. These natural disturbance regimes favor fire tolerant species, including older and larger diameter seral tree species such as western larch, western white pine, and ponderosa pine. The exclusion of low to moderate severity fires through fire suppression has altered the amount of shade-tolerant species in the understory of these forested stands as well as increased fuel loadings in the form of ladder fuels and downed woody materials. Fewer fires have also reduced the amount of natural openings, structural diversity, and the number/size of patches across the landscape. Fire suppression has not yet resulted in a departure from historic ranges for all stands within the project area (especially those with naturally longer fire return intervals), although they too are trending towards a departure. Due to the denser fuel conditions, resulting stand replacing fires in these stands often kill many of the overstory trees which historically survived mixed-severity wildfires. Past vegetation management practices that targeted these old, large trees removed the relic seral species and further altered tree size and composition; this in turn has promoted the development of climax species and conditions.

This has also influenced the persistence of root disease in now Douglas-fir dominated stands as species such as western larch and ponderosa pine are more resistant to these diseases. Planting of non-local ponderosa pine before breeding zones were understood has resulted in unhealthy stands that are not adapted to the local growing conditions. In addition, the close proximity to Troy, Montana influenced the removal of valuable western larch, western white pine, and ponderosa pine trees and snags in the lower elevation sites that supported local development and supplies (e.g., firewood). In general, the resultant stand patch sizes and occurrence, species composition, stand structure, and fire frequency and severity are departing from desired vegetative conditions based on historic range of variability within the project area. See the Forest Vegetation and Fuels Management sections for more detail.

No direct effects from federal actions would occur. The No Action alternative would maintain the existing vegetative condition on the landscape that consists of a low proportion of forage habitat compared to cover. With continued fire suppression and lack of active management, the indirect effects of this alternative would include a continued trend towards uncharacteristic vegetative conditions lacking in structural diversity as trees continue to encroach upon forage openings and

stands mature. Forbs, grasses, and other forage species, where present, may be less vigorous and productive in shaded rather than more open environments. The limited acres of productive foraging habitat currently available would continue to decline over time.

The increased tree density and continuous fuel profile from the ground up to the main canopy puts the area at greater risk of severe fire behavior (see the Fuels Management section). Although large, severe wildfire has occurred within this area in the past, mixed severity fires would have also played a role in creating a mosaic of forest structural stages. This mosaic of structural stages in juxtaposition to one another provides for different big game life requirements (e.g. foraging and cover habitats). If severe wildfires occur, especially over a large expanse, potentially drastic changes in the availability and distribution of these habitat types across the project area could occur. A large amount of forage habitat would be available within a few years following the fire and cover would begin to be available within about 15 years. However, a large expanse of cover followed by even-aged young forest would not meet the range of big game habitat needs that a diversity of structural conditions could provide.

Alternatives 2, 3, and 4 – Direct and Indirect Effects

Project Design Features and Mitigation Measures

There are no design features or mitigation measures for big game at this time.

Introduction

Proposed vegetation management would occur within the forest habitat type. This broad habitat type includes a range of dominant vegetation types from dry forest (i.e., ponderosa pine and Douglas-fir) to very moist cedar/western hemlock forests, including habitat types that occur on the cusp of these two extremes where a diverse mix of tree species can grow. Because of the diversity of habitat types and conditions used by big game species, vegetation management treatments that trend towards the desired conditions for the habitat and vegetation types, based on the historic range of variation, would provide the greatest diversity of habitat conditions for the variety of big game species present on the Forest. Table 181 below displays the acres of vegetation management proposed, by treatment, for each action alternative.

Table 181. Resource Indicators and Measures for Forage and Cover by Treatment Type

Resource Indicator	Measure	Treatment Type	Alt 2 (acres)	Alt 3 (acres)	Alt 4 (acres)
Changes to early successional habitat or the maintenance of open forest conditions resulting from timber harvest and fuels treatments	Acres treated that result in open forest conditions, early seral habitat, and edge habitat	Intermediate Harvest	1,011	1,008	1,037
		Regeneration Harvest	2,116	2,061	1,569
		Prescribed Fire	1,605	1,616	1,620
		Non-Harvest Fuels Treatments	111	128	111

Resource Indicator	Measure	Treatment Type	Alt 2 (acres)	Alt 3 (acres)	Alt 4 (acres)
		All Treatments Total	**4,843**	**4,813**	**4,337**

Forage and Cover

Harvest

Harvest is proposed within two general vegetation types: wetter vegetation types dominated by western redcedar/western hemlock and some grand fir, and drier vegetation types dominated by Douglas-fir and some ponderosa pine. Within the wetter vegetation types, the stands proposed for treatment have high canopy closure and contain little to no ground, shrub, or small conifer cover in the understory. Without disturbance processes such as wildfire, these stands have become dominated by shade tolerant species and are lacking in early seral species such as western larch and white pine. With forest succession, there has been a reduction of foraging opportunities as the understory plant species were outcompeted due to the lack of sunlight and nutrients. Regeneration harvest would occur within this vegetation type which would, in general, remove most trees except the existing healthy early seral species. This would result in an early seral community, both in structure and species composition that includes understory forage species for big game.

In the drier habitat types, both intermediate and regeneration harvest is proposed depending on the existing health of the stand. Regeneration harvest would occur in Douglas-fir dominated stands experiencing mortality due to root disease or in unhealthy ponderosa pine plantations that were planted with pine from outside of the local area. These pines are not adapted to the local conditions and have experienced poor growth and productivity over the years. Although these unhealthy stands generally provide open grown timber conditions and an understory shrub and grass community, their current condition (e.g., lack of growth and mortality) would not allow for development of large trees and snags which are desired vegetative conditions of the 2015 Forest Plan (see Forest Vegetation section). Intermediate harvest would occur in healthy stands where the desired species composition and structure is available. The goal of treatment within these stands would be to maintain these desired conditions and encourage continued tree growth, understory vegetation diversity, and stand health. Treating these stands would meet a purpose and need of the project, address desired vegetative conditions, and improve the foraging opportunities provided by these stands in the long-term for big game species that utilize open forest and early seral habitats (FW-DC-WL-19).

All action alternatives would result in a trend towards these desired conditions. However, Alternatives 2 and 3 would result in a greater improvement than Alternative 4 when considering the acres of proposed harvest. Alternative 2 proposes the most harvest within the OLY project area at approximately 3,127 acres including 2,116 acres of regeneration harvest. Alternative 3 proposes slightly fewer total acres of harvest (approximately 58 acres less) with most of the difference due to a reduction in the amount of regeneration harvest. Alternative 4 would treat the fewest acres at approximately 2,606 acres. Again, the difference in acres compared to Alternative 2 is due to a reduction of the amount of regeneration harvest proposed (approximately 1,569 acres less). See Table 181.

Alternatives 2 and 3 propose 32 and 30 regeneration harvest units, respectively, that would create openings greater than 40 acres in size, either on their own or in combination with an adjacent

unit. Tree species composition and health is variable among and/or within stands and although categorized as regeneration harvest, a range of overstory structure and canopy cover would be retained where available. Post-harvest retention would range from few trees per acre to portions resembling an intermediate harvest. In all units, where feasible, retained trees would be grouped together in clumps of 4-12 or more trees especially in those areas with fewer, quality leave trees available and along open roads. This is intended to better protect the leave trees as well as provide small areas of forested habitat for wildlife use, including use by big game. Also, the establishment of forbs, shrubs, and conifers within a few years following harvest would provide increased foraging habitat. In some areas, topography would also provide some cover due to the rolling/broken nature of the land.

These large patch sizes and shape mimic natural disturbance processes like wildfire and allow greater flexibility to work around and maintain features like hardwood patches, wet areas, or patches of leave trees, where available, that would increase within stand diversity in the greater cut area boundary. Also, edge habitat would be created along the boundary of the units. Larger unit boundaries are adjacent to a variety of habitats (e.g., RHCAs which were excluded from units, past harvested areas, unharvested areas, and old growth) resulting in different combinations of edge habitat and proximity to cover. Resulting edge habitat totals approximately 70 miles around the perimeter of the units for Alternative 2 and 66 miles of edge habitat for Alternative 3. Alternative 4 would keep the opening size of regeneration harvest units to 40 acres or less. Although the resultant 63 miles of edge is not much different than that for Alternative 3, it is due to an increase in the number of units rather than the size of units. For Alternative 4, the units and associated edge are more self-contained in that there would not be as much within stand variability, less interior habitat, fewer edge habitat combinations, and less contiguous miles of edge for big game use across the landscape compared to the other alternatives.

Prescribed Fire

Post-harvest underburning would help prep the site for tree establishment as well as stimulate the growth and productivity of understory vegetation. This would improve the post-harvest quantity and quality of forage species for big game. Total acres of proposed prescribed burning are similar among all alternatives, at a little over 1,600 acres each (see Table 181).

Low to moderate fire applied through prescribed burning in unharvested stands or larger ecosystem burns would be most similar to historical conditions created by mixed-severity fire. Implementation of these burns is intended to restore fire's role as a natural process used to maintain the open timbered conditions and improve the ecological function of a site. This would benefit big game species which are adapted to these open forest types and would be consistent with FW-DC-WL-19. Implementation would result in some reduction of understory vegetation in the short-term, but in a mosaic fashion that would retain areas of existing vegetation. Where the herbaceous and shrub layer was burned, it would be expected to return to pre-fire conditions within a few years and potentially improve the understory vegetation conditions as more light becomes available to the forest floor in the long-term.

Non-Harvest Fuels Treatments

Other non-harvest fuels treatments were identified for a variety of reasons and vary among alternatives. The majority of units initially identified for these treatments are located adjacent to private property where fuels reduction would improve safety of fire fighters and private structures as well as allow safe ingress and egress in the event of a fire, but timber harvest was not feasible due to the types of materials being treated. Some units include stands where prescribed fire was

desired but not feasible due to terrain and location of adjacent non-NFS ownership (i.e., ability to hold the fire to NFS lands). Still other units include stands where harvest was initially identified as the desired treatment, but due to other resource concerns treatment was changed to a fuels treatment. All of these units involve the slashing of understory trees with a diameter at breast height of 6 inches or less and subsequent treatment of the resultant ground fuels, depend on the amount of trees being cut and other resource concerns, and include grinding, lop and scatter, and grapple or hand piling where the piles would then be burned. This would result in a reduction in understory tree density but would not reduce the existing level of existing forbs, grass, or shrubs currently found within the stand. Alternatives 2 and 4 propose non-harvest fuels treatments on approximately 111 acres while Alternative 3 proposes slightly more at approximately 128 acres. See Table 181 for proposed treatment acres by alternative. Treating these stands as fuels units minimizes or eliminates the potentially negative effects to the concerned resources while still being able to accomplish some of the desired conditions that would have occurred with harvest or prescribed fire, including the potential to improve the quality and productivity of the existing forage for big game.

Movement

Connectivity would be maintained throughout the project area, including identified linkage and movement area, under all alternatives. Proposed treatments would trend vegetation towards the desired conditions that would promote diversity within the treated area by creating a mosaic of seral habitats, unharvested mature forest, and past harvested areas. An increased diversity and arrangement of cover and forage would benefit big game as they move through an area as compared to the existing condition which, in general, is becoming homogenous with high stand densities and canopy cover and reduced availability of quality of forage in the understory. Movement areas also include RHCAs applied to riparian areas that would not be treated.

Linkage or movement areas have been identified in three locations of the project area. The following summarizes activities occurring in these areas and their impacts to connectivity:

Yaak Falls

Harvest is proposed along NFSR 176 (East Side Road) located to the east of the Yaak River and Highway 508 near Yaak Falls. This treatment area consists of regeneration harvest units of variable shape and size, ranging from approximately 15 to 51 acres depending on alternative, which are separated by untreated stands generally associated with streams and riparian habitat. The proposed treatments would result in vegetative diversity in the area, including the creation of edge habitat that provides cover in the untreated stands adjacent to forage opportunities in the treated units. This would facilitate movement from secure, non-motorized areas to the east, to the timbered stands along the Yaak River to the west and would be consistent with GA-DC-WL-YAK-04.

Confluence of the Kootenai and Yaak Rivers

The OLY project is proposing vegetation management in the Sears Flat area off of Highway 2 and near the confluence of the Yaak and Kootenai Rivers. For all three action alternatives, proposed management includes regeneration and intermediate harvest and fuels treatments as well as retaining areas that would be left untreated, resulting in a mosaic of vegetative conditions consistent with the desired and historic conditions of the area. This mosaic would provide three general conditions for big game use: 1) forage opportunities within the more open, early seral habitat types resulting from regeneration harvest, 2) mixed forage and cover within the opened timbered stands resulting from intermediate harvest and fuels treatments, and 3) retention of

existing cover found in untreated stands. Except for one to two very small units adjacent to Highway 2, the NFS lands located between the highway and Kootenai River would not be treated.

Alternative 2 would treat the most acres in this area, including approximately 197 acres of regeneration harvest, 108 acres of intermediate harvest, and 53 acres of fuels treatments for a total of approximately 359 acres. This includes the harvest of five small units immediately adjacent to Highway 2, which range from 2 to 15 acres in size and are generally long and narrow in shape paralleling the highway. Untreated stands would be found between these small units and larger treatments to the northeast. Alternative 3 modified the proposed treatments to address heritage resource concerns as well as provide a little more habitat diversity. For example, a corridor of untreated timber would be left between Harvest Units 33 and 34 in a low area mapped as having a stream. Although no active stream is found here, this low area may have been more likely to survive a low to moderate intensity fire and would provide edge habitat (i.e., area of adjacent cover and forage) between the two regeneration harvest units for wildlife moving through this potential linkage area.

Alternative 3 would treat approximately 329 acres which is about 30 acres less than Alternative 2. The change in acres is primarily associated with the reduction in the total amount of regeneration harvest. Some change results from the reduction in unit size, but most is due to the conversion to fuels treatments including the units found along Highway 2. Changing the harvest treatments to fuels units would achieve some of the desired conditions for vegetation in this area while still addressing other resource concerns.

Alternative 4 would treat the fewest acres with a total of approximately 311 acres. This alternative is similar to Alternative 2 except regeneration harvest unit size has been kept to 40 acres or less with some change to fuels treatment. This alternative would not meet the purpose and need of managing for desired vegetative conditions as well as the other two alternatives nor adequately address other resource concerns. All alternatives would maintain movement through this potential linkage area and would be consistent with GA-DC-WL-BUL-04 and GA-DC-WL-YAK-04.

Flagstaff Mountain

No activities are proposed in the Flagstaff Mountain/Kootenai Falls area of the OLY project. Much of this area is steep and unroaded, and changes to the existing vegetation would be driven by natural disturbance processes such as wildfire, insects, and disease. There would be no impacts to the potential use of this area by big game moving to the Cabinet Mountains to the south. The project would be consistent with GA-DC-WL-LIB-01.

Proposed activities do not involve a change in federal ownership or construction/reconstruction of highways or high use forest roads and they would maintain the potential for future use of crossing features, should such features be identified and constructed. Therefore, proposed treatments for all alternatives would also be consistent with forestwide direction to maintain wildlife connectivity (i.e., FW-DC-WL-17, FW-GDL-WL-13, and FW-GDL-WL-14).

Conclusion

The OLY project area currently is not meeting desired conditions for forest structure. Early seral habitat consisting of young seedling/sapling trees that provide open habitat types are at the low end of the desired range and would soon move outside of the range. See the Forest Vegetation section for more details. Proposed harvest, prescribed fire, and non-harvest fuels treatments would trend towards the desired vegetation conditions which include an increase in the amount of early seral habitats consisting of seedling/sapling trees and open forest habitats. This also means

greater mosaic of habitat conditions across the landscape, an increase in vegetative and structural diversity within the stands, encouraged development of shrubs and other forage species in the understory, and an overall increase in the amount of early seral habitat for species adapted to these conditions. This would be consistent with forestwide wildlife desired conditions FW-DC-WL-19 which describe the desire to provide habitat for native fauna adapted to open forest and early seral habitats.

In all, Alternatives 2 and 3 propose a similar amount of vegetation management within the OLY project area with approximately 4,843 and 4,813 acres, respectively. However, the type of management differs by alternatives. Alternative 2 proposes more regeneration harvest whereas Alternative 3 proposes to change some of the regeneration harvest acres to non-harvest fuels treatments to address resource concerns. Alternative 4 would treat an intermediate amount of non-harvest fuels compared to Alternatives 2 and 3, but the fewest acres of treatment overall by keeping harvest generated opening sizes to 40 acres or less. Therefore, Alternative 3 would provide the most benefit to big game species while also protecting other resource values. See Table 181 above as well as Chapter 2 for the description of the proposed treatments and acres for each alternative.

Important Habitats or Seasons of Activity

Winter Range

When considering the winter ranges for all of the big game species, nearly all of the project area provides winter range for one or more species due to the number of big game species, overlapping of ranges, and the fact that most treatment units are generally located within lower elevation habitats. For Alternative 2, approximately 3,081 acres (over 98 percent) of proposed harvest is located within big game winter range. About 19 percent of that total is required to be harvested during the winter to protect soils and heritage resources. Winter harvest generally occurs between December and February of the year, although it can begin earlier or last longer into the spring if the conditions are right. The snow depth and frozen soil conditions desired to protect resources is also the kinds of conditions that move big game from summer to winter ranges; therefore, this timeframe of proposed activity generally correlates to the timeframe that big game are expected to be on winter range.

The 2015 Forest Plan has two guidelines related to activities occurring on winter range during its period of use (December 1 through April 30). The intent of both FW-GDL-WL-08 and FW-GDL-WL-09 is to avoid or minimize disturbance associated with management activities to native ungulates on winter range during this timeframe, especially during the critical mid-winter period. Although winter harvest would be required on a relatively small amount of winter range acres, the proportion varies by species (e.g., more would occur within white-tailed deer winter range than mule deer winter range). Also, it is likely that more units would be harvested in the winter due to their proximity to required winter units as it is more efficient and cost effective for the operator to complete as many units within one visit to an area as possible.

Therefore, because of the expected and potential disturbance associated with winter harvest on big game winter range the units were evaluated in coordination with the local wildlife biologist from MFWP. This included an assessment of the quality of winter range conditions for the species in question (i.e., does it provide classic winter range conditions), the size of the unit with respect to the species' capabilities to move to adjacent stands during snowy conditions, and the proximity and condition of the adjacent habitat that would not be treated. Based on this assessment, it was concluded that the proposed harvest units do not provide the classic winter range conditions for

the species considered. Some of the stands may currently be used during a mild winter but do not provide the conditions needed during a harsh winter. Most of the units are small compared to the adjacent untreated timbered stands and even the smaller deer species would be expected to be able to move into these adjacent stands during harvest operations. Although some units are larger, they would result in irregular shapes providing a combination of places with more interior habitat and places with more edge. Overall harvest would be maintaining or resulting in a mosaic of habitat conditions.

Although harvest of these units during the winter may result in short-term disturbance during the periods of activity which may cause big game to move to adjacent stands, big game using the units are not expected to be displaced from the treatment areas nor would the short distance movement be expected to result in increased energy expenditures that could impact the health of the individuals. In the long-term, treatments of these units would provide an opportunity to improve forage with edge habitat and cover in close proximity that would benefit big game winter range quality. Also, harvest activities would be concentrated within only a couple of treatment areas at a time, rather than spread throughout the project area, and harvest operators would generally work methodically through an area to improve efficiency and reduce costs.

Therefore, although winter harvest would occur on winter range during its period of use, the proposed activities continue to meet the intent of guidelines FW-GDL-WL-08 and FW-GDL-WL-09 to avoid or minimize disturbance due to the existing condition of the treated stands and surrounding area. Alternative 2 proposes the greatest number of units and/or acres of required winter harvest within big game winter range as compared to Alternatives 3 and 4. Therefore, the effects of these alternatives would be expected to be similar if not slightly less than that for Alternative 2. See the project file for documentation of this evaluation and a letter of support from MFWP.

Birthing/Parturition Period

The birthing/parturition period for big game species within the project area generally occurs in May and June. Project design does not include specific timing constraints during this time for big game species. However, due to timing restrictions for grizzly bear (no harvest activity April 1-June 15) most harvest and related activities (e.g., machine piling and harvest related road work) would not occur during this timeframe. This would reduce the potential effects to big game during the important period.

Secure Habitat

Management direction for grizzly bears, elk, backcountry areas, and IRAs would continue to maintain secure habitat within the project area for big game use. For example, roads utilized for proposed harvest and watershed improvement activities that are currently closed to public motorized use would remain so during project implementation and there would be no increase in public motorized access at any time of the year. This would maintain the existing level of secure habitat for big game.

Prescribed burns of approximately 1,605 acres in the project area are proposed. Of this, approximately 172 acres would occur within security habitat in prescribed burn Fuels Unit F1. Fuels Unit F1 would occur within an opened timbered stand where the goal of the mixed severity fire would be to reduce tree encroachment and encourage forage production. This would improve the palatability and enhance the quality of the forage produced on these acres and improve

foraging opportunities in secure habitat. Forage would also be improved in the other burn units, although use may be somewhat limited due to their proximity to open roads.

An increase in hunting pressure due to road hunting along open roads adjacent to recently harvested units is not expected. As mentioned previously, retained trees would be grouped together in clumps of 4-12 or more trees especially in those areas with fewer, quality leave trees available and along open roads. This would continue to provide some small areas of cover for big game as well as to break up the unit visually. Small conifer and shrubs would be expected to grow within 5 years and provide hiding cover within approximately 15 years. Also, topography of the project area would provide some cover due to the rolling/broken nature of the land in certain units. As described in the elk analysis, security habitat is not located within one-half mile of a public used open road during the hunting season. Big game use of this area close to the road is already limited and would not be expected to increase during or post-harvest because of this known avoidance. The potential for increased hunting success along open motorized roads is minimal and there would be no expected change to the big game populations within the project area.

The effects of increased activity due to timber harvest, prescribed fire (including helicopter ignition), and watershed improvement work in areas that do not generally experience activity could result in temporary disturbance and possible avoidance of the activity area. However, roads currently not open to public motorized use would remain closed to the public during implementation of the project and there would be no reduction in the availability of secure habitat. See the Grizzly Bear and Elk analyses for a more in depth discussion. Also, where vegetation management treatments are proposed within secure habitat the post-treatment improvement in the diversity, quantity, and quality of forage would benefit big game species.

Cumulative Effects

The “Existing Condition” section describes relevant past and present factors affecting the vegetative conditions of the project area which influences the relative proportion of forage and cover and the availability of important winter range and security habitat in the project area. This Cumulative Effects section summarizes the past actions as well as further describes ongoing and other reasonably foreseeable contributions potentially impacting big game and their habitat.

Spatial and Temporal Context for Cumulative Effects Analysis

As described for indirect effects under the section “Spatial and Temporal Context for Effects Analysis,” the project area was chosen as the appropriate scale for the cumulative effects analysis as alteration of habitat could influence big game use of available habitats within the surrounding areas.

Temporal boundaries for the big game analysis include both short-term and long-term effects and were also described under “Spatial and Temporal Context for Effects Analysis.” Short-term effects are those that are expected to last between a few days to a season or portion of two seasons, such as big game moving back into a treatment area once the disturbing activities have been completed. Long-term effects are those that are expected to last longer than a season or two and may include the maintenance of understory forage species through proposed treatments or changes in access management.

Past, Present, and Reasonably Foreseeable Activities Relevant to Cumulative Effects Analysis

Past Actions

Harvest has occurred in the project area since 1950 and resulted in a variety of age classes and successional stages that provided forage and cover for big game species. However, at the same time, roads constructed to facilitate harvest reduced the availability and quality of secure habitat. A detailed description of previous vegetation and road management activities are found at the beginning of Chapter 3, including Table 32 and Table 33, as well as Appendix F of this document. Historically, natural disturbances such as wildfire resulted in a mosaic of habitats and forage conditions. In contrast, fire suppression since the early 1900s has altered stand structure resulting in more homogenous stands with greater canopy closure in some areas, which has in turn reduced forage production for big game on many sites.

Activities affecting big game habitat have changed in recent years. The amount of open roads has dramatically dropped in the past several years as a result of restricting/reclaiming roads through decisions intended to facilitate grizzly bear recovery. This has also resulted in an improvement in secure habitat on NFS lands within the project area for big game. Also, since the mid-1990s there has been more reliance on restoration focused treatments that result in a greater mosaic of habitat conditions that provide both forage and cover conditions within the same area for big game use.

Alternatives 2, 3, and 4 – On-going and Reasonably Foreseeable Actions

Reasonably foreseeable actions include those federal, state, or private activities that are ongoing or scheduled to occur within the next five years, independent of this federal action. Table 34 located at the beginning of Chapter 3 identifies those current and foreseeable actions in the project area that were determined to be appropriate for inclusion in the analysis of environmental effects. Ongoing federal actions have been considered and included when formulating the existing condition for this project area.

A district wide thinning project of previously harvested units (Timber Stand Improvement 2010-2015) would occur within big game habitat. These units provided foraging habitat following the original harvest, but are or are becoming areas of hiding cover with reduced foraging opportunities. Planned units would be accessed via open or restricted roads and possibly by foot; restricted road use would not exceed administrative levels. Work would be completed by hand through the use of chainsaws within a short activity period. Big game may avoid the immediate area during activity, but would be expected to continue using the stands during inactive periods such as nights and weekends. Cumulatively, effects would be minor. Although thinning of conifers may result in a low level of temporary disturbance, thinning would continue to provide open space for shrub and grass growth and productivity (foraging opportunities) within the stands for a greater length of time.

Stimson Lumber Company has proposed to harvest approximately 216 acres of their timbered lands located at the top of Yaak Mountain. The existing road ends at the Stimson and NFS lands boundary and access to the proposed harvest area would require the construction of approximately 1.6 miles of road of which approximately 0.2 mile would cross NFS lands. Construction and use of this proposed road segment would be a Forest Service permitted activity based on approval. The new road would remain gated to public motorized use and, therefore, would have no impacts of the availability of security habitat (see the Elk analysis). Proposed harvest includes a mixture of regeneration, overstory removal, partial harvest, or commercial thin

treatments that would result in a mosaic of habitat conditions in the west slope of Yaak Mountain. This would be expected to result in an increase of foraging opportunities within secure habitat. Cumulatively, Stimson's proposed harvest in addition to OLY's proposed harvest, all past harvest, and untreated areas would result in a greater mosaic of habitat types and conditions on Yaak Mountain for big game use. Both OLY's and Stimson's proposed activities would be expected to cause temporary disturbance and/or displacement to big game using the treated stands. However, Stimson's activities could not occur until OLY's activities on Yaak Mountain are completed due to design features for grizzly bears (see the Grizzly Bear analysis and Design Features in Chapter 2). Therefore, it is expected that disturbance and/or displacement effects associated with the OLY project would have dissipated prior to the initiation of Stimson activities. There would be no overlap in the occurrence of these activities and, therefore, would be no cumulative effects associated with disturbance.

Land development which includes road construction, vegetation clearing, and residential construction and improvements can create a variety of changes to the landscape. For example, new access to land parcels and/or residential structures increases road densities and potentially reduces security habitat. Potential effects depend on the amount of private land on the landscape, the magnitude, type and location of developments, include the loss of secure habitat and localized disturbance on big game. In the OLY project area, future development opportunities are limited to approximately 3,802 acres (or about 5 percent) of private land not within corporate ownership. These lands are generally located in the lower elevation sites of the project area along the west and southwest boundaries that are bordered by the Kootenai and Yaak Rivers. Development of these lands likely altered and reduced big game habitat in these lower elevation sites that provide winter range, in general, for deer and elk. Past trends in land development here would suggest that development would continue to occur at a low rate. Also, private landowners generally restrict public use on their roads. Finally, the NFS lands within the project area would continue to provide habitat conditions needed for big game use. Therefore, development of private lands would be expected to have minor cumulative impacts on big game species within the project area over the next 10 years.

With population growth and development, it is reasonable to assume that some corresponding increase in human use of NFS lands is likely to occur. Recreational activities such as sightseeing, hiking, cross-country skiing, camping, snowmobiling, fishing, and firewood cutting are ongoing and expected to increase over the next 10 years. This increase is likely to be gradual and incremental and tend to be focused on areas along or near roads open to motorized traffic. Big game may, over time, experience more frequent disruption of their daily activities if they are in proximity to roads, though, as discussed earlier, these areas receive proportionately less use by big game than more secure habitats. This low level of increase of recreational use would not appreciably change the existing condition as big game already tend to avoid open roads. Potential cumulative effects to big game from recreational activities in the project area would be minimal.

The Forest Service influences hunter access on NFS lands through road management. The relationship of this project to increased recreational use of the area centers on the potential for increased hunting pressure. Currently, three outfitters are permitted to operate with set service days for this area. Areas used by the outfitters and other hunters may change as roads currently impassable due to vegetative growth are cleared; however, access would continue to be by non-motorized means as no new roads would be opened for public motorized use. Levels of hunting pressure would not be expected to increase and exposure to humans would remain low. Hunting activities within the project area would cumulatively contribute to minor, short-term disturbance effects during the general hunting season which would vary with specific area use and activity

levels. There would be no change to the availability of security habitat (see the Elk analysis). Therefore, mortality risk and potential cumulative effects to big game would be minimal within the project area.

Based on the nature and magnitude of potential cumulative effects to big game independent of this project, there are no cumulative effects anticipated that would change the effects determination to big game from implementation of the proposed federal action.

Regulatory Framework Findings

2015 Forest Plan

The 2015 Forest Plan provides desired conditions, objectives, standards, and guidelines for big game within the Wildlife Resource. The following are applicable to the actions in this project[28]:

Forestwide Direction

- p. 28, **FW-DC-WL-02**: A forestwide system of large remote areas is available to accommodate species requiring large home ranges and low disturbances, such as some wide-ranging carnivores (e.g., grizzly bear).

  Large areas of secure habitat are found within the project area that currently provide for grizzly bears and elk. These areas also provide security for other big game species. These secure habitat areas are found in association with IRAs and MAs that provide non-motorized or limited motorized access during the year. Limited prescribed burning activities would occur in these areas and would not change their existing management with respect to motorized access. Adherence to management direction for grizzly bears (FW-STD-WL-02) and elk (FW-GDL-WL-10, FW-OBJ-WL-02), backcountry areas, and IRAs would continue to maintain secure habitat within the project area for big game use. See "Secure Habitat" within the "Direct and Indirect Effects" discussion. Therefore, the OLY project would contribute to progress toward achieving GOAL-WL-02.

- p. 29, **FW-DC-WL-17**: Forest management contributes to wildlife movement within and between national forest parcels. Movement between those parcels separated by other ownerships is facilitated by management of the NFS portions of linkage areas identified through interagency coordination. Federal ownership is consolidated at these approach areas to highway and road crossings to facilitate wildlife movement.

  Movement areas would be maintained throughout the activity areas under all alternatives and include unharvested and recovered stands, RHCAs, and a mosaic of different treatments with varying levels of cover. Within identified linkage areas, proposed treatments would diversify the vegetative conditions found in these areas and provide a mosaic of forested cover and foraging opportunities which are habitat features that contribute to big game movement through an area. There would be no change to Federal ownership in these areas. See "Movement" under the "Direct and Indirect Effects"

[28] Goals, desired conditions, objectives, standards, and guidelines can be found on the noted pages in the 2015 Forest Plan.

discussion. Therefore, the OLY project would contribute to progress toward achieving FW-DC-WL-17.

- p. 30, **FW-DC-WL-19**: By trending towards the desired conditions for vegetation, habitat is provided for native fauna adapted to open forests and early seral habitats, or whose life/natural history and ecology are partially provided by those habitats.

  The OLY project area is currently not meeting desired conditions for forest structure associated with early seral conditions. Proposed vegetation management treatments would increase the amount of early seral habitats and trend towards the desired levels. This would benefit big game species that are adapted to these conditions and have historically used this area. See "Forage and Cover" within the "Direct and Indirect Effects" discussion. Therefore, the OLY project would contribute to progress toward FW-DC-WL-19.

- p. 31, **FW-GDL-WL-08. Big Game**: Management activities should avoid or minimize disturbance to native ungulates on winter range between December 1 and April 30, with the exception of routes identified on MVUM as open to motor vehicle use. Management activities that occur on winter range during the winter period should concentrate activities to reduce impacts to native ungulates.

  Proposed activities include required winter harvest within winter range during this timeframe. However, based on field review and discussions with MFWP it was determined that these stands currently do not provide classic winter range conditions and activities would not negatively impact big game use of the treatment area during winter. Also, harvest activities would be concentrated within only a couple of treatment areas at a time and not spread throughout winter range. See "Winter Range" within the "Direct and Indirect Effects" discussion. Therefore, the OLY project was designed in accordance with FW-GDL-WL-08.

- p. 31, **FW-GDL-WL-09. Big Game**: Management activities should be avoided on native ungulate winter range areas during the critical mid-winter period (January and February) when snow depth most likely influence movement and availability of forage.

  See FW-GDL-WL-08 above. Proposed activities occurring on winter range during this timeframe are not expected to negatively impact big game use of the treatment area due to the lack of classic winter range conditions and limited forage opportunities within the treated stands. Foraging opportunities would remain available in adjacent stands during implementation and, with an expected post-project increase in forage, the proposed treatments are expected to improve the future quality of winter range for big game species. See "Winter Range" within the "Direct and Indirect Effects" discussion. Therefore, the OLY project meets the intent of FW-GDL-WL-09.

- p. 31, **FW-GDL-WL-11. Big Game**: Management activities should avoid or minimize disturbance to native ungulates during the birthing/parturition period.

  Project timing restrictions for grizzly bears would reduce the potential effects to big game during this important period. See "Birthing/Parturition Period" within the "Direct and

Indirect Effects" discussion. Therefore, the OLY project meets the intent of FW-GDL-WL-11.

- p. 32, **FW-GDL-WL-13. Connectivity**: Management activities within one-quarter mile of existing crossing features, and future crossing features developed through interagency coordination, should not prevent wildlife from using the crossing features. The vegetative and structural components of connectivity, including snags and downed wood, should be managed according to the desired conditions for vegetation.

  The area near the confluence of the Kootenai and Yaak Rivers has been identified as a wildlife movement area. Proposed management in this area would result in a mosaic of vegetative conditions consistent with the desired and historic conditions of the area which would maintain conditions suitable for wildlife movement. See "Confluence of the Kootenai and Yaak Rivers" within the "Direct and Indirect Effects" discussion. Therefore, the OLY project was designed in accordance with FW-GDL-WL-13.

- p. 32, **FW-GDL-WL-14. Connectivity**: In wildlife linkage areas identified through interagency coordination, federal ownership should be maintained.

  All lands currently under federal ownership will remain so as OLY does not propose any change in land ownership. See "Movement" within the "Direct and Indirect Effects" discussion. Therefore, the OLY project was designed in accordance with FW-GDL-WL-14.

Management Area Direction

- p. 62, **MA5a,b,c-DC-WL-01 (Backcountry)**: Large remote areas with little human disturbance such as those found in these MAs (in conjunction with MAs 1a, 1b, and 1c) are retained and contribute habitats for species with large home ranges. Habitat conditions within these management areas contribute to wildlife movement within and across the Forest. These areas also provide foraging, security, denning, and nesting habitat for wildlife.

  MAs 5a and 5c are found within the project area in association with grizzly bear Core and elk security habitat areas as well as Flagstaff and Saddle Mountain IRAs. One ecosystem burn unit would be implemented within 5a. Otherwise these lands would continue to contribute to secure habitat for big game species with low levels of non-motorized human disturbance and largely natural vegetative conditions. See "Secure Habitat" within the "Direct and Indirect Effects" discussion. Therefore, the OLY project would contribute to progress toward MA5a,b,c-DC-WL-01.

Geographic Area

- p. 74, **FW-DC-WL-BUL-04**: Wildlife move along the Idaho/Montana border and from the West Cabinets into the Yaak, in the vicinity of the confluence of the Kootenai and Yaak Rivers.

  OLY proposes vegetation management at Sears Flat which is found within this identified linkage area. Treatments would result in a combination of early seral habitat conditions, open timbered stands, and untreated stands that would trend towards the desired

vegetative conditions for the area. There would be no change in ownership in this area and proposed management (i.e., a mosaic of forage and cover) would facilitate potential movement by big game through this area. See "Movement" within the "Direct and Indirect Effects" discussion. Therefore, the OLY project would contribute to progress toward FW-DC-WL-BUL-04.

- p. 87, **GA-DC-WL-LIB-01**: Habitat conditions are retained for wildlife movement between the Cabinet Mountains and the Yaak, in particular, the area of Flagstaff Mountain.

  No activities are proposed in the Flagstaff Mountain/Kootenai Falls area of the OLY project and there would be no impacts to the potential use of this area by big game to move to the Cabinet Mountains to the south. See "Movement" within the "Direct and Indirect Effects" discussion. Therefore, the OLY project would contribute progress toward FW-DC-WL-LIB-01.

- p. 93, **GA-DC-WL-YAK-03**: Big game habitat is maintained or improved on winter ranges as a result of restoration activities that may include prescribed burning, weed control, precommercial thinning, etc. These activities trend habitat conditions towards the desired conditions listed in the "Forestwide Direction" section for Vegetation.

  When considering all big game species, nearly all of the proposed harvest acres are located within big game winter range. Treatments are designed to trend the vegetation towards the desired conditions of the area. In the long-term, the proposed treatments would provide an opportunity to improve forage with edge habitat and cover in close proximity that would benefit big game winter range quality in the future. See "Winter Range" within the "Direct and Indirect Effects" discussion. Therefore, the OLY project would contribute to progress toward GA-DC-WL-YAK-03.

- p. 94, **GA-DC-WL-YAK-04**: Wildlife move between the Yaak and West Cabinets, particularly in the area around Yaak Mountain, Teepee Mountain, and the confluence of the Yaak and Kootenai Rivers. Wildlife also moves across the Yaak River and Highway 508 in the vicinity of Yaak Falls.

  Proposed harvest treatments would result in vegetative diversity in an area near the Yaak River and Highway 508. Cover would remain available between and adjacent to the units that would continue to allow for movement across the East Side Road to the Yaak River. See "Movement" within the "Direct and Indirect Effects" discussion. Therefore, the OLY project would contribute to progress toward FW-DC-WL-YAK-04.

Federal Law

National Forest Management Act

The project would comply with NFMA direction to provide for diverse populations of plant and animal communities through compliance with the 2015 Kootenai Forest Plan.

Other Guidance or Recommendations

State Elk Management Plan

The project area is located in the Purcell Elk Management Unit identified in the Montana Statewide Elk Management Plan (MFWP 2004b). The management plan recommends increasing forage opportunities in both summer and limited winter range, managing for appropriate levels of security habitat, and trending vegetative conditions towards those historically used by big game within the Management Unit. Implementation of the OLY project would address these recommendations.

State Deer Management Plans

State management of mule deer and white-tailed deer are guided by two documents: "Ecology and Management of Mule Deer and White-tailed Deer in Montana" (MFWP 1998) and "Ecology of White-tailed Deer in the Salish Mountains" (MFWP 2006). Both describe the habitat and ecology of deer within different areas of the state, population characteristics, and management implications and recommendations. Recommendations regarding habitat management include managing for a diversity of vegetative conditions and maintaining the availability and suitability of winter ranges. Implementation of the OLY project would address these recommendations.

Summary of Findings

The No Action alternative would maintain existing vegetative conditions that influence the proportion and quality of forage habitat compared to cover. Also, winter range and secure habitat would not be affected by activities. However, vegetative succession due to fire suppression and past management practices are resulting in a more homogenous environment with higher forested cover than what would have occurred under a mixed severity fire regime. As trees continue to encroach upon forage openings the acres of productive foraging habitat would continue to decline over time.

The action alternatives would trend vegetation towards the desired condition for the project area. This would result in an increase in early seral, open forest, and edge habitats that would provide forage for big game use. Abundant cover would remain available and intermixed with the foraging habitat, resulting in a mosaic of conditions that more closely reflect the historic conditions that big game evolved with. Activities occurring on winter range during the winter period would not be expected to result in a level of disturbance that would negatively impact big game use of the winter range or individual health. Similarly, there is minor potential to impact big game during the birthing and parturition periods due to activity timing restrictions for grizzly bear protection. Also, secure habitat managed through direction for other species or land management areas would continue to provide sufficient level of secure habitat for big game species during and post-project. Some short-term displacement of big game may occur during the life of the project in those areas that currently receive little to no motorized use or other human activity. However, big game would benefit from the improved foraging opportunities generated by proposed activities in the long term.

Other Agencies and Individuals Consulted

Tonya Chilton-Radandt, MFWP Wildlife Biologist

Communications consisted of a discussion of the type of proposed actions occurring within big game winter range, evaluation of winter range conditions within the stands proposed for winter

harvest, and determining the potential for disturbance during the winter period associated with the proposed treatments.

Elk

Introduction

During the Forest Plan revision process, elk security habitat was raised as a concern given the importance of this species for hunting. Therefore, the 2015 Forest Plan provides management direction for the maintenance and/or improvement of elk security by planning subunit (PSU). The primary activity that might impact elk security habitat, if not managed or mitigated, is motorized access management. This specifically concerns those routes open to public motorized use during the hunting season both on NFS lands and adjacent non-NFS lands and changes to this open route system will be the focus of analysis. Other activities such as vegetation management (e.g., alters the availability of forage and cover) and non-motorized access can influence the effectiveness of elk security within a given area and will also be discussed. Those activities that do not involve access management or changes to the vegetative condition, such as proposed watershed improvement work or road BMPs, would not be considered for analysis.

Analysis of this resource, elk security habitat, is directly related to the project purpose and need to "Provide forage opportunities while maintaining wildlife security . . . through access management."

Summary of Conclusions

The action alternatives maintain security habitat by keeping gated and barriered roads used for project activities closed to public motorized use both during and post-project. In addition, treatments would trend the local vegetation towards desired conditions and would improve foraging opportunities within and between blocks of security habitat. Based on the elk security habitat analysis, OLY's proposed alternatives would maintain effective security habitat for elk in the project's PSUs.

Regulatory Framework

2015 Forest Plan

The 2015 Forest Plan provides overall guidance for the management of the lands on the KNF. It describes the goals, desired conditions, and objectives toward which the management of the land should be directed. And it establishes standards and guidelines to help achieve or maintain the desired condition or conditions, to avoid or mitigate undesirable effects, or to meet applicable legal requirements.

The plan components which provide specific elk security habitat resource direction relevant to this project include:

Forestwide Direction

- FW-OBJ-WL-02
- FW-GDL-WL-10

There are several other 2015 Forest Plan components that provide resource direction for a range of wildlife species or habitat conditions that are not specific to elk security habitat, but still are applicable to management of security habitat. The full list of the plan components applicable to

elk security habitat management are found in the "Regulatory Framework Findings" section of this analysis.

Resource Indicators and Measures

The effects analysis for elk security habitat is based on direction provided in the 2015 Forest Plan which provides management direction (an objective and guideline) specific to elk security habitat as well as other goals and desired conditions that would benefit security habitat such as desired conditions for vegetation and providing a system of large remote areas. The 2015 Forest Plan guideline FW-GDL-WL-10 states that management activities should, at a minimum, maintain existing levels of elk security within the analysis area. FW-OBJ-WL-02 is to increase by one each the number of PSUs that provide at least 30 and 50 (high emphasis PSU) percent elk security over the life of the 2015 Forest Plan. This is based on the recommendations provided by Hillis et al. (1991). The percent change in elk security habitat in the PSU will be the measure for effects (i.e., resource indicator in Table 182) to compare alternatives as well as meeting the 2015 Forest Plan guideline and trending toward the objective. The overall assessment of security habitat also considers other activities or conditions that can influence the effectiveness of security habitat such as vegetation management, non-motorized access/activities, and systems of large remote areas within each PSU.

Table 182. Resource Indicators and Measures for Assessing Effects

Resource Element	Resource Indicator	Measure	Used to Address: P/N* or Key Issue?	Source
Security Habitat	Changes in the percent of NFS lands providing security habitat in the respective PSU.	Percent Security Habitat	Purpose and Need	KNF Forest Plan FW-OBJ-WL-02 and FW-GDL-WL-10.

*P/N = Purpose and Need

Methodology

Areas of elk security habitat offer elk refuge through reduced vulnerability during the hunting season and can greatly influence the age structure and composition of a herd. The 2015 Forest Plan defines elk security habitat as "Generally timbered stands on NFS land at least 250 acres in size greater than 0.5 mile away from open motorized routes during the hunting season." This definition and Hillis et al. (1991) emphasize the impact that open roads have on security habitat; however, both the 2015 Forest Plan and Hillis et al. (1991) recognize that non-motorized activities and the location of closed roads can also impact security habitat and potential effects should be considered at the project level.

The KNF will generally use the PSU as the analysis unit for elk security as this was the agreed upon measurement scale through coordination with MFWP who are the managers of the elk population. Each PSU was assigned an emphasis rating of high, medium, or low given the following considerations: the ability of a subunit to produce elk for harvest, elk hunter density, elk density, and opportunity to harvest a mature bull (USFS and MFWP 1997). The emphasis rating determines the desired minimum percent elk security based on the recommendations in Hillis (1991) and FW-OBJ-WL-02.

Security was calculated as generally timbered stands in blocks of habitat greater than or equal to 250 acres in size and greater than or equal to 0.5 mile from an open motorized route during the

hunting season. All open motorized routes within or adjacent to the PSU (within 0.5 mile) that could impact security were used for the calculations. Stand data from the FSVeg database was used to remove non-timbered areas such as waterbodies and scree fields. Security habitat was calculated only for those acres found on NFS lands as it is assumed that non-NFS lands either do not contain or would not retain security habitat (USFS 2013). Percent security is calculated by dividing the acres of security habitat on NFS lands by the total acres of NFS lands found within the PSU.

To assess the effectiveness of security habitat, other activities or conditions which reduce the availability of cover (e.g., vegetation management or wildfires) or influence the increased access and use of an area by humans (e.g., changes in access management) were considered. The reduction in cover can either improve or reduce the effectiveness of security habitat depending on its location in relation to an open road during the hunting season. For example, in remote areas the reduction of cover generally results in an increase in forage that would improve the effectiveness of security habitat. Hillis et al. (1991) states that in order to provide conditions suitable for elk throughout the hunting season, security habitat must also provide other habitat requirements such as food and water to sustain them and encourage their continued use of these secure areas. Reductions in cover are normally only temporary, as timbered stands generally provide cover approximately 15 years post-disturbance on the KNF. Use of the FSVeg database can help to identify those timbered stands 15 years or older. Increased human access can be influenced by timber harvest or clearing of roads to access units or natural events such as wildfire. This along with any proposed changes to access management and their potential influence on access were considered. In addition, NAIP imagery and topography were used to help evaluate the effectiveness of open or sparsely timbered areas. Open areas not associated with open roads and located within steep terrain were considered secure as access is limited or difficult and other topographical features would also serve as cover.

Data Sources

Elk population ecology, biology, habitat description and relationships identified by research and summarized below provided guidance in evaluating existing elk security habitat and potential effects at the project level. Elk population and harvest data come primarily from MFWP data. Additional information used is from recent District wildlife observation records and the NRIS wildlife database.

Historically elk were found in a variety of habitat types in Montana from open prairies to timbered forest lands. Elk show a preference for areas with diverse habitat types and community edge as the variety and quantity of forage plants along the edge of two habitat types is greater than either habitat type itself. Fire played a key ecological role in developing this mosaic of habitats that vary in characteristics such as age, structure, and species composition (Toweill and Thomas 2002).

Human activity and infrastructure can influence habitat use as well as potential for mortality. Human development of winter range and the construction of roads have resulted in habitat loss and altered elk use of traditional areas (Toweill and Thomas 2002). Roads in particular can greatly impact elk habitat by facilitating human access into otherwise remote areas thereby increasing displacement, hunting pressure, and mortality risk (Irwin and Peek 1983, Hillis et al. 1991, Unsworth et al. 1993, Unsworth et al 1998, Toweill and Thomas 2002). Elk have been reported to use areas of timbered cover more often and/or areas farther from roads during the fall months which coincide with increased human activity and road use during the hunting season (Irwin and Peek 1983, Hillis et al. 1991, Unsworth et al. 1998, Toweill and Thomas 2002, Ciuti et

al. 2012). Non-motorized human activities including horseback riding and hiking can also result in increased rates of movement, flight responses, and heightened levels of vigilance (Wisdom et al. 2005, Ciuti et al. 2012). Therefore, even remote areas may not provide security habitat if human access is facilitated by roads (Hillis et al. 1991) and potentially non-motorized trails into areas with mellow, open terrain. Cover is often provided by vegetation; however, topography can also provide "cover" by breaking up line of site distances or deterring access due to steep conditions (Hillis et al. 1991, Unsworth et al. 1993, Toweill and Thomas 2002, Wisdom et al. 2005, Sawyer et al. 2007) even in areas with little vegetation. In the Clearwater drainage of Idaho, Unsworth et al. (1993) determined that topographic variables were the most important measures of security. More bulls survived the hunting season in areas that were steeper and more broken or dissected, which likely influenced the lower open road and hunter densities also reported.

As mentioned above, to encourage elk to continue to use security habitat, especially during the hunting season, these areas must provide other habitat requirements such as food and water (Hillis et al. 1991). In many areas, fire suppression has generally resulted in a reduction in forage through tree encroachment into openings or open timbered stands. As a result, elk may venture out of secure areas more often in order to locate food making them more vulnerable during the hunting reason and increasing the risk of mortality.

Assumptions and Limitations

Successional or structural stage is based on year of origin and assumptions about the length of time it takes for a stand to move from one stage to the next. This includes the assumption that cover would be provided for elk after approximately 15 years. However, age does not account for environmental conditions or disturbance processes that affect development of the successional stage. For example, cold temperatures and short growing seasons at high elevation sites may maintain a more early seral stage despite more than 15 years of growing time. Therefore, personal observations of the area as well as NAIP imagery have been used to assist in better identifying those stands that currently provide cover and stands that do not.

It was assumed that most individuals hunting in remote, unroaded areas would stay near the trail system they used to access the area or connected ridgelines of similar topography. Once the topography breaks to steeper terrain, it was considered enough of a change to deter most individuals from pursuing an elk in that direction.

Affected Environment

Spatial and Temporal Context for Effects Analysis

Spatially, the KNF will generally use the PSU as the analysis unit for elk security as this was the agreed upon measurement scale through coordination with MFWP who are the managers of the elk population.

There are two temporal boundaries for elk security habitat for access management and vegetation management. Timeframes associated with changes to access management can be variable. There may be short-term periods (e.g., couple of years) of road restrictions needed to meet other resource needs that only occur only during project implementation. However, most changes to access management are generally considered very carefully to assess current and future management needs as well as public concerns, and are often for long-term commitments up to the life time of the road. Once a road is on the landscape, it can influence non-motorized access even if not open to public motorized use. The effects of vegetation management activities are generally

considered to be short-term compared to those of roads. Vegetation management has the potential to impact the availability of openings which may influence the effectiveness of security habitat. The high productivity of the area for tree establishment and growth means that openings created by harvest are generally considered to provide cover again within approximately 15 years.

Existing Condition

The project area includes a portion of the Lower Yaak and Sheep PSUs and all of the O'Brien PSU. The Lower Yaak and O'Brien PSUs have medium ratings while the Sheep PSU has a low emphasis rating. The PSUs are located in elk hunting district #100 (Purcell Elk Management Unit). The population in the hunting district increased during the 1980s and 1990s. It then stabilized and remained constant through 2004 (MFWP 2004b). The Forest's "Monitoring and Evaluation Report" (USFS 2008), concludes that the elk population on the KNF appears to be increasing in the last few years based on MFWP data. In this hunting district, the most recent count effort took place in 2009 within an estimated 173 elk (MFWP 2014b). More recent surveys have occurred within MFWP Region 1, which includes this hunting district and the KNF, and observations show an increase in elk numbers from 4,494 to 4,651 elk between 2012 and 2014 (MFWP 2012-2014b). Also, statewide there has been an estimated increase of approximately 17,500 elk in the same time period (ibid). Increased road restrictions and decommissioning in the last 20 plus years has improved elk security on the Forest, likely contributing to the population increase and steady numbers of large bulls observed since 2002 (USFS 2008).

See Table 183 for the security habitat emphasis rating, 2015 Forest Plan baseline, and project level existing condition by PSU. In general, the KNF provides good growing conditions for trees and timbered stands are generally found throughout the PSU and provide cover for elk. Historically, wildfire would create a mosaic of successional stages and result in vegetative diversity in this area. This includes the maintenance of open forest conditions or the creation of small openings interspersed with heavier cover that would provide forage opportunities within security habitat. In contrast, fire suppression and past timber management have resulted in a trend towards homogenous stand composition and structure consisting of high density stands of shade-tolerant species (see Forest Vegetation section) that reduce the presence and productivity of understory forage species. The increased tree density and fuel loadings makes the area more susceptible to high severity stand replacing fires that can result in large openings rather than a mosaic of variable sized patch openings. The project area experienced several large fires in 1994 and 2000 that effectively eliminated cover over thousands of acres within remote areas that potentially provide security habitat (see Chapter 3 – Past, Ongoing, and Reasonably Foreseeable Actions). Calculation of security habitat for the 2015 Forest Plan revision occurred at the Forest level and removed all stands currently not providing cover, including stands in the seedling/sapling stage associated with these fire areas. This provided the 2015 Forest Plan baseline percent displayed in Table 183 below. Based on project level analysis, nearly all of these areas were retained as security habitat based on their limited non-motorized access via NFS trails and steep topography and provide a higher level of existing security habitat than the baseline condition (Table 183). Also, there is likely more security habitat found in certain steep sided drainages (e.g., Hummingbird Creek) than use of the 0.5 mile buffer would indicate. A piece of potential security habitat found on the top of Kilbrennan Ridge was removed from the existing condition because of its long and narrow shape, the flat topography of the ridgetop, and hunter accessibility into the area via a barriered road system. These are characteristics that Hillis et al. (1991) suggests may reduce the security of an area for elk. This area will be removed from the 2015 Forest Plan baseline condition for future monitoring.

Table 183. Reference and Existing Elk Security Habitat Levels within the Lower Yaak, O'Brien, and Sheep PSUs.

PSU	Emphasis Rating	Minimum Desired Security Habitat (%)	2015 Forest Plan Baseline Security Habitat (%)	Existing Security Habitat (%)
Lower Yaak	Medium	30	35	46
O'Brien	Medium	30	21	34
Sheep	Low	30	17	36

Resource Indicator and Measure 1

Lower Yaak PSU

Five blocks of elk security habitat are found in the analysis area and provide approximately 46 percent security habitat for elk. This is better than the minimum desired 30 percent level for PSUs with a low to medium rating. Although large fires in the Arbo Creek basin and Gunsight Mountain areas reduced the availability of cover within the largest block of security habitat located in the eastern half of this PSU, this event is not considered to have negatively impacted the effectiveness of elk security due to the fire area's remote location, steep terrain, and limited non-motorized access. Conversely, this temporary reduction in cover provided forage opportunities on a north facing slope in the Arbo Creek drainage that likely provided little forage prior to the fires. A large portion of this security habitat block coincides with both MA5a (Backcountry) and the Saddle Mountain IRA. Motor vehicle use does not occur within this block of MA5a and, therefore, contributes to the effectiveness of security habitat within that management area. Roads could be built within an IRA; however, it would have to meet certain criteria which would limit most construction. Similar to MA5a, IRAs contribute to elk security through the creation and maintenance of large, remote areas that are likely to have a lower amount of human presence due to the difficulties of access. The upper portion of another block of security habitat along the western edge of the PSU also coincides with MA5a and the Buckhorn Ridge IRA.

O'Brien PSU

Four blocks of elk security habitat found within the analysis area are well over 250 acres in size with the smallest consisting of approximately 817 acres. The remaining four blocks are less than 250 acres in size, but this is only because they are located along the edge of the PSU boundary. Functionally, these blocks are part of larger security habitat blocks found within the adjacent Lower Yaak PSU and were included in the security habitat calculations. Fires in the Studebaker and Kedzie Creek drainages and on Pulpit Mountain reduced the availability of cover within the larger blocks of security habitat located in the central and northeast portion of this PSU. Although the large fire on Pulpit Mountain occurred over 20 years ago, tree recovery has been slow and the fire area still provides early successional forage opportunities for elk in remote areas with limited human access and use. This mosaic of forage and cover contributes to approximately 34 percent security habitat for elk which is better than the minimum desired 30 percent level for PSUs with a low to medium rating. This is a conservative estimate, however, as the steep topography associated with Hummingbird Creek and the north slope of O'Brien Creek likely offer more security than what is estimated with the 0.5 mile buffer from the open roads. Also, higher elevation locations such as along the jeep trail (NFSR 4429) may get snowed out early in the year and limit access during parts or all of the hunting season. A large security habitat block runs along

the northeast edge of the PSU. Portions of two IRAs are located at the north and south end of this block (Saddle Mountain and Flagstaff, respectively) which also coincide with MA5c. Although this MA does allow for over-snow vehicle use, it does not allow for other motor vehicle use and would contribute to security habitat during the fall hunting season.

Sheep PSU

One large block of 4,615 acres of security habitat is located along the Kootenai Face from about China Creek east to the south of Flagstaff Mountain. One additional block of security habitat contributes to the existing percent within the PSU that is less than 250 in size. Like for the O'Brien PSU, this block of habitat is found along the edge of the PSU and is functionally connected to larger blocks found to the north in the O'Brien PSU. The open habitat conditions found in the upper China Creek basin and post-fire conditions around Flagstaff Mountain have influenced the vegetative structure of security habitat in the upper elevation locations of the Sheep PSU. This area is similar to Pulpit Mountain in the O'Brien PSU in that tree recovery has been slow following the fire but has continued to provide early successional forage opportunities in remote areas with limited human access and use. Elk security habitat is approximately 36 percent within this PSU which is better than the minimum desired 30 percent level for PSUs with low to medium ratings. The Flagstaff IRA coincides with the majority of the large security block in the eastern half of this PSU. In addition, MA5a and MA5c are also found within this area. Due to the steep nature of the terrain in this area along with the IRA and MA designations, future road construction would be limited in the majority of this large block of security habitat.

Environmental Consequences

Alternative 1 – No Action

Roads have been restricted, stored, or decommissioned in the recent past due to lack of immediate need for vegetation management and for resource concerns such as watershed improvement and grizzly bear security (i.e., Core areas). This has resulted in the reduction in the number of roads available for public motorized travel during the hunting season and an improvement in elk security habitat. The exclusion of low to moderate severity fires through fire suppression has increased the amount of shade-tolerant species in the understory of these forested stands, resulting in increased fuel loadings in the form of ladder fuels and downed woody materials, while reducing the amount of natural openings that provide forage for elk. See the Forest Vegetation and Fuels Management sections for more detail.

No direct or indirect effects from federal actions would occur. The No Action Alternative would not result in a change in access management and the available security habitat for elk and would remain at 46, 34, and 36 percent in the Lower Yaak, O'Brien, and Sheep PSUs, respectively. Newly barriered or decommissioned roads that may currently provide non-motorized access into more remote areas would become vegetated and provide cover while reducing access within approximately 15 years.

With continued fire suppression and lack of active management, this alternative would continue to trend vegetation towards uncharacteristic conditions and increased potential for high severity fire behavior within the project area. Also, as trees continue to shade out the forest floor and encroach upon forage openings the acres of productive foraging habitat would decline over time. Forbs, grasses, and other forage species, where present, may be less vigorous and productive in shaded rather than more open environments.

The increased tree density and continuous fuel profile from the ground up to the main canopy makes the area more susceptible to high severity stand replacing fires (see the Fuels Management section). If severe wildfires occur, it is likely that openings much larger than 40 acres would be created as past stand-replacing fires occurred over thousands of acres within the project area. The amount of forage habitat would increase in these areas; however, it would not result in the vegetative diversity created with more frequent mixed severity fires (see the Forest Vegetation section) that would also provide areas of cover. Burned areas may become more visible and accessible immediately following the fires, especially if they are associated with open motorized routes. The project area has already experienced some of these large fire events within the past 20 years in the Arbo Creek, Studebaker/Kedzie Creek, Pulpit Mountain, and China Creek/Flagstaff Mountain areas.

Alternative 2 – Proposed Action

Project Design Features and Mitigation Measures

There are no design features or mitigation measures for elk security at this time.

Direct and Indirect Effects

Elk exhibit a negative association with open roads especially during the hunting season. Calculations of elk security based on the methods in Hillis et al. (1991), identify those areas located away from the effects open roads and associated human activities where greater security and reduced potential for elk mortality exist. Security habitat and impacts of proposed activities are discussed below. Table 184 displays the percent elk security habitat, by PSU, for the existing, during project, and post-project levels.

Table 184. Resource Indicators and Measures for Alternative 2[1]

PSU	Resource Element	Resource Indicator	Measure	Alt 2 (percent)	Change to Percent Security Habitat?
Lower Yaak	Security Habitat	Changes in the percent of NFS lands providing security habitat in the respective PSU.	Percent Security Habitat	46	No
O'Brien	Security Habitat	Changes in the percent of NFS lands providing security habitat in the respective PSU.	Percent Security Habitat	34	No
Sheep	Security Habitat	Changes in the percent of NFS lands providing security habitat in the respective PSU.	Percent Security Habitat	36	No

[1]The percent security habitat for Alternatives 3 and 4 are the same as Alternative 2.

Resource Indicator and Measure 1

Open motorized routes, primarily roads, and any changes to access management that influences this open route system has the greatest potential to impact elk security habitat. Roads utilized for proposed harvest, prescribed fire, and watershed improvement activities that are currently closed to public motorized use would remain so during and post-project implementation. There would be no increase in the availability of roads open to public motorized use during the hunting season. This includes existing gated and barriered roads, new construction to re-route portions of existing roads, and temporary roads. Therefore, use of these roads for project activities would have no direct or indirect effect on security habitat levels in the project PSUs. Similarly, the use of helicopters for prescribed burns planned in unroaded and/or more remote areas provides access for treatment while not increasing public access.

Effectiveness of Security Habitat

Vegetation Management

In order to provide conditions suitable for elk throughout the hunting season, security habitat must also provide other habitat requirements such as food and water to sustain them and encourage their continued use of these secure areas (Hillis et al. 1991). Fire suppression has impacted the vegetative component of security habitat for elk. Many areas are outside of historic conditions and in need of active restoration and fuels reduction. If proposed vegetation management trends conditions towards the desired conditions for vegetation and fire (FW-DC-VEG-01 through 06, FW-DC-VEG-10 and 11, and FW-DC-FIRE-03), then the vegetation component of elk security habitat would be nearer to what would have been present based on natural disturbance process and what elk evolved with locally. Stands would be resilient to large-scale disturbance and less likely to be lost to fire/insects/disease (USFS 2013).

Because the definition of security habitat includes “generally timbered stands,” proposed regeneration harvest that results in sparsely timbered stands could potentially reduce the effectiveness of security habitat within the treated area. Therefore, all harvest acres occurring within security habitat were considered for their effects to security habitat. This is a conservative effort as harvested stands would remain timbered to varying levels depending on the existing tree species composition and health as well as the retaining of existing shrub and hardwood species found within the stand. Harvest Units 18 and 20 are the only units located within security habitat at the top of Yaak Mountain. For Alternative 2, harvest of Unit 18 would reduce cover on approximately 40 acres off of NFSR 4407 in the Lower Yaak PSU. This would create a narrow unit of no more than 0.1 mile in width to the top of the ridge which then drops into timbered stands on a north facing slope with high canopy closure and little understory vegetation. Harvest of Units 18 and 20 would reduce cover on approximately 149 acres in the O’Brien PSU. These units are located approximately 5 miles uphill from the open road located at the bottom of Yaak Mountain. This would be a long trek by non-motorized means which would limit the number of hunters who would consider and attempt to access this area. In addition, the proposed treatment of these stands would trend towards the desired vegetative conditions for the project area related to desired species composition and structure. These stands would provide foraging habitat adjacent to a large area of cover found on the north side of Yaak Mountain. This would meet the intent of FW-DC-WL-16 which describes managing forage and cover habitat for native ungulates according to desired condition for vegetation (FW-DC-VEG-01, FW-DC-VEG-02, FW-DC-VEG-04, FW-DC-VEG-05, and FW-DC-VEG-11). There would be no measurable reduction to the effectiveness of elk security habitat due to proposed harvest. Proposed harvest is not located

within security habitat in the Sheep PSU and there would be no impact to the effectiveness of elk security habitat within the PSU.

The reintroduction of fire into ecosystems can aid in restoring habitat conditions and can be used to help to trend vegetation towards desired conditions (FW-DC-FIRE-03). Prescribed burning not associated with timber harvest would maintain more open conditions and habitat diversity as well as improve foraging opportunities within remote areas of security habitat which is desirable for elk and a variety of other wildlife species. Therefore, in more recent years, prescribed fire has been used as a management tool in areas that are inaccessible and/or undesirable for timber harvest to help restore fire's role on the landscape. Prescribed burns totaling approximately 1,605 acres are proposed. Of these acres, approximately 172 acres would occur within project area security habitat in prescribed burn Unit F1. Unit F1 would occur within an opened timbered stand where the goal of the mixed severity fire would be reduce tree encroachment and encourage forage production. Due to wildfire activity within the last 20 years or so much of the more open, higher elevation habitats that would have been considered for prescribed fire have already burned. Therefore, the remaining prescribed burn acres tend to be located within lower to mid elevation habitats in drier habitat types and more open conditions. These burns would also improve the palatability and enhance the quality of the forage produced on these acres. Although the availability of this forage may be somewhat limited due to their proximity to open roads during the hunting season, these units would still provide a mosaic of habitat conditions that elk could utilize when moving between security habitat blocks or outside of the hunting season.

Non-Motorized Access and Activities

Although proposed harvest is located along a gated road which could facilitate non-motorized access of the area, these stands are located approximately 5 miles uphill from the open road which would deter most hunters from accessing via non-motorized methods. Also, an increase in hunting pressure due to road hunting within the project PSUs along open roads adjacent to recently harvested units is not expected. Where available within the regeneration harvest units, retained trees would be grouped together in clumps of 4-12 or more trees especially in those areas with fewer, quality leave trees available and along open roads. This would continue to provide some small areas of cover for elk moving through the area as well as to break up the unit visually. Small conifer and shrubs would be expected to be on site within 5 years and provide cover within approximately 15 years. Also, topography of the project area would provide some cover due to the rolling/broken nature of the land in certain units. To re-emphasize, security habitat is not found within 0.5 mile of a motorized route open to public used during the hunting season. Elk use of this area close to the road is already limited and would not be expected to increase during or post-harvest because of this known avoidance. The potential for increased hunting success along open motorized roads is minimal and there would be no expected change to the elk population within the PSU.

System of Large Remote Areas

FW-DC-WL-02 states that a forestwide system of large remote areas would be available to accommodate species requiring large home ranges and low disturbances and these could function as security habitat for elk as well. Only prescribed fire would take place within the project area's IRAs and the backcountry management areas of MA5a and MA5c (see project file). No roads would be constructed into these areas and the proposed activities would not result in a change in the management of the existing non-motorized trail system. In addition, the grizzly bear 2011 Access Amendment is incorporated in the 2015 Forest Plan (FW-STD-WL-02) and

implementation of this standard would improve security habitat for not only grizzly bears, but for elk as well (see the Grizzly Bear analysis).

Conclusion

Existing security habitat levels would be maintained both during and post-project activities for Alternative 2 because there would be no change in access management. Therefore, guideline FW-GDL-WL-10 would be met in all PSUs. The project would remain neutral to objective FW-OBJ-WL-02 by maintaining the existing security habitat conditions. Where vegetation management treatments are proposed within security habitat the post-management improvement in the diversity, quantity, and quality of forage species would benefit elk in the long-term. Therefore, the proposed actions would meet the OLY project purpose and need to "Provide forage opportunities while maintaining wildlife security . . . through access management" within the OLY project's PSUs.

Alternative 3

As for Alternative 2, Alternative 3 does not propose any changes to access management and would not affect elk security habitat. The effects of vegetation management, non-motorized access, and the system of large remote areas and their influence on the effectiveness of security habitat would be the same as Alternative 2.

Alternative 4

As for Alternatives 2 and 3, Alternative 4 does not propose any changes to access management and would not affect elk security habitat. Expected effects from proposed harvest for Alternative 4 would be similar to Alternatives 2 and 3; however, fewer acres (approximately 77 acres located in security habitat) would be harvested as the total acres for Units 18 and 20 would be kept to 40 acres or less each. The effects to non-motorized access management and the system of large remote areas and its influence on security habitat would be the same as Alternatives 2 and 3.

Cumulative Effects

The Existing Condition section describes relevant past and present factors affecting security habitat for elk in the project area PSUs. This Cumulative Effects section summarizes the past actions as well as further describes ongoing and other reasonably foreseeable contributions potentially impacting elk security habitat.

Spatial and Temporal Context for Cumulative Effects Analysis

The spatial and temporal scales for cumulative effects analysis are the same as those described under the section "Spatial and Temporal Context for Effects Analysis." The PSU will continue to be used as the spatial scale of analysis. Temporally, there is potential for long-term effects for changes in road management (i.e., life of the road) compared to short-term effects associated with vegetation management as trees generally recover within a disturbed area within approximately 15 years.

Past, Present, and Reasonably Foreseeable Activities Relevant to Cumulative Effects Analysis

As for direct and indirect effects, the measure of effects associated with cumulative effects will be the percent elk security habitat in the PSU. Table 183 of this analysis summarizes the existing security habitat conditions within the PSUs. Harvest implemented by the Forest Service has

occurred in the project area since the 1930s and resulted in some variety of age classes and successional stages that provided forage and cover for elk. Roads constructed to facilitate harvest reduced security habitat as many also provided motorized access to the public. Detailed descriptions of previous vegetation and road management activities are found at the beginning of Chapter 3, including Table 32 and Table 33, as well as Appendix F of this document. Historically, natural disturbances such as wildfire resulted in a mosaic of habitats and forage conditions. In contrast, fire suppression since the early 1900s has altered stand structure, generally resulting in more homogenous stands with greater canopy closure which has in turn reduced forage production for elk on some sites.

Activities affecting elk security habitat have changed in recent years. Open motorized route densities have been reduced in the past several years as a result of restricting/reclaiming roads through decisions intended to facilitate grizzly bear recovery. This has increased security habitat within the project area for elk. Also, since the mid-1990s there has been more reliance on intermediate harvest which retains greater tree cover while thinning out the overstory and encouraging understory productivity. More recently, prescribed fire has been used as a management tool in more remote locations that are often difficult to access or undesirable for harvest. Prescribed fire is intended to restore fire's role on the landscape which would help maintain existing open conditions and habitat diversity as well as increasing foraging opportunities within secure habitat for elk.

Resource Indicator and Measure 1 – Alternatives 2, 3, and 4

Reasonably foreseeable actions include those federal, state, or private activities that are ongoing or scheduled to occur, independent of this federal action. Table 34, located at the beginning of Chapter 3, identifies those current and foreseeable actions in the project area that were determined to be appropriate for inclusion in the analysis of environmental effects. Past and ongoing federal actions have been considered and included when formulating the existing condition for this project area.

The primary activity that might impact elk security habitat, if not managed or mitigated, is motorized access management. This specifically concerns those routes open to public motorized use during the hunting season both on NFS lands and adjacent non-NFS lands and changes to this open route system will be the focus of analysis. Alternatives 2, 3, and 4 do not propose changes in access management. Because there are no direct or indirect effects to security habitat from changes to public motorized road use in the project, there would be no cumulative effects to elk security habitat from other activities that result in a change in access management within or immediately adjacent to the project PSUs.

A district wide thinning project of previously harvested units (Timber Stand Improvement 2010-2015) would occur within elk habitat. These units provided foraging habitat following harvest, but currently are or are becoming areas of cover with reduced foraging opportunities. Planned units would be accessed via open or restricted roads and possibly by foot; restricted road use would not exceed administrative levels. There would be no effect to elk security from a change in access management. Cumulatively, thinning would extend the life of the open areas within the treated stand and provide space for forb, grass, and shrub growth and productivity (foraging opportunities) for elk which would maintain the effectiveness of the security habitat block in which thinning activities occur.

The Rocky Pine Hazardous Fuels Reduction project is located adjacent to the OLY project area with activities occurring within the shared Lower Yaak PSU. The six harvest units and one

precommercial thin unit treated in this PSU are located off of open roads and do not affect security habitat. However, prescribed burn Unit B is located on south slopes in steep terrain above the Yaak River that provides both winter range and security habitat. The 298 acres burned within this unit would improve yearlong foraging conditions and cumulatively benefit the effectiveness of security habitat within this PSU.

With population growth and development, it is reasonable to assume that some corresponding increase in human use of NFS lands is likely to occur. Hunting activities are regulated by MFWP; however, the Forest Service influences hunter access on NFS lands through road management. Therefore, the relationship to this project to increased recreational use of the area centers on the potential for increased hunting access and pressure. Currently, one outfitter is permitted to operate with set service days for this area. Areas used by the outfitter and other hunters may change as roads currently impassable due to vegetative growth are cleared. However, access would continue to be by non-motorized means as no new roads would be opened for public motorized use and travel would likely be kept to these routes. Individuals that utilize a trail system for hunting are in the minority and impacts to elk security are minor compared to effects associated with open motorized routes. Levels of hunting pressure would not be expected to increase and exposure to humans in remote areas would remain low. Therefore, there would be no expected change to the availability or effectiveness of security habitat. Mortality risk and potential cumulative effects to elk security habitat would be negligible within the PSU.

Based on the nature and magnitude of potential cumulative effects to elk security habitat independent of this project, there are no cumulative effects anticipated that would change the effects determination to elk security habitat from implementation of the proposed alternatives.

Regulatory Framework Findings

2015 Forest Plan

The 2015 Forest Plan provides desired conditions, objectives, standards, and guidelines for elk security habitat within the Wildlife Resource. The following are applicable to the actions in this project:

Forestwide Direction

- p. 28, **FW-DC-WL-02**: A forestwide system of large remote areas is available to accommodate species requiring large home ranges and low disturbances.

  No road construction or use would occur within MA5a, MA5c, or IRAs nor would there be any increase in the current access management of open motorized routes found within the project area PSUs; therefore, there would be no impacts to the large remote areas that would help provide security habitat for elk (see the “Direct and Indirect Effects” discussion and Table 184). Therefore, the OLY project would contribute to progress toward achieving FW-DC-WL-02.

- p. 30, **FW-DC-WL-16**: Habitat for native ungulates is managed in coordination with state agencies. Cover and forage are managed according to FW-DC-VEG-01, FW-DC-VEG-02, FW-DC-VEG-04, FW-DC-VEG-05, and FW-DC-VEG-11.

  The proposed timber harvest and prescribed fire (FW-DC-FIRE-03) treatments would result in a trend towards the desired vegetative condition and better represent stand patch

size, structure (including a diversity of cover and openings with early seral conditions that provide forage opportunities), and species composition based on historic conditions and consistent with what elk evolved with in this area (See Forest Vegetation analysis and the "Direct and Indirect Effects" discussion). Therefore, the OLY project would contribute to progress toward achieving FW-DC-WL-16.

- p. 30, **FW-OBJ-WL-02, Elk**: Over the life of the Plan, increase by 1 each the number of planning subunits that provide at least 30 percent elk security and the number of high emphasis planning subunits that provide at least 50 percent elk security.

  The existing security habitat levels for each PSU would be maintained throughout the project (see Table 184). Therefore, the OLY project would not prevent the attainment of FW-OBJ-WL-02.

- p. 32, **FW-GDL-WL-10, Elk**: Management activities in PSUs should maintain existing levels of elk security with improvements made, where possible, in high and medium emphasis PSUs.

  All alternatives would maintain the existing level of elk security habitat with the Lower Yaak, O'Brien, and Sheep PSUs (see Table 184) which are better than the minimum desired level. Therefore, the OLY project was designed in accordance to this guideline.

- Pg. 62, **MA5a,b,c-DC-WL-01 (Backcountry)**: Retention of remote large areas with little human disturbance to provide habitat and contribute to wildlife movement within and across the Forest as well as provide foraging, security, denning, and nesting habitat for wildlife.

  See FW-DC-WL-02 above. Therefore, the OLY project would contribute to progress toward achieving this desired condition.

Other Guidance or Recommendations

Hillis et al. (1991)

Recommendation from Hillis et al. (1991) provided the basis for development of the 2015 Forest Plan guideline FW-GDL-WL-10 and objective FW-OBJ-WL-02. In addition to open motorized roads, Hillis et al. (1991) also recommends considering other factors such as non-motorized access and activities, the location of closed roads, spatial distribution of forage and cover, and topography which can also influence the effectiveness of security habitat within an analysis area. These recommendations were considered and were used in evaluating the effectiveness of security habitat in relation to the proposed activities for each alternative.

Montana Statewide Elk Management Plan

The Montana Statewide Elk Management Plan (MFWP 2004b) was developed to provide goals, objectives, and management strategies to guide management within each Elk Management Unit. The proposed project is consistent with these recommendations by maintaining existing levels of security habitat within the project PSUs and trending vegetative conditions towards those historically used by elk within the PSU which increases forage opportunities in both security and other habitats that may be used throughout the year.

Summary

The No Action Alternative would maintain existing levels of security habitat because there would be no change to current access management. However, succession due to fire suppression and past management practices are resulting in a more homogenous environment with higher forested cover than what would have occurred under a low or periodic mixed severity fire regime. As trees continue to encroach upon forage openings, the acres of productive foraging habitat would continue to decline over time which would reduce the effectiveness of security habitat and movement areas between blocks of security habitat.

For Alternatives 2, 3, and 4, gated or barriered roads used for timber harvest, prescribed fire, or watershed improvement work would not be open to public motorized use and the existing security habitat levels would be maintained during and post-project implementation within each PSU. These alternatives would meet FW-GDL-WL-10 and remain neutral to FW-OBJ-WL-02 which are specific to elk security habitat. These alternatives would trend the local vegetation towards the desired conditions for the habitat type and improve foraging opportunities within the project area with the greatest benefit from those treatments occurring within security habitat. This would improve the effectiveness of security habitat by providing necessary forage that would encourage elk to stay within security habitat during the hunting season (Hillis et al. 1991) rather than venturing into less secure areas to find forage. Based on the elk analysis of security habitat and the Forest's wildlife analysis (Anderson 2014), OLY's proposed management actions which address the objective and guideline for elk security and direction for large remote areas (e.g., MAs) and trends towards the desired conditions for vegetation, would maintain effective security habitat beneficial to the local elk population in the Lower Yaak, O'Brien, and Sheep PSUs.

Degree to Which the Purpose and Need for Action is Met

A purpose and need of the OLY project is to "Maintain areas of secure habitat through access management." None of the alternatives propose changes to the current access management and would maintain the existing elk security habitat levels (see Table 185). Therefore, all alternatives would meet this purpose and need.

Table 185. Summary Comparison of How the Alternatives Address the Purpose and Need

Purpose and Need	Indicator/Measure	PSU	Alt 1	Alt 2	Alt 3	Alt 4
Provide forage opportunities while maintain wildlife security.	Security Habitat (%)	Lower Yaak	46	46	46	46
Provide forage opportunities while maintain wildlife security.	Security Habitat (%)	O'Brien	34	34	34	34
Provide forage opportunities while maintain wildlife security.	Security Habitat (%)	Sheep	36	36	36	36

Other Agencies and Individuals Consulted

Tonya Chilton-Radandt, MFWP Libby Area Biologist

Communications consisted of discussing the elements to consider when evaluating the effectiveness of elk security habitat in areas with limited cover (e.g., slow tree recovery following a high severity fire), but farther than 0.5 mile from an open road and discussed the use of topographical features that can influence non-motorized accessibility.

Migratory Birds

Introduction

Migratory birds have been recognized for their ecological (biological diversity) and economic (e.g., bird watching and hunting) value. In recognition of these values, Executive Order #13186 (Clinton 2001) was issued in furtherance of the purposes of the Migratory Bird Treaty Act of 1918, the Bald and Golden Eagle Protection Act, the Fish and Wildlife Coordination Act, ESA, and the National Environmental Policy Act (i.e., NEPA). This order requires that each Federal agency develop a Memorandum of Understanding that promotes the conservation of migratory bird populations. This includes evaluating the effects of federal actions on migratory birds as part of the environmental analysis process (i.e., NEPA).

A Memorandum of Understanding was later signed between the Forest Service and USFWS (USFS and USFWS 2008) which outlines the responsibilities for both parties regarding migratory birds. This includes the Forest Service's consideration of migratory birds in NEPA projects and as well as guidance for developing effects analyses. The purpose of the Memorandum of Understanding "is to strengthen migratory bird conservation by identifying and implementing strategies that promote conservation and avoid or minimize adverse impacts on migratory birds."

Neotropical migratory birds are those bird species that migrate to more northerly latitudes to breed on the KNF each spring. Come fall, these species migrate south to spend the winter months. Of the approximately 205 bird species known to occur on the Forest as breeders, migrants, winter visitors, or transients, about 70 species could be classified as Neotropical migratory land birds (Bratkovich 2007). A wide range of habitat preferences exist from open environments (e.g. grassland communities) to a variety of forest habitat types. A mosaic of habitat types that reflect the historic range of vegetation communities and seral stages would provide for the greatest diversity of migratory species. Therefore, proposed vegetation management that trends towards the desired condition for the habitat and vegetation types, based on the historic range of variation, and promotes the retention and development of structural attributes is a main focus of the migratory bird analysis. Activities that would result in the loss of habitat for migratory birds would also be discussed.

Summary of Conclusions

Implementation of timber and fuels treatments would create a mosaic of successional habitat types within the treated areas. The resulting mosaic would more closely reflect the historic range of vegetative conditions found in the project area, therefore providing more opportunities for the diversity of migratory bird species historically found here. Implementation of proposed activities may result in short-term effects to individuals utilizing the existing habitat condition but **would not be expected to result in a measurable change to a species' population** within the project area.

Regulatory Framework

The NFMA directs the Forest Service to "provide for diversity of plant and animal communities based on the suitability and capability of the specific land area in order to meet overall multiple-use objectives" [16 U.S.C. 1604(g) (3) (B)]. The vegetation management approach in the 2015 Forest Plan is one that provides for ecosystem diversity by providing the ecological components, patterns, and processes at multiple scales on the landscape, and thereby provides the full spectrum of habitats and conditions needed for all of the biological organisms associated with the various

ecosystems (USFS 2013). The 2015 Forest Plan has a desired condition to provide productive plant communities, with a mosaic of successional states, structures, and species, for migratory landbirds to support nesting activities or use during migration (FW-DC-WL-09). There are several other desired conditions related to the management of migratory bird habitats as described below and in the "Regulatory Framework Findings" section.

2015 Forest Plan

The 2015 Forest Plan provides overall guidance for the management of the lands on the KNF. It describes the goals, desired conditions, and objectives toward which the management of the land should be directed. And it establishes standards and guidelines to help achieve or maintain the desired condition or conditions, to avoid or mitigate undesirable effects, or to meet applicable legal requirements.

The plan components which provide specific migratory bird resource direction relevant to this project include:

- FW-DC-WL-09
- FW-DC-WL-19
- FW-OBJ-WL-03

There are other 2015 Forest Plan components that provide resource direction for a range of wildlife species or habitat conditions that are not specific to migratory birds, but still are applicable to the management of migratory bird habitat. The full list of the plan components applicable to migratory bird habitat management are found in the "Regulatory Framework Findings" section of this analysis.

Resource Indicators and Measures

For the migratory bird analysis, the primary resource indicator will be the acres of vegetation management that trend vegetation towards the desired conditions addressed by habitat type (see Table 186). This reflects the changes to the amount of early seral and open forest habitats and tree species composition. A second resource measure is the reduction of habitat due to infrastructure development. The overall assessment of migratory bird habitat also considers effects to the retention and development of structural attributes of forested habitat, including large trees and snags, coarse woody debris, and old growth characteristics and the potential for disturbance and displacement to individuals.

Table 186. Resource Indicators and Measures for Assessing Effects

Resource Element	Resource Indicator	Measure	Used to Address: P/N*, or Key Issue?	Source
Forest Structure	Changes to early successional habitat or the maintenance of open forest conditions resulting from timber harvest and fuels treatments	Acres treated that result in open forest conditions or early seral habitats	Purpose and Need	2015 Forest Plan FW-DC-WL-19

Resource Element	Resource Indicator	Measure	Used to Address: P/N*, or Key Issue?	Source
Infrastructure Development	Proposed construction or other land conversion	Acres lost to development; potential impacts to habitat use?	No	Executive Order #13186; Migratory Bird Treaty Act; Bald and Golden Eagle Protection Act

*P/N = Purpose and Need

Methodology

Habitat types used by migratory birds, based on Partners in Flight priority habitats, were identified through the use of GIS spatial data. This includes FS Veg spatial data that identifies existing vegetation or non-vegetation types, fire history, stream location and size, and riparian habitat based on RHCAs. The location of proposed units with respect to these habitat types was identified and the acres of vegetation management treatments were calculated for each action alternative. Also, consideration of effects to the structural attributes of migratory bird habitat relies on the other habitat analyses in this document (i.e., Forest Vegetation and Old Growth).

Data Sources

Migratory bird ecology, biology, habitat description and relationships identified by research are described in Franzreb and Ohmart 1978, Hagar et al. 1996, McWethy et al. 2010, Siegel and DeSante 2003, and Tobalske et al. 1991. That information is incorporated by reference.

Assumptions and Limitations

There are no assumptions or limitations associated with this resource analysis.

Affected Environment

Spatial and Temporal Context for Effects Analysis

The analysis boundary for direct project impacts to individuals and their habitat is the proposed activity areas, as activities and alteration of the habitat would affect suitability for different species. Also, activities could result in disturbance, displacement, loss of habitat, and possibly mortality to individual birds currently utilizing the stands. The boundary for indirect effects is the OLY project area as alteration of habitat could affect the use of available habitats within the surrounding area.

Temporal boundaries for the migratory bird analysis include both short-term and long-term effects. Consideration of short- and long-term effects depends on the migratory species in question, their preferred vegetation type and condition, and whether the proposed treatments results in a change to the habitat and therefore migratory bird species use. Short-term effects are those that are expected to last between a few days to a season or portion of two seasons. Generally, once disturbance causing activities like prescribed burns and harvest have been completed birds can move back into and use the area. Long-term effects are those that expected to last longer than a season or two. For example, vegetation management that reduces the tree cover would encourage the development and growth of the remaining trees over many years. Also following harvest, especially regeneration harvest, it is expected that early seral and/or open

habitats would be available for up to approximately 15 years. The benefits of such treatments for migratory birds associated with these habitats would last longer if maintenance activities such as thinning and fire (natural or prescribed) are continued within the treated stand. Conversely, those species associated with dense forest habitats would not be expected to use these stands for as long as the stands remain in an open condition. Long-term effects could also include the loss of habitat due to land development.

Existing Condition

A report issued by several organizations and Federal agencies summarized the general condition of birds across the United States (NABCI 2009, 2011). It painted a picture of declines in multiple species across a variety of habitats. Climate change was one of the contributing factors to these declines and is likely to continue impacting birds into the future. As the climate warms, breeding seasons and migrations are being altered. These activities may become out of sync with prey abundance and climate change may also impact where and when those food items are available. This reinforces the need to have resilient habitat that is better able to handle climate change.

In 2008, the USFWS released a report titled "Birds of Conservation Concern" in which they listed species of concern by Bird Conservation Regions (BCR) (USFWS 2008b). That report helps focus conservation efforts on the species that need it. The KNF lies within BCR 10 (Northern Rockies). Listed below in Table 187 are the species of concern for BCR 10, not all of which are found on the KNF.

Table 187. Listed are the Birds of Conservation Concern for the BCR that Overlaps the Kootenai National Forest (BCR 10 = Northern Rockies)

Common Name	Scientific Name	Is the KNF w/in the Species' Range?*
Bald Eagle	*Haliaeetus leucocephalus*	Y
Black Rosy-Finch	*Leucosticte atrata*	N
Black Swift	*Cypseloides niger*	Y
Brewer's Sparrow	*Spizella breweri*	Y
Calliope Hummingbird	*Stellula calliope*	Y
Cassin's Finch	*Carpodacus cassinii*	Y
Ferruginous Hawk (nb)	*Buteo regalis*	Y
Flammulated Owl	*Otus flammeolus*	Y
Lewis's Woodpecker	*Melanerpes lewis*	Y
Loggerhead Shrike (nb)	*Lanius ludovicianus*	Y
Long-Billed Curlew	*Numenius americanus*	Y
McCown's Longspur	*Calcarius mccownii*	N
Olive-Sided Flycatcher	*Contopus cooperi*	Y
Peregrine Falcon	*Falco peregrinus*	Y
Sage Sparrow	*Amphispiza belli*	N
Sage Thrasher	*Oreoscoptes montanus*	N

Common Name	Scientific Name	Is the KNF w/in the Species' Range?*
Swainson's Hawk	*Buteo swainsoni*	Y
Upland Sandpiper	*Bartramia longicauda*	Y
White-Headed Woodpecker	*Picoides albolarvatus*	Y
Williamson's Sapsucker	*Sphyrapicus thyroideus*	Y
Willow Flycatcher	*Empidonax traillii*	Y
Yellow-Billed Cuckoo	*Coccyzus americanus*	N

nb = non-breeding

*Range information from KIPZ MIS Process and AMS Technical Report in the project record. Range includes accidental, migratory, or transient occurrences.

Some of these birds are additionally addressed and/or analyzed elsewhere in this document: bald eagle, flammulated owl, and peregrine falcon.

The KNF is within the Partners in Flight Montana Conservation Plan (PIF 2000a). These conservation strategies are recommendations to use in management but they are not binding requirements. However, they provide a way to categorize and analyze important migratory bird habitat and species. The use of these plans supports the goal of maintaining long-term sustainability of migratory bird species and their habitats as specified by the Executive Order and Migratory Bird Treaty Act. The priority habitats and species are listed below in Table 188.

Table 188. Partners in Flight Priority Habitats/Species for Montana (PIF 2000a)

Habitat	Species	Priority Level	Is the Forest w/in the Range of Species?*
Grassland			
Mixed Grass Prairie	Mountain Plover	I	N
	Burrowing owl	I	Y
	Sprague's Pipit	I	N
	Baird's Sparrow	I	Y
	Ferruginous Hawk	II	Y
	Long-billed Curlew	II	Y
	Lark Bunting	II	Y
	Grasshopper Sparrow	II	Y
	McCown's Longspur	II	N
	Chestnut-Collared Longspur	II	N
	Northern Harrier	III	Y
	Short-Eared Owl	III	Y
	Bobolink	III	Y

Habitat	Species	Priority Level	Is the Forest w/in the Range of Species?*
Intermountain Grasslands	Columbian Sharp-Tailed Grouse	II	Y
Shrubland			
Sagebrush Shrubsteppe	Sage Grouse	I	N
	Loggerhead Shrike	II	Y
	Brewer's Sparrow	II	Y
	Sage Thrasher	III	N
	Lark Sparrow	III	Y
Montane Shrubland	Calliope Hummingbird	II	Y
	Nashville Warbler	III	Y
	MacGillivray's Warbler	III	Y
	Lazuli Bunting	II	Y
	Common Poorwill	III	N
	Green-Tailed Towhee	III	N
	Clay-Colored Sparrow	III	Y
Forest			
Dry Forest	Flammulated Owl	I	Y
	Lewis's Woodpecker	II	Y
	Blue Grouse	III	Y
	Chipping Sparrow	III	Y
	Cassin's Finch	III	Y
	Red Crossbill	III	Y
Cedar/Hemlock	Brown Creeper	I	Y
	Vaux's Swift	II	Y
	Winter Wren	II	Y
	Chestnut-Backed Chickadee	III	Y
	Golden-Crowned Kinglet	III	Y
	Varied Thrush	III	Y
Burned Forest	Black-Backed Woodpecker	I	Y
	Olive-Sided Flycatcher	I	Y
	Three-Toed Woodpecker	II	Y
	Townsend's Solitaire	III	Y
Moist Douglas-Fir/Grand Fir	Northern Goshawk	II	Y

Habitat	Species	Priority Level	Is the Forest w/in the Range of Species?*
	Williamson's Sapsucker	II	Y
	Sharp-Shinned Hawk	III	Y
	Pileated Woodpecker	II	Y
	Plumbeous/Cassin's Vireos	III	N/Y
	Townsend's Warbler	III	Y
Whitebark Pine	Clark's Nutcracker	III	Y
Aspen	Ruffed Grouse	II	Y
	Red-Naped Sapsucker	II	Y
	Ovenbird	III	Y
Wet Subalpine Fir (Spruce/Fir)	Great Gray Owl	III	Y
	Boreal Owl	III	Y
Limber Pine/Juniper	N/A		
Dry Subalpine Fir / Lodgepole Pine	N/A		
Riparian			
Riparian Deciduous Forest (Cottonwood/Aspen)	Interior Least Tern	I	N
	Barrow's Goldeneye	II	Y
	Hooded Merganser	II	Y
	Bald Eagle	II	Y
	Black-Billed Cuckoo	II	N
	Yellow-Billed Cuckoo	II	N
	Red-Headed Woodpecker	II	N
	Cordilleran Flycatcher	II	Y
	Veery	II	Y
	Red-Eyed Vireo	II	Y
	Killdeer	III	Y
	Eastern Screech Owl	III	N
	Western Screech Owl	III	Y
	Downy Woodpecker	III	Y
	Least Flycatcher	III	Y
	American Redstart	III	Y
	MacGillivray's Warbler	III	Y
	Orchard Oriole	III	Y

Habitat	Species	Priority Level	Is the Forest w/in the Range of Species?*
Riparian Shrub	Willow Flycatcher	II	Y
	Rufous Hummingbird	III	Y
	Gray Catbird	III	Y
	Warbling Vireo	III	Y
	Song Sparrow	III	Y
Hardwood Draws	Swainson's Hawk	III	Y
Riparian Coniferous Forest	Harlequin Duck	I	Y
	Hammond's Flycatcher	II	Y
	American Dipper	III	Y
Wetlands			
Prairie Pothole	Piping Plover	I	N
	Horned Grebe	II	Y
	White-Faced Ibis	II	Y
	Marbled Godwit	II	Y
	Franklin's Gull	II	Y
	Forster's Tern	II	Y
	Black Tern	II	Y
	Clark's Grebe	III	N
	Black-Crowned Night Heron	III	N
	Black-Necked Stilt	III	Y
	Willet	III	N
	Wilson's Phalarope	III	Y
	LeConte's Sparrow	III	Y
	Nelson's Sharp-Tailed Sparrow	III	N
Intermountain Valley Wetlands	Common Loon	I	Y
	Trumpeter Swan	I	N
	Common Tern	II	Y
	American bittern	III	Y
	Yellow-Headed Blackbird	III	Y
Irrigation Reservoirs >640 acres	Caspian Tern	II	Y
	American White Pelican	III	Y

Habitat	Species	Priority Level	Is the Forest w/in the Range of Species?*
Irrigation Reservoirs <640 acres	Transient Shorebirds	II	Y
High Elevation Wetlands	N/A		
Unique Habitats			
	Peregrine Falcon	II	Y
	Black Swift	II	Y
	Black Rosy Finch	II	N
	White-Tailed Ptarmigan	III	Y
	Chimney Swift	III	N
	Red-Winged Blackbird	III	Y
	Brewer's Blackbird	III	Y

*KIPZ MIS Process and AMS Technical Report in the project record. Includes accidental, migratory, or transient occurrences.

Most of the habitats found on the KNF host one or more species of migratory birds. Generally speaking the birds arrive in the spring to set up territories for breeding purposes. Young are raised and fledged by mid-summer. Most species leave the Forest by mid- to late summer. The habitat requirements of the species listed above, as well as range information, can be found online at NatureServe Explorer's database: http://www.natureserve.org/explorer/index.htm. Population estimates can be found on the Partners in Flight online database: http://rmbo.org/pif_db/laped/. Some of these birds are additionally addressed and/or analyzed elsewhere in the document: bald eagle, black-backed woodpecker, common loon, flammulated owl, harlequin duck, and peregrine falcon.

The following table displays the dominant vegetation types on NFS lands in the project area. There is some overlap in categories, and therefore some double-counting. For example, some acres counted as "riparian" would also be counted under the other forested vegetation types. In general, specific tree species were placed in only one category. Douglas-fir is the exception and was separated into dry and wet forested types. Tree species may also be found in several other forest types. For example, aspen is displayed as a separate category, although aspen can be found in smaller quantities scattered throughout the other forested types.

As can be seen in Table 189, the predominant habitat type within the OLY project area is forest habitat which includes a variety of vegetation types with a range of contribution of each to the total. The amount of burned forest habitat would vary over-time depending on the severity and size of wildfires as well as the time since the disturbance. Currently, there is little burned forest habitat in the project area, although large fires have occurred in the project area in the past. Except for waters, other non-timbered or non-vegetation habitat types have a low occurrence within the project area.

Table 189. Dominant Vegetation Type for NFS Lands in the Project Area

Dominant Vegetation Type[1]	Estimated Acres of the Analysis Area	Estimated Percent of Analysis Area
Dry Forest (Ponderosa Pine / Douglas-Fir)	10,217	19
Lodgepole Pine	5,071	9
Cedar / Western Hemlock	6,650	12
Subalpine Fir (Spruce/Fir)	12,547	23
Moist Grand Fir	3,467	6
Aspen/Birch/Cottonwood	79	<1
Miscellaneous Forest (Alpine Larch, Mountain Hemlock, Western Larch, White Pine, Moist Douglas-Fir, Intolerant Mix)	15,179	28
Whitebark Pine	0	0
Waterbodies (Lakes, Ponds, Reservoirs, Marsh, Swamp, River, Stream)	922	2
Riparian (2015 Forest Plan direction)	7,392	14
Grassland	0	0
Shrubland[2]	656	1
Burned Forest[3]	52	<1
Non-Vegetated	198	<1

[1] Based on TSMRS and Biophsyical Setting, and organized to approximate the PIF priority habitats. Percentages and acreages do not tally to 100 percent due to rounding and overlap between some of the categories leading to double-counting.

[2] Shrubland includes timbered stands that were treated with regeneration harvest within the past 15 years and are currently providing shrub habitat.

[3] Recently burned, unharvested acres based on 2007-2015 fires. For species such as the black-backed woodpecker, recently burned forests are the most suitable habitat.

Environmental Consequences

Alternative 1 – No Action

A range of fire severity, from non-lethal to stand replacing crown fires, historically played a role in developing the vegetative characteristics in the OLY project area. Although the type and frequency of fire experienced varies within a given area and vegetation type (based on biophysical setting), with some being more prone to infrequent stand replacing fire, the vegetation types within the project area have historically experienced low and/or mixed severity fires at least periodically. These natural disturbance regimes favor fire tolerant species, including older and larger diameter seral tree species such as western larch, western white pine, and ponderosa pine. The exclusion of low to moderate severity fires through fire suppression has altered the amount of shade-tolerant species in the understory of these forested stands as well as increased fuel loadings in the form of ladder fuels and downed woody materials. Fewer fires have also reduced the amount of natural openings, structural diversity, and the number/size of patches

across the landscape. Fire suppression has not yet resulted in a departure from historic ranges for all stands within the project area (especially those with naturally longer fire return intervals), although they too are trending towards a departure. Due to the denser fuel conditions, resulting stand replacing fires in these stands often kill many of the overstory trees which historically survived mixed-severity wildfires. Past vegetation management practices that targeted these old, large trees removed the relic seral species and further altered tree size and composition; this in turn has promoted the development of climax species and conditions. This has also influenced the persistence of root disease in now Douglas-fir dominated stands as species such as western larch and ponderosa pine are more resistant to these diseases. Planting of non-native ponderosa pine before breeding zones were understood has resulted in unhealthy stands that are not adapted to the local growing conditions. In addition, the close proximity to Troy, MT influenced the removal of valuable western larch, western white pine, and ponderosa pine trees and snags in the lower elevation sites that supported local development and supplies (e.g., firewood). In general, the resultant stand patch sizes and occurrence, species composition, stand structure, and fire frequency and severity are departing from desired vegetative conditions based on historic range of variability within the project area. See the Fuels and Vegetation sections for more detail.

No direct effects from federal actions would occur. The existing condition has fewer remnant seral tree species, fewer acres consisting of seedling/sapling size classes, denser stands, and smaller patch size due to past timber harvest practices and fire suppression. Although these conditions may favor some species of migratory birds, it does not favor others that prefer more open or edge habitats that would have occurred more commonly historically. Flammulated owls are an example of a species that would have had more suitable habitat historically. This species prefers stands with large diameter woody material, especially ponderosa pine. Ponderosa pine is a seral species that was preferentially selected for in past harvests and, without natural vegetation disturbances such as wildfire, its presence and size is being further reduced through succession. Compared to historic conditions, stands would continue to provide less favorable habitat for this species as this successional trend continues without treatment under this alternative. A higher risk of a high severity wildfire would continue as well (see the Forest Vegetation and Fuels Management sections). A large, high severity wildfire would remove habitat for many species, although in the short-term it would favor those species that prefer open, early successional-stage habitats such as black-backed woodpeckers.

Alternatives 2, 3, and 4 – Direct and Indirect Effects

Responses of migrant birds to timber harvest and burning (prescribed or wildfire) depends upon their individual habitat preferences and needs. Regeneration harvest removes forest cover used by some species (e.g., brown creeper, golden-crowned kinglet, hermit thrush) and at the same time creates grass, forbs, and shrub habitat used by other bird species (e.g., American kestrel, calliope hummingbird, chipping sparrow). This activity also produces “edge” habitat that still other bird species use (e.g., dark-eyed junco, western tanager, Townsend’s warbler). Partial cutting treatments creates habitat similar to forested edge and edge associated species are often found in these stands. Therefore, this management practice may provide additional habitat for these species (Hutto and Young 1999).

The planned ignitions (prescribed and ecosystem burns) on a minimum of about 1,646 acres would move stands towards the vegetation desired conditions and contribute to habitat for olive-sided flycatchers, hairy woodpeckers, chipping sparrows, and Hammond’s and dusky flycatchers (FW-OBJ-WL-03). Movement towards vegetation desired conditions would provide sufficient and suitable habitat and populations of Neotropical migratory land birds. Forestwide monitoring

of the landbird assemblage (insectivores) will be used to evaluate population trends related to movement towards the coarse filter, vegetation desired conditions over time.

Project Design Features and Mitigation Measures

There are no design features or mitigation measures for migratory birds at this time.

Direct and Indirect Effects

In the short-term, timber harvest and fuels reduction treatments would directly influence bird community density through disturbance and alteration of stand composition and structure or indirectly through loss of nesting, foraging, or roosting habitat; affects to nest site suitability, availability, prey abundance, predator success; forage quality; and plant vigor. Some species would benefit from this habitat alteration while others would not. Some impacts may only be short-term. Overall, the long-term sustainability of the habitat would be increased by managing towards characteristic vegetation patterns, species composition, structure, patch size, and fuel loading as this would result in productive plant communities with a mosaic of habitat types and conditions for migratory bird use across the Forest (FW-DC-WL-09).

Foraging and nesting methods play a role in the type of habitat used (Siegel and DeSante 2003, Hagar et al. 2006, Tobalske et al. 1991, Franzreb and Ohmart 1978) and indicate the expected effects of harvest and fuels treatments. Shrub/ground nesting, aerial/ground foragers, and edge species (ibid) would potentially benefit from harvest and conifer fuels reduction, while other species that require conifer species or prefer denser stand conditions would lose habitat as a result of this project. Presence of shrubs in the understory appears to be an important component of bird density. Bird abundance for several species was associated with shrub cover in Douglas-fir stands of Western Oregon (Hagar et al. 1996) and difference in abundance was most extreme following thinning among shrub-nesting species in Sierran mixed conifer stands (Siegel and DeSante 2003). In productive Northwest forests, bird species abundance and richness was significantly higher in recently disturbed stands that resulted in rapid recovery of non-coniferous understory vegetation. As these stands mature and are replaced by conifer seedlings, bird species abundance would decrease over time (McWethy et al. 2010).

The following discussion first addresses the types of activities and potential effects occurring in the applicable priority habitat types displayed in Table 188 above. All proposed vegetation management would occur within the forest habitat type; treated acres are displayed by activity type for each alternative in Table 190 below. The analysis also discusses structural attributes that are beneficial to migratory birds which can be found within the variety of forest vegetation types.

Table 190. Resource Indicators and Measures for Alternatives 2, 3 and 4 by Treatment Type

Resource Element	Measure	Treatment Type	Alt 2 (acres)	Alt 3 (acres)	Alt 4 (acres)
Forest Structure	Acres treated that result in open forest conditions or early seral habitats	Intermediate Harvest	1,011	1,008	1,037
		Regeneration Harvest	2,116	2,061	1,569

Resource Element	Measure	Treatment Type	Alt 2 (acres)	Alt 3 (acres)	Alt 4 (acres)
		Prescribed Fire	1,605	1,616	1,620
		Non-Harvest Fuels Treatments	111	128	111
		All Treatments Total	**4,843**	**4,813**	**4,337**
Infrastructure Development	Acres lost to development; potential impacts to habitat use?	0	0	0	0

Forest Habitat

Proposed vegetation management would occur within the forest habitat type. This broad habitat type includes a range of dominant vegetation types from dry forest (i.e., ponderosa pine and Douglas-fir), to moist cedar/western hemlock, to post-fire burned forests. The development of infrastructure is not proposed with this project; therefore, there would be no loss of habitat associated with this type of activity.

Harvest

Harvest is proposed within two general vegetation types: wetter vegetation types dominated by western red cedar/western hemlock and some grand fir and drier vegetation types dominated by Douglas-fir and some ponderosa pine. Within the wetter vegetation types, the stands proposed for treatment have high canopy closure and contain little to no ground, shrub, or small conifer cover in the understory. Without disturbance processes such as wildfire, these stands have become dominated by shade intolerant species and are lacking in early seral species such as western larch and white pine. With forest succession, there is a transition in the migratory bird community from those species adapted to early seral and open habitat conditions to those that prefer dense forest conditions. The regeneration harvest that would occur within this vegetation type would, in general, remove most trees except the existing healthy early seral species. This would result in an early seral community, both in structure and species composition.

In the drier habitat types, both intermediate and regeneration harvest is proposed depending on the existing health of the stand. Regeneration harvest would occur in Douglas-fir dominated stands experiencing mortality due to root disease or in unhealthy ponderosa pine plantations that were planted with pine from outside of the local area. These pines are not adapted to the local conditions and have experienced poor growth and productivity over the years. Although these unhealthy stands generally provide open grown timber conditions and an understory shrub and grass community, their current condition (e.g., lack of growth and mortality) would not allow for development of large trees and snags which are desired vegetative conditions of the 2015 Forest Plan (see Forest Vegetation section). Intermediate harvest would occur in healthy stands where the desired species composition and structure is available. The goal of treatment within these stands would be to maintain these desired conditions and encourage continued tree growth, understory vegetation diversity, and stand health.

All action alternatives would result in a trend towards these desired conditions. However, Alternatives 2 and 3 would result in a greater change than Alternative 4 associated with proposed

harvest. Alternative 2 proposes the most harvest within the OLY project area at approximately 3,127 acres including 2,116 acres of regeneration harvest. Alternative 3 proposes slightly fewer total acres of harvest (approximately 58 acres) with most of the difference due to a reduction in the amount of regeneration harvest. Alternative 4 would treat the fewest acres at approximately 2,606 acres. Again, the difference in acres compared to Alternative 2 is due to a reduction of the amount of regeneration harvest (approximately 1,569 acres). See Table 190.

Alternatives 2 and 3 propose 32 and 30 regeneration harvest units, respectively, that would create openings greater than 40 acres in size, either on their own or in combination with an adjacent unit. Tree species composition and health is variable among and/or within stands and although categorized as regeneration harvest, a range of overstory structure and canopy cover would be retained where available. Post-harvest retention would range from few trees per acre to portions resembling an intermediate harvest. In all units, where feasible, retained trees would be grouped together in clumps of 4-12 or more trees especially in those areas with fewer, quality leave trees available and along open roads. This is intended to better protect the leave trees as well as provide small areas of forested habitat for wildlife use, including use by migratory birds. Also, the establishment of forbs, shrubs, and conifers within a few years following harvest would provide habitat to those species that use open forest or shrub/grass dominated communities. These large patch sizes and shape mimic natural disturbance processes like wildfire and allow greater flexibility to work around and maintain features like hardwood patches, wet areas, or patches of leave trees, where available, that would increase within stand diversity in the greater cut area boundary. Also, edge habitat would be created along the boundary of the units. Larger unit boundaries are adjacent to different types of habitat (e.g., RHCAs which were excluded from units, past harvested areas, unharvested areas, and old growth) resulting in different combinations of forested and more open habitats. This all would result in the creation of a mosaic of habitat types and vegetation types that would provide for a diversity of migratory species. Also, the larger areas provide more interior habitat as well as greater amount of edge for migratory species adapted to these habitat conditions compared to Alternative 4 which would keep the opening size to 40 acres or less.

Treating the proposed stands would meet a purpose and need of the project and address desired vegetative conditions. In addition, the proposed treatments would improve the conditions of the stands in the long-term for species that utilize open forest and early seral habitats (FW-DC-WL-19) within both moist (e.g., chipping sparrows) and dry (e.g., flammulated owls) forest types.

Prescribed Fire

Post-harvest underburning would help prep the site for tree establishment as well as stimulate the growth and productivity of understory vegetation. It also could result in the creation of snags that would provide some potential foraging and nesting opportunities for species like black-backed woodpeckers.

Low to moderate fire applied through prescribed burning in unharvested stands or larger ecosystem burns would be most similar to historical conditions created by mixed-severity fire. Implementation of these burns is intended to restore fire's role as a natural process used to maintain the open timbered conditions and improve the ecological function of a site. This would benefit migratory bird species adapted to these open forest types and would be consistent with FW-DC-WL-09 and FW-DC-WL-19. Implementation would result in some reduction of habitat components in the short-term, but in a mosaic fashion that would retain areas of existing vegetation. Where the herbaceous and shrub layer was burned, it would be expected to return to pre-fire conditions within a few years and potentially improve the understory vegetation

conditions as more light becomes available to the forest floor in the long-term. There may be a loss of adults, fledglings, and nests of Neotropical migratory birds depending on the season of implementation and location of the nests (i.e., located on the ground or in small trees or shrubs). Potential impacts would be to individuals or pairs and not to the population. Spring prescribed fires may result in additional negative impacts from smoke and disturbance around nest sites. However, spring conditions such as lingering snow on access roads, rain, and timing of vegetation green-up often limits the ability to conduct spring burning. Fall burning would reduce potential direct mortality compared to a burn during the spring period. A seasonal restriction to cover the entire project area would limit the ability to implement this beneficial activity such that they may not be able to be completed. This is not practicable in accomplishing the purpose and need for the project. However, a design feature has been identified that would ensure that site specific timing restrictions or other protections as appropriate would be implemented if an active sensitive species or raptor nest is discovered within a unit (FW-GDL-WL-02, FW-GDL-WL-16, FW-GDL-WL-21; see Chapter 2). Total acres of proposed prescribed burning are similar among all alternatives, at a little over 1,600 acres each (see Table 190).

Non-Harvest Fuels Treatments

Other non-harvest fuels treatments were identified for a variety of reasons and vary among alternatives. The majority of units initially identified for these treatments are located adjacent to private property where fuels reduction would improve safety to and from the property in the event of a fire, but timber harvest was not feasible due to the types of materials being treated. Some units include stands where prescribed fire was desired but not feasible due to terrain and location of adjacent non-NFS ownership (i.e., ability to hold the fire to NFS lands). Still other units include stands where harvest was initially identified as the desired treatment, but due to other resource concerns treatment was changed to a fuels treatment. All of these units involve the slashing of understory trees with a diameter at breast height of 6 inches or less and subsequent treatment of the resultant ground fuels depends on the amount of trees being cut and other resource concerns, and includes grinding, lop and scatter, and grapple or hand piling where the piles would then be burned. This would result in a reduction in understory tree density but would not impact any shrubs found within the stand. Alternatives 2 and 4 propose non-harvest fuels treatments on approximately 111 acres while Alternative 3 proposes slightly more at approximately 128 acres. See Table 190 for proposed treatment acres by alternative. Treating these 17 acres as fuels units minimizes or eliminates the potentially negative effects to the concerned resources while still being able to accomplish some of the desired conditions that would have occurred with harvest or prescribed fire.

Summary of Effects from Vegetation Management Treatments

The OLY project area is currently departed from desired conditions for tree species composition and forest structure. Percent composition of early seral species like western larch, western white pine, and ponderosa pine are below the desired condition whereas percent composition of species like Douglas-fir and cedar/western hemlock are above desired conditions. Similarly, early seral habitat consisting of young seedling/sapling trees that provide open habitat types are at the low end of the desired range and would soon move outside of the range. See the Forest Vegetation section for more details. Proposed harvest, prescribed fire, and non-harvest fuels treatments would contribute progress toward achieving the desired vegetation conditions which include an increase in the amount of early seral habitats consisting of seedling/sapling trees, greater composition of early seral tree species, and improved forest health and tree growth. This would also contribute to a greater mosaic of habitat conditions across the landscape, an increase in the diversity of species within the stands, encouraged development of shrubs in the understory, and

an overall increase in the amount of early seral habitat for species adapted to these conditions. This would be consistent with forestwide wildlife desired conditions FW-DC-WL-09 and FW-DC-WL-19 which describe the desire for productive plant communities with a mosaic of successional stages, structures, and species including open forest and early seral habitats to provide for a variety of migratory bird species.

Alternatives 2 and 3 propose a similar amount of vegetation management within the OLY project area with approximately 4,843 and 4,813 acres, respectively. However, the type of management differs by alternatives. Alternative 2 proposes more regeneration harvest whereas Alternative 3 proposes to change some of the regeneration harvest acres to non-harvest fuels treatments to address resource concerns. Alternative 4 would treat an intermediate amount of non-harvest fuels compared to Alternatives 2 and 3, but the fewest acres overall by keeping harvest generated opening sizes to 40 acres or less. See Table 190 above as well as Chapter 2 for the description of the proposed treatments and acres for each alternative. Therefore, Alternative 3 would be the most beneficial to a diversity of migratory bird species while also addressing other resource concerns.

Wetland and Riparian Habitats

Limited activities are associated directly with waterbodies within the project area. Improvements at Kilbrennan Lake Campground include replacing the existing native material boat ramp either with concrete or a floating structure. This would occur at the site of the existing structure and there would be no changes to the suitability of the lake (e.g., water depth or forage opportunities) to provide for aquatic species such as common loons (see the Common Loon analysis). Implementation of road BMPs or watershed improvements would only occur at the stream crossing and would help maintain or improve the flow and function of the stream and ultimately improving stream conditions in the long term.

Riparian buffers function as corridors and provides habitat for a variety of species (Lehmkuhl et al. 2007). Within the analysis area, RHCA corridors would not be treated and are located outside of harvest and prescribed fire unit boundaries. Proposed watershed work would occur within riparian habitat at stream crossing restoration sites, but these activities would not alter the riparian function of the site. Riparian habitat would remain available for species that have a preference for riparian habitat or utilize it as a movement area.

A limited amount of activities are proposed within aquatic and riparian habitats. The activities would occur within areas of previous disturbance and either would not change the existing condition of the site or would result in the maintenance or improvement of the site for species that use aquatic and/or riparian habitats. This would be consistent with the 2015 Forest Plan desired condition to provide a mosaic of aquatic and riparian habitat with a low level of disturbance for associated species (FW-DC-WL-10).

Burned Forest Habitat

Within the recent past, large landscape fires occurred within the project area in 1991, 1994, and 2000 providing high quality habitat for species like black-backed woodpeckers. However, the quality of this habitat diminishes over time and is no longer providing conditions suitable for species associated with burned forests. Since then, only two small fires have occurred within the project area that resulted in a small amount of burned forest habitat. Approximately 52 acres were burned in 2008 and 2009 in two small and isolated patches. This offers little high-quality burned habitat which is further limited due to the size and distance from other burns areas. Also, due to

the length of time the quality of the habitat is also diminishing. See the Fuels Management section for more details on fire ecology and history of the project area.

No harvest would occur within the burned habitats and the existing structure and quality for migratory species that use this habitat would be maintained. Implementation of prescribed fire, both as post-harvest underburns or non-harvest fuels treatments, would create some potential for use by migratory species associated with burned forests. Prescribed fire normally does not create extensive secondary mortality and would be limited to individual trees or small patches of trees and, therefore, would not provide the amount or longevity of high-quality burned habitat for long-term use. However, the creation of a few new snags or the deterioration of existing snags would provide elements of burned forest habitat that would benefit associated bird species in an area where this habitat type is currently limited. This is consistent with FW-DC-WL-14 which is a desired condition to have a diversity of patch sizes of fire-killed trees to primary habitat for species whose habitat requirements include this structural component. Also, see the effects of prescribed fire above.

High severity fire is a natural disturbance process that has occurred historically within the project area. Certain wildlife species, such as the black-backed woodpecker, have developed a close association to the habitat conditions created from fire. Because of demonstrated benefits to ecosystem function and resilience and by providing high quality habitat to certain wildlife species, DellaSala and Hanson (2015) and Hutto (2008), for example, advocate the need to both acknowledge the role of moderate and high severity fire on the landscape as well as to allow for its continued occurrence on the landscape.

A purpose and need of this project is to reduce the potential for high severity fires in the WUI; however, the proposed activities are not intended nor expected to eliminate all fires from the project area, especially high severity fires. For example, although wildfire activity did not occur within the project area in 2015, an increase in fire activity occurred on the KNF as approximately 32,724 acres were burned this past year. This is 24,917 acres more than what was reported in the past 8 years combined. This includes the Tepee Fire which is within a couple of air miles from OLY's western boundary that burned approximately 1,018 acres. This increase in fire activity is consistent with those expected in Bonn et al. 2007 and ERG 2012 and would benefit species associated with post-fire habitats, like black-backed woodpeckers, across the KNF. Also, 2015 Forest Plan direction encourages the use of wildland fire to help trend the vegetation towards desired conditions (FW-DC-FIRE-03). Under the right seasonal conditions, those natural wildland fires allowed to burn within more remote areas of the OLY project area (e.g., backcountry MAs or IRAs) would create mosaics of burned and unburned conditions that would also benefit a variety of migratory bird species.

Structural Attributes

Trees and Snags

Healthy western larch, western white pine, Douglas-fir, and ponderosa pine would be kept within harvest units where available, with emphasis placed on keeping the larger diameter trees. Retention of these species is beneficial for a couple of reasons. First, it helps establish early seral species on the site through their presence and providing a seed source. Second, maintaining them onsite contributes to both current and future structural diversity within the stand as standing live trees and future coarse woody debris. In general, these tree species are preferred by birds for nesting due to their suitability for creating cavities and for providing foraging opportunities. By opening up the canopy and reducing competition, more sunlight, nutrients, and water are

available to the remaining trees. These improved growing conditions would promote the development of large diameter trees and future snags over time.

Similarly, all snags would be left on site where they do not pose a safety hazard and also contribute to the structural diversity of the stand. Silvicultural prescriptions would incorporate recommendations for the number of snags based on the biophysical setting per FW-GDL-VEG-04. Proposed post-harvest girdling of mistletoe infected western larch in stands where snags are limited would increase snag densities within those units. See the Forest Vegetation section for more details.

The retention of large healthy trees and snags would provide nesting and foraging habitat for migratory birds immediately following harvest. In addition, the improved growing conditions would promote the development of large early seral trees and future snags for future migratory bird use. Therefore, proposed treatments would contribute to FW-DC-WL-12 which states a desired condition for trees and snags greater than 20-inch DBH to be available throughout the Forest, with special consideration for those species associated with the warm/dry biophysical setting.

Down Wood

The Forest Vegetation analysis states that "Existing tons/acre of coarse woody debris generally exceed the 2015 Forest Plan guideline and the level is currently being met mostly in the form of smaller diameter coarse woody debris with larger coarse woody debris, especially those greater than 16 inches, having greater occurrence within some units than others. However, it was found that 23 units within the project area were deficient in coarse woody debris levels by an average of 2-4 tons, especially in the warm/dry biophysical setting where dozer piling occurred in the past."

As for snags, the 2015 Forest Plan desired size and levels of coarse woody debris would be incorporated into the silvicultural prescriptions. During harvest, emphasis would be placed on retaining the larger materials which are more beneficial to wildlife species, based on availability. As a result of harvest and prescribed burning, there generally is a short-term reduction in the availability of smaller sized down material that is piled and/or consumed by fire whereas larger materials generally are not fully consumed while underburning the unit. However, long-term availability would be influenced by the amount of coarse woody debris and trees left on site post-treatments. For example, intermediate harvest treatments would retain more trees on site which would contribute to the recruitment of smaller diameter materials as limbs break from the trees and larger down materials in the future when the trees fall down. Overtime, the levels of coarse woody materials would be expected to increase over-time to levels that one might expect to find in untreated areas. Not all stands are expected to have the desired level of coarse woody materials immediately following treatment due to the lack of existing materials. However, recruitment of coarse woody debris in these stands would occur over time with the fall of snags and retained live trees, included the girdled, mistletoe-infected western larch. Also, snags fallen for safety would be left on site. See the Forest Vegetation analysis for more detail.

Forestwide desired condition FW-DC-WL-13 describes a desired condition that down wood, especially logs, are available throughout the forest for terrestrial species whose habitat requirements include this component. Due to past management practices some stands are currently deficient in the quantity of coarse woody debris, especially in the warm/dry physical setting. However, 40 units were found to contain coarse woody debris levels within the desired range and another 4 exceed the desired range for the appropriate biophysical setting. This includes 19 units within the warm/dry biophysical setting which is a similar number of units as

those found to be deficient (see the coarse woody debris summary in the project file). Therefore, overall the level of coarse woody debris found within the proposed harvest units generally meets the desired conditions and this would be expected within other more recently harvest stands that were implemented following prior Forest Plan direction as well as unharvested stands. In addition, through silvicultural prescriptions, implementation, and future recruitment the proposed stands would continue to contribute to the availability of large coarse woody debris levels throughout the Forest for migratory bird use. This would contribute to achieving FW-DC-WL-13.

Old Growth

A combination of vegetation types and disturbance processes can influence the development of old growth. Therefore, different old growth stands can demonstrate variation in the structural characteristics present (see Forest Vegetation section). Although definitions vary by forest and habitat type groups, the definitions of old growth are tied to features or conditions that reflect the structural conditions of the stands and generally mean the presence of trees that are old and large. Old growth stands are defined by a minimum number of trees, of a minimum age and diameter, in stands with a minimum density as described in Green et al., 2011 (USFS 2013). Important attributes of old growth stands also include the presence of snags, large old dying trees (decadence), large log component, and associated vegetation disturbance processes that resulted in these conditions (see Forest Vegetation section).

The presence and amount of large trees, snags, and coarse woody debris provides nesting or cavity habitat and foraging habitat for several migratory bird species. There is harvest and prescribed fuels treatments proposed within old growth habitat in the OLY project area that historically experienced frequent low intensity wildfire with areas of mixed severity fires. Due to fire suppression and lack of similar vegetation disturbance processes, forest succession is occurring in the understory and competing for resources with the large old trees. This increases the potential risk of insect and disease infestations, an increased risk of high severity fire due to the development of understory ladder fuels that could result in a stand replacing event, and impaired growth. See the Old Growth section for more details.

For all action alternatives, approximately 155 acres of harvest treatments and 376 acres of fuels treatments are proposed in old growth. An additional 34 acres of harvest treatments and 164 acres of fuels treatments would occur within recruitment potential old growth. The proposed vegetation management treatments are designed to maintain the existing old growth characteristics and further encourage development of these characteristics, especially in the recruitment potential stands, while making them more resistant to natural vegetation disturbances such as wildfire and insect and disease outbreaks (see the Old Growth section for more detail). Maintenance and improvement of existing and recruitment old growth would be consistent with FW-DC-WL-11. For the approximately 35 acres of treatments occurring within moister old growth habitat types, treatments would improve conditions for species such as the golden-crowned kinglet which is associated with old growth stands that contain western larch as this is a preferred foraging species (PIF 2000a). For the majority of the old growth treatments which would occur in dry habitat types, it would improve conditions for those species such as flammulated owls that are adapted to open forests with large trees. Therefore, the proposed treatments would also be consistent with FW-DC-WL-19.

Potential for Disturbance or Displacement

Proposed activities may result in the short-term negative effects including temporary disturbance and potential displacement. Temporary disturbance associated with an increase in noise and

activity within a stand may include a change in use or temporary avoidance of the area during activities by individuals. However, not all activities would occur at once and activity free areas would remain available near the treated stands for migratory bird use. During inactive periods and/or once the activities have been completed, birds would be expected to move back into and use the treated stands. Proposed treatments that result in a change to the structural condition of the stand, primarily regeneration harvest that would result in a change to the dominant tree age/size class, would be expected to result in the displacement of species that prefer more mature and/or denser stand conditions. However, a majority of the project area would remain untreated and would continue to provide an abundant amount of mature forests and denser stand conditions for use by these species during and post-project implementation. The effects would be to individuals utilizing the existing habitat condition which would not be expected to result in a measureable change to a species' population. Also, in the long-term the action alternatives would trend habitats to a state nearer what would have been present historically under natural disturbance regimes. This would provide more sustainable Neotropical migratory bird habitats in the area as well as greater habitat diversity for more species' utilization.

Cumulative Effects

Spatial and Temporal Context for Cumulative Effects Analysis

The "Existing Condition" section describes the migratory species found on the Forest and the variety of habitat types they utilize. This cumulative effects section summarizes the past actions as well as further describes ongoing and other reasonably foreseeable contributions potentially impacting migratory birds.

As described for the indirect effects analysis under the section "Spatial and Temporal Context for Effects Analysis," the project area was chosen for the cumulative effects analysis as localized alteration of habitat could affect the use of the treated stand as well as affect the availability of habitats within the surrounding area. Adjacent planning areas were also considered for effects related to habitat availability. However, known and expected activities in adjacent planning areas are not expected to cumulatively impact migratory bird movement, mortality, or habitat use within the project area.

Similarly, temporal boundaries for the migratory bird cumulative effects analysis are the same as for those described for the direct and indirect effects analysis. In summary, short-term effects are those that are expected to last between a few days to a season or portion of two seasons. Long-term effects are those that expected to last longer than a couple of seasons as they are generally associated with conversion of the vegetation type that results in a change of migratory bird use due to their specific habitat requirements. For example, the increase in early seral or open habitats would increase the amount of habitat for certain species while reducing it for others.

Past, Present, and Reasonably Foreseeable Activities Relevant to Cumulative Effects Analysis

Past Actions

Migratory birds represent a wide range of preferences and habitat use. Past harvest has had both positive and negative impacts depending on the activity and species of bird being considered. Harvest has occurred in the project area since the 1930s and has provided a variety of age classes and successional stages across the project area. Regeneration harvests would have benefitted species that prefer more open habitats while at the same time reduced habitat for those species

that prefer heavily forested habitat. Past harvest would have also reduced snags, coarse woody debris, old growth, and riparian habitats that are used by many species. Road construction would have also contributed to the reduction of these habitat types and components. Detailed description of previous vegetation and road management activities are found at the beginning of Chapter 3, including Table 32 and Table 33, as well as Appendix F of this document. In unharvested areas, natural disturbances such as wildfire would have contributed to this mosaic of habitats and forage conditions. In contrast, fire suppression since the early 1900s has altered stand structure resulting in more homogenous stands with greater canopy closure in some areas, which has favored those species that prefer forested habitats.

Since the 1990s, application of Forest Plan direction has resulted in better retention of snags and coarse woody debris and protection of old growth and riparian habitats. More recently, vegetation management treatments are designed to trend vegetation towards the desired conditions including the retention of more forest structure (including large old trees), snags, and cover which has helped maintain those habitat characteristics on the landscape.

Alternatives 2, 3, and 4 – On-going and Reasonably Foreseeable Actions

Reasonably foreseeable actions include those federal, state, or private activities that are ongoing or scheduled to occur, independent of this federal action. Table 34 located at the beginning of Chapter 3, identifies those current and foreseeable actions in the project area that were determined to be appropriate for inclusion in the analysis of environmental effects.

Recently completed and ongoing federal projects with treatments occurring within and/or adjacent to the OLY project include the Timber Stand Improvement 2010-2015 Project and small post and pole sales. For both projects, treatments would be maintaining the existing open habitat and young forest conditions that contribute to a mosaic of habitat types and successional stages within the project area. The thinning would help trend the vegetation characteristics towards historic conditions by keeping the desired tree species healthy and growing within the treated stands. Cumulatively, these projects would provide a variety of habitats suitable for a diversity of bird species. There are no reasonably foreseeable activities planned that would change the magnitude or scope of effects described above.

Stimson Lumber Company has proposed to harvest approximately 216 acres of their timbered lands located at the top of Yaak Mountain. The existing road ends at the Stimson and NFS lands boundary and access to the proposed harvest area would require the construction of approximately 1.6 miles of road of which approximately 0.2 mile would cross NFS lands. Construction and use of this proposed road segment would be a Forest Service permitted activity based on approval. Construction of the new road would result in the loss of forested habitat within the roadway, although this loss would be negligible at the project scale. Proposed harvest includes of mixture of regeneration, overstory removal, partial harvest or commercial thin treatments that would result in a mosaic of habitat conditions in the west slope of Yaak Mountain. This would be expected to result in a change in migratory bird species use from those that favor more timbered conditions to those that prefer more open and early seral conditions. Cumulatively, Stimson’s proposed harvest in addition to OLY’s proposed harvest, both entities’ past harvest, and untreated areas would result in a greater mosaic of habitat types and conditions on Yaak Mountain for a variety of bird species. Both OLY’s and Stimson’s proposed activities would be expected to cause disturbance and/or displacement to migratory birds using the treated stands. However, Stimson's activities could not occur until OLY's activities on Yaak Mountain are completed due to design features for grizzly bears (see the Grizzly Bear analysis and Design Features in Chapter 2). Therefore, it is expected that disturbance and/or displacement effects associated with OLY’s

activities would have dissipated prior to the initiation of Stimson's. There would be no overlap in the occurrence of these activities and, therefore, would be no cumulative effects associated with disturbance.

Other ongoing activities, including firewood gathering, may reduce the amount of future snags and coarse woody debris along road corridors. Snags created by underburning in the treatment stands would also be subject to loss from firewood gathering, especially in those areas in proximity to open roads. However, the OLY project does not propose any changes in the amount of roads accessible to public motorized use. All roads opened for project use would remain restricted to public use and no increase in firewood gathering would be expected. Snags in harvest units would be left on site per FW-GDL-WL-VEG-04 and 05 and any applicable design features listed in Chapter 2. Therefore, there would be no cumulative effects to snags when combined with ongoing road use and firewood gathering. Overall, the primary effects from these foreseeable projects would be due to disturbance and temporary displacement. Therefore, the cumulative effects due to minimal habitat loss, disturbance, and short-term displacement from these foreseeable projects are expected to be minor.

Future development opportunities are limited to approximately 3,802 acres (or about 5 percent) of private land not within corporate ownership. These lands are generally located in the lower elevation sites of the project area along the west and southwest boundaries that are bordered by the Kootenai and Yaak Rivers. Development of these lands likely altered and reduced some migratory bird habitat in these lower elevation habitats. Habitat loss associated with home building and road construction or other habitat alterations would be negligible compared to the amount of aquatic, riparian, and upland habitat available on NFS lands. Cumulatively, when other activities including the harvest on federal lands discussed under the proposed action alternatives and all past, present, and reasonably foreseeable activities are considered, habitat on federal lands is considered to sufficiently provide for the diversity of migratory species that would have occurred here historically by managing for desired vegetation structure, species composition, and pattern.

Regulatory Framework Findings

2015 Forest Plan

The 2015 Forest Plan provides desired conditions, objectives, standards, and guidelines for migratory birds within the Wildlife Resource. The following are applicable to the actions in this project[29]:

Forestwide Direction

- p. 28, **GOAL-WL-01**: The KNF manages wildlife habitat through a variety of methods (e.g., vegetation alteration, prescribed burning, noxious weed treatments, etc.) to promote the diversity of species and communities and to contribute toward the recovery of threatened and endangered terrestrial wildlife species.

  Proposed harvest and fuels treatments would result in the retention of remnant large tree species, better approximation of stand patch size and species composition, protection of riparian habitats, improved stand health, and general movement towards the desired

[29] Goals, desired conditions, objectives, standards, and guidelines can be found on the noted pages in the 2015 Forest Plan.

vegetative condition based on historic range of variation with the stands for this area. Harvest would also result in the creation of edge habitat that is preferred by some bird species. See "Forest Habitat." Therefore, the OLY project would contribute to progress toward achieving this goal.

- p. 29, **FW-DC-WL-09**: Productive plant communities, with a mosaic of successional stages, structures, and species, are available for migratory landbirds. These habitats support nesting activities or use during bird migration across the Forest. The use of fire, both planned and unplanned ignitions, improves and maintains this mosaic of habitats.

  Proposed regeneration harvest would result in an increase of early seral habitats as well as improve forest stand health where disease and non-native genetics are influencing growth and productivity. Intermediate harvest would occur in healthy stands where the desired species composition and structure is available. Similarly, prescribed fire would be used in stands to maintain healthy stand conditions. The variety of habitat types and treatments proposed would result in a mosaic of habitat conditions would be available for a diversity of migratory bird species. See harvest and prescribed fire sections under "Forest Habitat." Therefore, the OLY project would contribute to progress toward achieving this desired condition.

- p. 29, **FW-DC-WL-10**: A mosaic of aquatic and riparian habitats, with a low level of disturbance, is available for associated species.

  Proposed activities are limited in these habitat types and activities would occur within areas of previous disturbance and either would not change the existing condition of the site or would result in the maintenance or improvement of the site for species that use aquatic and/or riparian habitats. See "Wetland and Riparian Habitats." Therefore, the OLY project would contribute to progress toward achieving this desired condition.

- p. 29, **FW-DC-WL-11**: Old growth, or other stands having many of the characteristics of old growth, exists for terrestrial species associated with these habits.

  Proposed treatments would occur within old growth where past disturbance, such as wildfire, contributed to the development of old growth characteristics. The proposed treatments are designed to maintain the existing old growth characteristics and encourage further development of these characteristics while also making them more resistant to natural disturbances. See "Old Growth." Therefore, the OLY project would contribute to progress toward achieving this desired condition.

- p. 29, **FW-DC-WL-12**: Trees and snags greater than 20-inch DBH are available throughout the forest. Wildlife species associated with the warm dry biophysical setting find large-diameter ponderosa pine, Douglas-fir, and other species of snags for nesting.

  Snags and large healthy trees of the desired species would be retained within the treatments units where available. Growing conditions would be improved by opening up the canopy and reducing competition which would promote the development of large diameter trees and future snags over time. See "Trees and Snags." Therefore, the OLY project would contribute to progress toward achieving this desired condition.

- p. 29**, FW-DC-WL-13**: Down wood, especially down logs, are available throughout the Forest for terrestrial mollusks, reptiles, amphibians, small mammals, and other species who habitat requirements include this component.

  Silvicultural prescriptions would incorporate the desired size and levels of coarse woody debris based on biophysical setting. Retention of this material would depend on the existing availability as coarse woody debris appear to be deficient in the drier habitat types due to past management practices. For all harvest units, the retention of live trees, snags, felled snags, and girdled western larch would additionally contribute to coarse woody debris recruitment over time. See the "Down Wood" section. Therefore, the OLY project would contribute to progress toward achieving this desired condition.

- p. 29, **FW-DC-WL-14**: A diversity of patch sizes of fire-killed trees (either natural or prescribed burned and where not a safety concern) exists to provide primary habitat for population expansions for species whose habitat requirements include this structural component.

  Only two small wildfires have occurred in the project area in the last 8 years that would still provide high quality habitat. Proposed activities would not occur within this habitat type and, therefore, there would be no impacts to the availability or suitability of this burned forest habitat for use by associated migratory bird species. See "Burned Forest Habitat." Therefore, the OLY project would contribute to progress toward achieving this desired condition.

- p. 30, **FW-DC-WL-19**: By trending towards the desired conditions for vegetation, habitat is provided for native fauna adapted to open forests and early seral habitats, or whose life/natural history and ecology are partially provided by those habitats.

  The OLY project area is departed from desired conditions for tree species composition and forest structure associated with early seral conditions. Proposed vegetation management treatments would increase the amount of early seral habitats and species and trend towards the desired levels. This would also benefit migratory birds adapted to these conditions that have historically used this area. See the summary section under "Forest Habitat." Therefore, the OLY project would contribute to progress toward achieving this desired condition.

- p. 30, **FW-OBJ-WL-03, Landbird Assemblage (Insectivores)**: The outcome is the management of planned ignitions on 1,000 to 5,000 acres, annually, to prove habitat for olive-sided flycatchers, hairy woodpeckers, chipping sparrows, and Hammond's and dusky flycatchers).

  OLY's planned ignitions (prescribed and ecosystem burns) would move stands towards the vegetation desired conditions and contribute to habitat for these species. See "Alternatives 2, 3, and 4 – Direct and Indirect Effects." Therefore, the OLY project would contribute to the attainment of this objective.

Federal Law

National Forest Management Act (NFMA)

The project would comply with NFMA direction to provide for diverse populations of plant and animal communities through compliance with the 2015 Forest Plan.

Bald and Golden Eagle Protection Act of 1940 (16 U.S.C. 668-668c)

Without being permitted, it is illegal to “take” a bald eagle, including their parts, nest, or egg, and subsequent possession, transport, trade, etc. Also, the term “take” comprises a range of actions including but not limited to collection, injury or death, or disturbance.

See the Bald Eagle analysis for project effects to this species.

Migratory Bird Treaty Act of 1918 (16 U.S.C. 703-712), as Amended

Implemented to protect migratory birds and includes treaties between the U.S. and Great Britain (for Canada), Mexico, Japan, and the Soviet Union (now Russia). Without being permitted it is illegal to "pursue, hunt, take, capture, kill, attempt to take, capture or kill, possess, offer for sale, sell, offer to purchase, purchase, deliver for shipment, ship, cause to be shipped, deliver for transportation, transport, cause to be transported, carry, or cause to be carried by any means whatever, receive for shipment, transportation or carriage, or export, at any time, or in any manner, any migratory bird, included in the terms of this Convention . . . for the protection of migratory birds . . . or any part, nest, or egg of any such bird." (16 U.S.C. 703)

Proposed activities would not result in the possession of an individual, feathers or other parts, nest, or egg of a migratory bird. Potential effects would be incidental to the implementation of the activities and would impact individuals and not a population. See the “Direct and Indirect Effects” discussion.

Executive Orders

Migratory Birds, EO 13186 of January 10, 2001

Executive Order 13186 makes it illegal to take, kill, or possess migratory birds. Furthermore, this Executive Order requires federal agencies to evaluate the effects of federal actions on migratory birds through environmental analyses.

The project complies with Executive Order #13186 and associated Memorandum of Understanding by evaluating the effects of federal actions on migratory birds as part of the NEPA process and promoting conservation of and minimizing adverse impacts on migratory birds.

Summary of Findings

Alternative 1 (No Action) **would not be expected to result in a measurable change to a species’ population** for migratory birds within the project area. No management activities would take place that would alter the existing condition. However, the area is trending towards uncharacteristic conditions for species composition, stand age, tree density, and patch sizes. While favoring some species of birds, the existing condition is not providing the range of habitats that benefit other commonly occurring species that utilize more open or edge habitats in the OLY project area.

Alternatives 2, 3, and 4: Implementation of the action alternatives' proposed activities may result in short-term effects to individuals utilizing the existing habitat condition but **would not be expected to result in a measurable change to a species' population** within the project area. All alternatives would create a mosaic of successional habitat types through implementation of a variety of timber and fuels treatments. Harvest and fuels treatments would trend the existing vegetation toward the desired condition for the project area. This includes an increase in early seral habitats and seral tree species composition and larger patch sizes and the maintenance of structural components (e.g., large trees, snags, coarse woody debris, and old growth) that provide nesting and foraging habitat for a variety of migratory bird species. By increasing the amount of early seral and open habitat, it is also expected that there would be a trend for increased use of the project area by migratory bird species adaption to these habitat conditions which would have also been observed historically in this area. An abundance of untreated stands would remain available within the project area for existing migratory bird use, including those species associated with dense forest stands.

Chapter 4 Response to Comments for OLY DEIS

Comment Categories

Seventeen letters containing comments on the O'Brien, Lower Yaak, Sheep project's Draft Environmental Impact Statement were received during the comment period. These comments were categorized and personnel from the District responded to each comment. The following pages in Chapter 4 provide the comments and responses. The format used is as follows: The letter number and comment number are provided within brackets [xx, xx], followed by that exact comment in italics. The response is provided below the comment.

Comment Categories include:

2015 Forest Plan Direction
Alternatives
Aquatic Habitat and Species
Aquatic Habitat – Bull Trout
Climate Change
Cultural Resources
Economics
Fire and Fuels Management
Forest Vegetation: (General)
Forest Vegetation: Management Activities
General Background/Closing
General Comment
Implementation/Funding
Inventoried Roadless Area
Methodology
Monitoring
NEPA Process
Non-Specific to OLY Comment Attachments
Noxious Weeds
Old Growth
Openings Over 40 Acres
Precommercial Thinning
Recreation Improvements
Regeneration Harvest (Clearcuts)
Road System
Road BMPs
Road Decommissioning
Roads: General
Roads: Reconstruction
Roads: Stimson
Roads: Temporary
Roads: Undetermined
Scenic Resource
Soils
Transportation
Travel Management
Water Resource
Wild and Scenic River
Wildlife: (General)
Wildlife: Big Game
Wildlife: Bighorn Sheep
Wildlife: Canada Lynx
Wildlife: Fisher
Wildlife: Grizzly Bear
Wildlife: Grizzly Bear Access Management
Wildlife: Grizzly Bear and Over Snow Use
Wildlife: Grizzly Bear Core
Wildlife: Grizzly Bear Denning and Spring Emergence
Wildlife: Habitat Management
Wildlife: Management Indicator Species
Wildlife: Migratory Birds
Wildlife: Movement Corridors
Wildlife: Sensitive Species

2015 Forest Plan Direction

[09, 02] Comment: *The Lower Yaak, O'Brien, Sheep (dubbed "OLY" by the Forest Service) project proposes to implement the 2015 Revision of the Forest Plan (RFP). In carrying out its mission, AWR has participated in the public processes concerning management of the Kootenai National Forest (KNF) since the very early days of the implementation of the original 1987 Forest Plan, and has taken legal action several times to force the Forest Service (FS) to manage the KNF in conformance with environmental laws such as the Endangered Species Act (ESA), the National Forest Management Act (NFMA), and the National Environmental Policy Act (NEPA). AWR also participated fully in the public process*

as the FS developed its RFP, including commenting at every stage and submitting a formal objection. Because the FS provided essentially no relief in response to our formal objection, AWR thus fully incorporates the documentation of its participation in the RFP public process within the comments on the OLY DEIS. The FS' preferred Alternative 3 "proposes 2,061 acres of regeneration harvest, 623 acres of intermediate harvest and 385 acres of intermediate/regeneration harvest to move the stands towards the desired vegetative condition. This includes 155 acres of harvest treatment and 376 acres of fuels treatment within old growth."

Response: The Objection Deciding Official responded to AWR regarding the disposition of their objection to the 2015 Kootenai Forest Plan Draft ROD on September 8, 2014. The 2015 Forest Plan Final ROD was signed on January 5, 2015. The Forest Plan is outside the scope of the OLY project. The OLY project is a site-specific implementation of the plan.

[09, 03] Comment: *Scientifically flawed Desired Conditions analyses. A significant body of AWR's concerns about the RFP surround its over-reliance on "Desired Conditions" (DCs) as directing management, and too few standards that refrain management. As we pointed out, this results in an overall lack of accountability for the FS to ever accomplish anything positive expressed in the RFP's timeless, aspirational DCs, as well as there being far too few restraints that serve the conservation of biological diversity and promotion of ecological sustainability.*

Response: The new Forest Plan is certainly different than the prescriptive 1987 Forest Plan. However protections for the conservation of biological diversity remain in place through measures that protect the "fine filter" species, including the Regional Forester's sensitive list and species covered under ESA.

[09, 05] Comment: *The RFP's strategy of "moving toward" DCs (e.g., resilience) basically focuses upon static conditions, instead of the natural dynamics of the ecosystem. An abundance of scientific evidence suggests that DCs be conceptually replaced with desired future dynamics, to align with best available science. Kauffman, 2004 states: Restoration entails much more than simple structural modifications achieved through mechanical means. Restoration should be undertaken at landscape scales and must allow for the occurrence of dominant ecosystem processes, such as the natural fire regimes achieved through natural and/or prescribed fires at appropriate temporal and spatial scales. The philosophy driving the Forest Service's strategy to "move toward" and replicate historic vegetative conditions (basically, replace natural processes with logging and prescribed burning) is that emulation of the results of disturbance processes would conserve biological diversity. McRae et al. 2001 provide a scientific review summarizing empirical evidence that finds marked contrasts between the results of logging and wildfire. And Hessburg and Agee (2003) state: Patterns of structure and composition within existing late-successional and old forest reserve networks will change as a result of wildfires, insect outbreaks, and other processes. What may be needed is an approach that marries a short-term system of reserves with a long-term strategy to convert to a continuous network of landscapes with dynamic properties. In such a system, late-successional and old forest elements would be continuously recruited, but would shift semi-predictably in landscape position across space and time. Such an approach would represent a planning paradigm shift from NEPA-like desired future conditions[1], to planning*

for landscape-scale desired future dynamics. {footnote [1]. We are aware that NEPA does not require specific analysis of "desired future conditions." We take the authors to be referring to commonly included discussions of desired future conditions during the NEPA process.(Emphasis added.)}

Response: 36 CFR 219.36 – definitions says, "Desired condition: A statement describing a common vision for a specific area of land or type of land within the plan area. Statements of desired conditions should include the estimated time required for their achievement." The OLY project has been designed to move towards the desired conditions as described with the 2015 Forest Plan by Management Area and individual resource. For example, the OLY project area contains five Management Areas (MA): MA2 (Eligible Wild and Scenic Rivers); MA4 (Research Natural Areas); MA5a (Backcountry – Non-motorized Year-round; MA5c (Backcountry – Motorized Winter, Non-motorized Summer; and MA6 (General Timber). The 2015 Forest plan describes the desired condition for MA2 (starting at page 53); MA4 (starting at page 60); MA5a and 5c (starting at page 62); and MA6 (starting at page 65).

No management would occur within MA4 for the OLY project.

The OLY project takes a landscape scale approach to implementing actions that return process, structure, and function, to that portion of the landscape that can be managed give the limitations of law, regulation, policy, social considerations, and tools available As stated within the 2015 Forest Plan in the description of MA6 (page 64) says, "Vegetation and watershed restoration is accomplished predominantly through active management."

A prescribed ecosystem burn of 172 acres is proposed within MA5a for each action alternative. In total, about 870 acres of prescribed ecosystem burns are proposed for each action alternative (Please see OLY DEIS Table 5, page 42; Table 9, page 54; and Table 13, page 61). Prescribed non-harvest related underburns totaling 732 acres (Alternative 2), 748 acres (Alternative 3) and 752 acres (Alternative 4) are also proposed (see Tables 5, 9 and 13 in OLY DEIS). Approximately 3,069 acres of timber harvest with associated application of prescribed fire, along with 1,713 acres of prescribed fire without timber harvest, are proposed for Alternative 3. These actions are designed to takes a step in the direction of restoring natural processes.

Additionally, a large portion of the project area will still contain mature forest and various other successional stages, positioned across time and space.

Kauffman (2004) is an article about the policy of suppressing wildfires. Kauffman p. 881, also mentions that thinning or other mechanical treatments alone will not restore forest ecosystems. The removal of the overstory via selective tree removal can be an important initial step in forest restoration and that restoration also requires fire. That is exactly what the OLY project is proposing – a blend of mechanical treatment with prescribed fire and prescribed fire fuels units without harvest. The OLY project is utilizing wildland fire. This article does not contradict the OLY project.

Concerning McRae el al. 2001 and Hessburg and Agee 2003: The OLY FEIS never contends that logging and wildfire are the same. Remaining structure after treatments can mimic mixed and low severity fires (OLY FEIS pp. 213-214). Also the KNF Forest Plan provides guidance to increase wildland fire's role on the landscape. FW-DC-FIRE-03: The use of wildland fire (both planned and natural, unplanned ignitions), increases in many areas across the Forest. Fire plays an increased role in helping to trend the vegetation towards the desired conditions while serving other important ecosystem functions. However, when necessary to protect life, property, and key

resources many wildfires are still suppressed. The OLY project proposes over 1,500 acres of prescribed fuels units with the intent to reintroduce mixed severity fire on the landscape.

> ***[09, 06] Comment:*** *Likewise, Sallabanks et al., 2001 state: Given the dynamic nature of ecological communities in Eastside (interior) forests and woodlands, particularly regarding potential effects of fire, perhaps the very concept of defining "desired future conditions" for planning could be replaced with a concept of describing "desired future dynamics." (Emphasis added.) There is plenty of other support in the scientific literature for such an approach. The DEIS fails to consider such scientific information that opposes the FS's obsolete paradigm.*

Response: The 2015 Forest Plan does not look at desired future conditions, but rather desired conditions, which may occur at any time, including the present. All desired conditions are based on historic range of variability (HRV), and HRV is created by natural processes. [The reference is a book and not available on-line, other than for purchase for $65.]

Sallabanks, et al. (2001): This is a citation taken from the book *Wildlife-Habitat Relationships in Oregon and Washington*. It discusses eastside interior forests in Oregon and Washington and the results of fire suppression and benefits of wildfire. The quote cited by AWR to bolster their claim to use desired future dynamics rather than desired conditions comes from the following paragraph: "Kay[88] concludes that, historically, Native Americans commonly determined the structure of entire plant and animal communities by hunting and by setting fires (also see papers cited in Knowles and Knowles 93), and that a current "natural regulation" approach to management does not recognize, and thus probably would not replicate, such historical conditions. Perhaps with careful thinning, along with prudent reintroduction of fire into these ecosystems, old-growth ponderosa pine forests can be extensively restored. Given the dynamic nature of ecological communities in Eastside (Interior) forests and woodlands, particularly regarding potential effects of fire, perhaps the very concept of defining "desired future conditions" for planning could be replaced with a concept of describing "desired future dynamics." That is, long-term evolutionary potentials can be met only by accounting for potential future changes in conditions. No condition can be static for long. Impending changes in regional climates, too, have the capacity for causing great shifts in composition of ecological communities." The Sallabanks article, p. 223, also talked about reintroducing fire and reduction of conifer encroachment. This article does not contradict the OLY project, in fact, the article mentions careful thinning with prudent reintroduction of fire could restore old-growth ponderosa pine.

Alternatives

> ***[16, 04] Comment:*** *Briefly then, our suggestions for the OLY project are as follows; (1) LEAVE MORE TREES. If asked what alternative we would choose, it would have to be #4, as at least the red spots are smaller.*

Response: Thank you for your comment. The choice of which alternative selected is the responsibility of the Responsible Official, who in this case is the KNF Forest Supervisor, after reviewing the analysis of each alternative and considering the comments received.

Aquatic Habitat and Species

[09, 13] Comment:

{A} The DEIS discloses that some RFP Riparian Management Objectives (RMOs) are not being met in some project area streams. It also does not demonstrate that the streams are showing an upward trend toward the RMOs.

{B} The OLY project analysis is based upon the premise that an upward trend exists. The issue is credible documentation of improvement in fish habitat over time. Factual documentation of an upward trend requires a credible set of time-series data in order to deal with statistical variation.

{C} The OLY project would generate impacts with extensive logging, temporary road construction, reconstruction of existing roads, road decommissioning, culvert replacement, yarding, and skidding. The contention that no measurable sediment will be delivered to prescription watersheds and fish habitats is partly based on INFISH buffers (RHCAs), temporary roads, best management practices (BMPs), and the hope that no large storms will occur. INFISH buffers are certainly not "fail-safe." The Forest Service only has to consult their documentation of the 1995-96 storm event in the Clearwater Basin that resulted in hundreds, if not thousands, of road failures, stream blowouts, and landslides in developed watersheds to refute the "fail safe" contention (McClellan et al., 1997). During this storm, PACFISH buffers (100-300 ft.) did not effectively stop significant sediment delivery from road failures and other mass erosion events. Large amounts of sediment were delivered to the streams.

{A} Response: The Inland Native Fish Strategy (INFISH) was retained in the 2015 Kootenai Forest Plan through standard FW-STD-RIP-03 and states that project activities shall not retard the attainment of RMOs or slow the rate of recovery below the near natural rate of recovery if no additional human caused disturbance was placed on the system (page 136 Forest Plan). Project activities, with the implementation of RHCAs, would not be expected to slow the rate of recovery of pool frequency, water temperature, large woody debris or width/depth ratios within project area streams and riparian areas.

There is no requirement of illustrating an upward trend toward RMOs prior to project implementation. Further, the definition of RMOs is consistent with the definition of "desired conditions" in the Forest Plan rather than the definition of "objectives." The Forest Plan thus defines the RMOs as "desired conditions" (page 133 Forest Plan, Appx B). On page 134 of the Forest Plan (Appx B) it is stated in regards to RMOs that "all of the described features may not occur in a specific segment of stream within a watershed, but all generally should occur at the watershed scale for stream systems of moderate to large size (3rd to 6th order streams).

The first surveyed reach of Kilbrennan Creek falls below RMO standards due to the natural condition of the reach, rather than due to historical land use practices. The first reach is located within a wetland area that was historically flooded by beaver dams. Since the area was flooded, the riparian vegetation is now limited to shrubs and grasses. Tree growth in the vicinity has been limited, which has led to low Large Woody Debris (LWD)/mile in the reach. The lack of shade in the area due to the lack of stream side tree growth, in combination with slow moving water due to

low gradient, also leads to warmer water temperatures not meeting RMO standards. The limited tree growth and LWD in the area also leads to a lack of channel complexity and hence low pools per mile (also falling below RMO standards).

{B} Response: Evidence of improvements in fish habitat conditions over time does exist in the two main project area streams, O'Brien Creek and Kilbrennan Creek. The PacFish-InFish Biological Opinion Effectiveness Monitoring Program (PIBO-EMP) produces an "Index of physical habitat integrity" (index value) for managed and reference reaches which it monitors over time (PIBO Effectiveness Monitoring Data, 2014).

Habitat integrity of a reach is assigned a numeric score 0 (worst) - 100 (best) calculated by summing values of 6 metrics (residual pool depth, % pools, D50, % pool tail fines <6mm, large wood frequency, average bank angle) and scaling 0 - 100. D50 is the median stream bed particle size, measured by a pebble count procedure where 100 samples are taken from pools and riffles according to their percentage of the total length. Index was developed using data from reference reaches as a basis of comparison to managed sites.

Within the project area, Kilbrennan Creek Index value was shown to improve from 19.2 in 2006 to 31.2 in 2011. Further monitoring will take place in 2016. O'Brien Creek Index values were calculated to be 60.5, 46.8, and 62.1 in 2004, 2009, and 2014, respectively.

{C} Response: PIBO trend analysis of Kootenai National Forest stream habitat metrics conducted in 2016 indicates a positive change over time in the Overall Index (N=49, see Table 1, PIBO Kootenai Report 2016). The full report may be found in the project file. Metrics included in trend analysis included the observed/expected (O/E) macroinvertebrate index, residual pool depth, pool percent, wood frequency, D50, percent fines < 6 mm, bank angle, percent undercut banks, and bank stability.

According to the report, neither median substrate nor pooltail fines are significantly different than any of the three reference categories. Which means at the scale of the Forest sediment levels in managed streams are not statistically different from sediment levels in unmanaged reference streams.

While there is no trend for median particle size on the KNF, which is not unexpected since it is not different than reference, pooltail fines does show a significant negative trend with lower fines. It has dropped by 28 percent at the scale of the Forest.

Table 1 (Trend in Stream Habitat Attributes Across the Kootenai NF Subbasin) below shows trend in stream habitat attributes across the Kootenai NF Subbasin including: Overall_Index score, O.E. (Observed/Expected macroinvertebrate score), VegStab (bank stability), UnCutPct (percent undercut banks), LWFrq (large wood frequency), Bank Angle, PTFines6 (percent fines in pool tails), D50 (median substrate size), RPD (residual pool depth), and PoolPct (percent pools). Refer to page 5 of methods (Heading: 'Summary Tables') for further explanation. Time1 = mean during first visit; Time2 = mean value for last visit; Percent Change = Percent change in the mean values between the first and last visit; Sample size = number of observations with repeat visits; Negative Number = Number of sites where actual measurement was lower on last visit; Positive Number = Number of sites where actual measurement was higher in last visit; None Number = Number of sites where last visit and first visit values were equal; P-value = Significance test; Desired Direction = direction of change in the mean, which can be either + or -; Actual Change = actual direction of change in the mean, which can be not statistically significant (NS), + or -.

Table 1 Aquatic Resource Response to Comments:
Trend in Stream Habitat Attributes Across the Kootenai NF Subbasin

Metric	Time Value	Time Value	Percen Chang	Sampl Size	Negativ Number	Positiv Numbe	No Numbe	P-	Desired Directio	Actual Chang
Overall_Inde	43.78	50.23	14.7	49	16	33	0	0.01	+	+
O.E.	0.88	0.92	4.9	49	23	25	1	0.17	+	NS
VegStab	68.61	69.52	1.3	56	25	31	0	0.60	+	NS
UnCutPct	32.92	33.93	3.1	56	30	26	0	0.83	+	NS
LWFrq	302.1	351.7	16.4	55	20	35	0	0.01	+	+
BankAngle	108.7	108.8	0.1	56	24	31	1	0.71	-	NS
PTFines6	20.11	14.44	-28.2	50	35	15	0	0.00	-	-
D50	0.055	0.058	5.7	56	26	25	5	0.22	+	NS
RPD	0.28	0.31	12.2	55	19	33	3	0.00	+	+
PoolPct	35.81	32.14	-10.2	55	31	21	3	0.06	+	-

Similarly, the majority of stream habitat metrics (including Overall Index, N=507) have shown statistically significant trends of improvement within the broader Columbia River Basin portion of Forest Service Region 1 (see Table 2, Trend in Stream Habitat Attributes Across the Columbia River Basin, Region 1). The PIBO Report for FS-R1 CRB Only (2016) can be found in the Project File.

While no one direction within INFISH can be identified as a causal factor in habitat improvement in managed watersheds over time, it may be inferred that the overall net impact of INFISH implementation over the last 20 years is an improvement in aquatic habitat condition on the Kootenai National Forest, and within the broader Columbia River Basin Eco-Region.

Table 2 (Trend in Stream Habitat Attributes Across the Columbia River Basin, Region 1) shows trend in stream habitat attributes across the Columbia River Basin, Region 1 including: Overall_Index score, O.E. (Observed/Expected macroinvertebrate score), VegStab (bank stability), UnCutPct (percent undercut banks), LWFrq (large wood frequency), Bank Angle, PTFines6 (percent fines in pool tails), D50 (median substrate size), RPD (residual pool depth), and PoolPct (percent pools). Refer to page 5 of methods (Heading: 'Summary Tables') for further explanation. Time1 = mean during first visit; Time2 = mean value for last visit; Percent Change = Percent change in the mean values between the first and last visit; Sample size = number of observations with repeat visits; Negative Number = Number of sites where actual measurement was lower on last visit; Positive Number = Number of sites where actual measurement was higher in last visit; None Number = Number of sites where last visit and first visit values were equal; P-value = Significance test; Desired Direction = direction of change in the mean, which can be either + or -; Actual Change = actual direction of change in the mean, which can be not statistically significant (NS), + or -.

Table 2. Aquatic Resource Response to Comments:
Trend in Stream Habitat Attributes Across the Columbia River Basin, Region 1

Metric	Time1 Value	Time2 Value	Percent Change	Sample Size	Negative Number	Positive Number	No Change Number	P-value	Desired Direction	Actual Change
Overall_Index	40.87	44.53	9	507	198	294	15	0	+	+
O.E.	0.86	0.89	3.4	477	217	259	1	0.008	+	+

Metric	Time1 Value	Time2 Value	Percent Change	Sample Size	Negative Number	Positive Number	No Change Number	P-value	Desired Direction	Actual Change
VegStab	76.2	78.62	3.2	549	232	303	14	0.001	+	+
UnCutPct	33.43	40.72	21.8	549	235	303	11	0.001	+	+
LWFrq	220.44	283.46	28.6	544	167	357	20	0	+	+
BankAngle	107.3	106.77	-0.5	549	271	248	30	0.454	-	NS
PTFines6	26.29	23.3	-11.4	513	299	210	4	0	-	-
D50	0.0452	0.0476	5.3	548	219	274	55	0.006	+	+
RPD	0.32	0.33	3.3	542	238	297	7	0.064	+	+
PoolPct	40.5	40.18	-0.8	542	264	271	7	0.646	+	NS

In McClelland et al. (1997) the highest landslide rates occurred on roads constructed between 1940 and 1980, before the implementation of BMPs and Pacfish/Infish buffers (see Figure 10, page 41, McClelland et al., 1997). Infish buffers did not exist on the ground in this study area during the 1995-1996 storm event. The INFISH Decision Notice was finalized in 1995, and the associated USFWS Biological Opinion is dated 1998. The McClelland study (1997) does not refer to buffers or examine the effectiveness of buffers in the context of major storm events. The evaluation of buffers is not listed as one of the eight study objectives developed by the authors (see Executive Summary, p. vii). The OLY project proposes watershed restoration to address many high risk areas of roads built during that same time period within the project area to prevent similar road failures and road based landslides (see Table 23, pages 73-74 DEIS).

The Montana BMP 2012 Monitoring report states that "across all ownerships, BMPs were effective in protecting soil and water resources 99 percent of the time" (Montana DNRC 2012). See Appendix B of the DEIS for a description of the Forest's BMP program and a table listing the applicable BMPs for the proposed timber sale activities.

BMP implementation is proposed on non-haul routes where conditions warrant and on roads important for public access. Improvements are also planned for stored roads and for roads which are proposed for intermittent storage and decommissioning by recontouring and rehabilitating stream crossings by removing fill (see page 7 of the DEIS). Implementation of BMPs, along with other watershed work, is predicted to yield a net reduction in sediment contribution to project area streams compared to the existing condition (see Table 119, page 426 of the DEIS). For specific proposed BMP road work improvements see pages 7, 73-74, 80, 137-138 of the DEIS.

[09, 15] Comment: *The DEIS doesn't address the case law requirement that the FS insure that there exists the quantity and quality of habitat necessary to insure viability of aquatic species of concern.*

Response: Viability of aquatic species is a requirement at the Forest Plan level and is a matter beyond the scope of this project. Pages 116-121 of the DEIS list all regulatory framework pertaining to aquatic sensitive species (species of concern). A chief concern of the collective direction is protecting, maintaining, and/or improving aquatic habitat. Pages 146-149 of the DEIS go on to address each KNF Forest Plan component for Riparian, Aquatic Habitat, and Aquatic Species Resources and how the project adheres to this direction. The DEIS illustrates compliance with the Forest Plan and INFISH (DEIS pg. 146-149).

[09, 16] Comment:

{A} The DEIS doesn't present enough data or analysis to demonstrate consistency with FW-STD-RIP-02 or FW-STD-RIP-03.

{B} "These INFISH "standards and guidelines" are defined as standards: TM-1, MM-3, MM-4, MM-5, and RA-4.

{C} All others are defined as guidelines." The DEIS does not present enough data or analysis to demonstrate consistency with those RFP standards and guidelines. "Sediment in Lynx Creek has a high potential to be delivered directly to bull trout spawning habitat in O'Brien Creek." Since the action alternatives aren't guaranteed to address this and other (e.g., "NFSR 2380 and 2380A Road Work") road-caused sediment sources, how is this consistent with the RFP?

{A} Response: Table 39 on Page 137 of the DEIS lists proposed road work and stream crossing treatments common to all action alternatives. All activities related to the timber sale are funded and guaranteed to occur. The aim of these watershed restoration components is to promote a trend toward desired conditions by reducing sediment contribution derived from road related sources and to reduce road bed impacts to riparian areas. See the Water Resources section of the DEIS (page 409) for a full description of analysis watersheds and reference Table 39 to illustrate how these activities will address watershed concerns.

{B} Response: Buffers have been applied to all units according to FW-STD-RIP-03 (see KNF Forest Plan, page 25. Also, see Map M-7 of the DEIS). Therefore, sections (a) and (b) of this standard are not applicable.

Response to MM3, MM4, MM5: No solid or sanitary waste facilities are proposed in the OLY project. Therefore, items (1) through (5) of standard MM-3 are not applicable. As the OLY Minerals Affected Environment report states, "No mineral leasing is ongoing or anticipated in the project area in the foreseeable future." There are no existing or proposed sand or gravel mining and extraction activities within RHCAs in the project area. Therefore, standards MM-3, MM-4, and MM-5 are not applicable.

Response to RA-4: As stated in WCP 15.11 within Appendix B Best Management Practices (page B13) of the OLY DEIS, "Fueling should not occur within RHCAs or in locations where fuel spills could contaminate water bodies or riparian areas. ER/TSA will ensure contract compliance."

{C} Response: All road portions related to proposed activities (and to associated grizzly related habitat replacement) are guaranteed to be treated (see Table 39, page 137 DEIS) to comply with BMPs and/or to minimize sediment contributions through road storage/decommissioning (e.g. culvert and fill removal, culvert replacements, recontouring, etc.). See page Table 39 on page 137 of the OLY DEIS for a full summary of road work and funding status.

Road storage and decommissioning in upper Lynx Creek watershed (i.e. NFSRs 4433, 4433A, and 4433B) is required to be completed before the project begins (see page 425 DEIS). This work includes three road/stream crossings identified as high priority for treatment: two crossings at the end of NFSR 4433B where the culverts will be removed and crossings recontoured, and one

crossing on NFSR 4433 where the culvert will be replaced with a larger capacity culvert in order to provide continued snowmobile access. Several other crossings will be stabilized to reduce the risk of the culverts washing out. These actions will prevent road fill material from being eroded and contributing sediment to the streams. The storage work will include cleaning culverts and catch basins, providing controlled overflow relief for culverts in the event of failures, removing high risk culverts, stabilizing potentially unstable fills, waterbarring, scarifying, and seeding. In addition to preventing failures at the stream crossings, the storage work will reduce the risk of other road-related erosion (see page 426 DEIS).

BMP reconstruction work on NFSR 4445 (Lynx Creek Road) and NFSR 4429 (Pulpit Mountain Road) is proposed in all action alternatives to reduce sediment contribution to Lynx Creek and O'Brien Creek. BMP work on NFSRs 4445 and 4429 is not required for the timber sale because the roads will not be used as haul routes since no proposed timber harvest units exist in this area. Therefore, the work is funding and timing dependent. The net effect of the proposed road and watershed work in Lynx Creek watershed would reduce sediment contribution compared to the existing condition in both Lynx and O'Brien Creeks.

Aquatic Habitat and Species: Bull Trout

[09, 17] Comment:

{A} The downward trend in redd counts for O'Brien Creek bull trout also show management inconsistency with the RFP and ESA.

{B} Also, fine sediment in O'Brien Creek "remain unacceptably high."

{C} The significant risk of extirpation for westslope cutthroat trout disclosed in the DEIS also is inconsistent with NFMA.

{D} The private land cumulative effects in O'Brien Creek already indicate that the small spawning population of bull trout are at too much risk to allow the proposed logging and unnecessary road work in this watershed.

{A} Response: From 1995 through 2014 an average of 44 redds per year (SE = 5) have been detected in O'Brien Creek. The general trend of bull trout redds in O'Brien Creek has significantly increased since 1991 ($r^2 = 0.16$; $p = 0.054$). However, this relationship is strongly influenced by the increasing trend from 1991 to 2005, when redd numbers peaked (85 redds). Since the peak count in 2005, redd numbers have decreased (Dunnigan et al. 2015). In a broader context, the trend of bull trout redds for five Lower Kootenai tributaries downstream of Libby Dam (i.e. West Fisher, Bear, Pipe, and Quartz, and O'Brien creeks) has exhibited a significant negative trend since 1995 ($r^2 = 0.30$; $p = 0.012$), decreasing on an average of 4.8 redds per year (Dunnigan et al. 2015).

The general downward trend of Lower Kootenai redds is likely a result of factors outside the scope of this project, more related to broader influences on the life history of the Kootenai bull trout meta-population. One possible explanation is a long term, sustained level of interspecific competition with Brook trout (*Salvelinus fontinalis*). See "Dunnigan Personal Comm Hybridization 2008" in the Project File for analysis of hybridization in the Kootenai River.

{B} Response: While fine sediment in O'Brien Creek spawning habitat (as measured by MFWP) does remain unacceptably high, a significant negative trend (reduction) in fine sediment levels exists over the period of record since 1998 ($r^2 = 0.31$; $p = 0.032$).

Additionally, at the long term PIBO monitoring site on mainstem O'Brien above the falls, the percentage of pool tail fines measuring <2 mm and <6 mm have each consistently fallen over three monitoring years since 2004 (see PIBO Effectiveness Monitoring Data).

{C} Response: The DEIS discloses a moderate risk of local extirpation for westslope cutthroat trout and interior redband trout (pages 128 and 129).

Westslope cutthroat trout in the project area face interspecific competition for resources with non-native species, as well as genetic hybridization with introduced rainbow trout. See the Affected Environment section of the DEIS (page 124) for a history of non-native species introductions.

As habitat conditions improve within project area streams and steps are taken to further reduce sources of sedimentation, a leading threat to the viability of westslope cutthroat trout is that from non-natives. Non-native fish species have been stocked in the project area over the course of nearly 100 years by MFWP. Fish species composition in project area streams is unaffected by and outside the scope of project activities. See page 128-129 of the DEIS for an explanation the status of westslope and redband populations.

The management of populations falls under jurisdiction of MFWP, which has attempted non-native eradication efforts within the project area relatively recently (see "Kilbrennan EA Decision Document 9-01-06" in the Project File).

Response to NFMA portion: Cumulative effects were identified as a concern across private and public lands. This was recognized during planning and incorporated into project design via the following proposals: 1) avoiding harvest within RHCAs, 2) no instream work within O'Brien Creek, 3) road storage and decommissioning across the project area, 4) road reconstruction away from mainstem O'Brien Creek all of which minimize the potential for effects to area streams.

{D} Response: Implementation of INFISH, BMPs, and proposed watershed restoration work will further maintain or improve aquatic and riparian habitat for aquatic species. It is uncertain what the exact cause of the reduction in redd counts for bull trout is, as described in response to comment 13.

Climate Change

[09, 100] Comment:

{A} Climate change science suggests that logging for sequestration of carbon, logging to reduce wild fire, and other manipulation of forest stands does not offer benefits to climate. Rather, increases in carbon emissions from soil disturbance and drying out of forest floors are the result. Managers of national forest lands can best address climate change through minimizing development of forest stands, especially stands that have not been previously logged, by allowing natural processes to function. Furthermore, any supposedly carbon sequestration from logging are usually more than offset by carbon release from ground disturbing activities and from the burning of fossil fuels to accomplish the timber sale, even

when couched in the language of restoration. Reducing fossil fuel use is vital. Everything from travel planning to monitoring would have an important impact in that realm.

{B} The DEIS fails to analyze, disclose, and consider scientific information that is not in agreement with its position on soil carbon storage, logging, and wildfire. There is scientific certainty that climate change has reset the deck for future ecological conditions. For example, Sallabanks, et al., 2001: (L)ong-term evolutionary potentials can be met only by accounting for potential future changes in conditions. ...Impending changes in regional climates ...have the capacity for causing great shifts in composition of ecological communities. In other words, the DCs the DEIS relies upon must be evaluated in the context of how realistic—or even "desirable"—achieving them really is in the context of rapidly changing climate. The DEIS does not analyze or disclose the body of science that implicates logging activities as a contributor to reduced carbon stocks in forests and increases in greenhouse gas emissions. It also fails to provide any credible analysis as to how realistic and achievable its vegetation DCs are in the context of a rapidly changing climate, along an unpredictable but changing trajectory.

Response: The Forest does not ignore scientific opinion on forest management's negative effects on carbon sequestration. In fact, the KIPZ Climate Change Report discusses the direct, indirect, and cumulative effects of all action alternatives in the project on carbons stores, including the initial reduction in carbon stores, beginning on page 5, with at least nine individual scientific citations.

The commenter's statement that the Forest must evaluate how realistic or desirable DCs are in light of a rapidly changing requirement is already discussed. The 2015 Kootenai NF Forest Plan, at page 1, describes desired conditions as, "…attributes that will be used to guide management of the land and resources of the Plan area. Desired conditions are not commitments or final decisions approving projects and activities. The desired condition for some resources may currently exist, or for other resources may only be achievable over a long time period. The Forest may need to make adjustments in the desired conditions if monitoring results indicate they are not achievable in the long term…". Also at page 3, "…it is not likely that a project or activity can maintain or contribute to the attainment of all goals and desired conditions, nor are all desired conditions relevant to every activity (i.e., recreation desired conditions may not be relevant to a fuels treatment project). Most projects and activities are developed specifically to maintain or move conditions toward one or more of the desired conditions of the Plan. It should not be expected that each project or activity will contribute to all desired conditions in a plan, but usually to one or a subset", page 8 "Understanding these roles and contributions help to set realistic and achievable desired conditions which are the basis for management direction over the next 15 years (the life of the Plan)." The OLY project, and the Kootenai NF Forest Plan, contain adaptive management and use treatment monitoring as part of the method for evaluating changing needs.

{A}Response: DEIS page 233 states that the proposed actions being considered may alter the rates and timing of the carbon flux within the individually affected forest stands. These changes would be localized and infinitesimal in relation to the role of the world's forests play in ameliorating climate change and indistinguishable from the effects of not taking the action. Further supporting documentation is found in the Climate Change Report in the project file.

{B} Response: Forest ecologists and other scientists are increasingly noting that "resistance" and "resilience" are important as they relate to sustainability, biodiversity, and climate change (Blate et al. 2009, Drever et al. 2006, Folde et al. 2004, Hansen et al. 2003, Joyce et al. 2008, Millar et

al. 2007, Noss 2001, Stephens et al. 2010, Thompson et al. 2009, Unnasch et al. 2009, Walker et al. 2004, Walker and Salt 2006) (2015 Forest Plan pages 86-87). Relative to the current conditions, the desire is that the forests contain a greater abundance of tree species that demonstrate more of the following traits: less susceptibility to being killed by forest insects and diseases, more resistance to fire, more tolerance of drought, relatively long-lived, and being more productive. To improve adaptation of forest vegetation to the likely effects of climate change, these same researchers suggest promoting resistance and resiliency. Adaptation options are presented in the KIPZ Climate Change Report (USDA Forest Service 2010b) which states, ". . . emphasize management actions that address existing stressors, contribute to multiple land management objectives regardless of climate change (win-win), and are likely to be effective at achieving or maintaining desired conditions across a wide range of future climates. Their application in appropriate circumstances may be a critical contribution to sustaining the health, diversity, and productivity of the KNF to meet the needs of present and future generations (2015 Forest Plan page 87). When developing the goals, desired conditions, objectives, and standards in the Forest Plan that pertain to forest vegetation, the concepts and management approaches discussed above regarding forest resistance and resiliency were utilized with the overall objective of maintaining and restoring the forest biodiversity and sustainability. Since the OLY project uses the desired conditions as set forth in the Forest Plan, it does take into account the environmental effects in the context of climate change.

Pages 233-235 of the DEIS discuss the effects of the proposal on carbon cycling and storage. Under the no action, there would be no direct human-induced emissions of carbon into the atmosphere. For the short-term, on-site carbon stocks would remain higher under the no action alternative than under the action alternatives. Nevertheless, studies advise against interpreting carbon inventory maintenance or gains from deferred or foregone timber harvest in any specific forest or stand as affecting atmospheric concentrations of greenhouse gases. This only holds true if harvest does not occur elsewhere in the world to supply the same world demand for timber (Gan and McCarl 2007; Murray 2008; Wear and Murray 2004). The result can be a net carbon impact if the timber is replaced in the marketplace with higher carbon source products such as steel or concrete or is harvested in a manner that does not result in prompt reforestation (McKinley, et al. 2011; Ryan, et al. 2010; Harmon 2009). The long-term ability of forests to sequester carbon depends in part to their resilience to multiple stresses, including increasing probability of drought stress, high severity fires and large scale insect outbreaks associated with projected climate change.

The risk of some high mortality disturbance events is greater under the no action alternative. The long-term ability of these forests to persist as a net carbon sink is uncertain (Galik and Jackson 2009). Drought stress, forest fires, insect outbreaks and other disturbances may substantially reduce existing carbon stock (Galik and Jackson 2009, Hicke et al 2012). Climate change threatens to amplify risks to forest carbon stocks by increasing the frequency, size, and severity of these disturbances (Dale, et al. 2001; Barton 2002; Breashears and Allen 2002; Westerling and Bryant 2008; Running 2006; Littell, et al. 2009; Boisvenue and Running 2010). Recent research indicates that these risks may be particularly acute for forests of the Northern Rockies (Boisvenue and Running 2010). Increases in the severity of disturbances, combined with projected climatic changes, may limit post-disturbance forest regeneration, shift forests to non-forested vegetation, and possibly convert large areas from an existing carbon sink to a carbon source (Barton 2002; Savage and Mast 2005; Allen 2007; Strom and Fulé 2007; Kurz, et al. 2008a; Kurz, et al. 2008b; Galik and Jackson 2009). Leaving areas of forest densely stocked, as in the no action alternative, maintains an elevated risk of carbon loss due to disturbance. Thinning, prescribed fire, and other management actions are often suggested as climate change "adaptation actions" because they may

increase forest resilience to these multiple stresses, and thus increase the likelihood of sustaining forest carbon benefits in the long-term (Millar, et al. 2007; Joyce, et al. 2008; Ryan, et al. 2008b). The no action alternative foregoes such climate change adaptation actions.

Sallabanks, et al. (2001): This is a citation taken from the book *Wildlife-Habitat Relationships in Oregon and Washington*. It is not addressing climate change or carbon sequestering. It discusses eastside interior forests in Oregon and Washington and the results of fire suppression and benefits of wildfire. The quote cited by AWR comes from the following paragraph: "Kay[88] concludes that, historically, Native Americans commonly determined the structure of entire plant and animal communities by hunting and by setting fires (also see papers cited in Knowles and Knowles 93), and that a current "natural regulation" approach to management does not recognize, and thus probably would not replicate, such historical conditions. Perhaps with careful thinning, along with prudent reintroduction of fire into these ecosystems, old-growth ponderosa pine forests can be extensively restored. Given the dynamic nature of ecological communities in Eastside (Interior) forests and woodlands, particularly regarding potential effects of fire, perhaps the very concept of defining "desired future conditions" for planning could be replaced with a concept of describing "desired future dynamics." That is, long-term evolutionary potentials can be met only by accounting for potential future changes in conditions. No condition can be static for long. Impending changes in regional climates, too, have the capacity for causing great shifts in composition of ecological communities." The Sallabanks article, p. 223, also talked about reintroducing fire and reduction of conifer encroachment.

[14, 09] Comment: *The EPA appreciates the extensive discussion about climate change, adaptive management and impact to the ecosystems in the project area. We also appreciate that the DEIS identifies how climate-induced changes in disturbance regimes such as fire, insect outbreaks, and non-native invasive species are likely to affect forest vegetation sooner and more dramatically than incremental changes in temperature and precipitation associated with long-term trends. To enhance the analysis, the EPA offers the following recommendations below concerning the conclusion that proposed actions would be localized and infinitesimal in relation to the role the world's forests play in ameliorating climate change and indistinguishable from the effects of not taking the action (page 233). Even though diverse individual sources of emissions each make relatively small additions to global atmospheric GHG concentration, they result in large, cumulative impacts. Project impacts should not be compared to a global scenario. We recommend including practicable changes to the preferred alternative to make it more resilient to anticipated climate change. If the USFS has not already considered it, we suggest considering climate adaptation measures based on how future climate scenarios may impact the project. The National Climate Assessment (NCA), released by the U.S. Global Change Resource Program (http://nca2014.globalchange.gov), contains scenarios for regions and sectors, including forests. Using NCA or other peer-reviewed climate scenarios to inform alternatives analysis and possible changes to the proposal can improve resilience and preparedness for climate change. The FEIS should estimate potential emissions from prescribed burns. Including future climate scenarios in the FEIS would assist in determining whether the environmental impacts of the alternatives would be exacerbated by climate change and if additional mitigation measures should developed.*

Response: Forest ecologists and other scientists are increasingly noting that "resistance" and "resilience" are important as they relate to sustainability, biodiversity, and climate change (Blate

et al. 2009, Drever et al. 2006, Folde et al. 2004, Hansen et al. 2003, Joyce et al. 2008, Millar et al. 2007, Noss 2001, Stephens et al. 2010, Thompson et al. 2009, Unnasch et al. 2009, Walker et al. 2004, Walker and Salt 2006) (2015 Forest Plan pages 86-87). Relative to the current conditions, the desire is that the forests contain a greater abundance of tree species that demonstrate more of the following traits: less susceptibility to being killed by forest insects and diseases, more resistance to fire, more tolerance of drought, relatively long-lived, and being more productive. To improve adaptation of forest vegetation to the likely effects of climate change, these same researchers suggest promoting resistance and resiliency. Adaptation options are presented in the KIPZ Climate Change Report (USDA Forest Service 2010b), "emphasize management actions that address existing stressors, contribute to multiple land management objectives regardless of climate change (win-win), and are likely to be effective at achieving or maintaining desired conditions across a wide range of future climates. Their application in appropriate circumstances may be a critical contribution to sustaining the health, diversity, and productivity of the KNF to meet the needs of present and future generations (2015 Forest Plan page 87). When developing the goals, desired conditions, objectives, and standards in the Forest Plan that pertain to forest vegetation, the concepts and management approaches discussed above regarding forest resistance and resiliency were utilized with the overall objective of maintaining and restoring the forest biodiversity and sustainability. GOAL-VEG-01 states that plant communities are trending toward the desired conditions for composition, structure, patterns, and processes. The ecological integrity of the communities is high and they exhibit resistance and resiliency to natural and man-caused disturbances and stressors, including climate change. Since the OLY project uses the desired conditions set forth by the 2015 Forest Plan, it does take into account the environmental effects in the context of climate change.

Pages 233-235 of the DEIS discuss the effects of the proposal on carbon cycling and storage. Under the no action, there would be no direct human-induced emissions of carbon into the atmosphere. For at least the short-term, on-site carbon stocks would remain higher under the no action alternative than under the action alternatives. Nevertheless, caution is advised against interpreting carbon inventory maintenance or gains from deferred or foregone timber harvest in any specific forest or stand as affecting atmospheric concentrations of greenhouse gases. This only holds true if harvest does not occur elsewhere in the world to supply the same world demand for timber (Gan and McCarl 2007; Murray 2008; Wear and Murray 2004). The result can be a net carbon impact if the timber is replaced in the marketplace with higher carbon source products such as steel or concrete or is harvested in a manner that does not result in prompt reforestation (McKinley, et al. 2011; Ryan, et al. 2010; Harmon 2009). The long-term ability of forests to sequester carbon depends in part to their resilience to multiple stresses, including increasing probability of drought stress, high severity fires and large scale insect outbreaks associated with projected climate change.

The risk of some high mortality disturbance events is greater under the no action alternative. The long-term ability of these forests to persist as a net carbon sink is uncertain (Galik and Jackson 2009). Drought stress, forest fires, insect outbreaks and other disturbances may substantially reduce existing carbon stock (Galik and Jackson 2009, Hicke et al 2012). Climate change threatens to amplify risks to forest carbon stocks by increasing the frequency, size, and severity of these disturbances (Dale, et al. 2001; Barton 2002; Breashears and Allen 2002; Westerling and Bryant 2008; Running 2006; Littell, et al. 2009; Boisvenue and Running 2010). Recent research indicates that these risks may be particularly acute for forests of the Northern Rockies (Boisvenue and Running 2010). Increases in the severity of disturbances, combined with projected climatic changes, may limit post-disturbance forest regeneration, shift forests to non-forested vegetation, and possibly convert large areas from an existing carbon sink to a carbon source (Barton 2002;

Savage and Mast 2005; Allen 2007; Strom and Fulé 2007; Kurz, et al. 2008a; Kurz, et al. 2008b; Galik and Jackson 2009). Leaving areas of forest densely stocked, as in the no action alternative, maintains an elevated risk of carbon loss due to disturbance. Thinning, prescribed fire, and other management actions are often suggested as climate change "adaptation actions" because they may increase forest resilience to these multiple stresses, and thus increase the likelihood of sustaining forest carbon benefits in the long-term (Millar, et al. 2007; Joyce, et al. 2008; Ryan, et al. 2008b). The no action alternative foregoes such climate change adaptation actions.

In terms of reducing the carbon emissions through prescribed burning, several mitigation measures exist on the KNF (Smoke NEPA Guidance pages 9-10). The reduction of the amount of fuel consumed by prescribed burning would be accomplished through the use of spring burning. Harvested areas located on east, southeast, south, southwest and west aspects would be burned, to the extent possible, during the spring burn season, typically from late March through June. During this timeframe larger diameter fuels and the duff layer usually have relatively high moisture contents that reduces the amount of these fuels consumed by prescribed burning."

The Kootenai National Forest has encouraged, through sale contract provisions, the increase removal of material that is smaller than the established utilization standard for a given timber sale. First, purchasers are required to pay for, and therefore encouraged to utilize, top wood smaller than the utilization standard (Special Contract Provision C(T) 6.414). Second, the standard contract allows the purchaser to remove sub-merchantable material from regeneration harvests without prior consent of the Forest Service (Standard Contract Provision B(T) 3.41). And third, sub-merchantable material may also be removed from commercial thinning units with prior Forest Service agreement. All these measures help decrease the amount of woody fuel that must be burned.

Cultural Resources

> ***[09, 109] Comment**: "As required by Section 106 of the NHPA, the SHPO will also be consulted about any adverse effects to known cultural sites prior to project implementation." The DEIS doesn't provide enough analysis or data to demonstrate consistency with the NHPA and RFP.*

Response: The DEIS sections titled "Regulatory Framework" and "Methodology Used to Collect Data and Make Scientific Findings", located on pages 151 through 153 of the DEIS, describe the process undertaken by the cultural resource specialists to ensure compliance with NHPA (including consultation with the State Historic Preservation Office (SHPO)) and consistency with the 2015 Forest Plan (DEIS page 159). Specific site information and protection measures cannot be included in the DEIS as it is a publicly available document, and site information is protected; however, generic descriptions of how historic properties and other culturally sensitive areas will be treated is described in the "Design Features" section of the DEIS (pages 76 - 77) and in the Cultural Specialist section on pages 155 - 156.

Economics

***[09, 110] Comment**: The economics analysis doesn't disclose the costs of all cumulative FS management in the project area for the foreseeable life of the OLY project. It also omits analysis of a lot of project costs such as sale administration, tree planting, and other foreseeable government expenditures such as monitoring.*

Response: The analysis includes all costs associated with the timber sale as well as planned ecosystem management. The EIS states the following under "Financial Efficiency" in the Economics Section: "The financial efficiency analysis is specific to the timber harvest and ecosystem management activities associated with the alternatives (as directed in Forest Service Manual 2400, Timber Management and guidance found in the Forest Service Handbook 2409.18). Costs for sale preparation, sale administration, regeneration, and other activities are included. All costs, timing, and amounts were developed by the specialists on the project's interdisciplinary team." Thus, these costs have been included, including all costs with management in the project area for the life of the project. (Supporting documentation is found in the project file, document "20150726_OLYTransactions" dated 7/26/15 for documentation of all costs included in the analysis.)

Fire and Fuels Management

***[02, 01] Comment**: Regarding burning, thinning or actual cutting harvesting of timber and land on O'Brien Ck. (Kilbrennan) is beneficial to the enviroment in this area. Last summer was dry and hot. If a fire started it would be nearly impossible to contain. Also it will help the wildlife including turkeys that are moving in the East side of Koot. River as the land and forest is opened up for them to live here. The young timber growth has a better chance to spring up and is healthy than the old 100 yr growth currently standing now.*

Response: Thank you for your comment.

***[06, 07] Comment:** Regarding fuels treatment with fire and/or pre-commercial thinning, I realize the need to re-introduce a fire regime back into portions of the project area. Given the management history of the project area and the mixture and variability of habitat types there is the need for both active vegetation/fuels management as well as the re-introduction of fire in areas where active mechanical management is not appropriate. The agency should CAREFULLY re-introduce fire at regular intervals into the ecosystems of the project area in which historically - fire kept them in check for over-crowding.*

Response: Fire will be re-introduced at regular intervals as funding is available. The use of wildland fire (both planned and natural, unplanned ignitions) are supported in the 2015 Forest Plan to trend the vegetation towards desired conditions while serving important ecosystem functions (FW-DFC-03).

***[08, 04] Comment:** I also hope and believe, reading scientific literature, that we have progressed past the old Forest Service argument or bullet point that clearcuts mimic wildfire.*

Response: As indicated by the Silviculture Treatments section on pages 31-32, the intent of the proposed regeneration harvest units is to create stand conditions similar to what would occur, post wildfire, with the larger fire tolerant trees remaining and the smaller and non-fire-tolerant trees being killed. It would provide open grown conditions similar to a stand replacing fire and reforestation would focus on establishment of species that would naturally occur. Snags and snag replacement trees would be left at 6-12 trees per acre and leave trees would be in groups of 4-12 trees, as well as scattered individuals of 5-20 trees per acre in the proposed clearcuts with reserves, to mimic natural conditions and to leave the best trees no matter what spacing resulted. In this project regeneration is proposed in stands where healthy seral species (western larch and western white pine) are a minor component and the major component is unhealthy grand fir, western hemlock, and western redcedar, as well as in stands that are currently occupied by off-site ponderosa pine and Douglas-fir infected with root rot. Large western larch, ponderosa pine, western white pine, and Douglas-fir trees would be left with additional tree species in some places to provide diverse structure. Additionally, many of the regeneration units will be followed with prescribed burning. FW-OBJ-VEG-01 page 193 of the DEIS discusses how the combination of harvest treatments and planned prescribed fire within regeneration units promotes early seral species, provides seed beds and nutrient availability to foster regeneration (Certini 2005;Boerner et al. 2009).

[08, 15] Comment: *. . . I might also add also the reminder that these proposed units across the river hardly qualify in any sense other than the broad-stroke technical two-mile definition of true wildland-urban interface.*

Response: Thank you for your comment. We use the two-mile WUI boundary layer that was developed through the development of the Lincoln County Community Wildfire Protection Plan (found in the project file). The Protection Plan states on page 8, "The WUI boundary extends 2 miles beyond clusters of private, non-corporate land with known structures ..."

[09, 104] Comment*: A stated purpose is to "Treat hazardous fuels ...within the WUI." What criteria does this analysis rely upon to designate the extent of the WUI in the project area?*

Response: We use the two-mile WUI boundary layer that was developed through the development of the Lincoln County Community Wildfire Protection Plan (found in the project file). The Protection Plan states on page 8, "The WUI boundary extends 2 miles beyond clusters of private, non-corporate land with known structures ..."

[09, 111] Comment*: The fire/fuels analysis doesn't disclose the relative contribution of weather factors to fire spread, intensity, or severity, basically providing the misleading notion that manipulation of fuel conditions is the overriding factor when it is actually just the opposite.*

Response: Weather is an important factor in calculating fire spread and is a required input for fire modeling for both pre and post treatment in fire behavior comparisons for each unit. References to weather, how it affects fuel conditions, and how that information is used in modeling are in

multiple locations in the Fire and Fuels Report but primarily under Analysis Methods starting on page 172 of the DEIS.

***[14, 08] Comment**: The preferred alternative includes fuel treatment consisting of prescription burning, mechanical piling and grinding on approximately 1,744 acres. We support prescribed fire design criteria through the incorporation of the lnteragency Prescribed Fire Planning and Implementation Procedures Guide (November 2013). The guide provides consistent interagency guidance, promotes common terms and definitions, and provides standardized procedures for the planning and implementation of prescribed fire. As we were not able to find reference to the guide in the Draft EIS, we recommend including it in the Final EIS.*

Response: Thank you for your comment. Prior to prescribed fire implementation, we are required to adhere to the most current "Interagency Prescribed Fire Planning and Implementation Procedures Guide", which was lasted updated April 2014. This reference is located in the project file.

Forest Vegetation (General)

***[07, 11] Comment**: What is the long-term vision for the project? What will stands look like in 25-50 years? How will district get from existing condition to desired condition? I don't see much discussion of this in the DEIS, and I would like to.*

Response: Please see response to Letter 10, Comment 10.

[09, 04] Comment:

{A} The DEIS uses the word "resilient" or "resilience" well over a hundred times, mostly in terms of how the action alternatives are responding to RFP DCs by increasing the resilience of the ecosystem, The RFP defines "resilience" as "The ability of a social or ecological system to absorb disturbances while retaining the same basic structure and ways of functioning, the capacity for self-organization, and the capacity to adapt to stress and change." The RFP defines "restoration" in part, as "the process of assisting the recovery of resilience." And The RFP defines Forest Health as "An ecological perspective that looks at the resiliency of an ecosystem and its ability to be sustainable."

{B} However, the OLY DEIS provides absolutely no operational definition of resilience that would allow anybody to actually measure the resilience of the ecosystem as it stands now, or measure the change in resilience following project activities. An essential component of an operational definition is measurement. A simple and accurate definition of measurement is the assignment of numbers to a variable in which we are interested. In this case, the variable in which we are interested is resilience, and how the FS measures it in these ecosystems.

{C} AWR does not doubt that resilience is a valid scientific term that may be used to characterize forest ecosystems. However, mostly what we "learn" about resilience from

reading the DEIS is that it's what happens when the forest is "managed" (i.e., mostly logged or prescribe burned), and the more the forest is logged and burned, the more resilient it becomes. Also we "learn" that nothing that happens naturally, without management, will increase resilience. In other words, from the FS's perspective, resilience can only be manufactured, engineered, or imposed by management. So the term "resilience" as used in the DEIS is invalid, rendering much of its analyses confusing and misleading.

{A} Response: The 2015 Kootenai National Land Management Plan (2015 Forest Plan) provides the overarching direction for management activities on the Kootenai National Forest. The OLY DEIS measures the project's effects relative to the 2015 Forest Plan's goals, desired conditions, objectives, standards, and guidelines. There is nothing in the forest plan that implies the need for or requires a quantitative measurement of resilience at the project level, yet the Forest monitoring program (Forest Plan Chapter 5) will help us gauge progress toward desired conditions for resiliency. That being said, the OLY DEIS does provide some measures of the proposed activities. P. 107 of the 2015 Forest Plan FEIS states, "the resistance and resiliency of a forest to stress agents and disturbances is largely a function of the composition, structure (including density) and landscape pattern of forest conditions, and how those elements interact together. Both quantitative and qualitative information is utilized to assess how susceptible the forest may be to the various key stress agents." Pages 197-198 of the DEIS lists the indicators and measures used to evaluate each alternative's ability to address the purpose and need. These include quantitative measures for promoting resilient vegetation conditions by managing towards historic patch size and pattern, characteristic forest structure, historic fuel loadings, and desired species composition. Table 62 on pages 220-221 has the total acres for each alternative that address the purpose and need for each measure.

{B} Response: Nowhere in the document does it state that resilience can only be manufactured, engineered, or imposed by management. The 2015 Forest Plan states that mechanical treatments, prescribed fire, and managing wildland fires for resource objectives are all potential tools for increasing the resiliency of forest vegetation to climate and other stressors (FEIS page 87). DEIS page 200 explains the methodology used to identify proposed treatment units. It states that forest stand management needs were identified by a silviculturist based on existing vegetation conditions and desired stand conditions. The management needs identified for each stand are the actions that would move the stands from the existing condition toward the desired condition to maintain or promote forest resiliency in the project area in accordance with the 2015 Forest Plan. Stands that had an existing condition that was departed from the desired condition were proposed for treatment. There are 67,500 acres in the project area, and a maximum (Alternative 1 – No Action) of 4,842 acres were proposed for treatment. Many stands that were examined during field reconnaissance were not considered for treatment because their existing condition was similar to or in line with desired conditions, or were deferred for other resource management concerns. The 2015 Forest Plan acknowledges that natural processes will play a far greater role than active management in movement toward desired conditions overtime, but also that the application of management actions in appropriate circumstances may be a critical contribution to sustaining the health, diversity, and productivity on the KNF to meet the needs of present and future generations.

[09, 07] Comment:

{A} At page 198, the DEIS states, "Historic range of variability (HRV), presented in a social and environmental context, was used to help establish baseline reference conditions, disturbance regimes, and departures from historic conditions." In concocting the FS's case for OLY project Purpose and Need in terms of forest conditions, the DEIS compares existing conditions of the project area ("'Existing' is from FSVeg database") with project DCs ("'Desired' is from 2015 Forest Plan"). AWR pointed out the problem with the RFP's DCs in its Objection to the RFP, and notably in critiquing the Forest Plan Direction and Plan Elements (e.g., "The desired ranges for forest composition, structure, and pattern for each biophysical setting are not supported by reliable historic data taken from KNF surveys or scientific research that we are aware of.").

{B} The OLY DEIS does not disclose the statistical reliability of the FSVeg database—how old are the data, how accurate it can reasonably expected to be.

{A} Response: The usage of the HRV and desired condition of the forest plan is related to the 2015 Forest Plan, and not specific to the OLY project.

{B} Response: Page 200 of the DEIS disclosed that the most recent stand exam data available is from 1999 and before. These exams were done using R1 Stand Exam Protocol. This stand exam data is stored and available in the FSVeg database. As stated, by using field data, knowledge of existing condition, and professional resource judgement, the information used was reviewed and deemed to be valid. The measures used to quantify the existing condition of the vegetation for the project area were structure, forest type, and VRU (biophysical setting). Since forest succession occurs slowly over time, we used this data from the stand exams that were done in the relatively recent past of these stands. Exams conducted in the field, as well as NAIP and Google Earth imagery, were used to validate this information. We used the best information available to quantify the existing condition. Statistical reliability varies for all stand exams. Stand exams are designed to achieve a +/- 20% standard error and standard errors can vary widely due to the variability of the measured parameters. Most stand exams meet this 20% standard error but some are higher and some are lower. This information combined with field observations to confirm the data validity, is a reliable tool for forest management planning.

[09, 08] Comment:

{A} The DEIS states, "Regarding the historic range of variability of old growth in the analysis area, there is no way to accurately determine how much of the forest may have met the Green et al. (1992) definitions of old growth. In order to determine whether or not a forest stand meets those definitions, it requires detailed information on how many trees per acre exist in the stand over a certain diameter and age, the total stand density, the forest type and lastly, the habitat type group that the stand occupies. No historical information exists that can provide that level of detail." (Emphasis added.) From our reading of the DEIS, we feel safe in asserting that the same can be said of the historic range of variability for various stratifications of forest conditions used in the analyses, such as age class, size class, tree species composition, and so forth. The DEIS simply fails to identify the source of historical project-area data upon which its (and the RFP's) DCs are based.

{B} RFP FEIS: "The function and process of ecological systems has changed and fire suppression and some management activities have altered fuel loadings. As documented in Keane et al. (2002), the changes include an increase in shade-tolerant species, decrease in

fire-tolerant species, increased vertical stand structure, increased canopy closure, increased vertical fuel ladders, greater biomass, greater fire intensities and severities, and increased insect and disease epidemics." The DEIS doesn't present the kind of data that would validate that RFP assumption.

{A} Response: Please see the 2015 Forest Plan for a complete description of the development of the HRV for the KNF in Chapter 3 in the Methodology and Analysis Process section (pages 49-52) and Appendix B in the Development of the Historic Range of Variability section (pages 11-15). It does state that the HRV is the baseline for comparison with current conditions to assess the degree of past change (page 50) and the ranges for desired condition were a result of the HRV being reviewed in the context of climate change (page 51). The DEIS used the data stored in the information sources listed on DEIS pages 198-199 to describe the existing condition. The majority of that data came from FSVeg, a database that contains basic site and stand information and stand exam information including slope, aspect, elevation, habitat type, Montana fire group, Idaho fire group, forest type, size class, age class, and year of stand origin. The existing condition was compared against the 2015 Forest Plan's desired conditions. This comparison was then used to demonstrate how the existing condition of the OLY project area was either in line with or departed from the desired conditions of the 2015 Forest Plan.

{B} Response: The OLY DEIS clearly exhibits that the existing conditions of the project area do not match those of the desired condition of the 2015 Forest Plan. This comparison was done throughout the document. For example, DEIS pages 204-206 displays and discusses the forest types of the project area compared to the desired condition of each biophysical setting. It states that the shade intolerant species are well below desired levels. This is likely due to an increase in competition from shade tolerant species and fire suppression. DEIS pages 206-212 addresses the structure and compares the desired size class of the 2015 forest plan to the existing size class of the project area as well as by each VRU within the three biophysical settings. DEIS page 206 states that many of the multi-storied stands result from decades of fire suppression, which has enabled further development of the understory trees into the general forest canopy. In the Fire and Fuels Management section (DEIS page 181), the no action effects would result in ". . . many of the forested stands in the analysis area would remain overstocked and ladder fuels would continue to fill-in and crowd the understory. The drier forest stands would continue to lose vigor due to competition from a dense understory of shade tolerant species. This understory would serve as ladder fuels that would permit a surface fire to expand into the canopy of overstory trees. This could result in the mortality of many of the existing overstory trees that would have otherwise survived a surface fire of lower intensity." Therefore, the DEIS does adequately show that the existing condition of the OLY project does not meet the desired condition of the 2015 Forest Plan.

[09, 09] Comment:

{A} The FS's foreseeable budget for the KNF would not allow enough vegetation management under the agency's paradigm to "fix" the problems the FS says would be perpetuated by fire suppression. The RFP DEIS discloses that, with the likely scenario of a constrained budget as reflected by the 5-year average of funding allocated to the KNF from 2006 to 2010, the preferred alternative would be able to "move towards" vegetation Desired Conditions 546,119 acres—only 25% of the KNF over the next 250 years. Even the RFP DEIS's most optimistic (though unrealistic) scenario using an unconstrained budget shows that only 43% of the KNF could be treated over the next 250 years. The FS did not conduct

any analysis that faces up to any likely budget scenario, in regards to the overall management emphasis to "Move towards" vegetation Desired Conditions using active management—mostly logging. The implication is clear: logging and fire suppression is intended to continually dominate, except in those weather situations when and where suppression actions are ineffective, in which case fires of high severity will occur across relatively wide areas. No cumulative effects analysis at any landscape scale exists to disclose the environmental impacts.

{B} Also in describing what it claims to be landscape departures from the HRV, the DEIS does not provide a spatial analysis, either for the true reference conditions or of current project area conditions. The DEIS has no scientifically defensible analysis of the project area landscape pattern departure from HRV. It attempts to do so using yet another term ("mosaic") which—like "resilience"—lacks operational definition and thus defies genuine quantitative analysis. So for example, a DC is expressed thus: "A mosaic of diverse, productive habitats would be available to provide both cover and forage for wildlife species." The DEIS makes a case that an adequate "mosaic" doesn't exist in the areas it proposes to log and prescribe burn. At this juncture AWR would like to visually present among this text what these areas look like by pasting in Google Earth images, but they are too large for practicality purposes. Instead we direct the FS's attention to these jpg files (PA Overview, Northwest Cluster of units, West-Central Cluster of units, and South Cluster of units2) that are being submitted at the same time as this document, and ask that the FS present a quantitative and spatial analysis of this existing (faulty?) mosaic—to our eyes dominated by the "management" that is now proposed to cure the alleged "departure" of the mosaic. Even if project area conditions could accurately be described as continuous dense forest this does not imply an inevitable ecological catastrophe the DEIS implies because, as Churchill, 2011 points out: Over time, stand development processes and biophysical variation, along with low and mixed-severity disturbances, break up these large patches into a finer quilt of patch types. These new patterns then constrain future fires. Landscape pattern is thus generated from a blend of finer scale, feedback loops of vegetation and disturbance and broad scale events that are driven by extreme climatic events. {footnote 2. Altogether the three unit cluster images encompass the area containing the vast majority of logging units proposed in the DEIS.}

{A} Response: Cumulative effects considers current, past, and reasonable foreseeable actions. Predicting future budget allocations is not possible or appropriate for this analysis.

{B} Response: DEIS page 205 states that across the project area, there has been a homogenization and simplification of landscape patterns for forest structure. Landscapes have increasingly become dominated by large patches of medium size trees and there is less variability in internal structure or composition of these medium size patches (note- Forest Plan FEIS pages 84-86 discusses landscape pattern departure from HRV, and also discuss resiliency on pages 86-87). Meanwhile, the patches of the smallest and largest size classes are fragmented into smaller patches with more edge and less interior area. Table 54 in the DEIS displays the existing size class distribution of the project area compared to the desired size class distribution. Churchill (2011) was written to provide a science summary for mesic forests for the Colville National Forest restoration strategy. The report has not been published in any peer reviewed journals. However, we agree with the statement you reference in the appropriate context. Churchill (2011) states, "extreme fire weather can override the constraints of vegetation and topographic patterns to a significant extent and impose new patterns, typically large, high severity patches that become even-age forests. Over time, stand development processes and biophysical variation, along with

low and mixed-severity disturbances, break up these large patches into a finer quilt of patch types. These new patterns then constrain future fires. Landscape pattern is thus generated from a blend of finer scale, feedback loops of vegetation and disturbance and broad scale events that are driven by extreme climatic events. The result is that mixed conifer, mixed severity systems in the western US appear to have a distribution of patch sizes with many small patches, few medium patches, and very few large patches (a sharply negative exponential or power law distribution). However, the proportion of total area in large patches can be relatively high, especially in the decades following an extreme fire event." Studies indicate that in VRU 2 of the warm/dry biophysical setting patch size from 20-200 acres may be a representative range. In VRUs 4 and 5 of the warm/moist biophysical setting, the patch size may range from 5 to 2,000 acres with a mean of 437 acres (DEIS pages 208-210). All of our units are within this range, provide a variety of sizes on the landscape within this range, are designed to utilize naturally established form, line, color, and texture to soften edges, and are consistent with the disturbance types (mostly wildfire) within the project area.

The FEIS includes a project development section that explains how the landscape was designed to incorporate a mosaic of untreated patches and a variety of treatment types. We will include a summary of it here. As the team began field reconnaissance of the project area in the field season of 2014, they identified areas in need of vegetation management to move forest stands towards a more resilient desired condition in the project area. They focused their attention on the Kilbrennan Ridge, Sears Flats, Yaak Mountain/O'Brien Creek and Kootenai Mountain/Lynx Creek areas in particular because of the Forest Plan desired conditions, existing forest stand conditions and the presence of existing roads that could be used for vegetation management. These areas were also considered because they are in the Wildland Urban Interface (WUI) and outside of Inventoried Roadless Areas (IRAs). The team delineated riparian habitat conservation areas (RHCAs) with buffers ranging from 100-300 feet (as determined by INFISH guidelines retained within the 2015 Forest Plan), and in some cases much larger than 300 feet. The initial areas in need did not include many RHCAs or other water features, so ponds and wetlands were used to design corridors around and between them, where they existed. Many of these areas also included patches dominated by hardwoods. The team then focused on the areas with the highest levels of root disease, as well as existing off-site ponderosa pine stands. For example, the Kilbrennan ridge area was designed to provide wildlife movement corridors through and within the area by excluding Douglas-fir stands with minimal evidence of or effects from root disease. Also, in Alternatives 3 and 4 in the Sears Flats area, an untreated area was left between units 33 and 34 to add to the mosaic and improve wildlife movement. Large, irregularly shaped openings were designed where possible, as the team decided that they would be more effective in providing the following characteristics or features:

- Fewer periods of disturbance to wildlife associated with management activities.
- Better interior and edge habitat for some wildlife species, including migratory birds, western toad, Townsend's big-eared bat, big game and grizzly bear.
- A landscape fuels management strategy with effective barriers to interrupt crown fire spread across the landscape.
- Historic patch sizes across the landscape.
- A combination of forage and cover opportunities for wildlife.
- More acres of western larch, ponderosa pine and western white pine restoration.
- Better economic feasibility by concentrating management.

The team then identified the existing roads on the landscape that would allow for activities to occur while continuing to meet the grizzly bear habitat parameters laid out in the 2015 Forest Plan. As a result, some additional treatments along the East Side Road were identified. The identified areas of need correspond with the jpegs included in your comment and a map of this has been added to the project file.

The 2015 Forest Plan acknowledges that natural processes will play a far greater role than active management in movement toward desired conditions overtime, but also that the application of management actions in appropriate circumstances may be a critical contribution to sustaining the health, diversity, and productivity on the KNF to meet the needs of present and future generations. The DEIS does not discuss an “inevitable ecological catastrophe” but does state that as the forest trends towards the desired conditions, uncharacteristic levels of bark beetles, root disease, and fire intensity, decrease over time. As Frissel and Bayles (1996) pointed out, "ecosystem management should be framed as a conscious experiment with a largely uncertain outcome." Human disturbance has and will continue to alter the ecosystems we work with. The intent of the treatments is to trend the stands towards having a structure, species composition, fuel loadings, and pattern that more closely approximates historical conditions and is also more resistant and resilient towards potential climate change stressors and other disturbances.

***[09, 10] Comment**: The DEIS's concern over an ecological risk due to high connectivity of dense forest is misplaced. A more accurate ecological analysis of the KNF reveals too much fragmentation—not too much connectivity. The DEIS does not view ecological damage through the same lens as it does for vegetative conditions HRVs. Here is a simple list other factors that have been heavily influenced by management, and their HRVs: FACTOR HRV, Road density zero, Noxious weed occurrence zero, Miles of long-term stream channel degradation (“press” disturbance) zero, Culverts zero, Human-induced detrimental soil conditions <1%, Maximum daily decibel level of motorized devices zero, Acres of significantly below HRV snag levels for many decades zero, Roadless extent 100%, Extent of veg. communities affected by exotic grazers (livestock) zero, Extent of veg. communities affected by fire suppression zero.*

Response: HRV is a modern-human concept and used to describe the range of ecological conditions that occurred prior to influences by euro-settlers. The OLY project is responsive to the 2015 Forest Plan and the Forest Service mission.

Forest Vegetation: Management Activities

***[06, 02] Comment**: With that being said, I feel the agency should take any and all opportunities to treat as many acres as possible with-in the project area. As the area contains approx. 67,500 acres with over half the acreage contained with-in the WUI, the agency should prioritize vegetative management actions which reduce fuels while promoting healthy stands of early seral species. The proposed management should also strive to maintain and I or improve both wildlife habitat quality and security as well as address or improve water quality issues.*

Response: These were the some of the same issues used to develop the purpose and need to help move the landscape towards the desired condition (pages 7-8). The OLY projects proposes to treat a maximum of 4,842 acres (Alternative 1 – No Action), which is just over 7% of the total project area and about 86% of those proposed treatments are in the WUI.

[06, 03] Comment: *Furthermore, I realize that there are numerous MA's with-in the project area as well as several dispersed recreation sites. The project should contain management activities which enhance these management areas as well as the recreation sites- both for fire protection as well as site improvement.*

Response: Yes, the project does have treatments proposed in two different MA's. About 90% of the proposed treatments in Alternative 3, the preferred alternative, are within MA6 and 10% are in MA2. All of the proposed treatments are designed to mimic ecological processes, meet the purpose and need of the project, and move these stands to the desired condition. Several areas within the project area were proposed for vegetation treatments because they offer recreational opportunities that could be enhance, restored, or protected by these treatments. Within the vicinity of developed recreation areas such as Yaak Mountain Lookout rental, Yaak River, Kilbrennan Lake Campground, Troy Shooting Range, and Alvord Lake day-use will meet the purpose and need of the project to reduce and/or maintain low fuel conditions in the wildland urban interface. This will increase the defensible space around private property and improve accessibility for emergency responders and the public in the event of a wildfire (DEIS page 325). Additionally, harvest and burning will improve habitat for a variety of wildlife and can improve opportunities for hunting, wildlife viewing, access, and gathering forest products (firewood, mushrooms, huckleberries).

[06, 04] Comment*: I feel that the agency needs to choose the alternative that treats the most acreage and has the most outputs for this entry. If that means requesting permission from the regional forester for regeneration openings over 40 acres - then so be it. If it means management activities (mechanical or nonmechanical) with-in old growth to enhance old growth - then so be it. If it is the right thing to do; active management in meeting the above stated objectives while protecting or enhancing the above named attributes - that should be the agency's chosen alternative.*

Response: The Regional Forester agreed with our proposal and approved our request on 2/9/16. Our proposed treatments in old growth have been carefully considered and analyzed. These treatments have been designed to achieve the desired condition of these stands by being more resistant and resilient to disturbances and stressors while creating characteristic patch sizes on the landscape.

[10, 02] Comment*: First, we support the 626 acres of intermediate harvest and the 385 acres of intermediate/regeneration harvest, as they appear to match the type of treatment we recommend in our guidelines for those specific forest--types. We are generally supportive of forestry practices that create structural diversity within a stand.*
Intermediate harvest with regeneration--type openings is one way to achieve this goal and we

are glad to see it included in the project. We hope to see more of this type of treatment in future projects.

Response: Thank you for your comment. Please refer to the response for Letter 08, Comment 01.

***[10, 06] Comment**: Fifth, KFSC requested the district prescribe winter logging to mitigate soil disturbance and to address the potential spread of weeds in the project area. The district's preferred alternative (alternative 3) most aggressively addresses potential issues related to soil disturbance and we hope this is carried into the final decision. Another positive aspect of the project area are the design features including weed spraying and washing of equipment, however, we see more opportunities to further mitigate soil disturbance and the spread of noxious weeds, which we will discuss later in this letter.*

Response to Soils Disturbance: also see response to Letter 07, Comment 09

Response to noxious weeds: also see response to Letter 07, Comment 09; Letter 09, Comment 112; and Letter 13, Comment 05

***[10, 08] Comment**: Seventh, KFSC asked the district to consider implementation of the KFSC guidelines, which advocate for an ecosystem--based approach to management focusing on landscape--scale restoration and designing treatments to mimic historic patterns of disturbance. The district agreed to use KFSC guidelines in the layout of unit 30. We are grateful for the opportunity and hope to work from this starting point to incorporate the guidelines at a larger scale in future projects.*

Response: As discussed in the past, we are following an ecosystem based approach to management. The Forest Service is a leader in research and implementation of ecosystem based management. The DEIS analysis approach is a similar concept as the KFSC guidelines, the primary difference being the scale. The KFSC guidelines for harvest prescribe vegetative diversity at a very fine scale, while the management proposed in the DEIS focuses on the broad scale.

***[10, 10] Comment**: In addition to the positive aspects of this project, we have some remaining questions and concerns. We hope our description of these can effectively communicate where our group is still struggling, and offer some potential solutions that might move us toward full support of the project. We are open to discussing these challenges with the district and working together to find solutions. We have some questions about the long--term vision for what the treated stands in this project will look like 25--50 years from now and how this project plans for long-- term forest health and diversity. There is a good description of the desired condition and the proposed treatment, but how will the district get from start to finish? Is there a plan for re--entry into these stands? What would that look like? As the project currently exists, the treatments will create many two--storied stands, but there is an opportunity either by re--entering these stands at a later date, or choosing a more selective type of harvest, to create more diverse, multi--structural stands in the forest. Where wildfire is*

a concern, a shaded fuel break could be included in those stands where a real threat to private property exists.

Response: To address your concerns, we encourage you to consider forest dynamics and the purpose and need for the project. Forest dynamics is the development of stands through time, including stand structure and stand behavior during and after disturbances. In the short term, the intent is to decrease stand densities, rejuvenate understory vegetation (promote forage), increase the number of acres in the seedling/sapling size class, and in some stands underburn to help restore fire's role on the landscape in order to achieve some of the desired conditions that will meet the purpose and need. Throughout time, these stands will achieve different aspects of the purpose and need. For example, ponderosa pine, western larch, and western white pine will be established and the desired species composition will be moving toward the desired condition to help meet the purpose and need. From past experience in this area, we expect the proposed regeneration harvest units to be fully stocked within 5 years (DEIS page 240). Wildlife cover would be achieved in about 15 years (DEIS pages 480-481) and about 80 percent of hydrologic recovery is expected within 50 years on most sites within the project area (DEIS page 419). Specific to the individual units, a silviculturist followed the policies and procedures detailed in the Forest Service Manual (FSM 2400 Chapter 2470- Silvicultural Practices) in developing individual prescriptions for each unit. Prior to initiating any treatment, silvicultural examinations, diagnosis of treatment needs, and the preparation of prescriptions detailing the methods, techniques, and timing of the silvicultural activities necessary to achieve established objectives are required. These prescriptions are objectives driven and a "target stand" (desired condition) is developed for each successional stage, which on the KNF is 100-120 years, based on those objectives. This means that the prescription contains all of the foreseeable and predicted future treatments that the stand will require in order to meet that target stand in 100-120 years. These future prescriptions could be a variety of treatments, but all regeneration units will have precommercial thinning exams scheduled to assess stand conditions at that time (this could mean putting shaded fuel breaks in if deemed necessary). We acknowledge that managing the forest for multiple resources while attempting to emulate natural processes does not result in one correct solution. As Frissel and Bayles (1996) pointed out, "ecosystem management should be framed as a conscious experiment with a largely uncertain outcome." Human disturbance has and will continue to alter the ecosystems we work with. Taking action carries risk and taking no action carries risk. The intent of the treatments is to trend the stands towards having a structure, species composition, fuel loadings, and pattern that more closely approximates historical conditions and is also more resistant and resilient towards potential climate change stressors and other disturbances. Creation of multi-structural stands (uneven-aged management) was not a common occurrence in these biophysical settings historically. Stand replacing fires were the dominant disturbance process that created single or 2 age classes. In addition, uneven-age management favors shade tolerant and root disease susceptible trees, requires frequent and continual entries for harvest which impacts wildlife security, economics, and soil disturbance.

***[12, 02] Comment**: As per suggested by YVFC, I support:*
Splitting unit 61 into two units - 61 and 61a with an untreated area in between to break up and soften the area between these units and the Saddle Mtn. roadless area.

Response: Thank you for your comment.

***[12, 05] Comment**: As per suggested by YVFC, I support: It would be nice if you could leave extra trees between unit 62 and the IRA boundary to break up and soften the boundary line.*

Response: Please see response to Letter 10, Comment 03. There are no proposed harvest units within the IRA. Unit 62 is a regeneration unit with a seed tree cut with reserves prescribed. DEIS page 33 describes that 10-25 quality trees per acre will remain, plus snags and snag replacement trees where they exist. Treatments adjacent to IRA boundaries do not require a buffer.

***[12, 08] Comment**: And how about more interest by the district in a long-term vision for the project - will future generations be looking at overgrown thickets of even aged stands such as I often see when I'm out and about in the heavily logged areas of the 70's and 80's?*

Response: Please see response to Letter 10, Comment 10.

***[12, 10] Comment**: I am not opposed to logging - just would like to see it be more selective, with end results of how the forest is left after the logging being a top priority in setting up the project.*

Response: Please see response to Letter 10, Comment 10. Forest management is a long term commitment for long lived organisms. Selective logging in many of the sites proposed for regeneration harvest would result in stand conditions outside of historic and desired conditions. The vegetation section in the DEIS describes some of the conditions that have resulted from selective harvest.

***[13, 06] Comment**: Furthermore, there seems to be only a brief discussion of the negative effects of the off-site ponderosa pine seed source in the DEIS. We have read in the EIS and also seen first hand in the field that some units are experiencing mortality and others contain healthy trees. We are interested in learning more about your plans to treat these stands. Perhaps you could direct us toward the scientific studies that exist that provide direction on how to best address Ponderosa pine trees from off-site seed sources in the Rocky Mountains?*

Response: Please see response to Letter 08, Comment 05. The following resources pertain to off-site plantations and have been added to the project file:

Erickson, B.; Burwasser, J.; Gibson K. 2006. Reducing mountain pine beetle-caused mortality in Ponderosa pine plantations: A risk-rating system for Western Montana. USDA Forest Service, Forest Health Protection, Numbered Report 06-10. 12p.

Harrington, T.C., and M.J. Wingfield. 1998. Diseases and the ecology of indigenous and exotic pines. Pp. 381-404. In: D. Richardson, ed. Ecology and Biogeography of Pinus. Cambridge University Press.

Johnson, GR; Sorensen, Frank C; St Clair, J Bradley; Cronn, Richard C. 2004. Pacific Northwest forest tree seed zones: a template for native plants? Native Plants: 131-140.

Lockman, B. 2014 Root Disease in the OLY Project Area, Three Rivers RD, Kootenai NF. MFO-TR-14-36. Missoula, MT: U.S. Department of Agriculture, Forest Service, Northern Region, Forest Health Protection. 4p.

Lockman, B. and Sturdevant, N. 2011. Root disease and bark beetles in off-site ponderosa pine at Troy shooting range. TR-05-05. Missoula, MT: U.S. Department of Agriculture, Forest Service, Northern Region, Forest Health Protection. 3p.

***[16, 05] Comment**: (2) Feather the edges of all cuts, no matter what variety. Nature does not do straight lines; neither should you.*

Response: The visual aspect of management activities was analyzed for the Lower Yaak, O'Brien and Sheep (OLY) project. An effort is made to avoid geomtric shapes and straight lines where practical.

• Page 334 of DEIS says, "Harvest unit design would utilize naturally established form, line, color, and texture to soften edges which would create more of a blended mosaic rather than a patchwork of straight edges, which would be consistent with the SIO of high in eligible scenic river segments. Management activities after 5 years would not be apparent."

• Page 338 of DEIS says, "The shapes of these openings would mimic the natural ridgelines and natural openings already present on the landscape. By tying into existing openings and topographical breaks, the edges of the openings would be less noticeable."

• Page 344 of DEIS says, " …harvest units and prescribed burning would have short-term (1 to 3 year) effects on scenic resources, but the harvest unit layout design criteria and project contribution to trending the landscape toward desired conditions for forest composition, structure, and pattern (see Forest Vegetation Section of DEIS) would be consistent with all 2015 Forest Plan Scenic Integrity Objectives. This contributes to progress toward achieving the FW-DC-AR-02 and meets the intent of guidelines: FW-GDL-AR-01, MA2-GDL-AR-07, MA6-GDL-AR-05, MA5a,b,c-GDL-AR-06."

***[16, 06] Comment**: (3) Winter log practically everything.*

Response: Winter logging is currently proposed for certain units with historic properties and/or soils concerns (See Design Features in the OLY DEIS). However, winter logging does not necessarily equate to resource protection, and winter logging every unit within the OLY project area is not practical. For example, within the OLY project area, some proposed units in lower elevations do not always receive frozen ground or a deep enough snow layer, and summer logging may better protect resources. Also, a deep snow layer does not guarantee resource protection because an early season, thick layer of snow can insulate the soil and prevent it from freezing. Winter logging can be permitted upon purchaser request. This would be reviewed to determine if the winter conditions for a specific area actually would protect resources via winter logging. Please also see responses to Letter 12, Comment 07 and Letter 13, Comment 04.

General Background or Closing

Response: Any general background / closing information that a commenter provided about themselves or their agency, and which did not contain a comment were placed in this category. NOTE: Contextual information provided with a comment was not considered as general background information – that information was included as part of the comment.

General background information not requiring a comment included [Letter number, Comment number]: [06, 01], [06, 09], [07, 01], [07, 12], [08, 18], [09, 01], [09, 90], [10, 01], [10, 16], [13, 01], [14, 01], [14, 10], [16, 01].

General Comment

> ***[01, 01] Comment**: i am totally oppose to us open space being used by sheep grazerrw. firs ot flall they bring disease to the area. secondly, they pay low low rates for use of our national land. none of it ever gets to the us treasury. they should be on private land and pay competitive rates. the taxpayers are tired of them leaching on us. we want that land open space for wildife. too much land is being taken from wildlife. let these sheep profiteers rent land from other montana private owners of land and pay. it will help the economy in montana instead of them leaching for low rates from national taxpoaeyrs, representing a drag on us. we are tired of their leachuing. throw them off gthe national land. this comment is for th epublic record. we are sick and tired of the way these sheep profiteers want all natural wildife killed when they move int. they are not good tenants on our national land. tjhey are killersr who want to kill everything that is noit connected to their profits. that is evil. this comment is for th epubic rtecord. that is malevolent. that is malignant to this nation.*

Response: The OLY project does not proposed sheep grazaing. The full project name is Lower Yaak, O'Brien, Sheep project and is derived from the three planning subunits, or portions thereof, included in the project area. The Sheep Planning Subunit is named for the population of wild bighorn sheep that live there.

> ***[05, 03] Comment**: Replacing the culvert on our access to pulpit NFSR 4433 is a wise choice, thank you for making that decision.*

Response: Thank you for your comment.

> ***[07, 02] Comment**: I'm concerned about protecting the Yaak's roadless areas and grizzly habitat, including recovering endangered species, and reducing the spread of invasive species of weeds as well.*

Response: Grizzly Bear and recovering endangered species: We are adhering to the 2015 Forest Plan Goals, Objectives, Standards, Guidelines and Desired Conditions to maintain habitat security parameters for animals such as grizzly bear, lynx, bull trout, as well as sensitive species such as Coeur d'Alene Salamander, western toad, wolverine, Townsend's big-eared bat, black-backed woodpecker and others. For example: FW-STD-WL-02. The Motorized Access Management

within the Selkirk and Cabinet Yaak Grizzly Bear Recovery Zone Management Direction and ROD is included in appendix B, and shall be applied; 2015 Forest Plan Guideline: FW-GDL-WL-01. Grizzly Bear. Management activities should avoid or minimize disturbance in areas of predicted denning habitat during spring emergence (April 1 through May 1); and 2015 Forest Plan Desired Conditions: FW-DC-WL-04. All grizzly BMUs have low levels of disturbance to facilitate denning activities, spring use, limit displacement, and reduce human/bear conflicts and potential bear mortality. Spring, summer, and fall forage is available for the grizzly bear; and FW-DC-WL-05. Recovery of the grizzly bear is promoted by motorized access management within the KNF portion of the Cabinet-Yaak recovery zones. By anhering to these parameters we are maintaining grizzly bear Core and maintaining habitat security parameters. The OLY project would also adhere to Forest Plan guidance for plant species and old growth.

Roadless Areas: There is no harvest within any Inventoried Roadless Area within the OLY Project. Also see response to Letter 10, Comment 03.

Noxious Weeds: The OLY project will adhere to Desired Condiitions for the Yaak and Bull Geographic Areas: GA-DC-VEG-YAK-03 and GA-DC-VEG-BUL-03. Populations of new noxious weed species are treated promptly and eradicated. Established noxious weed infestations are reduced and habitat conditions are improved for native grasses, forbs, and shrubs. Private, county, state, and federal organizations work cooperatively to prevent, control, and manage noxious weed infestations. Also see response to Letter 07, Comment 09.

***[11, 01] Comment**: I agree with forest council on this issue. Thank you for your time*

Response: It is unclear which issue is being referred to. However, see the Response to Comments for Letter 13, Comments 2-7 for responses to the comments from the Yaak Valley Forest Council.

***[12, 01] Comment**: I'd like to comment on the OLY project. I've not spent much time in this area with just an occasional drive through on FS roads and one visit to Alvord Lake - a very special place in my opinion. But I care a lot about how the Kootenai is managed in general and I support the work of the Yaak Valley Forest Council so my comments will tend to follow their recommendations. It's important to me to see management practices on the Kootenai focus on what's left behind as far as healthy condition of trees, soil - especially with regard to compaction, water quality, wildlife habitat and the overall connectivity of the forest ecosystem. I think it's important to protect the wild traits of roadless areas, grizzly as well as other sensitive species habitat, wildlife security along open roads, appropriate amount of snag retention for resident species, and control of noxious weeds.*

Response: Please see response to Letter 07, Comment 02.

***[12, 07] Comment**: I also agree and would encourage the district to take measures to address the problems of noxious weeds and soil disturbance such as using winter logging and changing unit 61a from summer tractor to winter tractor.*

Response: Please see response to Letter 07, Comment 02.

Unit 61A may be winter logged at the discretion of the contractor. The OLY project area receives a short winter season. If prescribed winter logging occurred on wet soils, rather than frozen ground, the amount of disturbance could actually be more than logging on dry ground in the summer. Therefore the amount of mandatory winter logging prescribed was minimized. Should good winter conditions occur, the purchaser may take advantage of them on any other harvest unit in the project area.

Noxious Weeds Response: Measures to reduce the spread of weeds are found in the design features for the project on DEIS page 77. Measures to protect soils are included in the DEIS on pages 78 and 79. Protection of soil is important to future land productivity and has been incorporated into the project. Minimization of weed spread has also been an important consideration in project design.

***[14, 07] Comment**: The EPA compliments the USFS on the detailed information provided in the Design Features and Unit Specific Design Feature Table in Chapter 2 (pages 75-82), the Best Management Practices (BMPs) included in Appendix B, and the Monitoring Plan included in Appendix G. The clear and thorough compilations of these measures to avoid or minimize potential impacts to resources from this project outlined in the Draft EIS greatly assist the reader in understanding the layers of protection committed to by the USFS.*

Response: Thank you for your comment.

***[17, 01] Comment**: Montana Fish, Wildlife & Parks (FWP) Wildlife Department has no additional comment with regard to the Lower Yaak, O'Brien, Sheep (OLY) Project Draft Environmental Impact Statement. FWP Fisheries Department will work with USFS and Three Rivers Ranger District as individual projects arise. Thank you for the opportunity to comment.*

Response: Thank you for your comment.

Implementation/Funding

***[09, 103] Comment**: At p. 88 the DEIS identifies Funding Dependent Resource Improvement Work, stating, "The following activities are not required project design features or mitigation for project activities. These activities have been designed to improve existing resource conditions. Implementation of these activities is dependent upon available funding. (Emphasis added.) These include:*
• Surveys of old growth
• After landing piles have been burned, landing sites will be restored by decompaction and spreading of duff and slash.
• Spray noxious weeds in areas where their concentrations occur
The list is long, and in many cases such as the three quoted, the DEIS states or implies that the actions MUST be implemented in order to insure RFP compliance. The FS needs to straighten out the project and the EIS.

Response: Some of the items listed within the Funding Dependent Resource Improvement Work section on page 88 of the DEIS are additions to ongoing activities. For example old growth surveys and control of noxious weeds have occurred within the OLY project area. The Old Growth section of the DEIS, page 282, states, “”Old-Growth Forest Types of the Western Montana Zone” was used as the criteria to identify stands that may qualify as old growth habitat (Green and others 1992, corrected 12/2011 pp. 25-32). Data sources to identify old growth stands include District files and surveys, R1 summary database old growth reports, the Kootenai National Forest old growth GIS layer which was developed from stand-level old growth inventory that was aggregated and summarized at the Forest scale, and the Forest Inventory and Analysis (FIA) data which collects and reports data at the Forest scale. The most current information and data for old growth are displayed in this analysis.” Also, Table 76, pages 257-259 displays the past herbicide treatments for noxious weeds, and Table 77, pages 259-260, displays the biological control agents used to treat noxious weeds in the OLY project area. Post treatment old growth surveys and additional noxious weed spraying, in addition to what has occurred, were listed in the “Funding Dependent” section.

Additional work, including post-treatment old growth surveys, additional noxious weed spraying, and landing restoration, can be completed if additional funds are secured through the Knutson Vandenberg Act (KV funds) within the project area. To secure these funds, such projects must be listed for KV funding in the NEPA document.

Inventoried Roadless Areas (IRA)

> ***[07, 03] Comment**: I support splitting unit 61 into two units – 61 and 61a with untreated area in between to break up and soften the area between these units and the Saddle Mountain roadless area.*

Response: See response to Letter 10, Comment 03.

> ***[08, 14] Comment**: ..... The proximity of these proposed units to the inventoried roadless areas remains a highest concern to me, as well, from viewshed matters as well as safeguarding the greater ecological integrity—indeed, the closest thing we have to baseline values—in the Yaak. In my view, the risk is certainly not worth the prescription here. You can’t put a view back together after it’s gone, and, indeed, it’s hard to put a forest back together, after it’s been clearcut, behind a satisfactory screen or not.*

Response: The Flagstaff and Saddle Mountain Inventoried Roadless Areas (IRA) within the OLY project boundary were analyzed by the various resources. No harvest will occur within Inventoried Roadless, however ten harvest units are in the proximity of the Saddle Mountain IRA boundary. As stated within the IRA Effects Analysis of the OLY DEIS on page 277, "The project file contains Google Map images with Saddle Mountain IRA overlay mapping and IRA validation letters. None of the above units are within the Saddle Mountain IRA roadless expanse and are not discussed in detail. This project does not propose any new road construction or road reconstruction in the roadless expanse. None of the action alternatives would be non-compliant with the Roadless Area Conservation Rule which establishes prohibitions on road construction and road reconstruction in IRAs on National Forest System lands."

In the 1980s the KNF began development of a land and resources plan, which included the evaluation of roadless areas. The 1987 KNF Plan EIS, Appendix C Volume 1 & 2, included 32 inventoried roadless areas (IRAs). These inventories were updated and other unroaded areas were evaluated for potential wilderness as part of the forest plan revision efforts in 1999. The 1999 evaluation resulted in an increase in the number of potential wilderness inventory areas by 11, and an increase in acres by 235,870, from the 1987 Forest Plan. The Saddle Mountain #168 Roadless Area was validated on November 30, 1999. Because of new technology (digital ortho quads) and updated stand information, some refinements to the boundary of this roadless area have been made. Several harvest units were taken out of the roadless area, and several areas shown to be unroaded were added in (Saddle Mountain Validation letter-project file).

For National System lands in Montana, Inventoried Roadless Areas, are those mapped under the 2001 Roadless Area Conservation Rule (RACR). These areas are also identified in Appendix C of the FEIS for the 2015 KNF Forest Plan (USDA FS 2013). The DEIS p.277 states, “The project file contains Google Map images with Saddle Mountain IRA overlay mapping and IRA validation letters.” None of the mentioned units are within the Saddle Mountain IRA and are not discussed in detail. This project does not propose any new road construction or road reconstruction in IRAs. All action alternatives would be compliant with the RACR which establishes prohibitions on road construction and road reconstruction in IRAs on National Forest System lands. DEIS page 31-34 describes the silvicultural prescription for units 61, 61a, and 62. The project file also has images of units 61, 61a and 62 and their proximity to Saddle Mountain IRA.

Evidence of past timber harvest (skid roads) is evident in these images of units 61, 61a and 62 (see Figure 1 Inventoried Roadless Response to Comments). DEIS page 273 describes the wilderness attributes and roadless characteristics crosswalk and can help explain why this area was excluded in the Saddle Mountain IRA.

Also see response to Letter 08, Comment 13 and Letter 10, Comment 03.

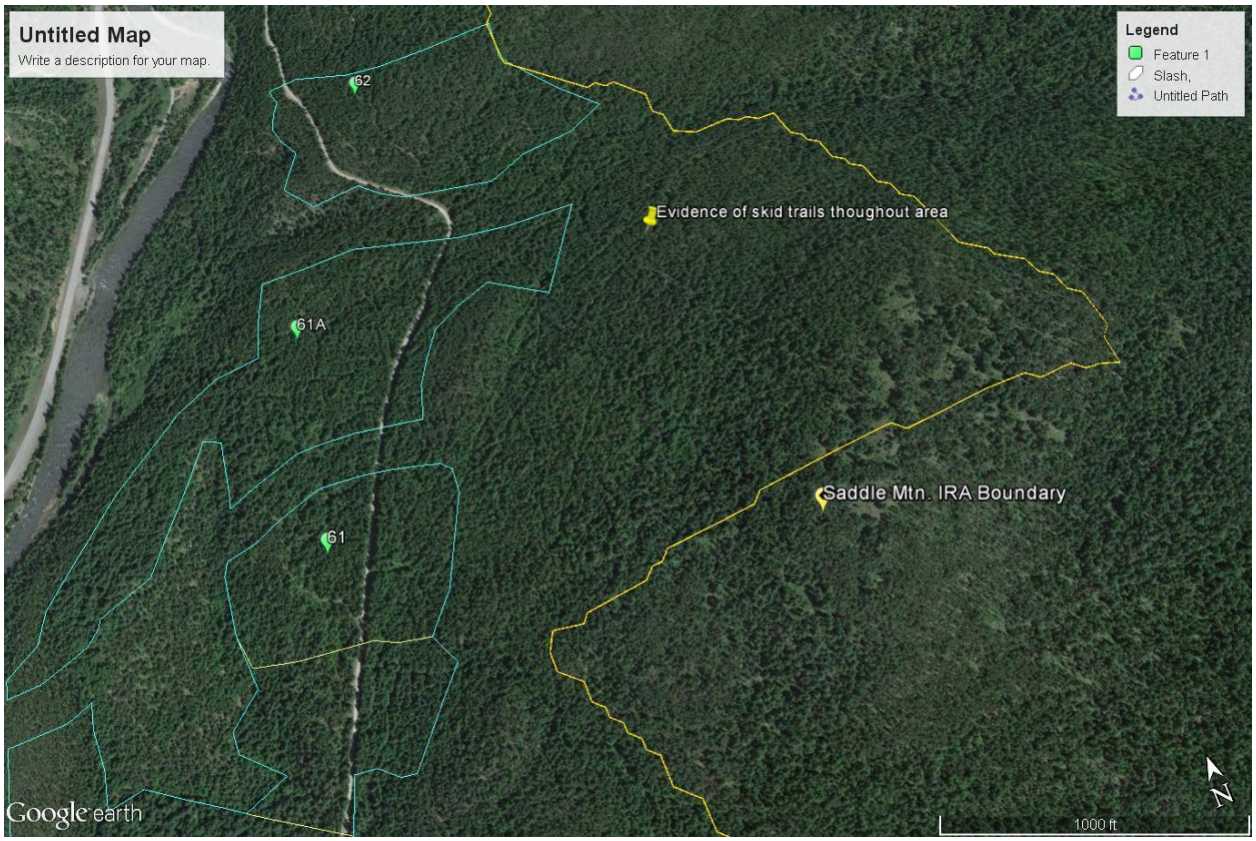

Figure 1 Inventoried Roadless Area Response to Comments: Saddle Mountain IRA Boundary in Relation to Harvest Units

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[09, 42] Comment*: The DEIS states that no logging would occur in the inventoried roadless areas, uninventoried roadless or "roadless expanse." However, the maps are not clear enough to verify. The DEIS does not analyze whether any land contiguous to the roadless area is indeed roadless. Since many logging units border the roadless area, the on-the-ground situation is what determines roadless nature of an area, not past analyses or documents or faulty inventories.*

Response: See Response to Letter 10, Comment 03.

[09, 43] Comment*: The DEIS does not provide an adequate analysis showing that prescribed burning in the roadless area is responding to any existing ecological need.*

Response: MA5a, b, c - GDL-FIRE-01. Natural, unplanned ignitions, as well as planned ignitions, may be used to meet resource objectives.

There is one prescribed burn Fuels Unit (F1), totaling 172 acres, in Alternatives 2, 3, and 4 within the Saddle Mountain IRA and no prescribed burning proposed in the Flagstaff IRA.

Unit F1 is a higher elevation treatment. Forage and berry production is reduced due to tree canopy closure, re-vegetation encroachment, lack of fire, and /or browse pressure. The proposed treatment will be implemented using aerial and/or hand ignition which will create a mixed severity fire. The timeframe for this treatment will be spring or late summer/fall.

The objective of this proposed burn is to reintroduce fire on the landscape, maintain existing open conditions; stimulate forage/browse reproduction for big game and other wildlife species; and improve huckleberry production in higher elevation locations, where present, thus benefitting grizzly bear recovery efforts. (page 277 DEIS).

> ***[10, 03] Comment****: Second, we asked the district to include design features in units near the Saddle Mountain roadless area to break up and soften the border between treated areas and the roadless area boundary. KFSC and members of the ID team visited unit 61 near the boundary of Saddle IRA and identified an area where the unit could be designed to protect the RHCA and leave more trees near the roadless area boundary. We are pleased to see this unit was split into 2 smaller units, now 61 and 61a, with an untreated area in between, to accomplish this. We wonder if any similar actions could be taken in unit 62, which runs all the way up to the IRA boundary.*

Response: The KNF Forest Plan FEIS says the following: "Inventoried roadless areas (IRAs) are undeveloped areas typically exceeding 5,000 acres that meet the minimum criteria for wilderness consideration under the Wilderness Act. Roadless area inventories have been completed during the Roadless Area Resource Evaluations of 1972 (RARE I), 1979 (RARE II), 1987 KNF Plan EIS, appendix C, and 2001 Roadless Area Conservation Rule" (KNF Forest Plan FEIS page 442). In the 1980s the KNF began development of a land and resources plan, which included the evaluation of roadless areas. The 1987 KNF Plan EIS, appendix C Volume 1 & 2, included 32 inventoried roadless areas (IRAs). These inventories were updated and other unroaded areas were evaluated for potential wilderness as part of the forest plan revision efforts in 1999. Areas identified through the 1999 inventory process are potential wilderness inventory. The 1999 evaluation resulted in an increase in the number of potential wilderness inventory areas by 11, and increase in acres by 235,870, from the 1987 Forest Plan. The Saddle Mountain #168 Roadless Area was validated November 30, 1999. Its boundary was located along natural features and excluded areas with roads, past harvest locations and areas with skid trails.

Because of new technology (digital ortho quads) and updated stand information from Ranger Districts, some refinements to the boundary of this roadless area have been made. Several existing harvest units were taken out of the roadless area, and several areas shown to be unroaded were added in (Saddle Mountain Validation letter-project file). Inventoried Roadless Areas on National Forest System lands in Montana are those mapped under the 2001 Roadless Area Conservation Rule (RACR). These areas are also identified in Appendix C of the FEIS for the 2015 KNF Forest Plan (USDA FS 2013). The 2001 Roadless Rule was the subject of litigation in multiple jurisdictions. Ultimately, the rule was upheld (2012), DEIS page 277. Thus the boundary of the Saddle Mountain #168 Roadless area has been upheld. The project file contains Google Map images with Saddle Mountain IRA overlay mapping and IRA validation letters. Also found in the project file is the Saddle Mountain Boundary Map (saddleHPSC0184.pdf) which shows the IRA's boundary location rationale by color coding; for example, yellow boundary line depicts harvest units; red depicts private; brown depicts roads buffered 50 feet from center.

None of the mentioned harvest units are within the Saddle Mountain IRA and are not discussed in detail. This project does not propose any new road construction or road reconstruction in the roadless expanse. The action alternatives would be compliant with the RACR which establishes prohibitions on road construction and road reconstruction in IRAs on National Forest System lands. DEIS pages 31-34 describes the silvicultural prescription for units 61, 61a, and 62.

The project file contains images of units 61, 61a and 62 and their proximity to Saddle Mountain IRA.

Past timber harvest (skid roads) is evident in these images of units 61, 61a and 62 (see Figure 1 Inventoried Roadless Response to Comments under response to Letter 08, Comment 14). Page 273 of the DEIS describes the wilderness attributes and roadless characteristics crosswalk and can help explain why this area was excluded in the RACR.

Methodology: Data, Analysis and Modeling

> ***[09, 107] Comment****: The DEIS describes its cumulative effects analysis methodology:*
> *In order to understand the contribution of past actions to the cumulative effects of the proposed action and alternatives, this analysis relies to a large extent on an examination of the current environmental conditions in order to highlight the impacts of past actions. This method is useful because existing conditions reflect the aggregate impact of all prior human actions and natural events that have affected the environment and might contribute to cumulative effects.*
> *The problem with methodology is that the DEIS analyses aren't actually based upon enough data to satisfy NEPA. There are, for example, no numbers presented on important habitat components for wildlife in previously logged areas. This includes components for which there are RFP requirements such as snags, down wood (also important for long-term soil productivity), as well as other habitat needs specific to Species of Concern. There are also no estimates for DSD conditions outside of proposed treatment units.*

Response: Analysis for DSD is not required outside activity area. Desired conditions for snags and down wood are included in the revised Forest Plan. A forest-wide guideline (FW-GDL-VEG-04, 2015 Forest Plan) sets goals for snags to be left during vegetation management, but also allows for retention to be met through leaving live trees and allows for exceptions; it states "Vegetation management activities should retain snags greater than 20 inches DBH and at least the minimum number of snags and live trees (for future snags) that are displayed in table 4. Where snag numbers do not exist to meet the recommended ranges, the difference would be made up with live replacement trees. Exceptions occur for issues such as human safety and instances where the minimum numbers are not present prior to the management activities." Levels of snags within any given area are in constant fluctuation due to the fact that dead trees fall down and live trees die. The application of vegetation management, including fire, in the project area, will result in the creation of additional snags. There is no requirement for a specific number of snags per acre in the Forest Plan. Snag and downed wood existing condition are found in the DEIS on pages 212 to 214. Page 219 of the DEIS explains: "Prescribed fire would be used to promote the growth and development of large trees and snags; as well as provide forage and snag habitat in a mosaic pattern with areas of cover (FW-DC-VEG-07, FW-DC-VEG-08)." [Paragraph break] Further, the forest vegetation analysis shows that the no action alternative would lead to a reduction of snags and course woody debris: "Snags and coarse woody debris would continue at current levels in the

short-term. However, with continued fire suppression and lack of active management, the indirect effects of this alternative would include a loss of preferred snag species, such as western larch, and the potential spread of more severe fires would result in an abundance of snags initially, but would fall within 20 years (Bull 1997, Morrison and Raphael 1993, Harris 1999, Russell et al. 2006) with little recruitment of new snags for several years. CWD would follow a similar pattern as a loss in snags reduces the future recruitment of large diameter CWD. Without a reduction of the dense understory, the development of large diameter trees would continue to decline. Also, if a high severity fire occurs due to the uncharacteristic fuels conditions then much of the existing CWD would either be consumed by the fires or altered to a condition less usable by wildlife."

With respect to soil DSD measuremenets, the DEIS, page 348, states the following: "The direct and indirect effects of the alternatives will focus on individual soils analysis which equates to activity area as defined by the Forest Service Manual (R-1 Supplement No. 2500-2014-1):

“Activity Area: A land area affected by a management activity to which soil quality standards are applied. Activity areas must be feasible to monitor and include harvest units within timber sale areas, prescribed burn areas, and grazing areas or pastures within range allotments, riparian areas, recreation areas, and alpine areas. All temporary roads, skid trails, and landings are considered to be part of an activity area.”

The soil activity area (analysis area) is limited to the unit and temporary roads. The proposed soil analysis area for this project involves timber harvest, piling, fuel treatments, fire line construction, skid trails, landings, both new and temporary road construction, and road decommissioning and storage, and post-harvest activities. System roads, and newly constructed roads that would become National Forest System roads, are not a part of the soils analysis areas because they have been removed from production. Similarly, system trails have been removed from the productive land base as well." Thus the dirction for measuring soil DSD clearly states the measurement should take place within the activity area.

***[09, 108] Comment**: The DEIS also does not present adequate analysis of the 11,500 acres proposed for thinning in the foreseeable Forestwide Young Growth Vegetation Management project.*

Response: As stated in the DEIS page 102, "The KNF has scoped for public input concerning young growth vegetation management forestwide across approximately 400,000 acres of previously managed stands, originating after 1969. This broad-scale, adaptive management project would authorize site-specific treatments based on minimum stand characteristic criteria and environmental thresholds to meet 2015 Forest Plan direction and avoid adverse impacts to threatened and endangered species and to sensitive areas. Within the OLY project area, approximately 11,500 acres met the initial stand age and resource protection screens, indicating they may be candidates for commercial or pre-commercial thinning in the next 10 to 15 years under the Forestwide Young Growth project.

During the development of the OLY proposed action, all opportunities that appeared to be candidates for treatment were considered and included either in the proposed action or in project alternatives. This would preclude any Young Growth Project treatments in the OLY vicinity in the near term. However, should OLY project area stands reach the Young Growth Project stand criteria age and structure in the next 5 to 15 years, the Young Growth Project design criteria would include consideration of OLY project activities as the environmental baseline when

determining whether the site-specific treatments were within the required resource protection thresholds. At the time a site-specific treatment is proposed in the OLY project area under the Young Growth decision, the potential cumulative effects of that project with the OLY project activities will be described, analyzed, and considered. Activities with adverse cumulative effects will not proceed.

No specific activities relating to the Young Growth project are proposed in the OLY project area. Therefore, no analysis of specific cumulative effects can be done, and must be completed at the time that specific projects are proposed.

***[09, 12] Comment**: Many of the DEIS's analyses rely upon the use of models. The reliability of all the data used as input for the models used for the analyses is not disclosed. There's the potential for garbage in, garbage out. Also, the validity of the models utilized in the DEIS's analyses have not been established for how the FS utilizes them. No studies are cited which establish their validity, and no independent expert peer review process of the models was cited. Just like the use of "resilience," the models used by DEIS analyses stand without adequate scientific support. Nothing in the DEIS indicates the FS has undertaken the process of a Science Consistency Review for the RFP or for the OLY Project, or for any other planning effort regarding the KNF for that matter. The FS prepared Guldin et al. (2003) which: ...outlines a process called the science consistency review, which can be used to evaluate the use of scientific information in land management decisions. Developed with specific reference to land management decisions in the U.S. Department of Agriculture Forest Service, the process involves assembling a team of reviewers under a review administrator to constructively criticize draft analysis and decision documents. Reviews are then forwarded to the responsible official, whose team of technical experts may revise the draft documents in response to reviewer concerns. The process is designed to proceed iteratively until reviewers are satisfied that key elements are consistent with available scientific information.*

Response: DEIS page 163. The limitations of the IMPLAN modeling system are discussed on page 163 of the DEIS stating, "Potential limitations of these estimates are the time lag in IMPLAN data and the data intensive nature of the input-output model. Changes in economic sectors since the latest data for IMPLAN have been adjusted using information from the University of Montana's Bureau of Business and Economic Research."

DEIS page 202 states, "None of the alternatives can influence the time and place where ignitions may occur. Wildland fire is a natural, ongoing process whose time and location can never be precisely predicted by fire behavior science. There would still be untreated areas of high fuel accumulations that could lead to high-intensity fires. Blowdown, insect and disease mortality, and other causes of fuel accumulation would likely continue in the analysis area. However, treated stands would help reduce fire effects."

DEIS page 216 states, "The most recent stand exam data available is from 1999 and before. By using field data, knowledge of existing condition, and professional resource judgement, the information used was reviewed and deemed to be still valid. Also, size class estimates on some Forest Service and non-Forest Service stands were estimated using Google Earth Imagery, stand origin data, existing data on stands in the vicinity, and the judgement of the silviculturist trainee."

DEIS pages 351-352 discuss "Assumptions and Limitations, and Limitations and Scientific Uncertainty" in the Soils section.

DEIS pages 417-418 discuss Limitations and Scientific Uncertainty in the Water Resource section.

DEIS page 445, 514, 539, 558, 575, 587, 623, 644, 660, 676, 698, 710, 733, 748: disclose the Assumptions and Limitations for various wildlife species effects analysis.

The Forest Vegetation Simulator (FVS) growth models were mentioned on page 199 of the DEIS, but FVS was not specifically used for the OLY analysis.

Fuel Models are mentioned numerous times in the Fire and Fuels section of the EIS, however these "models" are not mathematical relationships such as the BehavePlus Fire Behavior Model. Fuel Models are input values such as fuel load, fuelbed depth and dead fuel moisture of extinction. The project file contains documents relating to fuel models: Albini_Baughman_1979.pdf; Heinsch_Andrews_2010.pdf; Rothermel_1983.pdf; and Scott_Burgan_2005.pdf.

BehavePlus SURFACE model include assumptions of a homogeneous and continuous fuel bed, the fire is at steady state, fire behavior is only considered in the flaming front (i.e., smoldering is not considered), and fine fuels drive fire behavior. The CROWN component of BehavePlus assumes a 20-foot wind speed and uniform surface fuel moisture. Andrews 2014 states, “The model for crown fire rate of spread is a simple correlation based on seven crown fires (Rothermel 1991). The inputs are only 20-ft wind speed and surface fuel moisture. The model does not utilise a description of either the surface or the crown fuels. It was designed to predict an average crown fire spread rate over several hours. Andrews 2014, also states, “Due to the many influencing factors and unknowns in crown fire behavior, the results in CROWN are not to be taken as predictions. Rather these calculations are useful in considering the possibility of extreme fire behavior under low-wind conditions.”

Response to Data Reliability:

DEIS page 192 states, "Fuel models, canopy base heights, and canopy bulk densities for the OLY analysis area were verified with ground reconnaissance and/or aerial photos."

DEIS page 216 states, "The most recent stand exam data available is from 1999 and before. By using field data, knowledge of existing condition, and professional resource judgement, the information used was reviewed and deemed to be still valid. Also, size class estimates on some Forest Service and non-Forest Service stands were estimated using Google Earth Imagery, stand origin data, existing data on stands in the vicinity, and the judgement of the silviculturist trainee."

Also please see response to Letter 09, Comment 07 regarding the reliability of stand data in the FSVeg database.

***[09, 54] Comment**:*

{A} Schultz (2010) provides a critique of Forest Service wildlife analyses, including use of the Sampson analyses the FS relies upon for viability assurances. Schultz (2010) states that the Sampson assessment “suffers from several problems, the most prominent being that the analysis is based on habitat availability, which alone is insufficient for understanding the status of populations (Noon et al. 2003, Mills 2007)”. Schultz (2010) recommendations generally call for more peer review of large-scale assessments and project level management

guidelines, and to adopt more robust scientifically sound monitoring and measurable objectives and thresholds if maintaining viable populations of all native and desirable non-native wildlife species is to be accomplished. The Sampson assessment focuses on short-term viability and long-term viability, and did not evaluate long-term viability for the fisher and marten, but it did do so for the goshawk, pileated woodpecker, flammulated owl and black-backed woodpecker. Sampson concluded that "In regard to long-term viability, this conservation assessment has found that long-term habitat conditions in terms of Representativeness, Redundancy, and Resiliency are "low" for all species." Sampson also admits that "Methods to estimate canopy closure, forest structure, and dominant forest type may differ among the studies referred to in this assessment and from those used by the Forest Service to estimate these habitat characteristics" and that "FIA sample points affected within the prior 10 years by either timber harvest or fire are excluded in the estimates of habitat for the four species" and finally that "FIA does not adequately sample rare habitats". This especially concerning given the reliance on the FIA queries to identify suitable habitat and the fact that the data used in the analysis is now over 20 years old. A Northern Region project EIS (USDA Forest Service, 2007a) even notes the limitations of Samson's modeling methodology: In 2005, the Regional Office produced a Conservation Assessment of the Northern goshawk, black-backed woodpecker, flammulated owl, and pileated woodpecker in the Northern Region (Samson 2005). This analysis also calculated the amount of habitat available for these species, but was based on forest inventory and analysis (FIA) data. FIA data is consistent across the Region and the state, but it was not developed to address site-specific stand conditions for a project area. In some cases, these two assessments vary widely in the amount of habitat present for a specific species. (P. 116.) (Emphasis added.) This is the very same data that Bollenbacher et al. 2009 relied upon.

{B} The analysis for most wildlife species does not analyze or disclose the adverse effects of cumulative decreased interior forest and increased edge effects.

{C} "The most recent stand exam data available is from 1999 and before. By using field data, knowledge of existing condition, and professional resource judgement, the information used was reviewed and deemed to be still valid." "Valid"—for exactly what purposes? Estimating timber volume? The FS cannot credibly say that that the data is still accurate for other purposes such as evaluating quality of wildlife habitat. The FS has already discredited the use of timber stand database (based on "stand exam data") for wildlife habitat analyses: Habitat modeling based on the timber stand database has its limitations: the data are, on average, 15 years old; canopy closure estimates are inaccurate; and data do not exist for the abundance or distribution of snags or down woody material… . (USDA Forest Service, 2000c.)

{A} Response: Although the FEIS for the 2015 Forest Plan did describe the findings in Samson (2006), Samson (2006) was not used to determine wildlife species viability when developing and analyzing components of the 2015 Forest Plan. Also, note that Samson (2006) was similarly used in the OLY DEIS for the black-backed woodpecker analysis. Instead, the Ecosystem Research Group (ERG) was contracted to analyze the "effects of the [revised] KNF and IPNF Forest Plan alternatives on 12 wildlife species . . . over a 50-year timeframe" (ERG 2012, page 1). One of several questions addressed through that analysis was "Are projected long-term vegetation changes consistent with sustaining long-term viability[2] of indigenous species as required in the 1982 planning regulations (1982 rule provisions 219.19 (a)(6))?" (page 2). The suite of wildlife species evaluated for this study met certain criteria, including: 1) "habitat quality and availability are likely the limiting factors for those species, as opposed to other non-habitat factors," 2) all are

"specialists" that "require a narrow set of vegetative conditions for suitable habitat and are thus more likely to become at-risk from changes in habitat over time," and 3) the species "occupy substantially different habitats across the KIPZ" (Kootenai and Idaho Panhandle Planning Zone) (page 1). The wildlife analysis for the 2015 Forest Plan noted "that ERG (2012) found that viability would be maintained for all the species analyzed in that report" (FEIS, page 208).

[2] *The National Forest Management Act regulations requires that wildlife habitat shall be managed to maintain viable populations of existing native and desired non-native vertebrate species in the planning area.*

Regarding data used by Bollenbacher et al. (2009), please see the response to Letter 09, Comment 55.

{B} Response: In the OLY DEIS effects analyses for many species, it was discussed how a mosaic of structural conditions is beneficial to many species as well as how treating larger units would provide more interior habitat in the future for species use. Also, larger units would increase the amount of edge habitat which "can provide unique combinations of cover and a diversity and abundance of forage species that may be beneficial for grizzly bears" (DEIS, page 479) and other wildlife species.

{C} Response: See response to Letter 09, Comment 07 regarding the reliability of stand data in the FSVeg database.

It is noted that the documented reference is from an Idaho Panhandle National Forest - Forest Plan and Monitoring Report from 1998. While the report states that using stand data has its limitations, the report does not discount its use altogether. Also, this statement is related to the then new use of Geographic Information Systems, or GIS, technologies to evaluate habitat abundance and distribution rather than using a wildlife species as a surrogate to estimate habitat suitability. While there may still be limitations associated with the use of stand data, there have also been improvements in technology associated with GIS applications and other sources of information that can be used in habitat mapping in the last 15 years since this document was produced.

Additional sources of data are used in conjunction with stand data to evaluate wildlife habitat. For example, field review, satellite imagery, Region One report on snag densities for western Montana (Bollenbacher et al., 2009), surveys for down woody materials, and biophysical setting contribute information regarding estimates of canopy cover, availability of snags and coarse woody materials, and consistency with habitat mapping efforts. With regards to canopy cover, recent fisher "research by Sauder and Rachlow (2014) and Schwartz et al. (2013) indicate that tree size and canopy height are better indicators of mature habitat used by fishers than canopy cover" (DEIS, page 623). While it is unknown if there is similar research or results for other species of wildlife regarding canopy cover at this time, it is reasonable to consider that other structural conditions describe the suitability of species habitat better than canopy cover per se. Use of stand age provides information regarding tree size (i.e., size class) and potential canopy height. Stand age is based on year of origin and this data is not something that would change over time unless updated in the database due to a known disturbance event that reset the stand's age (e.g., wildfire or regeneration harvest). Also, vegetation succession occurs slowly over a long time period. Therefore, use of existing and potential vegetation types is unlikely to change dramatically over even a 15 year period as mentioned in the comment.

***[09, 55] Comment**: Similarly, the DEIS refers to an unpublished, non-peer reviewed Region 1 paper to estimate snags in the project area: In order to quantify and describe the existing snags in the OLY project area, a Region One report on snag densities for western Montana using Forest Inventory and Analysis (FIA) data collected on the forest was used (2015 Forest Plan p. 80-83). … (Bollenbacher et al. 2009)…The locations of FIA plots are kept secret. Bollenbacher et al. 2009 also do not provide any basis for believing that the data are not subject to the above criticisms—after all, snags are the result of a dynamic process and their persistence on the landscape is temporary, and subject to complex factors. Bollenbacher et al. 2009 is being applied in this DEIS for an invalid purpose. The claims the DEIS makes about accuracy of snag data also fail to reconcile other facts such as "This proximity to infrastructure resulted in the removal of the most valuable trees, including western larch and western white pine, leaving less commercially important species such as grand fir" (p. 217) and "For Forest Service lands, 30 percent has been harvested by an intermediate treatment and 50 percent by a regeneration harvest (some of these occurred on the same site)." (Id.) There is also no data cited from all the post-fire logging that occurred in the project area.*

Response: The use of Bollenbacher et al. 2009 in the Forest Plan is not specific to the activities being proposed as part of the OLY project, but is related to the 2015 Forest Plan direction. As stated in Bollenbacher et al. 2009 and DEIS page 213, snag density, distribution, and longevity can be affected by timber harvest and human access in timbered managed areas and possibly climate change and fire suppression in unmanaged areas (i.e. wilderness or roadless). The DEIS further acknowledges that although the report is for the entire KNF, the project area follows the same density and distribution patterns by habitat group. The distribution of snags across the landscape is clumpy and uneven due to the fact that many snags are created as a result of periodic, broad- and fine-scale disturbances such as fire, insects, and diseases; and these disturbances do not occur evenly across space. Snag densities are most likely lower in areas closer to town and visual observations suggest that snag levels can be as low as zero along open roads due to firewood cutting. Conversely, the project area contains a lot of land area without road access, in the warm/moist biophysical setting. Also, areas such as Gunsight, Pulpit, and Arbo Mountains have very high snag densities due to recent wildfires. In terms of effects of the OLY project to snags, pages 226-227 address that management activities can both create and reduce snag densities. Table 66 has the snag and snag recruitment levels to retain (where they exist) after vegetation management activities (including post-harvest activities). Forestwide Desired Condition (FW-DC-VEG-07) and guidelines (FW-GDL-VEG-04 and FW-GDL-VEG-05) provide guidance for snag retention and have been incorporated into the design features and silvicultural prescriptions for the OLY project. Appendix F of the DEIS has the past activities in the OLY project area, including salvage harvests. Post fire data is reflected in the existing conditions described throughout the DEIS.

***[09, 56] Comment**: Similarly, the FS gathered coarse woody debris data by ton, and discloses that many units are deficient (DEIS at 214), but this tells little about large down logs, which persist longer on the landscape with importance as wildlife habitat correlating with size. There is no reason to believe that a measure of CWD by tons is an accurate measure of wildlife habitat.*

Response: Concerning coarse woody debris (CWD). Also from page 214 of the DEIS it is stated: "Existing tons/acre of CWD generally exceed the 2015 Forest Plan guideline and the level is currently being met mostly in the form of smaller diameter CWD with larger CWD, especially

those greater than 16 inches, having greater occurrence within some units than others." The point being that CWD greater than 16 inches was noted.

Table 3, page 19 of the 2015 Forest Plan (and Table 67 of the OLY DEIS) displays the "Levels of Coarse Woody Debris to Retain after Vegetation Management Activities for each Biophysical Setting". The number and size of logs to retain is quantified in three categories: tons per acre, number of logs per acre, and desired size.

The OLY project is designed to meet Forest Plan guidance. For example, prescibed burn prescriptions are designed to retain larger CWD, by burning when fuel moisture within large CWD is 20% or greater. This provides the best scenario to consume the fine fuels yet retain the large CWD. In proposed units where CWD meets or exceeds Forest Plan guidance, CWD representation would be maintained. In proposed units where CWD representation does not currently meet Forest Plan guidance, larger-diameter CWD is anticipated to increase through events such as blowdown of retained large trees and snags. Page 277 of the DEIS states, "The same variable spatial distribution is true for CWD as it was for snags. In the units known to be deficient in CWD, the standing dead snags that are left on site will contribute toward CWD recruitment. Table 67 below displays the 2015 Forest Plan desired levels which would be incorporated into the silvicultural prescriptions."

Monitoring

> ***[08, 16] Comment**: I hope and expect also that post-treatment monitoring will be conducted by the agency with regard to all of these concerns, mine as well as the agency's—specifically and particularly regeneration, weeds, grizzly security/displacement/(with associated risks of increased mortality)/weed presence/spread, post-treatment forest mortality, etc. Winter logging will offer the best chance of reducing the spread of weeds that is all but guaranteed to follow these clearcutting prescriptions, if they remain.*

Response: See the response to Letter 08, Comment 07 and Letter 13, Comment 05. Annual monitoring for grizzly bear is included in the Forest Plan monitoring reports and is also reported to the Interagency Grizzly Bear Committee (IGBC). Forest regeneration monitoring is required by law (NFMA) and regularly accomplished. Winter logging is included where necessary but limited to those areas due to the short winter season in the project area (see response to Letter 13, Comment 04).

With respect to grizzly bears, all bear management units (i.e., BMUs) are assessed and monitored annually for impacts to Core habitat and motorized route densities whether projects such as OLY have been recently implemented or not. Core habitat provides security habitat, including areas for displacement during project activities, and low risk of mortality. Monitoring identifies changes in these habitat parameter levels and the reason for the change, including analyzed effects of planned projects.

> ***[09, 102] Comment**: The DEIS fails to disclose that historically, monitoring as required by the Forest Plan has not occurred. This leads to inadequate experiential basis for professional judgment and conclusions made regarding project impacts.*

Response: Forest Plan monitoring is documented in Forest Plan monitoring reports in the project file and on the Kootenai National Forest web page. Worldwide Web Links for Forest Plan monitoring reports can be found at http://www.fs.usda.gov/main/kootenai/landmanagement/planning. The IDT used monitoring as one of many tools during project development and analysis.

***[09, 18] Comment**: "New road construction associated with timber sales on USFS lands continued through the fire salvage sales of 1996-1997." Did the FS perform monitoring on those roads post-project to assure they met Skyline Ridge EIS expectations?*

Response: Roads in the project area, including the roads used in the Skyline Ridge project, have been reviewed on the ground to determine their current condition. Any roads in the project area that were reviewed and not meeting desired condition for resource protection have been included for work to improve resource conditions. Page 418 of the DEIS notes data sources for the analysis, including 2008 decommissioned road surveys, satellite imagery, landtype maps, and field reviews.

NEPA Process

***[04, 01] Comment**: The U.S. Department of the Interior has reviewed the Draft Environmental Impact Statement for the Lower Yaak, O'Brien, Sheep Project EIS, Three Rivers Ranger District, Kootenai National Forest; Lincoln County; Montana, and has no comments on the document. The U.S. Fish and Wildlife Service advises that any concerns they may have will be addressed through the Section 7 consultation process.*

Response: No Response Required

Comment Attachments Non-specific to OLY

***[Letter 03] Comment**: My comments are in the "comments" attachment. The other attachments contain the science that supports my comments.*

Response: The commenter provided six (6) attachments: Attachment #1, Attachment #3, Attachment #4, and Attachment #19 contained literature citations of opposing views. Attachment #10 contained Public Opinion Poles. Attachment #15 contained Forest Service leadership "Best Science" statements.

The content of the literature citations provided in the applicable four (4) attachments (#1, #3, #4, #19) were evaluated for their value to analyze the alternatives. A response is provided for each of the articles of literature as to how the literature was used in the analysis process. Responses are also provided for the Public Opinion Pole (Attachment #10) and the Forest Service leadership "Best Science" statements (Attachment #15). This evaluation is found in the Project File and is also posted on the Kootenai National Forest's project planning web site, currently located at http://www.fs.usda.gov/projects/kootenai/landmanagement/projects

Noxious Weeds

***[07, 09] Comment**: I encourage the district to take measures to address the spread of weeds and soil disturbance.*

Response: Measures to reduce the spread of weeds are found in the design features for the project on DEIS page 77. Measures to protect soils are included in the DEIS on pages 78 and 79. Protection of soil is important to future land productivity and has been incorporated into the project to the extent possible. Minimization of weed spread has also been an important consideration in project design.

***[08, 07] Comment**: As ever, particularly with regeneration units, I remain concerned about soil disturbance and the spread of weeds due to overland sheet flow, disturbance, increased aridity. Hosing off equipment is fine, but after the soil is damaged (further) and the equipment is gone, the passage of generalists (deer) and increased wind will bring seeds and weeds. I hope we are in agreement that it is not a coincidence that our greatest weed infestations are in clearcuts, skid trails, and logging roads.*

Response: As described in the effects of the no action alternative for the OLY project (DEIS page 261), reducing or eliminating weed spread is not as simple as not implementing logging or regeneration harvest. Forest health contributes to overall healthy vegetation composition. In other words if an unhealthy stand condition exists on the landscape, vegetation change will occur even in the absence of management activities either due to insects, disease, or fire. These changes influence the species composition of grasses, forbs, and shrubs in the understory and may result in the spread of invasive plant species. Sheley and Petroff (1999), page 356, states the following: "A single, low-intensity fire does not effectively control spotted knapweed because it is not hot enough to prevent resprouting from crowns or reestablishment from viable seeds in the soil (Renney and Hughes 1969). In northern Washington, a single, low-intensity fire increased the cover and density of this weed without improving the residual, desirable understory species (Sheley and Roche 1982). Similarly, spotted knapweed increased about six-fold within two years after a controlled fire on a forested site in Montana (S. Arno, unpublished data). Fires may create the type of disturbance that promotes colonization of knapweeds."

If an intermediate harvest treatment does not lead to future forest health, then additional disturbance processes, whether natural or human caused, are likely and will also result in potential weed spread. So while there is a concern about spreading weeds during regeneration harvest, there is also a concern about future weed spread if treatments to improve forest health are not undertaken. Design features included in the project (DEIS pages 75-88), particularly those related to soils and weeds (DEIS pages 77-79) will help minimize weed spread as a result of project activities.

Page 263 of the DEIS, in the effects of Alternative 2, describes that "(i)nformal monitoring on the district has shown that, over time, weeds are suppressed by the growth of new trees as they reach pole timber size and native vegetation does return."

***[09, 112] Comment**: "The Kootenai spends approximately $200,000 per year for the weed control program with an annual accomplishment of 600 to 900 acres of forest land treated with herbicides and other integrated methods." (DEIS at 268.) The DEIS does not disclose a similar annual estimate of the weed-free acres of KNF land experiencing management disturbance and therefore vulnerability to weed invasion. Nor does the DEIS cite any monitoring supporting its implications that weed treatments or mitigations work as intended, creating a positive trend so as to be consistent with DCs and other RFP direction. This was a Forest Plan monitoring item in the original 1987 Forest Plan, and what little required monitoring the FS conducted revealed only a disturbing trend.*

Response: A target for treatment monitoring of 50% of the acres treated is required by the agency (Supporting documentation is found in the National Forest System Invasive Species Management Record Keeping Business Rules and National Standards 2012 in the project file). Page 268 of the DEIS states that "“The KNF has used herbicides to control noxious weeds with success. Spraying of roadsides, administrative sites, and gravel pits has visibly reduced weed populations in many areas and prevented weeds from spreading to un-infested areas.” (Paragraph) The annual Forest Plan monitoring report for the 1987 Forest Plan for Fiscal Year 2013 includes the following: "Effectiveness monitoring is required on 50% of acres treated in order to count any weed treatments toward target accomplishment. This effectiveness monitoring reveals that average weed control over the years 2007 – 2013 is 83 percent."

***[13, 04] Comment**: In addition to the requests of KFSC to increase mitigation to soil disturbance, we request that unit 61A be changed from summer tractor to winter tractor. Our concern is that summer harvest may increase the presence of weeds in this unit, increasing the potential risk of weed infestation in the Saddle Mountain roadless area. Changing this unit to winter tractor seems to be an easy switch, given that all the surrounding units are already assigned to winter tractor harvest. This may also be easier for the contractor, who could perform operations in all units in that area in one season instead of two.*

Response: Unit 61A may be winter logged at the discretion of the contractor. The OLY project area receives a short winter season. If prescribed winter logging occurred on wet soils, rather than frozen ground, the amount of disturbance could actually be more than logging on dry ground in the summer. Therefore the amount of mandatory winter logging prescribed was minimized. Should good winter conditions occur, the purchaser may take advantage of them on any other harvest unit in the project area.

***[13, 05] Comment**: We have also experienced that monitoring of soils and weeds often goes unfunded and isn't completed. Because regeneration harvest can create conditions highly susceptible to weed infestations which crowd out native plant species, overall reducing forest health and resilience, it is important to our organization to feel certain that the agency has taken measures to mitigate the spread of weeds and soil disturbance, and has done everything within their power to protect these resources before moving forward with this project. How can we work together to ensure these protective measures are included and monitoring for weeds and soils is completed in the project area?*

Response: Some monitoring for soils and weeds are required and accomplished consistently. These are displayed through the Forest Plan annual monitoring reports located on the web here:

http://www.fs.usda.gov/detail/kootenai/landmanagement/planning/?cid=stelprdb5347363 and located in the project file. Additionally monitoring of 50 percent of invasive plant herbicide treatment is required (see National Forest System Invasive Species Management Record Keeping Business Rules and National Standards (v04.01.2012) located in the project file, Output #2 page 4).

Please see also the response to Letter 08, Comment 07.

***[16, 07] Comment**: (4) Do the preliminary and followup weed work (believe it or not we have seen where sometimes this just doesn't get done), and revisit each unit 2 or 3 years later to see if spot spraying is necessary.*

Response: See responses to Letter 09, Comment 112; Letter 08, Comment 07; Letter 07, Comment 09; Letter 13, Comment 05

Old Growth

***[07, 04] Comment**: I also support feathering edges of old growth to maintain structural integrity of edges and decrease risk of windthrow as well as snow and ice damage.*

Response: Please see response to Letter 10, Comment 05.

***[09, 59] Comment**:*

{A} At p. 9 the DEIS states that "management within old growth ...would not remove any old growth attributes." What are the specific "attributes" the DEIS is referring to?

{B} AWR is on record stating that the RFP direction for old growth is ecologically and scientifically deficient (see DEIS comments, Objection). The original 1987 Forest Plan included Appendix 17 and other directions, including standards, and nothing resembles it in the RFP. The FS has never explained what it is about the 1987 Forest Plan's Appendix 17, or the old growth standards, that are inconsistent with the best available science. Instead, the RFP greatly waters down protections for old growth, and in fact provides direction for logging old growth without sufficient scientific support.

{C} The DEIS cites a case (West Troy project unit 60) it claims supports the FS's expertise in messing around in old growth without causing it to no longer conform to the old-growth criteria. Given that some of the old growth identified in DEIS maps also overlaps with past logging, the FS should analyze and disclose the pre- and post-logging data from those stands.

{D} Also, West Troy project unit 60 is not even the same biophysical setting as 147 acres of proposed logging in old growth. The DEIS cites nothing scientific to support its claim that logging those 147 acres is ecologically sound.

{E} Regardless, the FS has no studies that compare pre- and post-logging use of old growth by the wildlife species with strong biological associations with habitat components found in old growth.

{F} Biologically speaking, the FS should "ask" the real experts if logged old growth is still functioning.

{A} Response: The attributes referred to are the ones used as the criteria to identify stands that may qualify as old growth habitat as defined in the "Old-Growth Forest Types of the Western Montana Zone" (Green and others 1992, corrected 12/2011 pages 25-32).

{B} Response: Your comment regarding Forest Plan direction on old growth is not specific to the activities being proposed as part of the OLY project, but is related to the 2015 Forest Plan. The DEIS points to sufficient scientific support to harvest in old growth. DEIS page 289 contains a discussion as to how the approach to maintaining resilience in old growth systems was incorporated into all the action alternatives, based on the current literature (e.g. Hawe and Delong 1997, Fiedler 2000b, Quesnel and Steeger 2002, Steeger and Quesnel 2003, Briana et al. 2004, Lindh and Muir 2004, Sala and Callaway 2004, Spies et al. 2006, Kolb et al. 2007, Ritchie et al. 2008, Zhang et al. 2008, Elzinga and Shearer 1997, Arno et al. 1997, Harrington 2007, Erickson et al 2008). Several studies show that increasing forest resilience can be accomplished with various silvicultural treatments (Fiedler 2002, Agee and Skinner 2005, Stephens and Moghaddas 2005, Metlen and Fiedler 2006, Youngblood et al. 2006, Fettig et al. 2008, Ritchie et al. 2008, Zhang et al. 2008, Fulè et al. 2012).

{C} Response: West Troy unit 60 was added as a local example of successfully meeting objectives while maintaining old growth characteristics through an intermediate treatment in the warm/dry biophysical setting.

{D} Response: The DEIS did not state that West Troy unit 60 was in the same biophysical setting (warm/moist) as 147 acres of the project. P. 293 contains an example from the forest plan as to when treatments in the warm/moist biophysical setting could be proposed to achieve the desired conditions of old growth stands. This example explains the intent and rationale for the treatments.

{E} Response: There are some old growth stands that have had past harvest. All of the regeneration harvest and the majority of the intermediate harvest (except for 5 acres of a 48 acre stand and 4 acres of a 60 acre stand were salvaged in 1993 and 1987, respectively) was done before the 1987 Forest Plan and the old growth exams and designation were done after harvest. The stands with regeneration harvest had prescriptions such as single tree selection, two-age seedtree, and two-age shelterwood. These are now examples of types of harvest that can occur in old growth and still meet OG Criteria as defined by the 2015 Forest Plan. The same holds true for the stands with intermediate harvests. These stands had salvage harvest in the past and presently meet old growth criteria. Since these treatments were done in the 1980s and before, pre-harvest monitoring data is not available and the objectives were not related to old growth. Without these two elements, we can't measure whether these treatments met their intent. For these reasons, we did not use these stands as examples of harvest treatments in old growth. We chose West Troy unit 60 because we had pre-harvest monitoring plots established, silvicultural prescriptions with an objective of maintaining old growth characteristics, and post-harvest monitoring to measure the objectives with the results.

{F} Response: As stated both in the wildlife analysis for the 2015 Forest Plan and response to comments (FEIS Appendix G, page 525) for the 2015 Forest Plan, there are no wildlife species

found on the Kootenai National Forest that are solely dependent on old growth habitat. Therefore, the detection (or not) of a particular wildlife species in an old growth stand would not be a reliable indicator of the old growth condition. Such surveys would not be appropriate for this use.

***[09, 60] Comment**: There is little in DEIS Table 85's Indicator/Measure column that correlates to the FS's own old-growth criteria.*

Response: Table 85 of the DEIS contains 9 indicators/measures comparing the degree to which each alternative addresses the impacts to old growth and recruitment potential old growth for the OLY project. The 2015 Forest Plan has two components (FW-DC-VEG-03, FW-GDL-VEG-01) that would allow vegetation management activities to occur within old growth stands if the activities were designed to increase the resistance and resiliency to disturbance or stressors. Most of the indicators/measures were used to measure how many acres were applicable to this objective. Measures such as acres of surface/ladder fuels and canopy bulk density reduction, acres treated to promote early seral species, and acres of proposed harvest and fuels treatments across the alternatives were used to describe how the OLY project will trend the old growth towards the desired conditions. The measure of acres no longer meeting minimum old growth criteria due to proposed treatments was used to compare the alternatives with the standard (FW-STD-VEG-01) that states within old growth stands, timber harvest or other vegetation management activities shall not be authorized if the activities would likely modify the characteristics of the stand to the extent that the stand would no longer meet the definition of old growth.

***[09, 61] Comment**: The DEIS cannot even demonstrate consistency with the RFP's protectively weak DCs, standards, and guidelines concerning old growth.*

Response: DEIS pages 296-297 describes the consistency of the proposed treatments to the 2015 Forest Plan.

The Forest Plan states, "FW-DC-VEG-03 The amount of old growth increases at the forestwide scale. At the finer scale of the biophysical setting, old growth amounts increase for the Warm/Dry and Warm/Moist settings while staying close to the current level for the Subalpine setting. Relative to other tree species, there is a greater increase in old growth stands that contain substantial amounts (i.e., 30 percent or more of the total species composition) of one or more of the following tree species: ponderosa pine, western larch, western white pine, and whitebark pine. Old growth stands are more resistant and resilient to disturbances and stressors such as wildfires, droughts, insects and disease, and potential climate change effects. The size of old growth stands (or patches of multiple contiguous old growth stands) increase and they are well- distributed across the five Geographic Areas on the Forest."

Under Alternative 1 (No Action), old growth amounts are predicted to increase (see the introduction of this section), but none of the proposed units would be treated to increase their resistance and resilience to disturbances. Alternatives 2, 3, and 4 would all increase the resistance and resilience of the proposed 531 acres of old growth treatments and 198 acres of recruitment potential old growth treatments. Therefore, the OLY project would contribute to progress toward achieving this desired condition.

The Forest Plan states, "FW-STD-VEG-01 Within old growth stands, timber harvest or other vegetation management activities shall not be authorized if the activities would likely modify the characteristics of the stand to the extent that the stand would no longer meet the definition of old growth (see glossary for old growth definition)."

Alternative 1 (No Action) does not propose any treatment within old growth. Vegetation management in Alternatives 2, 3, and 4 would be designed to maintain the characteristics of the old growth stands so they would continue to meet the 2015 Forest Plan definition of old growth post treatment. All of the purposed units within old growth have pre-treatment exams, would have a silvicultural prescription written by a silviculturist, and would have post treatment monitoring scheduled to monitor the effects of the treatment and verify the old growth character. Stands identified as recruitment potential old growth would have post treatment monitoring scheduled as well and any future treatment would be towards them reaching old growth. Therefore, the OLY project was designed in accordance with this standard.

The Forest Plan states, "FW-GDL-VEG-01 Timber harvest or other vegetation management activities may be authorized in old growth stands if the activities are designed to increase the resistance and resiliency of the stand to disturbances or stressors, and if the activities are not likely to modify stand characteristics to the extent that the stand would no longer meet the definition of old growth (see the glossary for the definitions of resistance and resilience)."

Under Alternative 1 (No Action), old growth amounts are predicted to increase (see the introduction of this section), but none of the proposed units would be treated to increase their resistance and resilience to disturbances. Alternatives 2, 3, and 4 all propose to treat 531 acres in old growth and 198 acres in recruitment potential old growth in order to increase their resistance and resilience by modifying their structure and species composition. They are designed not to modify the characteristics beyond meeting the 2015 Forest Plan definition of old growth. Therefore, the OLY project was designed in accordance with this guideline.

The Forest Plan states, "FW-GDL-VEG-02 Road construction (permanent or temporary) or other developments should generally be avoided in old growth stands unless access is needed to implement vegetation management activities for the purpose of increasing the resistance and resilience of the stands to disturbances."

None of the alternatives in the OLY project propose road construction or development in old growth. Therefore, the OLY project was designed in accordance with this guideline.

- MA2—no additional desired conditions are applicable to old growth for OLY.
- MA6—no additional desired conditions are applicable to old growth for OLY.
- Bull Geographic Area - no additional desired conditions are applicable to old growth for OLY.
- Libby Geographic Area - no additional desired conditions are applicable to old growth for OLY.
- Yaak Geographic Area –GA-DC-YAK-02 Management of vegetation toward the desired vegetation condition provides habitat for moonworts and northern beechfern and increases in late succession and/or old growth vegetation.

As stated in the proposed, threatened, endangered, and sensitive plant report, surveys have been completed, and *Botrychium ascendens* (upward-lobed moonwort), *Botrychium crenulatum* (wavy

moonwort), *Botrychium hesperium* (western moonwort), *Botrychium paradoxum* (peculiar moonwort), *Botrychium pedunculosum* (stalked moonwort), and *Phegopteris connectilis* (northern beech-fern) are not known to occur within the project area. Alternatives 1, 2, 3, and 4 would therefore have no impact and the OLY project would not cause any change toward this desired condition.

***[09, 62] Comment**: What is "classic old growth" (DEIS at 305)? Please disclose the source of this classification.*

Response: "Classic old growth" in this sense, is more of a descriptor than a definition. The type of old growth in this statement, is the type of old growth that was referred to by Thomas et al. 2006, also quoted in the DEIS on page 288, in reference to the appropriate types of old growth to target for restoration activities. Since some types of old growth have developed without the influence of disturbance such as wildfire, it is believed that treatments to mimic wildfire within these types of sites would not fall under the category of "old growth restoration". These types of old growth are generally characterized by large old western red cedar, deep duff layers, and often occur near streams. These areas are also sometimes referred to as "fire refugia", areas that seldom if ever, were fatally impacted by stand replacing wildfires. No moist site "classic old growth" areas are proposed for treatment within the OLY project. The warm/moist biophysical setting encompasses a wide spectrum of different habitat types. The 147 acres of proposed treatments in old growth within the warm/moist biophysical setting have been examined on the ground as being on the drier end of that spectrum and outside of the moister habitat types which include moonworts and northern beechferns. These stands would have historically experienced wildfires on an average of 30-85 years, with stand replacing fires occurring every 100-200 years. DEIS page 285 discusses the role of fire within this the warm/moist biophysical setting and page 293 provides an example from the 2015 Forest Plan with direction on treatments within this setting.

***[09, 63] Comment**: The DEIS states, "Proposed harvest treatments are designed to preserve all of the old growth attributes while treating excess fuel accumulations. The purpose of fuels treatment within old growth is to maintain the fire return cycle within these stands and promote the characteristics of old growth." Since the FS intends to prevent the natural fire return interval from happening here, this doesn't make sense. It seems the FS wants to perpetually log old growth, a subject AWR discussed in its RFP Objection.*

Response: Salwasser (2009) states "Perpetuating some older forests will require a combination of conditions within stands that enhance resilience against low to moderate disturbances and redundancy of developmental states across landscapes so that when major stand-replacing disturbances do occur, there are forests moving into older stages somewhere else to replace the altered stands. Where fires have been suppressed for long periods of time, selective removal of some biomass followed by use of managed fire-perhaps harkening back to the prehistorical land use practices- may be needed to restore stand resilience." FEIS page 79 states that if cutting smaller trees is needed and the removal of the cut trees is necessary to meet the site-specific restoration objectives, then timber harvest may be proposed. Restoring forest composition and structure before wildfires occur should allow fire to play its characteristic role in maintaining ecosystem structure and function in the forest (Noss et al. 2006, Johnson and Franklin 2007). DEIS page 188 states that the overall goal is to work towards returning these stands to their appropriate fire regime and increase fire resiliency.

[09, 64] Comment: *The DEIS states, "Regarding the historic range of variability of old growth in the analysis area, there is no way to accurately determine how much of the forest may have met the Green et al. (1992) definitions of old growth. In order to determine whether or not a forest stand meets those definitions, it requires detailed information on how many trees per acre exist in the stand over a certain diameter and age, the total stand density, the forest type and lastly, the habitat type group that the stand occupies. No historical information exists that can provide that level of detail." (Emphasis added.) However, the DEIS doesn't disclose any scientific information that analyzes the topic. For example, the KNF's own analysis (Gautreaux, 1999) reveals 10% to be, quite realistically, not within the historical range, and indicates that 22% old growth is at the lower limit for "reference conditions" on the KNF. The DEIS doesn't even provide an estimate of how much old growth in the project area has been destroyed by logging. Also, Lesica (1996) stated that the Northern Region of the (FS's) general goal of maintaining 10% of forests as old-growth may extirpate some species. This is based on his estimate that 20-50% of low and many mid-elevation forests were in old-growth condition prior to European settlement. If that is not "best science", please cite what the FS considers to be "best science" on old growth HRV.*

Response: It is very difficult to determine the historic range of variability for any resource since the conditions occurred prior to the arrival of euro-americans. The Forest Plan used the best science to determine these ranges. Gautreaux (1999) does not discuss old growth as defined in the 2015 Forest Plan – it refers to the structural class and age class of "old forest". Knowledge of ecosystems is ever changing and as more information is known, management guidelines and emphasis is incorporated into our actions.

[09, 66] Comment*: There appears to be an erroneous conclusion regarding the Green et al. 1992 paper which was never intended to describe definitions of old growth types. The numbers were intended to be minimum screening criteria for possible old growth stands from the timber stand data base. According to the Green et al. 1992 the final determination of old growth status was to be made by a qualified ecologist or wildlife biologist. Strict reliance on data base queries from the timber stand database has been shown to give unreliable results in past court cases (Iron Honey Timber Sale, Idaho Panhandle National Forest – 9th U.S. Circuit Court of Appeals in San Francisco, 2004) and is no substitute for field investigation by qualified professionals. Defining characteristics of old growth that are discounted by the RFP are acknowledged by Green et al., 1992: Old growth forests encompass the late stages of stand development and are distinguished by old trees and related structural attributes. These attributes, such as tree size, canopy layers, snags, and down trees generally define forests that are in and old growth condition.*
Definition: Old growth forests are ecosystems distinguished by old trees and related structural attributes. Old growth encompasses the later stages of stand development that typically differ from earlier stages in a variety of characteristics which may include tree size, accumulations of large dead woody material, number of canopy layers, species composition, and ecosystem function. (O)ld growth is typically distinguished from younger growth by several of the following attributes:
1. Large trees for species and site.
2. Wide variation in tree sizes and spacing.
3. Accumulations of large-size dead standing and fallen trees that are high relative to earlier

stages.
4. Decadence in the form of broken or deformed tops or bole and root decay.
5. Multiple canopy layers
6. Canopy gaps and understory patchiness.
Green et al., 1992 also recognize that "Rates of change in composition and structure are slow relative to younger forests." Logging in old growth, as proposed, would not be anything but slow rate of change.
Green et al. 1992 (and corrected versions) arrived after the Forest Plan was adopted. In preparing and adopting these old growth guidelines, the Forest Service did not use an independent scientific peer review process, as discussed by Yanishevsky, 1994: As a result of Washington Office directives, Region 1 established an Old-Growth Committee. In April 1992, Region 1 issued a document entitled "Old-Growth Forest Types of the Northern Region," which presented Old-Growth Screening Criteria for specific zones on Western Montana, Eastern Montana, and North Idaho (U.S.D.A. Forest Service 1992). This was an attempt to standardize criteria for classifying the variety of old-growth types across the Region. ...The committee, however, executed this task without the benefit of outside scientific peer review or public input, either during or after the process (Yanishevsky 1990, Shultz 1992b). Moreover, the methodology used by the committee was unscientific and did not even include gathering field data to verify the characteristics of old-growth stands as a basis for the definition (id.). A former member of the Region 1 Old-Growth Committee described a "definition process" that relied heavily upon the Committee members' pre-conceived notions of the quantifiable characteristics of old-growth forests (Schultz 1992b). The old-growth definition in its present state, without field verification of assumptions, and without addressing the issue of quality, is inadequate to scientifically describe, define, delineate, or inventory old-growth ecosystems. (id.) Not only did the Committee fail to obtain new field data on old-growth forest characteristics, it failed even to use existing field data on old-growth definition and classification previously collected for Region 1 (Pfister 1987). Quality of old growth was not addressed during the

Response: The use of Green et al. 1992 (and corrected versions), as defined in the Forest Plan is the direction we use for old growth management.

***[09, 67] Comment**:*

{A} In sum, it appears the agency wants to make the definition of old growth to be a simplistic numbers and database analysis game, void of biologically vital data gathered in the field that documents what is unique about old growth—not just a few large, old trees left over after logging, but decadence, rot, snags, down logs, patchy irregular canopy layers—things that can't be created by the agency's version of "restoration," things that will be depleted by such management actions—which are habitat characteristics critical for maintaining wildlife species viability.

{B} The FEIS also does not analyze and disclose the natural historic range vs. current conditions regarding patch size, edge effect, and amount of interior forest old growth in the KNF.

{C} "Fire suppression has not yet resulted in a departure from historic ranges for all stands within the project area (especially those with naturally longer fire return intervals such as might be found in lynx habitat), although they too are trending towards a departure." Please

provide a map of areas that have departed from historic ranges, those, that have not, and those that are "trending towards a departure."

{A} Response: Refer to response to Letter 9, Comment 10 regarding HRV.

{B} Response: Refer to response to Letter 9, Comment 10 regarding HRV.

{C} Response: Your reference to the DEIS discussion on fire suppression and departure from HRV was made in the context of stand replacing fires, while Old Growth management for this project is designed to mimic mixed and low severity fires.

***[10, 05] Comment**: Fourth, through our work in the field and in meetings we have spoken extensively and taken field trips to visit the treatments in old growth in this project. The DEIS states that design features to feather edges of treated areas of old growth will be implemented to maintain structural integrity of edges and decrease risk of windthrow as well as snow and ice damage (DEIS, 294) This design feature was a big step in increasing our comfort with the treatments in old growth. Thank you for including it.*

Response: All proposed treatments within old growth have an intermediate treatment and the structural integrity of those edges will be maintained by the inherent nature of the prescription, and additional "feathering" is not needed. Furthermore, "feathering" is a qualitative term with no quantitative silvicultural definition. This makes its application difficult and subjective because so many factors differ from unit to unit. A few of these factors are: the condition of the adjacent stand and how those trees are spatially arranged, the condition and spatial arrangement of the old growth, the species composition for each stand, the slope position of where the break will occur, and the topography of the stands.

***[12, 03] Comment**: As per suggested by YVFC, I support: Feathering edges of old growth to maintain integrity of edges and decrease the risk of blow down trees.*

Response: Please see response to Letter 10, Comment 05.

***[15, 02] Comment**: Maintenance of Old growth is especially to be respected in this vulnerable area of the lower Yaak.*

Response: The proposed units in old growth will trend the landscape towards the desired conditions and increase the resistance and resilience to disease and stressors, making them more likely to persist into the future.

Openings Over 40 Acres

***[08, 12] Comment**: I cannot support the 100-plus acre clearcut of unit 62. The only thing a clearcut mimics is a clearcut.*

Response: Please see pages 31-33 of the DEIS for an explanation as to why regeneration harvest has been prescribed by a Certified Silviculturist as the most appropriate treatment to meet the stand and project level objectives. Forestry is managing the land for the long term. These sites will grow and slowly mature from young forests into mature forest with associated conditions to provide habitat for plants and animals that evolved with these conditions.

***[09, 11] Comment**: "Alternative 4 was designed to address the publicly raised issue of creating large openings (defined as openings over 40 acres for the purposes of this project) through regeneration harvest." (DEIS at 55.) "This alternative would not meet the purpose and need of managing for desired vegetative conditions as well as the other two alternatives nor adequately address other resource concerns." (DEIS at 477.) Does the FS realize that this means the RFP mandates that openings must be greater than 40 acres? Yet, the RFP didn't come right out and reject NFMA's limits.*

Response: NFMA doesn't prohibit over 40 acre regeneration openings, but the R1 Supplement 2400-2001-2 of the Silvicultural Practices chapter of the Forest Service Manual does state that "the size of harvest openings created by even-aged silviculture in the Northern Region will be normally 40 acres or less." Creation of larger openings will require 60-day public review and Regional Forester approval, also in the Forest Plan as FW-STD-TBR-02. In the request, reference should be made to the specific situation in terms of both short- and long-term management strategies and to a supporting Environmental Assessment, which has evaluated all resources and socio-economic factors. This request was submitted and approved by the Regional Forester on 2/9/16. The Forest Plan does not "mandate" that openings must be greater than 40 acres, but FW-DC-VEG-05, FW-DC-VEG-11, and FW-DC-WL-19 do encourage us to consider the pattern of forest conditions across the landscape which consists of a range of patch sizes that have a diversity of successional stages, densities, and compositions. P. 9 of the DEIS explains why the interdisciplinary team decided that large, irregularly shaped openings adhere to several of the Forest Plan's desired conditions and what those opening could help provide. Alternative 4 was designed to address the publicly raised issue of creating large openings through regeneration harvest (DEIS page 56).

***[10, 04] Comment**: Third, KFSC asked the district to include design features within units over 40 acres in size that mimic patterns of natural disturbance while maintaining protection for wildlife. The Kootenai Forest Stakeholder Coalition's silvacultural guidelines (pg. 16--17) provide some guidance for design features that address these concerns. As we have discussed, the inclusion of these design features would go a long way in increasing our confidence that forest resources in units where regeneration will occur are given adequate protection. These features include: leaving 5--50% of the pre--harvest forest untreated, with an average of 30% in mesic VRU's. The majority of this retention would be in the form of small (e.g., ½ to 3 acre) intact patches.*
VRU's with more of a stand--replacement fire history would typically leave less of the pre--harvest forest, but would leave an average of at least 20% uncut; the majority of this retention would be in the form of 5--10 acre patches. As we have discussed, these areas could be strategically placed in riparian areas, special habitats such as seeps, rocky outcrops, and other areas of high species diversity, patches dominated by hardwoods, representative patches of the pre--harvest forest stand, and clusters of shade--intolerant tree species. Other

design features include feathering edges of regeneration units where appropriate (i.e. not in areas highly susceptible to windthrow); retaining wildlife security screening (understory & small diameter trees) immediately next to roads where necessary to break up elongated views into the unit; designing units to have irregular shapes, i.e. not square. Reading through the DEIS, we noticed many places where the district created design features to address this concern. They include: large opening will be irregularly shaped (DEIS, 9) and will include retention of small diameter trees and brushy vegetation along roadways to "break up and soften" the view of harvest and fuel treatment activities, avoiding ignition along roads where possible and design ignition patterns to minimize mortality of small diameter trees and brush along roads (DEIS, 79). Our group was also pleased to see that retained trees would be grouped together in clumps of 4--12 or more trees especially in those areas with fewer, quality leave trees available. Page 479 of the DEIS goes on to say, "this is intended to better protect the leave trees as well as provide small areas of greater cover for wildlife use, including potential use by grizzly bears." We are glad to see the district has made some consideration to where and how leave trees will be incorporated into the overall design of the units, and how they contribute to opportunities for wildlife movement and cover in harvest areas. We also believe there is room for improvement in this regard, which we will discuss later in this letter.

Response: The FEIS includes a project development section that explains how the landscape was designed to incorporate a mosaic of untreated patches and a variety of treatment types. We will include a summary of it here. As the team began field reconnaissance of the project area in the field season of 2014, they identified areas in need of vegetation management to move forest stands towards a more resilient condition in the project area. They focused their attention on the Kilbrennan Ridge, Sears Flats, Yaak Mountain/O'Brien Creek and Kootenai Mountain/Lynx Creek areas in particular because of the Forest Plan desired conditions, existing forest stand conditions and the presence of existing roads that could be used for vegetation management. These areas were also considered because they are in the Wildland Urban Interface (WUI) and outside of Inventoried Roadless Areas (IRAs). The team delineated riparian habitat conservation areas (RHCAs) with buffers ranging from 100-300 feet (as determined by INFISH guidelines), and in some cases much larger than 300 feet. The initial areas in need did not include many RHCAs or other water features, so ponds and wetlands were used to design corridors around and between them, where they existed. Many of these areas also included patches dominated by hardwoods. The team then focused on the areas with the highest levels of root disease, as well as existing off-site ponderosa pine stands. For example, the Kilbrennan ridge area was designed to provide wildlife movement corridors through and within the area by excluding Douglas-fir stands with minimal evidence of or effects from root disease. Also, in Alternatives 3 and 4 in the Sears Flats area, an untreated area was left between units 33 and 34 to add to the mosaic and improve wildlife movement. Large, irregularly shaped openings were designed where possible, as the team decided that they would be more effective in providing the following characteristics or features:

- Fewer periods of disturbance to wildlife associated with management activities.
- Better interior and edge habitat for some wildlife species, including migratory birds, western toad, Townsend's big-eared bat, big game and grizzly bear.
- A landscape fuels management strategy with effective barriers to interrupt crown fire spread across the landscape.
- Historic patch sizes across the landscape.
- A combination of forage and cover opportunities for wildlife.

- More acres of western larch, ponderosa pine and western white pine restoration.
- Better economic feasibility by concentrating management.

The team then identified the existing roads on the landscape that would allow for activities to occur while continuing to meet the grizzly bear habitat parameters laid out in the 2015 Forest Plan. As a result, some additional treatments along the East Side Road were identified.

The KFSC guidelines include suggestions as to where retention areas occur: riparian buffers, special habitats such as seeps, rocky outcrops, or other areas of high species diversity, patches dominated by hardwoods, representative patches of the pre-harvest forest stand, and clusters of shade-intolerant tree species. As you can see from our project development, our landscape does include almost all of the retention areas that are suggested. Because individual units already exclude riparian areas, seeps, rocky outcrops, and large hardwood patches, these are incorporated at a coarser scale. As page 33 of the DEIS explains, all regeneration units will leave a range (depending on the treatment type) of quality trees in an uneven arrangement of individuals, small groups, and clumps as well as snags and snag replacement trees. Representative patches of the pre-harvest forest stand have been incorporated at the landscape scale and exist in the untreated patches between units. Studies indicate that in VRU 2 of the warm/dry biophysical setting patch size from 20-200 acres may be a representative range. In VRUs 4 and 5 of the warm/moist biophysical setting, the patch size may range from 5 to 2,000 acres with a mean of 437 acres (DEIS pages 208-210). All of the units are within this range and are consistent with the disturbance types (mostly wildfire) within the project area. Refer to the response to Letter 10, Comment 08 for more discussion on scale.

Pre-commercial Thinning

> ***[06, 08] Comment****: There are also numerous plantations in SERIOUS need of pre-commercial thinning. I feel the agency should prioritize this activity as those plantations are the active management "stands of tomorrow" before they succumb to overcrowding and stress.*

Response: There are no pre-commercial thinning (PCT) treatments proposed with this project. However, as stated on page 232 of the DEIS, there are about 715 acres of PCT planned to start in 2015. Additionally, the Forest-wide Young Growth project would consider approximately 1,500 acres as candidates for PCT within the OLY project area which would result in additional analysis.

Recreation Improvements / Parking Facilities

> ***[05, 02] Comment****: Improved parking at the Lynx Creek Trailhead would be a benefit. The county would need to be willing partner to plow and sand the road leading up to the proposed parking area, There is a hill that leads to the proposed parking area, and will become icy and impassible under those conditions, If the county is unable to participate.*

Response: Thank you for your comment. Due to private property, the proposed parking cannot be located outside the unit at the bottom of the referred to hill.

***[07, 05] Comment**: I support as well accessibility upgrade at Alvord lake – it has immense biological importance, and also is an incredible asset to the community that enjoys it. People have stepped forward to help preserve some of this area and lake to enjoy, and the forest service should be assisting the public in this endeavor. It is clear that the public wants this area cared for and enjoyed.*

Response: Thank you for your comment

***[10, 09] Comment**: Eighth, we support the accessibility upgrade at Alvord Lake. Many members of our project team are active participants in and steadfast supporters of the Alvord Lake project, and we are glad to see increased accessibility for all people to visit this community resource and biological stronghold in the Troy area.*

Response: Thank you for your comment.

***[12, 04] Comment**: As per suggested by YVFC, I support: Upgrading the access at Alvord Lake. This lake provides valuable wildlife habitat - especially for loons and is well used by the community for recreation. I myself am hoping to paddleboard there this summer!*

Response: Thank you for your comment.

***[13, 08] Comment**: Finally, we'd like to express our ongoing support for the Alvord Lake Community Forest as a local resource and biological stronghold in the Troy area. We value that the district has*
included an accessibility upgrade for Alvord Lake in this project area.

Response: Thank you for your comment.

Regeneration Harvest (Clearcut)

***[07, 06] Comment**: The OLY project proposes very large cutting units (up to 109 acres), and units 18 and 20 combined would produce a 190 acre seedtree/clearcut. There is no certainty provided in the DEIS that these units will be treated differently than the homogenous-looking example given on page 32 of the DEIS. What specifically the district is doing to break up these large regeneration units and where we can expect to see this?*

Response: All of the proposed unit acreage is based on the area being analyzed for treatment prior to implementation. During the layout process, all units will be within the area analyzed, but some may be reduced. Units 18 and 20 fall within this category. Through our analysis process, some concerns about Yaak Mountain and some landslide prone soils were raised. Because of public concern, the size of units 18 and 20 will be reduced and the landslide prone soils will be avoided. Page 33 of the DEIS describes the differences between the various types of regeneration

harvest that are proposed in the OLY project. In all regeneration units, healthy, quality leave trees will be left where they exist regardless of the spacing (individuals or groups) with additional snag replacement trees. The picture shown on page 32 of the DEIS is one example out of many that may result, depending on where and how leave trees are spatially arranged. The intent is to create a stand condition similar to what would occur, post-wildfire, with the larger, fire tolerant trees remaining and the smaller and non-fire tolerant trees being killed. As described in the existing condition of the Forest Vegetation section, studies indicate that patch sizes historically ranged from 20-200 acres in the warm/dry biophysical setting and 5-2,000 acres in the warm/moist biophysical setting. All of the regeneration harvest units are within these historical ranges. Together, the treatment areas in combination with the non-treatment areas outside of the unit boundary and between harvest units will provide the desired shifting mosaic pattern at the landscape scale.

***[07, 07] Comment**: Regeneration units should be designed to provide cover for wildlife, protect viewshed, leave overstory and canopy cover to mitigate adverse soil exposure, which is a concern given the future of overall hotter, drier conditions brought on by climate change. The overall temperatures in the Yaak and surrounding areas are rising each year, and there has been much more drought in the area, and I believe plans need to be made to be prepared for that immediately. I encourage the district to take a hard look at whether these regeneration units are necessary given their effects to soils, wildlife, watersheds, and overall forest health.*

Response: Please see response to Letter 10, Comment 04. The commenter suggests incorporating other design features, including the retention of "security screening." Please see DEIS Design Features, page 79 (Tree Retention along Roadways). However, there is a distinction between providing for cover within a proposed harvest unit and providing for security habitat within the project area. The OLY DEIS analyses for grizzly bear and elk discuss security habitat: what provides security habitat and how much there is currently, during the project, and post-project. These are areas located beyond a species specified distance from open and/or restricted roads. Therefore, access management is the biggest influence on the abundance and location of security habitat. Security habitat is also discussed in other species analyses, such as gray wolf and big game. The effects of regeneration harvest, including units or combination of units that would result in openings greater than 40 acres in size, were discussed in individual wildlife analyses in the OLY DEIS. The following are points discussed in the grizzly bear analysis, as an example, regarding large openings that would be created through regeneration harvest and what would contribute to their use (pages 479 – 480): 1) existing trees would be retained, where feasible, and grouped to protect the leave trees as well as provide small areas of cover; 2) topography would help break up the visuals for some units; 3) establishment of understory vegetation within a few years would also help break up the visuals and provide cover; 4) the large patch sizes and shape mimic natural disturbance processes and allow for greater flexibility to work around and maintain features such as hardwood patches that the commenter suggested; 5) increased availability of edges habitat that would be adjacent to different types of habitat; 6) irregularity of edge shape; and last but not least 7) the influence of roads. Adaptation options are presented in the KIPZ Climate Change Report (USDA Forest Service 2010b), "emphasize management actions that address existing stressors, contribute to multiple land management objectives regardless of climate change (win-win), and are likely to be effective at achieving or maintaining desired conditions across a wide range of future climates. Their application in appropriate circumstances may be a critical contribution to sustaining the health, diversity, and productivity of the KNF to

meet the needs of present and future generations" (2015 Forest Plan page 87). The OLY project proposes treatments, including the regeneration harvests, that will help trend the landscape towards the desired conditions of the forest plan and the environmental consequences of these proposed actions have been analyzed by all resources, including soils, wildlife, hydrology, and vegetation in the DEIS.

***[07, 08] Comment**: Why did the district chose to regenerate stands experiencing low levels of root disease when the option exists to treat root disease pockets creating regeneration-type openings and using intermediate harvest outside of the root disease pockets? I don't understand why that decision would be made.*

Response: Please see response to Letter 08, Comment 06.

***[08, 01] Comment**: I'm writing of offer comments regarding the proposed Oly project. The first thing that caught my eye was the preponderance of clearcuts—nearly 70% of treated acres within the proposed watershed-scale project. This seems more like gardening than the selective forestry I've seen the FS begin considering in past years. Coming on the heels of the East Res project, also clearcut-heavy, I can't help but worry that this is beginning to suggest a trend, a turn, back to the bad old days of the Kootenai, which, at their worst, were often characterized by a rushed, cookie-cutter approach to silvicultural prescriptions and a hastiness in the planning process that overlooked critical factors and public participation, and even science, in that rush to get the cut out. I very much hope this is currently not the case.*

Response: Forest management is objectives driven. Our objectives were stated in the purpose and need (DEIS pages 7-8). We start by identifying opportunity areas where the current condition is departed from the desired condition. Then we identify a desired condition for that individual stand based on the existing site characteristics. It is only after looking at the difference (or departure) of the desired condition to the current condition that a silviculturist will prescribe the necessary management actions (after considering a wide range of options) to achieve the desired condition. Please refer to response to Letter 10, Comment 10 for an explanation of the long-term vision for the project.

***[08, 02] Comment**: I am concerned by the prevalence for Forest Plan exceptions to clearcut size. The Forest Plan guidelines are there for a reason; 40-acre clearcuts should be the exception, for good reason, not the default setting and/or general forest guideline. In a warming world, removing all overstory is a prescription for more loss of moisture from an already-drying forest. In the critical wildland-urban interface (which is increasingly utilized by numerous species, as water availability and seasonality decreases at higher elevations, rendering the riparian areas ever-more critical to wildlife), there are fire risks associated with regeneration harvests—wind, blowdown, proliferation of fine-fuels in the form of highly flammable weeds, where intermediate harvests, retaining some shade and moisture retention, could be strategic.*

Response: Forestwide Desired Conditions (FW-DC-VEG-05, FW-DC-VEG-11, and FW-DC-WL-19) encourage us to consider the pattern of forest conditions across the landscape which consists of a range of patch sizes that have a diversity of successional stages, densities, and compositions. P. 9 of the DEIS explains why the interdisciplinary team decided that large, irregularly shaped openings adhere to several of the Forest Plan's desired conditions and what those opening could help provide. Alternative 4 was designed to address the publicly raised issue of creating large openings through regeneration harvest (DEIS page 56). The intent is to create a stand condition similar to what would occur, post-wildfire, with the larger, fire tolerant trees remaining and the smaller and non-fire tolerant trees being killed. As described in the existing condition of the Forest Vegetation section, studies indicate that patch sizes historically ranged from 20-200 acres in the warm/dry biophysical setting and 5-2,000 acres in the warm/moist biophysical setting. All of the regeneration harvest units are within these historical ranges. Together, the treatment areas in combination with the non-treatment areas outside of the unit boundary and between harvest units will provide the desired shifting mosaic pattern at the landscape scale. None of the treatments propose to remove all of the overstory. As page 33 of the DEIS explains, all regeneration units will leave a range (depending on the treatment type) of quality trees in an uneven arrangement of individuals, small groups, and clumps as well as snags and snag replacement trees. As for your comment regarding fire risks associated with regeneration harvest, all proposed units have a fuels treatment prescribed to deal with hazardous post-harvest and provide for site preparation in regeneration units. DEIS page 189 of the Fire and Fuels Management analysis states that regeneration harvest results in stands that are more fire resilient for the future. As we discussed in your previous comment (Letter 08, Comment 05), the regeneration harvest was prescribed based on the current condition compared to the desired condition (objectives). Those objectives are what dictate the prescription, not the other way around.

***[08, 05] Comment**: I also do not agree that P-pines from off-site source renders them candidates for removal. It's admirable to replant with locally sourced seeds, though in a changing world this precedent is long-shattered—i.e. blister rust-resistant white pine, for one example. Indeed, with the warming/drying forest conditions we will be facing for the next hundred years or more, seeds from other, drier sites, rather than the (once-upon-a-time) wetter Kootenai might be the best possible option. At this point, I wouldn't go in and eradicate them, unless there is proof that they are not prospering specifically due to their genetics. It feels very much like a red herring/Trojan horse justification.*

Response: The Kootenai, including the OLY project area, has numerous plantations, established between 1918 and 1958, with unknown or distant seed source and/or unknown elevation of seed source. Planting stock failures occurred, sometimes taking many years for symptoms to develop, even after seemingly successful establishment. The seed zone concept was not adopted until the 1970s. Besides planting records (or their absence), visual clues of tree performance can be an indicator of poor seed source. This may include poor vigor and growth compared to known natives of the same species in nearby areas, and relatively poor resistance to insects and diseases or significantly different growth form characteristics. Reconnaissance and Forest Health Protection (FHP) service on the KNF (March 2011, and July 2015) have confirmed the occurrence of mortality from western pine beetle and growth losses and impacts from *Lophoderamium* species. There has been a concerted effort to reduce density in the plantations that are in the WUI in an attempt to improve overall health of residual trees and reduce their vulnerability to bark beetles, while meeting other objectives. It is important to note that not every

ponderosa pine in these units will be removed, nor is every offsite ponderosa pine plantation in the OLY project area being treated. Trees with enough crown vigor and that are in good health that they are expected to persist in the future will be left on site. In units 28, 38, 46, and 50, enough healthy trees exist and will be left on site allowing for an intermediate harvest. Units 33, 38A, 47, 48, 49, 50, 51, 53, and 77 had too much mortality or imminent mortality in the ponderosa pine so regeneration harvest was prescribed. Therefore, existing conditions would dictate the proposed treatment. We recognize the potential genetic and climate change data that could be useful, but only if those trees persist into the future. For these reasons, the proposed treatments in the offsite plantations were carefully considered and prescribed.

***[08, 06] Comment**: I believe the purpose and need for removing root-rotted Doug fir an be accomplished more specifically and without regeneration harvest of all species, all age classes; certainly without 2000 acres of such proposed treatments. It's numeric such as these that lead to concerns of planning to get the cut out, rather than site-specific needs of each unit. Past projects have shown that the two desires are not always incompatible. The relative one-dimensionality of this proposal certainly raises concerns about a reversion to those days.*

Response: It is the site-specific needs of each unit and multi-dimensionality of the objectives that lead to the prescriptions of these units. The project area is composed of 38% of the Douglas-fir forest type (DEIS page 204), which is substantially higher than the desired range for the KNF of 4-8% (DEIS page 203). This is due to fire suppression, targeted removal of ponderosa pine and western larch in the past, and the decline of western white pine due to disease. Furthermore, the desired range for the Douglas-fir forest type in the warm/dry biophysical setting is 2-5% and the existing is about 81%. In the warm/moist biophysical setting the desired range is 2-5% and the existing is about 34% (DEIS page 205). Therefore, across the forest and within the project area, there is an overabundance of Douglas-fir. The purpose and need includes the desire to promote early seral tree species including western larch, ponderosa pine, and western white pine. DEIS page 215 explains that where significant root disease and susceptible species are present, stand development is likely to remain in early succession and advance to climax stages is not expected. Pockets are scattered throughout the project area and root diseases are present in about 54 percent of the Douglas-fir forest type. The Region 1 plant pathologist concluded that decreasing the impact from root disease will require decreasing the component of Douglas-fir where possible, and that broadcast burning under Douglas-fir stands, even stands with very little root disease, will likely contribute to mortality of residual Douglas-fir trees (See the silviculture section of the project file). The purpose and need includes the desire to contribute to fire's role on the landscape and to maintain or increase the forage component through timber harvest and prescribed fire. It is the combination of all of these desired conditions that lead to the prescription of regeneration harvest in some Douglas-fir stands. That being said, not every Douglas-fir stand is proposed for regeneration harvest. There are 385 acres (across all action alternatives) with an intermediate/regeneration harvest prescription. These stands will result in an improvement cut with seed tree or shelterwood openings. The size of the regeneration openings is not limited to 5 acres or less, but is dependent upon the appropriate size needed to treat pockets of insects and disease within the unit (DEIS page 34). Furthermore, Units 8, 16, 24, 27, 37A, 45B, and 55A (178 acres total) have significant amounts of Douglas-fir and have intermediate treatments prescribed. Additionally, a mix of species diversity will be maintained by incorporating healthy western redcedar, lodgepole pine, Douglas-fir, grand fir, and others where appropriate (DEIS page 225).

***[10, 11] Comment**: In addition, we are surprised to see so much regeneration proposed for the units with low levels of root disease. Reports from the forest pathologist state that root disease can be treated by removing groups of trees in the area, leaving pockets of openings within a unit. This seems like an option to consider, rather than cutting everything except the few healthiest trees. We wonder why the district chose to fully regenerate most stands rather than first trying a less intensive prescription where disease levels are low.*

Response: Please see response to Letter 08, Comment 06. Note that a variety of prescriptions are proposed in Douglas-fir dominated stands and it was the combination of objectives that lead to the prescription that will achieve the desired condition for each stand.

***[10, 12] Comment**: Furthermore, we appreciate the USFS incorporating design features similar to those in the KFSC guidelines to address regeneration harvest units greater than 40 acres in size. We still have some uncertainty around where these design features will be implemented and what exactly they will look like. We don't require leave islands and irregularly shaped openings in every unit, and sometimes in smaller units this isn't feasible either for the landscape or the operator. We do, however, desire large regeneration units to have more and larger leave islands, which is a gap we see in the DEIS.*

Response: Please see response to Letter 10, Comment 04.

***[10, 13] Comment**: To this regard, Figure 8 on page 32 of the DEIS shows an example of what we can expect regeneration harvest in the project area to look like. This photo shows an even-¬-aged stand of leave-¬-trees (mostly larch) that are evenly spaced across the unit. The OLY project proposes very large cutting units (up to 109 acres), and units 18 and 20 combined would produce a 190 acre seedtree/clearcut. It is very hard for our group to find support for such treatments without some certainty that these units will be treated differently than the homogenous-¬-looking photo in the DEIS. What would help our group find support for the amount and size of regeneration harvest units in this project is a more clear understanding of what specifically the district is doing to break up these large regeneration units and where we can expect to see this.*

Response: All of the proposed unit acreage is based on the area being analyzed for treatment prior to implementation. During the layout process, all units will be within the area analyzed, but some may be reduced. Units 18 and 20 fall within this category. Through our analysis process, some concerns about Yaak Mountain and some landslide prone soils were raised. Because of public concern, the size of units 18 and 20 will be reduced and the landslide prone soils will be avoided. Please also see response to Letter 10, Comment 04 and Letter 07, Comment 06. Note that the photo used on DEIS page 32 was an example of potential outcomes. As page 33 of the DEIS explains, all regeneration units will leave a range (depending on the treatment type) of quality trees in an uneven arrangement of individuals, small groups, and clumps as well as snags and snag replacement trees.

***[12, 06] Comment**: I also share YVFC's concerns regarding large seed tree/clear cut units such as units 18 and 20. I had thought clear cuts were a thing of the past. Will these units*

provide cover for wildlife, protect viewshed, leave overstory cover to mitigate adverse soil exposure? Are they really necessary? Also it seems closer attention could be given to treating root disease areas individually - with specific regard to their severity - such as using intermediate harvest where there is less of a problem.

Response: All of the proposed unit acreage is based on the area being analyzed for treatment prior to implementation. During the layout process, all units will be within the area analyzed, but some may be reduced. Units 18 and 20 fall within this category. Through our analysis process, some concerns about Yaak Mountain and some landslide prone soils were raised. Because of public concern, the size of units 18 and 20 will be reduced and the landslide prone soils will be avoided. Please also see response to Letter 10, Comment 04 and Letter 07, Comment 06. In regards to clearcuts being a thing of the past, please see response to Letter 08, Comment 01. As far as units providing cover to wildlife, protecting viewshed, and leaving overstory cover to mitigate adverse soil exposure, please see response to Letter 07, Comment 07. Concerning root disease, please see response to Letter 08, Comment 06.

***[12, 09] Comment**: I know some believe clear cuts supposedly mimic stand replacing wildfires. But after a wildfire there remains valuable snags for wildlife and no compacted soils. After clear cuts there remains stumps and ruts - it seems to me.*

Response: Our proposed "clearcut with reserves" units will have 5-20 trees per acre that would remain after harvest in an uneven arrangement of individuals, groups, and clumps (DEIS page 33). The intent is to create a stand condition somewhat similar to what would occur, post-wildfire, with the larger fire-tolerant trees remaining and the smaller and non-fire tolerant trees being killed (DEIS page 32). Table 66 (page 226) of the DEIS has the snag and snag retention levels to retain (where they exist) after vegetation management activities (including post-harvest activities. Table 67 (page 227) of the DEIS has the levels of coarse woody debris (CWD) to retain after vegetation management activities. These levels are incorporated into each silvicultural prescription. Additional design features are included in the DEIS pages 75-78 in regards to snags and CWD. DEIS pages 84-88 include the design features which will avoid, minimize, or provide restoration from potential impacts to soils.

***[13, 02] Comment**: First, we have some remaining questions about regeneration harvest in the project area, where the majority of regeneration acres are found in units greater than 40 acres in size. We believe large regeneration units should be given extra consideration for their effects to soils, wildlife, watersheds, and overall forest health. The Kootenai Forest Stakeholder Coalition's silvacultural guidelines (pg. 16-17) provide some guidance for design features that address these concerns. The inclusion of these design features would go a long way in increasing our confidence that forest resources in units where regeneration will occur are given adequate protection. These features include: leaving 5-50% of the pre-harvest forest untreated, with an average of 30% in mesic VRU's. The majority of this retention would be in the form of small (e.g., ½ to 3 acre) intact patches. VRU's with more of a stand-replacement fire history would typically leave less of the pre-harvest forest, but would leave an average of at least 20% uncut; the majority of this retention would be in the form of 5-10 acre patches. As we have discussed, these areas could be strategically placed in riparian areas, special habitats such as seeps, rocky outcrops, and other areas of high species diversity, patches dominated by hardwoods, representative patches of the pre-harvest forest*

stand, and clusters of shade intolerant tree species. Other design features include feathering edges of regeneration units where appropriate (i.e. not in areas highly susceptible to windthrow); retaining wildlife security screening (understory & small diameter trees) immediately next to roads where necessary to break up elongated views into the unit; designing units to have irregular shapes, i.e. not square.

Response: Please see response to Letter 10, Comment 04. The commenter suggests incorporating other design features, including the retention of "security screening." There is a distinction between providing for cover within a proposed harvest unit and providing for security habitat within the project area. The OLY DEIS analyses for grizzly bear and elk discuss security habitat: what provides security habitat and how much there is currently, during the project, and post-project. These are areas located beyond a species specified distance from open and/or restricted roads. Therefore, access management is the biggest influence on the abundance and location of security habitat. Security habitat is also discussed in other species analyses, such as gray wolf and big game. The effects of regeneration harvest, including units or combination of units that would result in openings greater than 40 acres in size, were discussed in individual wildlife analyses in the OLY DEIS. The following are points discussed in the grizzly bear analysis, as an example, regarding large openings that would be created through regeneration harvest and what would contribute to their use (pages 479 – 480): 1) existing trees would be retained, where feasible, and grouped to protect the leave trees as well as provide small areas of cover; 2) topography would help break up the visuals for some units; 3) establishment of understory vegetation within a few years would also help break up the visuals and provide cover; 4) the large patch sizes and shape mimic natural disturbance processes and allow for greater flexibility to work around and maintain features such as hardwood patches that the commenter suggested; 5) increased availability of edges habitat that would be adjacent to different types of habitat; 6) irregularity of edge shape; and last but not least 7) the influence of roads.

***[13, 03] Comment**: We acknowledge that the district has included some of these design features in the project, and hope that greater consideration to these suggestions can be given in the revision of the EIS for large regeneration units. We remain uncertain about where these design features will be implemented and what they will look like upon completion. We do not have enough specific information to inform our decision about whether we can support this project with the magnitude of regeneration harvest as it currently stands. We recommend the FEIS address where these design features will occur and what specifically they will look like. There seems to be ample opportunities within the regeneration units, many of which are 40-110 acres in size, to incorporate these features. Leaving more overstory and canopy cover in regeneration units could also mitigate adverse soil exposure, which is a concern of ours given the future of overall hotter, drier conditions brought on by climate change.*

Response: Forest ecologists and other scientists are increasingly noting that "resistance" and "resilience" are important as they relate to sustainability, biodiversity, and climate change (Blate et al. 2009, Drever et al. 2006, Folde et al. 2004, Hansen et al. 2003, Joyce et al. 2008, Millar et al. 2007, Noss 2001, Stephens et al. 2010, Thompson et al. 2009, Unnasch et al. 2009, Walker et al. 2004, Walker and Salt 2006) (2015 Forest Plan pages 86-87). To improve adaptation of forest vegetation to the likely effects of climate change, these same researchers suggest promoting resistance and resiliency. Adaptation options are presented in the KIPZ Climate Change Report (USDA Forest Service 2010b), "emphasize management actions that address existing stressors, contribute to multiple land management objectives regardless of climate change (win-win), and

are likely to be effective at achieving or maintaining desired conditions across a wide range of future climates. Their application in appropriate circumstances may be a critical contribution to sustaining the health, diversity, and productivity of the KNF to meet the needs of present and future generations (2015 Forest Plan page 87). When developing the goals, desired conditions, objectives, and standards in the Forest Plan that pertain to forest vegetation, the concepts and management approaches discussed above regarding forest resistance and resiliency were utilized with the overall objective of maintaining and restoring the forest biodiversity and sustainability. GOAL-VEG-01 states that plant communities are trending toward the desired conditions for composition, structure, patterns, and processes. The ecological integrity of the communities is high and they exhibit resistance and resiliency to natural and man-caused disturbances and stressors, including climate change. The OLY project's purpose and need was developed to help move the landscape towards the desired condition. The regeneration units would provide open grown conditions similar to a stand replacing fire and reforestation would focus on establishment of western larch, western white pine, ponderosa pine, and Douglas-fir in the stand with western redcedar, lodgepole pine, Engelmann spruce, grand fir, and western hemlock and some seral species naturally regenerating and present as a component of the species mix (DEIS page 32). Additionally, our silviculturists and culturists use the Reforestation-Revegetation Climate Change Primer for Region 1 to adequately incorporate climate change into the prescriptions.

***[15, 01] Comment**: Given that there still exist serious concerns regarding regeneration and soil compaction in this area where lynx, grizzly, and big horn, as well as additional important wildlife, abide, additional assurances are needed.*

Response: All resources, including wildlife and soils, conducted in-depth analyses of the four alternatives proposed and their environmental consequences, as well as the consistency to the 2015 Forest Plan. Design features were developed to avoid or minimize potential adverse impacts to resources from this project. These analyses, along with the incorporation of relevant issues into an FEIS, will guide the decision maker in choosing an alternative.

***[16, 02] Comment**: The main point we want to make here, after perusing the EIS online until our eyes crossed, is WAY TOO MUCH red on the map, i.e., clearcuts. We were relieved and gratified when, just a few years ago Three Rivers seemed to have largely abandoned clearcutting as a forest management tool, and we are disheartened and disappointed to see it surging back. We find clearcuts of any size to be as damaging ecologically as they are visually. There is no natural counterpart for what the agency euphemistically refers to as ŕegeneration cuts,"no natural process wherein trees simply disappear from the landscape, leaving neither blowdown nor charred snags and ashes. A landscape whose natural understory, if any, likely succumbs to sunscald, as weeds colonize the newly disturbed sunflooded ground. We have seen this process in action on our own land, which like everybody's was logged before we bought it.*

Response: Please see response to Letter 08, Comment 01, for the rationale to the number of regeneration (clearcut) units. Also please see response to Letter 10, Comment 10 for an explanation of the long term vision for the OLY project.

***[16, 03] Comment**: Another result of clearcutting, indeed of most logging protocols, that we have observed on our own land is the phenomenon that occurs a few years down the road after logging: about a million (in our case, spruce) seedlings per acre springing up all over the place, so that you suddenly realize you have a lifetime of work to do with your loppers if you want to be able to see through, let alone walk through, your land. Talk about ladder fuels! Everywhere we have hiked in the Yaak in the past 15 years, we've observed the same conditions on Forest Service land: a former regen or heavy thinning unit which is absolutely packed solid with regrowth, from seedling size to 20-30 foot trees as thick as grass (maybe this is what is meant by "regeneration?") And we wonder what the original plan was for the area, since this couldn't possibly be it. Was the plan to underburn? Or to hire a few hundred low-wage workers with loppers? Whatever it was, it never happened. And so now we are wondering what the plan is for the future of all those clearcuts in the OLY project. We do not see this in the EIS.*

Response: Although there are no pre-commercial thinning treatments proposed specifically for the OLY project, there are about 650 acres of pre-commercial thinning planned to begin in 2016 (please see Table 32, page 99, in DEIS Chapter 3). Also, the Kootenai National Forest Forest-wide Young Growth Project would consider about 1,500 candidate acres for pre-commercial thinning. FROM Response TO Letter 10, Comment 10: "Prior to initiating any treatment, silvicultural examinations, diagnosis of treatment needs, and the preparation of prescriptions detailing the methods, techniques, and timing of the silvicultural activities necessary to achieve established objectives are required. These prescriptions are objectives driven and a “target stand” (desired condition) is developed for a specific time period, which on the KNF is 100-120 years, based on those objectives. This means that the prescription contains all of the foreseeable and predicted future treatments that the stand will require in order to meet that target stand in 100-120 years. These future prescriptions could be a variety of treatments, but all regeneration units will have precommercial thinning exams scheduled and will most likely have some type of intermediate treatment but will be reassessed on the objectives set forth at that time (this could mean putting shaded fuel breaks in if deemed necessary)."

Road System

***[02, 02] Comment**: I feel we have enough roads in this area. More roads will not help anything for public or wildlife habitat. Except for possible forest fire control if needed. Only for putting out the fire.*

Response: A Travel Analysis Process (TAP) was performed for the OLY project area. The process was conducted by an interdisciplinary team (IDT) of specialists from many relevant fields. The IDT took a critical look at the existing condition of the transportation system as well as its future needs, for example future wildland fire suppression needs was addressed. The existing condition of the transportation system was compared to the desired conditions of the 2015 Forest Plan and by the socio-economic, cultural, and environmental consequences relative to the travel route network. The objective of this analysis was to work toward an optimal transportation system that meets land stewardship needs, management objectives, and public recreational desires, yet provides a proper balance between the benefits of access and the

concerns of associated effects to the environment. The process was documented in the Lower Yaak-O'Brien-Sheep Travel Analysis Report and is part of the project file.

As stated in the 2015 Kootenai National Forest TAP (see the project file): "The results of the TAP are documented in a Transportation Analysis Report (TAR). The TAP and TAR are important first steps towards the development of the minimum road system."

The TAP has six steps that are outlined in Chapter 20 Travel Analysis, FSH 7709.55 – Travel Planning Handbook. The analysis is tailored to local situations and landscape conditions by Forest staff and considers public/partner agency input. Instructions from the Forest Supervisor for the analysis are contained in an initiation letter as part of the analysis record. The six-step process includes:

- Step 1. Setting up the Analysis
- Step 2. Describing the Situation
- Step 3. Identifying Issues
- Step 4. Assessing Benefits, Problems and Risks
- Step 5. Describing Opportunities and Setting Priorities
- Step 6. Reporting.

The analysis is a science-based process, considering social and environmental risks and benefits of the road system, a financial review, and contribution of the road system to the land management objectives and desired condition.

The OLY Travel Analysis Report found in the project file describes the travel analysis completed for the OLY project area. As stated on page 5 of the report, ""... Travel analysis is not a decision-making process. Rather, travel analysis informs decisions relating to administration of the forest transportation system and helps to identify proposals for changes in travel management direction. Forest Service Manual (FSM) 7712 directs units:""

The Forest Plan does not make any site-specific travel management decisions, aside from Research Natural Areas and Recommended Wilderness. This analysis occurs at the project-level, with decisions following site-specific NEPA. Ongoing project-scale travel analysis continues to prioritize road maintenance and decommissioning opportunities as the Forest works to identify the minimum number of roads needed for an efficient transportation system as directed in 36 CFR 212. User safety, resource protection, and mission needs are used to prioritize roads for maintenance."

***[06, 05] Comment**: Regarding road closure and / or storage - decommissioning, as over half this area is with-in the WUI, the agency needs to look into the future as far as access for fire protection in years to come. While I realize that roads are a source for water quality degradation and / or sedimentation, they are also key to rapid response for fire suppression. Careful consideration should be given as to any road storage or decommissioning activities when considering future fire suppression needs.*

Response: A project level travel analysis was conducted for the project area. The process was conducted by an interdisciplinary team of specialists. The IDT took a critical look at the existing condition of the transportation system as well as its future needs. The existing condition of the

transportation system was compared to the desired conditions of the 2015 Forest Plan and by the socio-cultural, economic, and environmental impacts relative to the travel route network. The objective of this analysis was to work toward an optimal transportation system that meets land stewardship needs, management objectives, and public recreational desires, yet provides a balance between the benefits of access and the concerns of associated effects to the environment. The process was documented in the Lower Yaak-O'Brien-Sheep Travel Analysis Report and is part of the project file.

Roads: BMPs (culverts and other roadwork)

> ***[09, 20] Comment**: Johnson (1995) discusses how "snowmelt re-direction and concentration and surface flow production" increase peak flow amounts multiplicatively by the presence of roads in a drainage. Johnson (1995) adds, "For the roads we no longer actively use, our dwindling road maintenance budget will make it difficult to maintain the culvert crossings. When these fail during storm and runoff events, tremendous amounts of sediment can be delivered directly to the channel and from there down to lower streams with significant beneficial uses such as sensitive fish habitat." Johnson (1995) also points out that the old roads utilize ditches on the inside of the road which greatly increases drainage efficiency, causing peak flows to go far beyond any modeled predictions. Does the OLY project eliminate all such roads (ditches on the inside of the road) in the project area?*

Response: The DEIS displays the potential effects roads can have on watersheds (419-428). Page 405 refers to FW-GDL-WTR-03 which specifically talked to "ditch and road surface runoff [being] disconnected from streams and other water bodies." Page 417 states "The objectives of the BMP work are to reduce sediment delivery to streams, reduce surface water runoff concentration by roads, and reduce the risk of mass failures and washouts." The Design Criteria on pages 79 and 80 present site specific BMPs for disconnecting ditches from streams. Page 428 specifically identies the effects from guranteed work and from work that would need additional funding. See also responses to Letter 09, Comments 21 and 23.

> ***[09, 21] Comment**: How does the DEIS analyze the direct, indirect and cumulative of not upgrading the roads of substandard design on water quality? The DEIS fails to disclose if all roads in the project area will be brought up to BMP standards.*

Response: All roads were built to the current standards of that time. Standards change over time. In a 2008 Memorandum of Understanding (MOU) between the Forest Service and the State of Montana, the Forest Service has been designated as the management agency responsible for water quality protection on National Forest System lands. In the MOU (2013), the Forest Service has agreed to follow State Water Quality Standards established under the Montana Water Quality Act, primarily through implementation of BMPs. These are designed to ensure that water quality and beneficial uses are protected both during and after implementation of land management activities. The FS continues to improve BMPs. The DEIS displays the potential effects roads can have on watersheds (419-428). Table 23 on pages 73 and 74 of the DEIS display the proposed work for the roads in the project area. This includes haul routes and non-haul routes. The DEIS is clear throughout the watershed section that there are required BMPs and road work and some work that is not. Both were analyzed. Page 428 of the DEIS states "It is estimated there will be a 500 CY

reduction in sediment to O'Brien Creek resulting from the road storage and decommissioning work required before the timber sale occurs. There may be an additional reduction 450 CY reduction in sediment to O'Brien Creek if other work, currently unfunded, occurs." Page 438 of the Oly DEIS summarizes the effects as follows: "Required BMP work would minimize sediment delivery from timber sale activities and contribute to long-term sediment reduction in the affected watersheds. Some road storage, road decommissioning, and stream site stabilization work would be required as part of the timber sale project and would benefit O'Brien Creek. Additional road storage, road decommissioning, and BMP work that would occur as funding becomes available, would also benefit O'Brien and Kilbrennan creeks by reducing sediment." See also response to Letter 09, Comments 20 and 23.

***[09, 23] Comment**: The DEIS states the project might "Implement stabilization and drainage work on roads currently stored or proposed for intermittent storage by removing culverts at risk for failure, recontouring failing stream crossings, constructing armored overflows, and water barring." The DEIS seems to say these actions depend upon funding, which confuses the analysis of impacts on water, fish, and soils. Also, the DEIS doesn't disclose if the project proposes to perform the above work on all previously stored roads in the project area, thus leaving their ongoing impacts uncertain. The DEIS states the project might "Rehabilitate road/stream crossings on currently decommissioned or closed roads by removing the road fill where actively eroded by streams." Again, the DEIS seems to say this depends upon funding, which confuses the analysis of impacts on water, fish, and soils. Also, the DEIS doesn't disclose if the project proposes to perform the above work on all previously decommissioned roads in the project area, thus leaving their ongoing impacts uncertain. The DEIS states the project might "Implement BMPs on non-haul routes where conditions warrant." Did the FS conduct thorough field surveys of all non-haul routes in the project area to assess needs for upgrade using BMPs? The DEIS states, "If funding is available, BMPs would be implemented on … the portion of NFSR 4445 which is the main road up the Lynx Creek drainage." The DEIS also discloses that: NFSR 4445… is very steep and in some locations is located quite close to the stream making prevention of sediment delivery to the stream difficult. Sediment in Lynx Creek has a high potential to be delivered directly to bull trout spawning habitat in O'Brien Creek. In order to use the Lynx Creek road as a haul route, BMPs would have needed to be implemented to minimize sediment delivery. These BMPs would have included installation of additional drainage structures, replacement of undersized culverts, and other measures which would be costly to implement.*

Response: Road surveys in the project area were done for both haul routes and non-haul routes. Table 23 on pages 73 and 74 of the DEIS display the proposed work for the roads in the project area. This includes haul routes, non-haul routes, decommission roads and storage roads. All work on NFS Lands is dependent on the funding that is received in a given year. The Water Resources Section of the DEIS is clear that road BMPs, storage, and decommissioning associated with timber sales will be funded with the timber sales. The road BMP, storage, and decommissioning not associated with timber sales is prioritized and completed based on the annual funding available. The KNF has had a good track record of getting these types of projects completed. Over the last 20 years the KNF has decommissioned 980 miles of road and stored another 283 miles (KNF LMP FEIS 2013). The DEIS displays the potential effects roads can have on watersheds (419-428). Page 438 of the Oly DEIS summarizes the effects as follows: "Required BMP work would minimize sediment delivery from timber sale activities and contribute to long-term sediment reduction in the affected watersheds. Some road storage, road decommissioning,

and stream site stabilization work would be required as part of the timber sale project and would benefit O'Brien Creek. Additional road storage, road decommissioning, and BMP work that would occur as funding becomes available, would also benefit O'Brien and Kilbrennan Creeks by reducing sediment." See also responses to Letter 09, Comments 20 and 21.

***[09, 24] Comment**: The fact that NFSR 4445 is such a watershed liability calls into question a forestwide TAP that doesn't identify it as a road not needed for management.*

Response: The Forest Wide Transportation analysis offers a matrix of opportunities based on the risk and the benefits of a road. One segment of Road 4445 was classified as High Risk, High Benefit in the Forest TAR and another segment was classified as Moderate Risk, High Benefit. Both High Risk/High Benefit and Medium Risk/High Benefit are given a preliminary opportunity spectrum of "Storage, Reconstruction or Maintenance".

Similar segments were identified on a more site-specific scale at the project level travel analysis. TABLE 5: Individual Road Description and Identification of Need in the OLY TAR (page 55) describes the need for NFSR 4445. The OLY TAR can be found in the project file. The OLY DEIS has significant discussion concerning the value of Road 4445 and the risk to the watershed resource. It also lays out design criteria for mitigating the watershed issues in Table 25 (DEIS page 80), as well as on Page 89 under "Funding Dependent Resource Improvement Work". It is important to note that the project area transportation analysis looks at more issues at a much finer scale, so differences can be expected.

Roads: Decommissioning

***[09, 25] Comment**: For roads designated for "passive" decommissioning, will all the stream crossings be pulled, and the entire template be hydrologically neutralized so that no maintenance will be desirable? The U.S Fish & Wildlife Service has concluded, "Culverts left in place behind gated and bermed roads . . . pose a risk to bull trout. . . Whatever the design life, any crossing structure would have a 100% chance of failure over its installation life if it is not removed after the road is abandoned." (USFWS Montana Field Office, Biological Opinion on the Effects of the Moose Post-Fire Project on Bull Trout, 11/14/2002).*

Response: Roads proposed for "passive" decommissioning are those that won't need maintenance and can be left in the condition they are in; they don't have stream crossings with culverts that need to be removed. These roads are hydrologically stable and can be considered for contributing to grizzly bear Core. From DEIS page 394: "If there are no hydrologic concerns and the road prism is allowed to naturalize without ground-disturbing activity, it is called passive decommissioning."

Roads: General

***[09, 89] Comment**: The main ecological and financial problem facing the KNF, and national forests throughout the Inland Northwest and U. S. Northern Rocky Mountains, is the existing excessive network of roads. Although the main focus of the Travel Management Rule Subpart*

A was to be this excessive road network, the FS sidesteps the issue at every juncture—in the design of the RFP, in the design of projects implementing the forest plan, and in the systematic avoidance of conducting its duties under Subpart A, which requires the agency to minimize the ecological and economic liabilities of the excessive road network by significantly downsizing it. The 2003 Analysis of the Management Situation Technical Report presented information on the financial liabilities of the KNF's National Forest System Roads: For the KNF, the annual maintenance budget would need to be approximately $28.8 million dollars and the cost to bring all roads up to their assigned maintenance level is estimated at $515 million dollars.

Response: A Travel Analysis Process (TAP) was performed for the OLY project. As stated in the 2015 Kootenai National Forest TAP (see the project file): "The results of the TAP are documented in a Transportation Analysis Report (TAR). The TAP and TAR are important first steps towards the development of the minimum road system."

The TAP has six steps that are outlined in Chapter 20 Travel Analysis, FSH 7709.55 – Travel Planning Handbook. The analysis is tailored to local situations and landscape conditions by Forest staff and considers public/partner agency input. Instructions from the Forest Supervisor for the analysis are contained in an initiation letter as part of the analysis record. The six-step process includes:

- Step 1. Setting up the Analysis
- Step 2. Describing the Situation
- Step 3. Identifying Issues
- Step 4. Assessing Benefits, Problems and Risks
- Step 5. Describing Opportunities and Setting Priorities
- Step 6. Reporting.

The analysis is a science-based process, considering social and environmental risks and benefits of the road system, a financial review, and contribution of the road system to the land management objectives and desired condition.

The OLY Travel Analysis Report found in the project file describes the travel analysis completed for the OLY project area. As stated on page 5 of the report, "... Travel analysis is not a decision-making process. Rather, travel analysis informs decisions relating to administration of the forest transportation system and helps to identify proposals for changes in travel management direction. Forest Service Manual (FSM) 7712 directs units:"

The 2015 Kootenai National Forest Transportation Analysis estimates about $1.98 million dollars of total annual costs for its road system compared to the $28.8 million estimate for annual maintenance costs in the 2003 KNF Analysis of the Management Situation Report. The Transportation Analysis Report can be found on the Kootenai National Forest www website at http://www.fs.usda.gov/detail/kootenai/home/?cid=fseprd476512 and can also be found in the OLY project file).

Travel Analysis is a deliberate process used to determine the minimum road system and key resource issues. The OLY Travel Analysis Report describes the travel analysis completed for the OLY project area. As stated on page 5 of the report, "Travel analysis assesses the current forest transportation system and identifies issues and assesses benefits, problems, and risks to inform

decisions related to identification of the minimum road system per 36 CFR Part 212.5(b)(1) and designation of roads, trails and areas for motor vehicle use per 36 CFR Part 212.51. Travel analysis is not a decision-making process. Rather, travel analysis informs decisions relating to administration of the forest transportation system and helps to identify proposals for changes in travel management direction. Forest Service Manual (FSM) 7712 directs units:"

The Forest Plan does not make any site-specific travel management decisions, aside from Research Natural Areas and recommended wilderness. This analysis occurs at the project-level, with decisions following site-specific NEPA. Ongoing project-scale travel analysis continues to prioritize road maintenance and decommissioning opportunities as the Forest works to identify the minimum number of roads needed for an efficient transportation system as directed in 36 CFR 212. User safety, resource protection, and mission needs are used to prioritize roads for maintenance.

***[09, 91] Comment**: These days, the FS likes to claim that just about all of its management projects are "restoration," but such claims are mostly overhyped because their focus on "vegetation" (i.e., logging) misses what really needs restorative action—the overbuilt road system. Wisdom et al., 2000 (a scientific reference cited extensively in the RFP FEIS) point out issues the KNF wants to ignore: Our analysis also indicated that >70 percent of the 91 species are affected negatively by one or more factors associated with roads. Moreover, maps of the abundance of source habitats in relation to classes of road density suggested that road-associated factors hypothetically may reduce the potential to support persistent populations of terrestrial carnivores in many subbasins. Management implications of our summarized road effects include the potential to mitigate a diverse set of negative factors associated with roads. Comprehensive mitigation of road-associated factors would require a substantial reduction in the density of existing roads as well as effective control of road access in relation to management of livestock, timber, recreation, hunting, trapping, mineral development, and other human activities. ...Efforts to restore habitats without simultaneous efforts to reduce road density and control human disturbances will curtail the effectiveness of habitat restoration, or even contribute to its failure; this is because of the large number of species that are simultaneously affected by decline in habitat as well as by road-associated factors. (Emphases added.)*

Response: See response to Letter 09, Comment 89.

***[09, 92] Comment**:*

{A} Then, on the verge of taking bold, necessary strides towards reforming its roads and access management into something ecologically sustainable, last year the FS issued the RFP and FEIS which failed to analyzed or address the problem, and then followed that up with a sham Region 1-directed Travel Analysis Process that failed to follow the Travel Management Rule Subpart A requirements for involving the public in a science-based effort to identify the forestwide minimum road system. The OLY DEIS does not analyze or disclose the project area road system's long-term financial liabilities, nor the associated ecological impacts due to inadequate maintenance funding. The DEIS rests on the assumption that this project will adequately mitigate the problems chronically posed by the road network by project road work and BMP implementation, despite the fact that KNF officials themselves know otherwise:

{B} Constructing and improving drainage structures on Forest roads is an ongoing effort to reduce road-related stream sediment delivery. Although BMPs are proven practices that reduce the effects of roads to the watershed, it is not a static condition. Maintaining BMP standards for roads requires ongoing maintenance. Ecological processes, traffic and other factors can degrade features such as ditches, culverts, and surface water deflectors. Continual monitoring and maintenance on open roads reduces risks of sediment delivery to important water resources. (USDA Forest Service, 2010t.)

{A} Response: The OLY project implements road related improvements. During the Forest wide travel analysis process in 2015, the KNF did meet the Travel Management Rule Subpart A requirements for involving the public with 4 open houses which were held on Feb. 19th, 24th, 25th, and 26th, held in Troy, Libby, Trout Creek, and Eureka respectively. The KNF also utilized an ArcGIS online interactive mapping website that was available to the public from Feb. 16th to March 16th, 2015. The public was able to view the analysis and provide input to help identify risks and benefits.

{B} Response: Although some roads in the OLY project area may be deteriorating due to lack of maintenance as a result of less funding for maintenance over recent years, overall the condition of much of the National Forest System roads in this area is good. Since 1993, approximately 27 road-related projects have been implemented including 68 miles of road reconstruction and 18 miles of road storage. Eight major culverts have been replaced including two that provided fish passage. As part of this work, stream crossings were replaced to improve water quality and habitat for aquatic organisms. Other types of BMP work included the replacement and installation of drain dips, constructing or cleaning catch basins and ditches, blading, dust abatement, buttressing cut slopes and fill slopes and resurfacing roads. (See Appendix H, Known Past Road Treatments.) In addition, overall the roads database shows approximately 62 miles of road previously decommissioned (removed from the NFS road inventory) or converted to trail in this analysis area.

As a result of this OLY project additional road work would be accomplished including approximately 45-55 miles of reconstruction/reconditioning and many miles of storage and decommissioning as summarized in Chapter 2, Table 22 and described more specifically in Tables 17-19 . Specific timber sale related BMP work is described in Table 25.

Roads: Reconstruction and Maintenance

***[09, 22] Comment**: The FS claims that logging is justified to fund road maintenance across the forest. However there exists no forestwide NEPA analysis on that management model—no analysis or disclosures of how efficient timber projects are at providing additional funding, no analysis of the*
environmental damage because of roads left unmaintained or otherwise in poor condition, and no comparison of alternative road management schemes such as ones that would decommission roads the agency cannot afford to adequately maintain.

Response: No such analysis is required. Decisions on how to fund road maintenance are not subject to public involvement. The TAP completed for this project analyzed roads in the project area for their need for future use and for their potential risk to natural resources. Proposals for

addressing resource risks on project area roads have been included in project action alternatives along with road maintenance work as described in Chapter 2 of the DEIS.

Roads: Stimson

> ***[09, 27] Comment****: The DEIS does not analyzed or disclose the impacts of log hauling on roads from the ongoing or foreseeable 910 acres of logging on Stimson lands.*

Response: Within the OLY DEIS, Table 121, Ongoing and Foreseeable Actions in the OLY Project Area says, "Approximately 183 acres of harvest is planned on Stimson land in the O'Brien watershed between 2015 and 2022. Most of this harvest would be overstory removal or thinning and would not have a measurable effect on water yield. Stimson is required to implement SMZs and BMPs so sediment delivery would be negligible. Riparian zones would be maintained as required by Montana's SMZ law. The harvest proposed by Stimson on Yaak Mountain is not within any of the analysis watersheds. It is on the Kootenai River face. The harvest would be on the northwest side of Yaak Mountain. There are no apparent stream channels at the bottom of the slope of the proposed harvest area. The harvest and road construction would have no effect on water quality."

DEIS page 489 states, "Many of the haul roads used for harvest would occur on roads open to public motorized use or allow limited public use (i.e., access to Yaak Mountain Lookout). This means most activities would occur in areas that already tend to be avoided by bears, or used by bears with some degree of tolerance for human activities. However, to access areas that are currently inaccessible to motorized use and contributing to Core habitat, the OLY project proposes a change in access management. In general, barriered roads used for harvest would become restricted roads that would then be available for current and future administrative use.

Road BMPs would be used during construction, reconstruction, and reconditioning for preparing haul routes and most would occur on existing road prisms."

DEIS page 7 states, "• Implement Best Management Practices (BMPs) on Forest Service roads to be used for timber sale activities."

DEIS page 12 states, "Best Management Practices and road maintenance work would be implemented on Forest Service haul roads. Approximately 45 miles of NFS haul road would be reconstructed to meet State BMPs for water quality."

Within the OLY Project area, Stimson Lumber Company would utilize the same main haul routes which are either County roads or National Forest System Roads (with their associated BMPs).

Roads: Temporary

> ***[09, 28] Comment****: This begs the legitimacy of the designation of such roads as "temporary" because in a few years, after continuing fire suppression has led to the same forest health problems that necessitate treatment all over again (or maybe the FS will claim that they're "preventing" such forest health problems with that next round of logging), won't those "roadbeds" be used over and over again? This DEIS reveals that their impacts in between*

are not nil, yet nobody apparently wants to estimate their environmental impacts or otherwise account for them.

Response: As summarized in Table 22 of the OLY DEIS, for each of the action alternatives in the OLY project, 0.2 mile of temporary road construction is proposed; during project planning it was determined that long term access would not be needed in the location following this activity so a new system road is not necessary and temporary road would suffice. As described in Chapter 2, under Harvest Related Road Work, and in Transportation section of Chapter 3, the short piece of temporary road would be constructed to the minimum standard necessary to accommodate log truck haul and would be decommissioned following activities. Decommissioning of the road would include full recontouring, replacing excavated soils back onto the road prism to return the ground to its natural contour, placing woody debris upon the disturbed area, and seeding and fertilizing the disturbed soil. The removal/decommissioning will be done by the purchaser upon completion of activities. Impacts of the temporary road were analyzed be each resource as needed and included in their reports in Chapter 3.

Roads: Undetermined

***[09, 26] Comment**: "Approximately 4.6 miles of undetermined road segments are proposed to be added to the National Forest System (see Table 20)." Did the FS consider the amount of additional road maintenance dollars this entails?*

Response: As explained on OLY DEIS pages 394-395 of the Transportation section in Chapter 3, the undetermined roads being proposed to add to the National Forest System of Roads (NFSR) are road segments that already exist on the ground but aren't categorized as NFSR in the road database. During the travel analysis process the undetermined roads were carefully reviewed and the interdisciplinary team determined which were needed for current or future land management activities. Chapter 2, Tables 20 lists those that were determined to be needed and Table 19 lists those that were not. The needed roads would be reclassified in the transportation atlas from undetermined to NFSR. There are no proposed public access changes. Those roads which are impassable and not proposed to be used for immediate project activities would remain in their current impassable condition and will be maintenance level 1 (closed year round). Road condition surveys are conducted on a portion of maintenance level 1 roads and basic custodial maintenance would be performed only if needed. Those roads used for currently proposed project activities would be gated during implementation of harvest activities and would either remain gated or barriered after those activities are complete as shown in the Access Management Table and Map in Appendix E. Gated roads would be available for limited administrative use and would require limited maintenance only to prevent resource damage by maintaining and repairing drainage facilities.

Scenic Resource

***[08, 13] Comment**: Proposed units 61 and 61-A are an excellent further example of my deep concerns. Simply leaving a screen may or may not protect the viewshed for travelers entering the Yaak Valley at the first gateway, the Yaak Falls; I have my doubts that a screen can satisfactorily hide the ravages of large clearcuts (islands or not), and we know that without*

exception there will be associated peripheral blowdown and collapse of adjacent stand structural integrity. It's the first good look a visitor (or resident) has of the wild quality of the Yaak, one of the region's great attributes, and I hope that each proposed large-scale project will consider how to protect and/or increase, rather than decrease, this irreplaceable and invaluable resource.

Regarding the use of screens to protect the viewer from the unpleasantness of clearcuts and industrial/liquidation forestry--this is a wearyingly familiar sight on the Kootenai: a gaping large clearcut, sun-blasted, weed-begotten, surrounded by an impassable gridwork of sun-blasted blowdown of mature mixed species composition: sunscalded cedar, wind-tossed larch and spruce and lodgepole.

Response: The 2015 Forest Plan revision process presented opportunity for the Kootenai National Forest to become current with national direction through the implementation of Landscape Aesthetics Handbook for Scenery Management-agricultural Handbook number 701. The Forest has completed the scenery inventory and the various layer mapping and produced a 2014 Scenic Integrity Objectives (SIOs) map integrated into the 2015 Forest Plan. A key concept of Scenery Management System (SMS) is that scenery is not "static". Objectives for scenery are linked to a range of conditions, connected to the historic range of variability, instead of basing them on one landscape condition at one point in time as was done under the Visual Resource Management System. Long term results, as opposed to immediate results, are considered when analyzing the effects to scenic resources. SMS focuses on landscape visibility components and concern levels (DEIS page 330 describes this in detail), essentially what can be seen from a concern level 1 or 2.

Landscapes are viewed to varying degrees from different locations and subsequently differ in their importance. To assist scenic inventory and analysis, this importance can be ranked by concern levels (USDA 701 Handbook 1995).

- Concern Level 1 routes and sites are those that are nationally or regionally important locations associated with recreation and tourism use, where there is high interest in scenic resources such as: U.S. Highway 2, Highway 508, Highway 56, National Recreation Trails 366 and 706, and the Pacific Northwest National Scenic Trail.
- Concern Level 2 routes and sites are those that are locally important and are associated with recreation, where there is high to moderate interest in scenic resources such as: Troy Shooting Range, Kilbrennan Lake Campground, NFSRs 752 (O'Brien Creek), 4445 (Kootenai Mountain), 4429 (O'Brien Lynx Creek), and 331 (Rabbit O'Brien).

The project area was analyzed from 15 viewpoints (VP) or locations (DEIS page 334). Five viewpoints were further analyzed and the ten viewpoints not further analyzed are located in the project file. In response to Units 61 and 61a in the viewshed, two viewpoints were analyzed for meeting the SIO. Both were analyzed from Highway 508 (Yaak Highway). VP#3 Yaak Highway 508 milepost 7.6 (south bound traveling) topography and naturally evolving foreground vegetation growth will not provide sustained viewing of the proposed harvest activities of unit 62, 61, and 61a. The portion of these units that may slightly be visible, however fall into a SIO of moderate where management activities are noticeable but are subordinate to the landscape character – the landscape appears slightly altered (see DEIS page 331). VP #4 Yaak Falls Interpretive Pullout of Yaak Highway 508 was analyzed as it is a popular scenic destination. The conclusion for VP#4 was the same as VP#3. Both VPs are located in the project file with photos and Google Earth unit overlays.

Also see response to Letter 09, Comment 101

***[09, 101] Comment**: The DEIS fails to demonstrate that all that regeneration logging proposed would be consistent with RFP scenic integrity direction.*

Response:

- Concern Level 1: U.S. Highway 2, Yaak Highway 508, Highway 56, sections of the Pacific Northwest National Scenic Trail, Pulpit Ridge National Recreation Trail 366, Skyline National Recreation Trail 706, Yaak Falls, Kootenai Falls, and Yaak Lookout.
- Concern Level 2: Kilbrennan Lake Campground, Troy Walking Path\Troy Airport, Alvord Lake, Troy Shooting Range, NFSR 4445 Kootenai Mountain, NFSR 752 O'Brien Creek, NFSR 4429 O'Brien\Lynx Creek, NFSR 331 Rabbit\O'Brien, East Side County Road, Kilbrennan Lake County Road, and Rabbit Creek County Road. Several mountain summits and NFS trails are also within the project area.

The 2015 Forest Plan revision process presented opportunity for the KNF to become current with national direction through the implementation of Landscape Aesthetics Handbook for Scenery Management-agricultural Handbook number 701. The forest has completed the scenery inventory and the various layer mapping and produced a 2014 Scenic Integrity objectives (SIOs) map integrated into the 2015 Forest Plan using the Scenery Management System (SMS). A key concept of SMS is that scenery is not "static". Objectives for scenery are linked to a range of conditions, connected to the historic range of variability, instead of basing them on one landscape condition at one point in time as was done under the Visual Resource management System. Long term results, as opposed to immediate results, are considered when analyzing the effects to scenic resources. SMS focuses on landscape visibility components and concern levels (DEIS page 330 describes this in detail), essentially what can be seen from a concern level 1 or 2 (DEIS page 332). DEIS page 328 under regulatory frame lists several forest plan guidelines for scenery. Predominantly FW-GDL-AR-01. Management activities should be consistent with the mapped scenic integrity objective. The scenic integrity objective is high to Very High for scenic travel routes, including the Pacific Northwest National Scenic Trail, designated Scenic Byways, and National Recreation Trails. Fifteen viewpoints were analyzed for their landscape visibility components in the project area. Five were further analyzed DEIS p.334-344. The ten viewpoints not further analyzed are located in the project file, these ten viewpoints included viewpoints: Highway 508 milepost 7.6, Yaak Falls Interpretive Pullout off Highway 508, Highway 508 milepost 3.9, Rest Area\Weigh Station at Junc. Highway 2 and Highway 56, Highway 56 milepost 31, Mount Henry Lookout –off the Pacific Northwest National Scenic Trail, Arbo Mountain from National Scenic Trail 706, NFSR 4445 milepost 6.6 (Concern Level 2), NFSR 4445 milepost 10.2 (Concern Level 2).

Landscapes are viewed to varying degrees from different locations and subsequently differ in their importance. Not all regeneration logging units would be visible from Concern Levels 1 and 2 such as Highway 2 and Highway 508. An overview of the viewpoints in relation to the OLY project boundary are shown in the figure below.

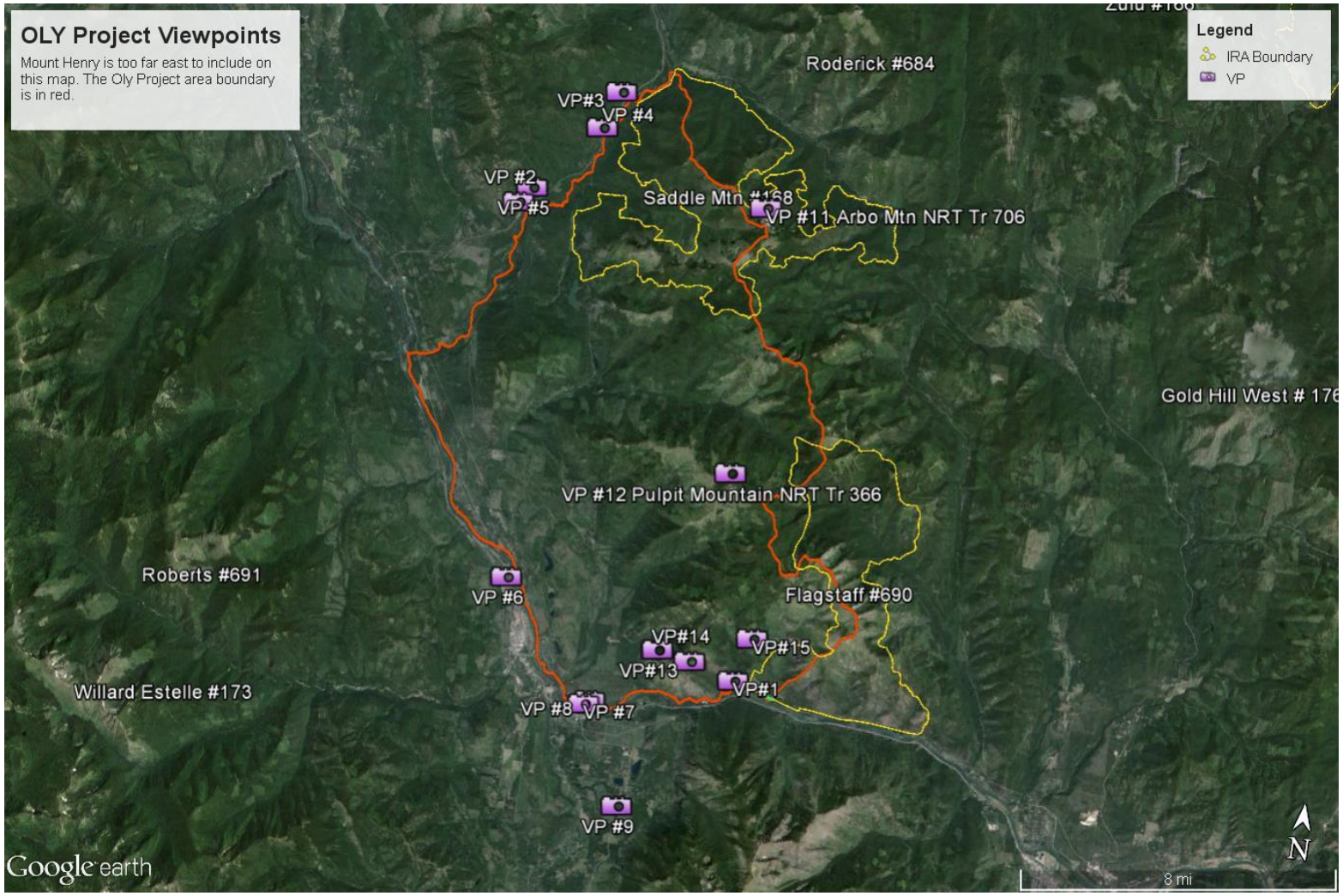

Figure 1 Scenic Resource Response to Comment: OLY Project Area Viewpoint Locations.

Table 1 for Scenic Resource Response to Comments shows that harvest units do meet the SIOs. The following silvicultural prescriptions (Rx) abbreviations are represented:

- Improvement Cut with Seed Tree or Shelterwood Openings = IC\S,
- Clearcut with Reserves = C\R,
- Seed Tree with Reserves = ST\R,
- Improvement Cut = IC,
- Shelterwood with Reserves = SW\R.

Each of these Silvicultural Prescriptions/Vegetation Management are defined previously in this Scenic Resources report. The vast majority of the units in this table are viewed from Concern Level (CL) 2 routes or sites. CL 2 routes or sites are typically those that are locally important and associated with recreation activities. . Once every 5 years, each National Forest and Grassland has visitor use survey, the last KNF survey was in 2012. The most frequently reported primary activities are hiking/walking (20 percent), hunting (16 percent), and viewing natural features (14 percent). Over half of the visitors report participating in viewing scenery, and nearly 40 percent report viewing wildlife according to the Kootenai National Forest National Visitor Use Monitoring (NVUM results accessed 12/08/2015). All top activities are popular in the project area and the vast majority of units are located or visible from CL2s. The ease of access and close proximity makes the project area important to the community of Troy Montana where the area is utilized year-round. In addition, the vast majority of SIOs analyzed are Moderate. Whereas, Moderate SIOs are management activities are noticeable but are subordinate to the landscape character. Silvicultural prescriptions therefore play a key role in the direction of utilizing naturally established form, line, color, and texture to soften edges which would create more of a blended mosaic rather than a patchwork of straight lines. SIOs are seldom met in the short term but seldom not met in the long term with ecological processes at work.

Table 1 Scenic Resource Response to Comments:
SIO Consistency for All Harvest Units

Unit #	Acres	SIO	Rx	SIO Consistency
1	54	M	IC\S	Yes, see Viewpoint #13 in Scenic Resources Report-CL 2 from NFSR 4445 (Kootenai Mountain Road) MP 5.3.
3A	12	L	C\R	Yes, see Viewpoint #13 in Scenic Resources Report-CL 2 from NFSR 4445 (Kootenai Mountain Road) MP 5.3.
3B	13	L	ST\R	Yes, see Viewpoint #13 in Scenic Resources Report-CL 2 from NFSR 4445 (Kootenai Mountain Road) MP 5.3.
4	176	L\M	IC	Yes, see Viewpoint #13 in Scenic Resources Report-CL 2 from NFSR 4445 (Kootenai Mountain Road) MP 5.3.

Unit #	Acres	SIO	Rx	SIO Consistency
5	8	M	ST\R	Yes, MA6 (General Forest) Foreground viewing off CL 2 Kilbrennan Lake Road. Mechanical treatment effects may be negative in short term (stumps, slash, disturbed soil and understory vegetation, etc.) Immediately upon project completion and, depending on site conditions, for the first few years. Longer term, these effects may diminish (when properly designed) result in positive effects such as: a natural appearing mosaic of vegetation; diversity in the species, composition, age classes, and structure vegetation; and a landscape that is more resilient to predicted catastrophic disturbances. Typically, at a foreground distance, people can distinguish more individual forms and sensory messages: clumps of wildflowers, birds singing, small\medium sized wildlife, detailed texture in boughs, branches and tree trunks etc.
6	42	M	IC\S	Yes, MA6 (General Forest) Foreground viewing off CL 2 Kilbrennan Lake Road. See Unit #5 write up.
7	8	M	ST\R	Yes, MA6 (General Forest) Foreground viewing off CL 2 Kilbrennan Lake Road. See Unit #5 write up.
8	66	M	IC	Yes, MA6 (General Forest) this unit is located on a ridge top between the Kilbrennan Lake road and NFSR 4612.
8A	4	M	IC	Yes, MA6 (General Forest) Foreground viewing off CL 2 Kilbrennan Lake Road. See Unit #5 write up.
9	16	M	ST\R	Yes, MA6 (General Forest) Unit 9 is located off Kilbrennan Lake Road and is not easily visible. The Seed Tree\Reserves RX will blend with the more heavily treated private land to the east and south.
11	11	M	ST\R	Yes, MA6 (General Forest) Foreground viewing off CL 2 NFSR 4612. See foreground viewing write up on Unit 5.
12	25	M	ST\R	Yes, MA6 (General Forest) Foreground viewing off CL 2 NFSR 4612. See foreground viewing write up on Unit #5.
14	70	M	C\R	Yes, MA6 (General Forest) Foreground viewing off CL 2 NFSR 4612. See foreground viewing write up on Unit #5.
15	27	M	ST\R	Yes, MA6 (General Forest) Foreground viewing off CL 2 Kilbrennan Lake Road. See Unit #5 write up.
16	6	M	IC	Yes, MA6 (General Forest) Foreground viewing off CL 2 Kilbrennan Lake Road. See Unit #5 write up.
18	81	M	C\R	Yes, MA6 (General Forest) Unit 18 is located off NFSR 4407. 4407 is only accessed by individuals who've rented the Yaak Mountain Lookout Tower. The viewing for these visitors is foreground viewing. See foreground viewing write up on Unit #5.
20	109	M	ST\R	Yes, see Viewpoint #6 in Scenic Resources Report-CL 1 from Us Highway 2 Troy Airport parking lot.
21	129	M	IC	Yes, MA6 (General Forest) Foreground viewing off CL 2 Kilbrennan Lake Road. See Unit #5 write up.
23	24	M	IC\S	Yes, MA6 (General Forest) Foreground viewing off CL 2 East Side Road. See Unit #5 write up.
24	25	M	IC\R	Yes, MA6 (General Forest) Foreground viewing off CL 2 East Side Road. See Unit #5 write up.
25	65	M	C\R	Yes, MA6 (General Forest) Foreground viewing off CL 2 East Side Road. See Unit #5 write up.

Unit #	Acres	SIO	Rx	SIO Consistency
27	11	M	IC	Yes, MA6 (General Forest) Foreground viewing off CL 2 East Side Road. See Unit #5 write up.
28	80	M	IC	Yes, MA6 (General Forest) Foreground viewing off CL 2 East Side Road. See Unit #5 write up.
29	25	M	ST\R	Yes, MA6 (General Forest) Foreground viewing off CL 2 NFSR 4445. Unit 29 borders private land on the west side. See Unit #5 write up.
30	37	M	SW\R	Yes, MA6 (General Forest) Unit 30 has a string of timber between its northern boundary to NFSR 4445. The southern boundary should blend in well with the private ground it borders. Unit 30 is a shelterwood unit.
31B	60	M	C \R	Yes, MA6 (General Forest) is Foreground viewing off NFSR 752 (CL2) See Unit #5 write up.
32	34	H	IC	Yes, Unit 32 is not viewable from Highway 2 a CL 1. Unit 32 is located on a low lying ridge and its RX will blend well the private harvest land located to the west. Its low elevation plus exposure will enhance vegetation growth to a healthy vigorous stand.
33	30	H	C\R	Yes, has low rolling topography and is not viewable from a Highway 2 (CL 1). Timbered corridors are positioned between 32 to 33 and from 33 to 34 which helps create a mosaic across the landscape.
34	40	M\H	ST\R	Yes, Unit 34 is located on a flat between a powerline and Highway 2. The unit is not viewable from Highway 2. Unit 32, 33 and 34 are all similar to the end result.
37	68	M\H	ST\R	Yes, The portion of this unit that is rated a high SIO blends into private agriculture field with structures. The vast majority is Medium SIO-General Forest.
37A	34	M\H	IC	Yes, is a long narrow unit connecting with private agriculture land and is very similar to Unit 39 for meeting its SIO.
38A	6	M	C\R	Yes, General Forest out of view of either CL1 or CL2.
38	71	M	IC\S	Yes, General Forest out of view of either CL1 or CL2.
39	52	M\H	ST\R	Yes, The small acreage portion of this unit that is rated a high SIO blends into private agriculture field with structures. The vast majority is Medium SIO-General Forest. Unit 39 incorporates three tree islands to break up the unit and provides for a mosaic across the landscape.
40	109	M\H	ST\R	Yes, The portion of this unit that is rated a high SIO which is nearly half the unit acreage blends into private agriculture field with structures. The portion of MA2 has a couple tree islands in the RX providing a mosaic on the landscape. Unit 40 is not visible from a CL1 or CL2.
42	85	M\H	ST\R	Yes, Unit 42 is located off the East Side Road (CL2)-it's not visible from a CL1. The private land that has been actively managed prior to Unit 42 is a good indication of how Unit 42 will present itself to the landscape from CL2. The private land opens up the road to see the adjacent mountains and stretches of the Yaak River-42 would benefit the scenery off the East Side Road, The topography is fairly steep in this MA2 area.
43	48	M	ST\R	Yes MA6 (General Forest) borders NFSR 14315 (CL2) -Foreground viewing. (see Unit #5 write up for foreground viewing)

Unit #	Acres	SIO	Rx	SIO Consistency
44	20	M	ST\R	Yes, MA6 (General Forest) Foreground viewing off the East Side Road (CL2). See Unit #5 for foreground viewing.
45	33	M	C\R	Yes, MA6 (General Forest) is positioned on a north to south running ridge between the East Side Road and the Kilbrennan Lake Rd.(both CL2s)-the unit is not visible from either CL2s.
45A	63	M	ST\R	Yes, MA6 (General Forest) Foreground viewing off the NFSR 14315 (CL2). See Unit #5 for foreground viewing.
45B	26	M	IC	Yes, MA6 (General Forest) is located a stretch of timber between its western boundary and the East Side Road not readily visible to viewers.
45C	35	M	ST\R	Yes, MA6 (General Forest) is positioned on a north to south running ridge between the East Side Road and the Kilbrennan Lake Rd.(both CL2s)-the unit is not visible from either CL2s.
46	16	M	IC	Yes, MA6 (General Forest) Foreground viewing off the East Side Road (CL2). See Unit #5 for foreground viewing.
47	17	M	C\R	Yes, MA6 (General Forest) is positioned on a north to south running ridge between the East Side Road and the Kilbrennan Lake Rd.(both CL2s)-the unit is not visible from either CL2s.
48	23	M	C\R	Yes, MA6 (General Forest) is positioned on a north to south running ridge between the East Side Road and the Kilbrennan Lake Rd.(both CL2s)-the unit is not visible from either CL2s.
49	6	M	C\R	Yes, MA6 (General Forest) is positioned on a north to south running ridge between the East Side Road and the Kilbrennan Lake Rd.(both CL2s)-the unit is not visible from either CL2s.
50	21	M	IC	Yes, MA6 (General Forest) Foreground viewing off the East Side Road (CL2). See Unit #5 for foreground viewing.
51	36	M\H	C\R	Yes, Same as Unit 53.
52	56	M	IC\S	Yes, MA6 (General Forest) is positioned on a north to south running ridge between the East Side Road and the Kilbrennan Lake Rd.(both CL2s)-the unit is not visible from either CL2s.
52A	39	M	C\R	Yes, MA6 (General Forest) is positioned on a north to south running ridge between the East Side Road and the Kilbrennan Lake Rd.(both CL2s)-the unit is not visible from either CL2s.
52B	65	M	ST\R	Yes, see Viewpoint #2 in Scenic Resources Report -CL 1 from Yaak Highway 508 MP 3.5 (also, see VP #5 following this table)
52C	31	M	IC\S	Yes, MA6 (General Forest) is positioned on a north to south running ridge between the East Side Road and the Kilbrennan Lake Rd.(both CL2s)-the unit is not visible from either CL2s.
52D	14	M	C\R	Yes, MA6 (General Forest) is positioned on a north to south running ridge between the East Side Road and the Kilbrennan Lake Rd.(both CL2s)-the unit is not visible from either CL2s.
53	49	M\H	C\R	Yes, MA2 not visible from East Side Road or Kilbrennan Lake Road topography is too steep.
54	24	M	C\R	Yes, MA6 (General Forest) is positioned on a north to south running ridge between the East Side Road and the Kilbrennan Lake Rd.(both CL2s)-the unit is not visible from either CL2s.

Unit #	Acres	SIO	Rx	SIO Consistency
55	31	M	IC\S	Yes, MA6 (General Forest) Foreground viewing off the East Side Road (CL2). See Unit #5 for foreground viewing.
55A	10	M\H	IC	Yes, see Viewpoint #2 in Scenic Resources Report-CL 1 from Yaak Highway 508 MP 3.5
55B	18	H	SW\R	Yes, MA2 (is not visible from VP #2 or yak River corridor) Fuels Unit F2 is located between Unit 55B and East Side Road So the unit is not readily visible to viewers.
56	29	H	ST\R	Yes, MA2 is located in the foreground (see Unit #5 description) off the East Side Road and near the junction of the Kilbrennan lake Road the steep topography makes the unit not visible to viewers traveling the East Side Rd.
57	68	M	ST\R	Yes, see Viewpoint #2 in Scenic Resources Report-CL 1 from Yaak Highway 508 MP 3.5
58	15	H	ST\R	Yes, MA2 (See VP #4 for analysis from CL 1 from Yaak Highway\Yaak Falls following this table) is also located off CL2 East Side Road. This portion of road is very densely timbered, this is a foreground view not viewable from the Yaak River itself. See Unit #5 write up for foreground viewing. The SIO of high will be consistent from the CL1 viewing area long before the CL2 viewing area will meet SIO high consistency due to its proximity to the viewer.
59	11	H	ST\R	Yes, MA2 (See VP #4 for analysis from CL 1 from Yaak Highway\Yaak Falls following this table) is also located off CL2 East Side Road. This portion of road is very densely timbered, this is a foreground view not viewable from the Yaak River itself. See Unit #5 write up for foreground viewing. The SIO of high will be consistent from the CL1 viewing area long before the CL2 viewing area will meet SIO high consistency due to its proximity to the viewer.
60	24	H	ST\R	Yes, MA2 (See VP #4 for analysis from CL 1 from Yaak Highway\Yaak Falls following this table) is also located off CL2 East Side Road. This portion of road is very densely timbered, this is a foreground view not viewable from the Yaak River itself. See Unit #5 write up for foreground viewing. The SIO of high will be consistent from the CL1 viewing area long before the CL2 viewing area will meet SIO high consistency due to its proximity to the viewer.
61	51	H	C\R	Yes, MA2 (See VP #3 and VP #4 for analysis from CL 1 from Yaak Highway 508-following this table) is also located off CL2 East Side Road. This portion of road is very densely timbered, this is a foreground view not viewable from the Yaak River itself. See Unit #5 write up for foreground viewing. The SIO of high will be consistent from the CL1 viewing area long before the CL2 viewing area will meet SIO high consistency due to its proximity to the viewer.
61A	34	H	C\R	Yes, MA2 (See VP #3 for analysis from CL 1 from Yaak Highway 508 following this table) is also located off CL2 East Side Road. This portion of road is very densely timbered, this is a foreground view not viewable from the Yaak River itself. See Unit #5 write up for foreground viewing. The SIO of high will be consistent from the CL1 viewing area long before the CL2 viewing area will meet SIO high consistency due to its proximity to the viewer.

Unit #	Acres	SIO	Rx	SIO Consistency
62	24	M\H	ST\R	Yes, MA2 (See VP #3 for analysis from CL 1 from Yaak Highway 508) is also located off CL2 East Side Road. This portion of road is very densely timbered, this is a foreground view not viewable from the Yaak River itself. See Unit #5 write up for foreground viewing. The SIO of high will be consistent from the CL1 viewing area long before the CL2 viewing area will meet SIO high consistency due to its proximity to the viewer.
63	10	M	IC	Yes, MA6 (General Forest) is Foreground viewing off CL 2 NFSR 4445. It's a shelterwood unit. See Unit #5 write up.
68	70	M\H	SW\R	Yes, see Viewpoint #1 in Scenic Resources Report-CL 1 from US Highway 2, Swinging Bridge-Kootenai Falls Parking Lot
69	27	L\M	ST\R	Yes, MA6 (General Forest) Unit 69 has NFSR roads below, above and through the middle of the unit.
70	67	L\M	ST\R	Yes, MA6 (General Forest) Foreground viewing from NFSR 4445 (CL2) See Unit #5 write up.
71	39	L\M\H	ST\R	Yes, MA6 (see VP #15 following this table)
73	18	H	ST\R	Yes, see Viewpoint #8 in Scenic Resources Report-CL 1 from US Highway 2 MP 17.2 eastbound.
74	100	H	ST\R	Yes, see Viewpoint #8 in Scenic Resources Report-CL 1 from US Highway 2 MP 17.2 eastbound.
75	50	L\H	IC\S	Yes, see Viewpoint #8 in Scenic Resources Report-CL 1 from US Highway 2 MP 17.2 eastbound. Also, see Viewpoint #13 in Scenic Resources Report-CL 2 from NFSR 4445 (Kootenai Mountain Road) MP 5.3.
77	41	L\M	C\R	Yes, see Viewpoint #13 in Scenic Resources Report-CL 2 from NFSR 4445 (Kootenai Mountain Road) MP 5.3.

MP = mile post
CL = Concern Level

Soils

***[07, 10] Comment**:*

{A} I also support implementing winter logging or other methods of harvest that comparably limit soil disturbance where soil disturbance is expected to meet or exceed 15%.

{B} And I request that unit 61A be changed from summer tractor to winter tractor. It just makes good sense for less impact on the land and forest.

{A} Response: Winter Tractor is proposed in Units 14, 14A, 33, 34, 35, 35A, 35B, 36, 37, 41B, 45C, 46, 48, 51, 52B, 52C, 52D, 57, 57A, 60, 61, 61B, and 63. (DEIS pages 366-370). The DEIS discloses detrimental disturbance coefficients for winter logging DSD values when compared to summer operations (DEIS page 350).

{B} Response: Post-harvest soil monitoring is planned to be conducted in units where reduced DSD assumptions were utilized due to reentry. (DEIS pages 78-79; Table 27 on pages 84-88;

Table 110 on pages 366-370; and page 371). Unit 61A is on that list (DEIS Table 27 on pages 84-88; Table 110 on pages 366-370, and page 371).

***[09, 29] Comment**: The DEIS does not adequately demonstrate project consistency with the Region 1 Soil Quality Standards (R-1 SQS). The DEIS does not provide a statistically sound explanation for how accurate the values of detrimental soil disturbance (DSD) are, of what percentage error can be expected of existing and predicted values for DSD. This renders the estimates and measures of DSD inadequate for demonstrating consistency with the R-1 SQS.*

Response: All field surveys were completed in accordance with R1-2500-2014-1 to determine existing and predicted soil disturbance values in accordance with proposed design criteria (DEIS page 24; pages 348-350). The DEIS discloses confidence intervals with regard to detrimental soil disturbance (DEIS pages 349-350). Field surveys consisted of random stratified transect/sample point methods with confidence intervals at 80% ± 5% with the majority of surveys being 95% ± 5%. As a result the KNF reviews provide a very accurate quantitative value of what the existing physical conditions are within the proposed management units. All points are consistently sampled by reviewing the existing soil condition at every other pace (that is, step, as per DEIS page 348) during a random soil transect within proposed harvest units. Every other pace (step) is considered a sampling location and is completed by using a tile spade shovel to determine resistance to penetrating the soils. Physical resistance to penetrating is found to correlate quite well with altered soil conditions.

***[09, 30] Comment**:*

{A} "Existing disturbance is based on field surveys." The DEIS doesn't provide enough detail to indicate the thoroughness of the surveys, including whether all sources of DSD were inventoried.

{B} The DEIS does not disclose that DSD area extent percentage limits are based on feasibility of timber sale implementation rather than concerns over soil productivity.

{C} The DEIS also does not disclose that the bulk density increase limit is based upon the limitations of detection by bulk density measuring methods—again, not concerns over soil productivity. DSD is merely a proxy for soil productivity, the entity that NFMA requirements center upon. The DEIS also fails to scientifically validate the R-1 SQS for utilization as a soil productivity proxy.

{D} We also note that it doesn't matter how sensitive the soils, how steep the land, how poor the site is for growing trees, the R-1 SQS standard is the same—15%.

{A} Response: Soil surveys were conducted using R1 Soils Protocol (DEIS pages 24; 348-352). The R1 Soils Protocol mimics the protocol being used by the Rocky Mountain Research Station for the Long-Term Soil Productivity Study. The Soil Scientist that conducted the soil surveys for this project was trained to use the R1 Soils Protocol by the Rocky Mountain Research personnel including Deborah Page-Dumroese (author of Gen. Tech Rpts. WO-82a and 82b). All soil surveys can be found in the Soil project file.

{B} Response: The soils analysis used activity areas as directed in Northern Region (R1) Soil Protocol 2500-2014-1 (DEIS pages 347-348). The impact of all past disturbance (including logging) within activity areas are shown as the percent existing disturbance in DEIS Table 110 (pages 366-370). All units were field surveyed (DEIS pages 366-370).

Soil conditions are site-specific. Loss of soil productivity in one treatment unit will not lead to a loss in soil productivity in an adjacent stand or other areas across a project area. Soil productivity can vary from one square foot to the next with each area functioning independently. Thus the highly variable and independent nature of soil productivity requires site-specific analysis to maintain proper context. Assessment of cumulative effects on soil productivity at scales larger than the specific treatment unit boundary (such as a watershed scale) also misrepresents the effects of management activities by diluting the site-specific effects across a larger area. In contrast, soil processes such as erosion regime and hydrologic functions occur at a watershed scale and have been analyzed as such in the Watershed Section of the DEIS (pages 423-438).

{C} Response: Currently the long-term effects of soil disturbance on soil quality are being studied across North America in a cooperative research study called the "North America Long-Term Soil Productivity Study" (LTSP). The study began in 1990 and is currently ongoing in order to provide the best available science to forest managers. Results from the first decade indicate that there is little evidence of adverse effects of surface matter removal or soil compaction on productivity as measured by total biomass production, and the growth and vigor of planted trees (Powers et al. 2004); DEIS page 352.

{D} Response: From 2012-2013, the KNF completed a repetitive soil monitoring study to determine if soil recovery was occurring. This study involved re-sampling 183 units of the 251 original units (73% resampled acres) which were monitored in that time frame. Of those units re-sampled 83% were found to have decreased soil disturbance levels with none found to exceed 15% during secondary measurements. The linear confidence level is 0.7507. This study shows that regardless of the impacts to soils from past management activities there was a steady movement towards natural soil recovery and future vegetative management activities (publication currently in process). Refer to Figure 1 Soils Response to Comments below displaying 183 sampled unit results.

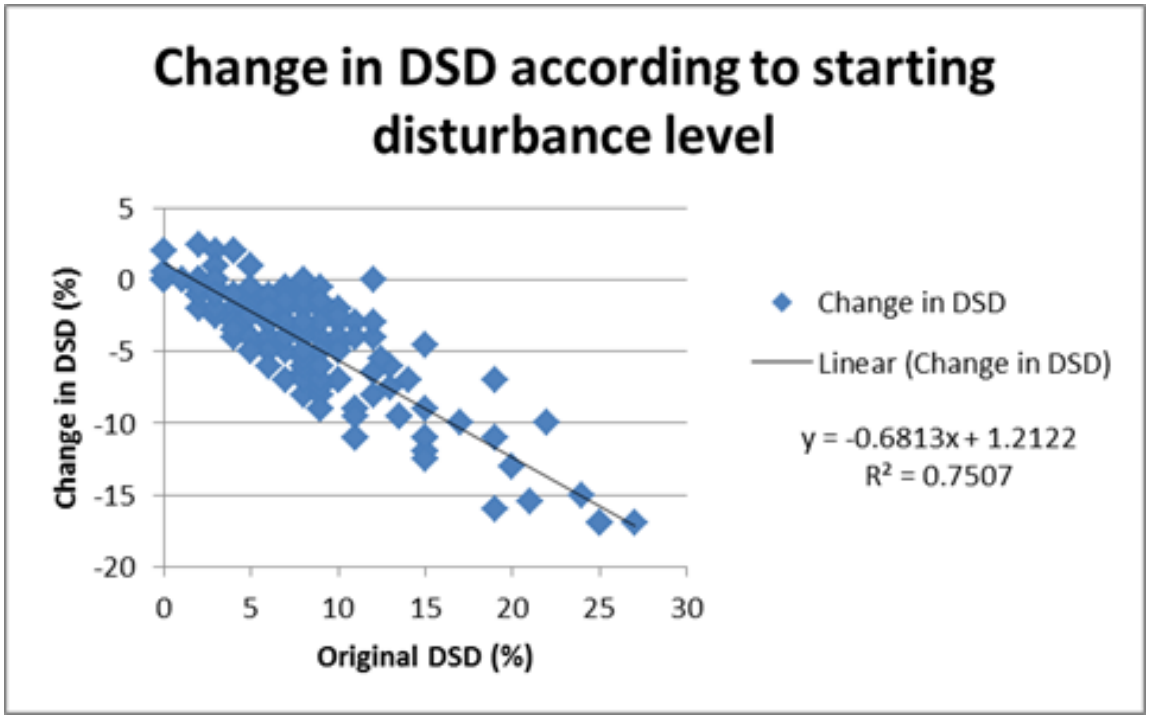

Figure 1 Soils Response to Comments:
Change in DSD According to Starting Disturbance Level

***[09, 31] Comment**:*

{A} The DEIS does not properly distinguish between the issues of soil disturbance and soil productivity. Whereas soil disturbance measures physical signs of potential soil productivity losses, the FS's measures of soil disturbance do not necessarily provide scientifically valid and reliable measures of soil productivity—the latter being the focus of NFMA requirements.

{B} The R-1 SQS and its definition of DSD consider only alterations to physical properties, but not chemical or biological properties. Adoption of the R-1 SQS did not consider best available science.

{C} The DEIS does not disclose how soil and land productivity has been affected in the project area and forestwide due to noxious weed infestations, nor any trends. The DEIS also does not cite any monitoring supporting assumptions that weed treatments or mitigations work as intended.

{A} Response: The effect of soil disturbance from logging activities on soil productivity is being addressed by cooperative research study called the North American Long Term Soil Productivity Study (LTSP). The five year results were recently published (Page-Dumroese et al. 2006; Flemming et al. 2006; Sanchez et al. 2006). These studies are following control and managed sites over a forest rotation. To date there has been no reduction in tree growth noted as a result of compaction or organic removal in plots with soil typical of the Analysis Area.

The analysis of soil organic matter (nutrient cycling) can be found in DEIS page 24 and pages 378-380. The analysis of physical (detrimental) soil disturbance can be found in DEIS, pages 24-25; 84-88; and 365-377.

A discussion of landtypes with inherent low productivity can be found in DEIS pages 362-365.

{B} Response: The adequacy of using the Soil Technical Guide is beyond the scope of this project. All soil surveys completed for the OLY Project Area were completed by the soil scientist or soil science assistant with equal intensity and a confidence level of 80% ± 5% (DEIS page 348) with the majority of surveys being 95% ± 5%. As a result the KNF reviews provide an accurate quantitative value of what the existing physical conditions are within the proposed management units. All points are consistently sampled by reviewing the existing soil physical conditions at each sample point. Each sample point is completed using a till spade shovel to determine resistance to penetrating soil. Physical resistance to penetration is found to correlate quite well with altered soil conditions. Soil monitoring (1988-present date) contains over 300,000 data points (over 28,000 acres sampled) and has found that over 95% of the data points which were considered detrimental when sampled were associated primarily by ground based equipment, skidding, blading, fire lines, skyline corridors, landings or temporary roads located within the harvest units.

In the study conducted here on the KNF (2012-2013) of the 183 units which were re-monitored all (100%) of these units displayed DSD values at or below 15% with 69 of the original data set (38%) now at 2% or less. Such data provides similar results to the Nation-wide "Long Term Soil Productivity – LTSP" studies where the degree of soil recovery is dependent on soil textural class.

{C} Response: A comprehensive analysis was done under the KNF Invasive Plant Management DEIS (2006). Refer to DEIS pages 245-270 for the analysis on Noxious Weeds. Refer to Design Features, DEIS page 77, for a list of how the District will reduce the introduction and spread of weeds in accordance with the 2007 KNF Invasive Plant Management ROD; also see DEIS page 89. Noxious weeds are discussed on DEIS pages 169, 193, and 232. Noxious weeds are also mentioned in the Soils portion under the KNF Invasive Plant Management Record of Decision (2007a) (DEIS page 384). See the document titled "Worksheet for Consideration of Cumulative Effects to Soils Resources" in the Soil project file as well as the individual soils Unit Reviews for the potential identification of noxious weeds found to be present at the individual unit level.

***[09, 32] Comment**: NEPA requires that an EIS specify the effectiveness of its mitigations. 40 C.F.R. 1502.16. The OLY DEIS fails to specify the effectiveness of its mitigation of DSD. Please cite quantitative monitoring data that demonstrates that DSD remediation activities have taken a KNF activity area with DSD amounts violating the quantitative standard to an amount that no longer violates the standard.*

Response: Beginning in 2012-2013 field seasons the KNF embarked on a soil study to determine if soil recovery was occurring in a selected sub-group of units where post-harvest soil monitoring data had been collected. The time period for the units sampled was 1992-2006. The original dataset included 119 timber sales with 245 timber units covering 7,616 acres. The subsequent data was collected from 183 of the original timber units covering 5,253 acres. During this survey the KNF completed 391 soil transects encompassing 76,651 monitoring points (69% original acres). When compared to the historic DSD values, 6% were found to exceed 15% DSD with the highest being 27% DSD. Such high values were dominantly a result of harvest activities before

implementation of project specific Best Management Practices (BMPs), the Inland Native Fish Strategy (INFISH), and RHCAs requirements.

Upon re-sampling these identical units in the 2012-2013 field seasons none (0%) were found to exceed 15%. Early data indicates that soil recovery may be greatest in the initial 5 years following fuel abatement and harvest activities but that the recovery curve is not uniform for all landtype groupings. Furthermore, individual recovery of soils may be related to freeze-thaw relationships. When viewed as a logarithmic regression the soil disturbance values are not stagnant and constantly changing with time. Publication currently in process; coordinating with Page-Dumroese at the Rocky Mountain Research Station. See DEIS Pages III-371, 376. The enclosed graph (Figure 2 Soils Response to Comments) depicts the change in years since harvest.

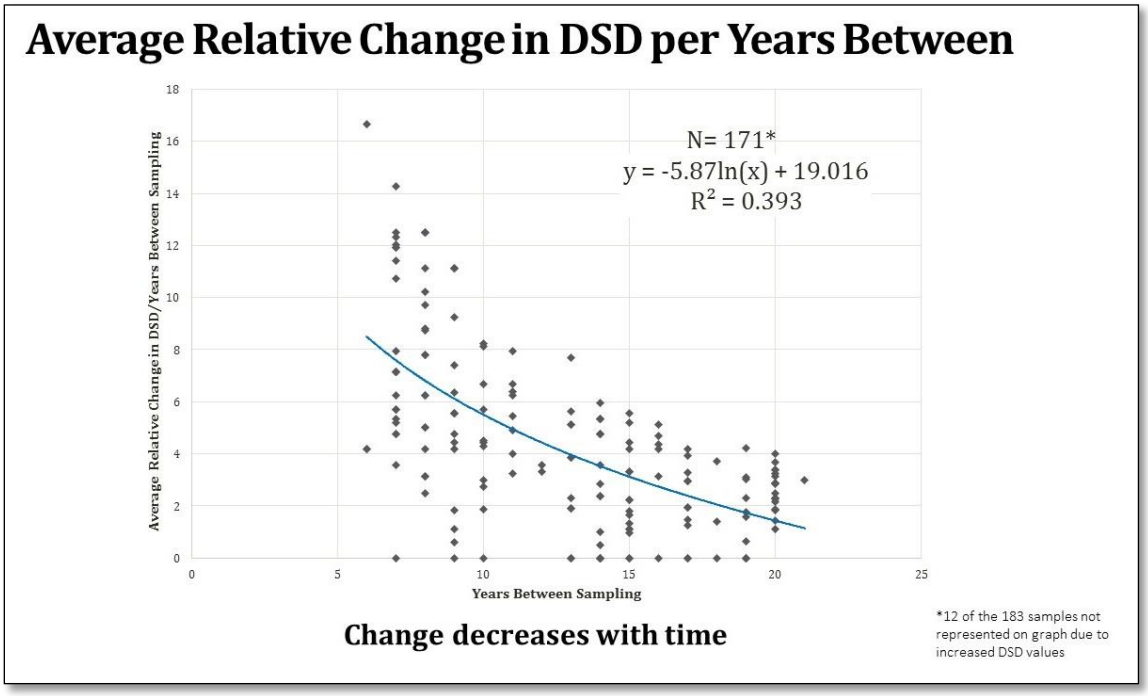

Figure 2 Soils Response to Comments:
Average Relative Change in DSD per Years Between

***[09, 33] Comment**: The DEIS proposes that logging equipment use old skid trails (sites already damaged by previous logging activities) to avoid adding too much DSD within activity areas. The soil surveys already completed did not result in a spatial inventory of old skid trails, so this would require a professional soil scientist to re-inventory the unit, because they are the only specialists properly trained to identify old skid trails and other sites meeting the definition of DSD. Requiring a professional soil scientist for this step is not a commitment the DEIS makes, so we don't believe this mitigation will really be effective in limiting new DSD. If there is monitoring the FS has conducted on the KNF to demonstrate this minimization works, please cite it. Also, the design specification assumes that ground skidding patterns created by past logging (which removed trees that no longer exist) will*

suffice to log different trees in different locations for different project objectives, which the DEIS doesn't explain.

Response: The soil scientist plans to work on the OLY project area during timber sale lay-out and address at that time any questions which may arise regarding skid trail placement. Some of the units will require re-using existing skid trails to the greatest extent feasible.

Regarding the impacts of timber harvest equipment, data on the KNF (2012-2013 soil study) is similar to that found by authors evaluating harvest method and number of passes on soil disturbance (Hand and others 2009; Gent and Ballard 1984; Froehlich and others 1980; Han and others 2006). In the DSD study on the KNF unit reviews displayed that where historic skid trails already existed secondary entry by harvest equipment often changed the initial values by only minor amounts (often less than 2%).

***[09, 34] Comment**: FS policy is to log these "activity areas" repeatedly and perpetually, chronically maintaining soil productivity in a depressed state, without disclosing the actual degree of below-natural productivity. The Forest Plan's definition of "soil productivity" is instructive here: "The inherent capacity of a soil to support the growth of specified plants, plant communities, and soil biota. It is often expressed by some measure of biomass accumulation." Despite the agri-centric character of that definition, the implications for the myriad other resources[3] that depend upon healthy soils are clear—the Forest Service's ability to sustain of them is in doubt, because they cannot even tell the public how far depressed the ability of the soil will forever be for producing the agency's favorite "crop"—timber. With the analysis area for soil productivity being the "activity area" this means the analysis area varies from alternative to alternative, depending upon each specific alternative's proposed logging unit. And this means that there is no analysis area whatsoever for the no action alternative. The FS's logic goes something like this: soil effects are only site-specific, and impacts only occur within the proposed logging units. They apparently believe that there are no indirect effects of damaged soils, outside those specific locations. And therefore no cumulative effects from previously damaged soils, outside those specific locations. It's analogous to the vegetation section only analyzing the impacts on the trees to be logged. This ignores the link between existing soil disturbance in project area watersheds and cumulative impacts on water quantity and quality. The DEIS has failed to incorporate the best available science on this subject or to disclose the full extent of soil restoration needs in project area watersheds. Nothing in the DEIS's watershed analysis section specifically addresses the hydrological implications of the cumulative soil damage. {footnote[3]. "Soil is a critical component to nearly every ecosystem in the world, sustaining life in a variety of ways—from production of biomass to filtering, buffering and transformation of water and nutrients." Lacy, 2001.}*

Response: The effect of soil disturbance from logging activities on soil productivity is being addressed by cooperative research study called the North American Long Term Soil Productivity Study (LTSP). The five year results were recently published (Page-Dumroese et al. 2006; Flemming et al. 2006; Sanchez et al. 2006). These studies are following control and managed sites over a forest rotation. To date there has been no reduction in tree growth noted as a result of compaction or organic removal in plots with soil typical of the Analysis Area. Regarding the KNF soil recovery study (2012-2013) early data indicates that fine-textured soils (higher sand silt

concentration) are recovering at a slower rate than soils containing a greater content of coarse heavy grained sediments and gravels (draft publication, 2016).

The hydrological implications of soil damage on watersheds is addressed in the Water Section of the DEIS (pages 403-439). RHCAs and BMPs help prevent most management activities from impacting water quality by minimizing sediment producing disturbance and minimizing the potential for any sediment that is generated to reach a waterbody (DEIS pages 403-439 and Appendix H). The mechanism whereby soil disturbance most affects water quality is through soil compaction affecting infiltration and runoff patterns. The predominant area this occurs and where sediment carrying runoff has the greatest potential to be delivered to streams is on roads. Water quality and the relationship to roads are addressed in the analysis of water quality (DEIS pages 423-428; 437-439; and 434 (FW-DC-WTR-02). In addition, measured stream data is present in the Hydrology Project folder. Measured data is the best indicator of cumulative watershed conditions that are the result of past and ongoing activities. For harvest specific Best Management Practices regarding soils are listed on DEIS pages 78-79; 86-88; and 381-382. Refer to DEIS Appendix B (B1-B16) for Best Management Practices.

***[09, 35] Comment**: Is it outside the realm of "best available science" to assume that alteration of soil physical properties results in loss of soil capacity to sustain native plant communities and reductions in storage and transmission of soil moisture that may affect water yield and stream sediment regimes? And if not, why does the DEIS not provide even an estimate of the total amount of management-induced soil physical properties across the project area?*

Response: Results from the first decade of the cooperative research project titled the North American Long Term Soil Productivity Study (LTSP) indicate that there is little evidence of adverse effects of surface organic matter removal or soil compaction on productivity as measured by total biomass production, and the growth and vigor of planted trees (Powers et al. 2004). The National Forest Management Act (NFMA) requires the Forest Service to "insure that timber will be harvested from National Forest Service lands only where soil, slope, and watershed conditions will not be irreversibly damaged.

***[09, 36] Comment**: If soil mitigation is needed to make activity areas remain below 15% DSD, but the measures are "not allowed" then how would the logging be consistent with the RFP?*

Response: Predicting detrimental and foreseeable activity disturbance is based on information from Kuennen 2003; 2006d; 2006e; USDA Forest Service 2011b; and Gier (pending 2016 publication) which includes a summary of all Kootenai Forest Soils Monitoring to date with recommendations for analysis based on field results. For proposed harvest units currently equal to or exceeding 8 percent DSD (DEIS Table 110, pages 366-370), the analysis assumes a 50 percent disturbance values for proposed machinery activities compared to similar harvest activities on undisturbed soils (Louis Kuennen pers. comm. 2011). Refer to DEIS Table 106, III-350. This value presumes that secondary entry harvest activities would be re-using approximately 50 percent of the already existing skid trails in ground based harvest units. The 50 percent disturbance value was not used for units where it was known that the existing skid trails cannot be reused due to the pattern or location of existing trails (refer to DEIS Table 110, pages 366-370).

Based on the soil surveys where proposed harvest activities may exceed 15 percent DSD values in order to meet the 2015 Forest Plan and Northern Region (R1) Supplement 2500-2014-1, post-harvest soil decompaction activities may include ripping skid trails, temporary roads, and landings associated with units and seeding as necessary. Such activities will help offset the effects of harvest activities to soil productivity by allowing previously disturbed soils to re-establish as a productive area (DEIS pages 371-377).

***[09, 37] Comment**: The DEIS does not disclose that the R-SQS methodology for "activity areas" inherently encourages gerrymandering areas never logged into project "activity areas", helping to artificially dilute the amount of effective DSD from previously logged units by creating a more favorable average.*

Response: The soils analysis used activity areas as directed in R-1 Supplement No. 2500-2014-1 (DEIS page 348). The impacts of all past disturbance (including logging) within activity areas are shown as the percent existing disturbance in DEIS pages 365-370, Soils Table 110. All units were field surveyed and surveys are present in the OLY project file.

Soil conditions are site-specific. Loss of soil productivity in one treatment unit will not lead to loss in soil productivity in an adjacent stand or other areas across a watershed. Soil productivity can vary from one square foot to the next with each area functioning independently. Thus, the highly variable and independent nature of soil productivity requires site specific analyses to maintain the proper context. Assessment of cumulative effects on soil productivity at scales larger than the specific treatment unit boundary also misrepresent the effects of management activity by diluting the site-specific effects across a larger area. In contrast, soil processes such as erosion regime and hydrologic functions occur at a watershed scale and have been analyzed as such in the Water Resource section of the DEIS (DEIS pages 403-439)

***[09, 38] Comment**: Table 106 Detrimental Disturbance Coefficients are given as a single value, rather than being correctly displayed as a range, bound by rational confidence intervals.*

Response: Soil disturbance values were generated as "statistical summaries" or the average value which takes into account all timber management activities in a given polygon which may have impacted soils including skid trails, temporary roads, landings, mechanized piling, and fire lines DEIS pages 350-351 (Table 106).

***[09, 39] Comment**: "(A)ctive and passive road decommissioning would bring back approximately 16.6 acres of land back to being a part of the productive land base." Does this mean the 16.6 acres would not be considered DSD?*

Response: Detrimental effects on erosion or soil productivity can be direclty attributed to roads (Grigel 2000). Another effect of roads on productivity is the loss of area from the productive land base. Although this loss would seem to be directly proportional to the area of roads, reality is not as straightforward. First some roads are closed following harvest and returned to the productive land base. Secondly, both the lack of competition and the modern good rooting environment on

fill slopes may lead to enhanced growth on that part of the area (Megahan, 1988). Finally, relative production may increase on undisturbed areas adjacent to the roads because of reduced competition for resources. It should be noted that frost-heave activities are believed to be one of the most important activities associated with long term soil amelioration on the KNF (Kuennen pers. comm. 2015). Refer to DEIS pages 66-71; 376-377; and 383.

With time, following road closure activities, the roads which are both actively and passively removed from vehicular use on forest service lands will return back to a productive land base. Active road closure in places are planned to involve culvert removal; sidecast pullback; and in places total sideslope recontouring in steeper sloped areas where felt necessary. Areas scheduled for passive road decommissioning are those roads found to no longer be needed which have been removed from the active use by vehicles for numerous years. As a result many are thickly overgrown and no longer passable at this current date. Roads proposed for passive decommissioning are hydrologically stable and have no culverts.

In a study conducted on the KNF (2012-2013), 183 units were re-monitored for DSD values. All (100%) of these units displayed DSD values at or below 15%, with 69 of the original data set (38%) now at 2% or less (2016 presentation titled: Soil Compaction Recovery on the Kootenai National Forest: Findings over a 25+ Year Period). Such data provides similar results to the Nation-wide "Long Term Soil Productivity – LTSP" studies where the degree of soil recovery is dependent on soil textural class.

***[09, 40] Comment**: "FW-GDL-SOIL-04: Ground-disturbing management activities on landslide prone areas should be avoided." Instead of using high risk landtypes for identifying "landslide prone areas", the DEIS substitutes highly subjective analyses.*

Response: As described on DEIS pages 337-338 no units were found to be located on landslide prone areas and those which are "near" where past landslides have occurred will receive full RHCA buffers and design criteria to exclude future landslide prone activities. Additional buffers are planned to be layed out prior to implementation on the ground regardless of the alternative selected to minimize the potential for harvest related mass soil movement.

***[09, 41] Comment**: "FW-GDL-SOIL-03: On nutrient- limited landtypes, harvesting organics should remain on site for at least 6 months or over a winter season to allow foliage nutrients to leach into the soil, ... No nutrient limited landtypes have been identified for the KNF." What exactly, then, is the purpose of this guideline?*

Response: Potassium deficient soils are primarily found on the Idaho Panhandle National Forest and may exist on the Idaho-Montana border but are not found in the OLY Project Area.

***[10, 14] Comment**: We have also noticed that many of the logging units have disturbed soils, yet are still slated for summer tractor harvest. In those units where soil disturbance is predicted to meet or exceed 15% (the threshold indicated by best available science) we would like to see the district take further measures to mitigate soil disturbance in this already heavily disturbed area. We encourage the district to review the options and methods available*

for harvest that will achieve desired soils objectives (i.e. winter tractor harvest or summer harvest using log forwarders operating on slash mats). These measures would ensure less soil disturbance than traditional summer tractor logging.

Response: All units were field reviewed to determine the existing DSD values in the field (DEIS pages 78-79; 84-88). The units in this report that were above or near the 15% threshold were past regeneration units that had been dozer piled. In order to reduce the impacts of future harvest operations on soil physical conditions some of these units (where feasible) are proposed for winter operations, others with potential impacts to historic properties are proposed to be cut-to-length by a forwarder on slash mats. All these prescriptions were developed by the team to avoid and reduce impacts to soil physical conditions.

In order to meet 2015 Forest Plan and Northern Region (R1) Supplement 2500-2014-1, post-harvest soil decompaction activities may include ripping skid trails, temporary roads, and landings associated with units and seeding as necessary. Such activities will help offset the effects of harvest activities to soil productivity by allowing previously disturbed soils to re-establish as a productive area (DEIS pages 24-25; 78-79; Table 27 on pages 84-86; pages 374-376; page 383).

***[14, 05] Comment**: Soil Disturbance: The Draft EIS identifies that Alternative 3, the Preferred Alternative, was designed to address concerns regarding detrimental soil disturbances (DSD). This was done by either dropping proposed timber harvest units with soil conditions that could not be rehabilitated post-harvest to less than 15% DSD values, or converting them to fuels reduction "F units." We appreciate and support this proactive approach to soil disturbance impacts that the USFS has taken within the Preferred Alternative, particularly given the connection to potential water quality impacts that may result from accelerated surface erosion and sediment delivery. If the USFS has not already done so, we also recommend requiring a minimum 100 foot setback from slopes greater than 30% to minimize soil disturbance.*

Response: Thank you for your support of this element of the analysis. Regarding the 100 foot buffer the FS is providing buffers as needed based on the current 2015 Forest Plan and existing ground conditions on a unit-by-unit basis in accordance with the current BMPs and Design Criteria identified in this document (DEIS Appendix B (B1-B16). Also refer to DEIS Table 26 (page 84), Table 27 (pages 84-86), and pages: 346, 356, 371, 381, and 388. The Forest Plan guideline (FW-GDL-SOIL-01), page 24, states, “FW-GDL-SOIL-01. Ground-based equipment should only operate on slopes less than 40 percent, in order to avoid detrimental soil disturbance. Where slopes within an activity area contain short pitches greater than 40 percent, but less than 150 feet in length, ground-based equipment may be allowed, as designated by the timber sale administrator.”

***[16, 08] Comment**: Rehabilitate all logging landings by workiing up the compacted soil, replanting, and dealing with weeds.*

Response to Log Landings: Rehabilitating Log Landings is part of the Best Management Practices (see DEIS Appendix B, page B-7), which says, "Landings will be rehabilitated to the full extent possible under the Timber Sale Contract considering future activities." and "Landing conditions will be reviewed by IDT after completion of harvest area activities and additional

rehabilitation needs will be determined. Funding will be sought for additional work identified that cannot be completed under the Timber Sale Contract."

Response to Noxious Weeds: Please see responses to Letter 09, Comment 112; Letter 08, Comment 07; Letter 07, Comment 09.

Transportation

***[09, 93] Comment**: "A science-based transportation analysis was completed per the requirements at 36 CFR 212 subpart A." (DEIS at 400.) Please provide a list of scientific references which the DEIS-incorporated forestwide and project level Travel Analysis Reports cite.*

Response: The term "science-based" describes the scientific method employed by various resources that help steer the process. The Travel Analysis Process (TAP) involves the input of various resource specialists based on their discipline's science or expertise to address Steps 1-5 of the TAP. The OLY Travel Analysis Report found in the project file describes the travel analysis completed for the OLY project area. As stated on page 5 of the report, "... Travel analysis is not a decision-making process. Rather, travel analysis informs decisions relating to administration of the forest transportation system and helps to identify proposals for changes in travel management direction. Forest Service Manual (FSM) 7712 directs units:"

As per 36 CFR 212.5(b), the 2015 Kootenai National Forest Travel Analysis Report (TAR), The OLY TAR and within the OLY DEIS page 400, state that the Travel Analysis Process is science-based. The TAP has six steps that are outlined in Chapter 20 Travel Analysis, FSH 7709.55 – Travel Planning Handbook. The analysis is tailored to local situations and landscape conditions by Forest staff and considers public/partner agency input. Instructions from the Forest Supervisor for the analysis are contained in an initiation letter as part of the analysis record. The six-step process includes:

- Step 1. Setting up the Analysis
- Step 2. Describing the Situation
- Step 3. Identifying Issues
- Step 4. Assessing Benefits, Problems and Risks
- Step 5. Describing Opportunities and Setting Priorities
- Step 6. Reporting.

***[09, 94] Comment**: "FW-OBJ-AR-03: National Forest System Road Maintenance – The outcome is:*
• Annually, meet maintenance level requirements on 20 to 30 percent of Operational Maintenance Level 3, 4, and 5 roads (roads that are drivable by passenger vehicles and provide primary access to many recreation opportunities).
• Annually, meet maintenance level requirements on 10 to 20 percent of Operational Maintenance Level 2 roads (roads that are drivable by high clearance vehicles and provide

additional access to recreation opportunities).” What percentages have been accomplished since the RFP was adopted?

Response: Twenty-nine percent of seasonally open Operational Maintenance Level (OML) 2 roads and 8% of seasonally open OML 3, 4, and 5 roads on the Kootenai National Forest are inspected yearly for maintenance needs. Another 17% of yearlong open OML 3, 4 and 5 arterial roads are inspected throughout the year for maintenance needs. 100% of OML 3, 4, and 5 roads are inspected over a five year period for real property inventory. Maintenance tasks identified during these inspections are completed to meet maintenance level requirements.

Travel Management

***[09, 106] Comment**: The FS is not managing consistent with Travel Management Regulations at 36 CFR 212 Subpart C by facilitating increased snowmobile use in the project area.*

Response: We are improving parking at the bottom of NFSR 4445 to facilitate existing snowmobile use (see page 63, DEIS).

Also, although a culvert replacement is proposed for NFSR 4433 to maintain snowmobile access, over-snow use around Pulpit Mountain would actually receive a shortened season. Page 472, DEIS says, "Watershed improvement work has been proposed on NFSRs 4433 and 4433B and includes both active and passive long-term storage. Historically, portions of these roads have been used by snowmobilers as a route to access the open terrain found within the identified over-snow use area on and around Pulpit Mountain. The proposed active work, primarily the removal of a culvert, would impact snowmobile use in this area because they could no longer cross the stream. Because of the historic and continued use of this road by snowmobilers, storage work would be designed to maintain snowmobile access and existing use of this route. However, snowmobile use is currently allowed through April 30 which extends into the early part of the spring emergence period. To reduce potential disturbance effects to grizzly bears during this period, especially sows with cubs of the year, a forest order would prohibit motorized over-snow use of this road after March 31 to be consistent with the 2015 Forest Plan guideline FW-GDL-WL-01 (see Design Features, Chapter 2).” Forest-wide guideline (FW-GDL-WL-01) states that management activities on NFS lands should avoid/minimize disturbance in areas of predicted denning habitat during spring emergence (April 1 through May 1).

The Grizzly Bear Biological Opinion retained in the 2015 Forest Plan on page II-105 bullet point 4 says, “During the first year of implementation of the Revised Forest Plan, the Forest and the Service shall cooperatively develop a plan to monitor the scope and magnitude of late-season snowmobiling (post April 15) as it relates to effects on post-den emergent grizzly bears (see Incidental Take Statement). Within five years of implementation of the Revised Forest Plan, the Forests shall complete a winter travel plan, which will include considerations for grizzly bear and other federally listed species.”

Water Resource

***[06, 06] Comment**: Regarding water quality and soil compaction thresholds, the agency should consider timber harvest activities which allow for maximum schedule flexibility and*

return to the government while providing for good soil conditions following management. This may include Summer operations utilizing "at the stump" processing and skidding or log forwarding on a slash mat as the bulk of soil disturbance occurs in skidding operations -not in the felling operations.

Response: Where feasible, the Forest Service Timber Sale Contract(ing) process, provides for the greatest flexibility for harvest operations, such as at the stump processing and slash mats. Projects are designed, analyzed, altered, implemented and administered to prevent or control the spread of noxious weeds while helping protect resources such as soils, water, historic properties, Proposed, Threatened, Endangered and Sensitive plants, and wildlife. Design Features (DEIS pages 75-89) for the various resource areas of the OLY Project were established. For example, winter harvest would occur on 4 inches of frozen ground or 1-inch of frozen ground with log-forwarding and cut-to-length system to help minimize soil impacts. DEIS page 156 describes harvest operations designed to protect historic properties which also utilize log-forwarding, cut-to-length, while placing tops and limbs evenly on the strip road as the harvester proceeds. Best Management Practices are displayed in Appendix B of the OLY DEIS and are described within various sections of the document; for example: in Chapter 2 (page 97), in Chapter 3, noxious weeds (page 268); Chapter 3, Soils (page 346), and Chapter 3, Water Resource (page 403).

***[08, 03] Comment**: I also remain concerned about what the sediment yield will be, at the landscape-level, from a watershed project that proposes over 2000 acres of regeneration harvest, in terms of effective clearcut-equivalents, and, given the location of the wildland interface, are so much closer to major tributaries than not.*

Response: The effects to with regard to water quality and sediment are discussed within the DEIS on pages 423-428. The effects of harvest on sediment are discussed specifically on page 427.

***[09, 14] Comment**: The DEIS is unclear as to whether thorough surveys of sediment sources have been conducted in the project area—that is, comprehensive surveys of all roads and other sites where management activities have caused soil damage, with quantitative estimates of tons of sediment yield.*

Response: Both previously decommissioned road surveys and existing road surveys are identified as a data source in the DEIS Table 117, page 418 and can be found in the project file.

***[09, 19] Comment**: "In addition to increases in peak flows, ground based harvest systems and associated activity on haul roads may also increase sediment production. Overall changes in sediment delivery to Arbo, Koot, and China Creek as a result of the OLY project would be indiscernible." The DEIS doesn't present enough data or analysis, based on best available science, to support that "indiscernible" claim.*
"(P)roposed activities would not increase peak flows in O'Brien Creek to the extent that the existing hydrograph or water quantity would be significantly altered." Again, the DEIS doesn't support that statement with enough analysis or data, based on best available science. The hydrology analysis doesn't present a credible, quantitative sediment yield analysis.

"Lincoln County Road 2394 (Kilbrennan Lake Road) will be used as a haul route but will not receive BMP upgrades as this county road lies outside of the jurisdiction of the Forest Service." This doesn't exempt the FS from conducting a quantitative cumulative effects analysis.
"Roads can also alter the drainage network of a watershed and thereby increase peak flows." KNF hydrologist Johnson, 1995 noted this effect from his reading of the scientific literature: "Studies by Dennis Harr have consistently pointed out the effects of the compacted surfaces (roads, skid trails, landings, and firelines) on peak flows." Elevated peak flows harm streams and rivers by increasing both bedload and suspended sediment, which is not adequately analyzed in the FEIS's watershed analysis.

Response: The effects with regard to sediment delivery are discussed on DEIS pages 423-428. Quantitative sediment analysis is displayed on page 426 and discussed further on pages 427 and 428.

***[09, 95] Comment**: The DEIS makes only vague statements about project compliance with FW-GDL-WTR-02 and FW-GDL-WTR-03. "The proposed project would have no measurable effect on water temperature in the project area streams." How does the DEIS consider temperature increase effects of all the "regeneration logging" as recognized in the RFP?*

Response: In the "Water Quality Concerns Not Affected by the Proposed Action" section of the DEIS on page 407 the DEIS states that "Implementation of riparian standards and guidelines will protect shading and riparian groundwater function. The proposed project would have no measurable effect on water temperature in the project area streams." On page 417 the DEIS goes on to say that "Perennial and intermittent streams, springs, ponds, wetlands, and landslide prone areas in the timber harvest area are identified and protected by establishing RHCAs around these features. No activities will occur in RHCAs that will retard attainment of riparian management objectives or adversely affect inland native fish (see Fisheries analysis)."

Also see the response to Letter 09, Comment 13.

***[09, 96] Comment**: The DEIS relies upon ECA as a water yield effects measure. It seems completely uninformed by Forest Plan Implementation and Monitoring from past years, as well as scientific basis.*

Response: ECAs are a commonly used indicator of the potential effects to water yield from management and natural disturbances in forested landscapes. The use of ECAs and their limitations are discussed in DEIS on pages 418-423. The use of ECAs for the Oly Project is consistent with the 2015 KNF Forest Plan as ECAs were used for watershed characterization as well (KNF LMP FEIS Appendix D).

***[09, 97] Comment**: "Arbo Creek … Sediment is readily transported downstream and does not accumulate in the channel." Such cumulative effects are why the Yaak River should be included in the analysis.*

Response: A stable stream is expected to "consistently transport its sediment load" (Rosgen 1996, page 1-3). Page 422 of the DEIS states that "The entire road system in the drainage was decommissioned so roads have almost no influence on stream flow. The cobble channel substrate has low sensitivity to peak flow increases. Field reviews confirmed existing stable channel conditions. The OLY project will have no direct, indirect or cumulative effect on stream flows or channel conditions in Arbo Creek." The DEIS (page 432) goes on to say that "The cumulative effect of any action alternative of the OLY project, when considered with ongoing and foreseeable actions, would have no effect on Arbo Creek because little activity is proposed in Arbo watershed." Because the cumulative effects are not expected to be discernible it would not be additive at a larger cumulative effects boundary.

***[09, 98] Comment**: "There are three road/stream crossings on NFSR 4407B on the north side of Yaak Mountain that were identified as not functioning correctly and at possible risk of failure." The DEIS does not guarantee these crossings would be restored.*

Response: The DEIS Table 17 on page 67 and Table 39 on page 137 of the DEIS state that Road 4407B is identified for storage. However, funding is not certain so it will be accomplished as funds become available.

Table 119 listed 3 crossing needing treatment in the Kilbrennan watershed. The correct number is one (1) crossing that needs improvement. This error will be corrected in the FEIS.

This work is committed to and would be accomplished during the same season the timber sale road work is occurring on Yaak Mountain (see Chapter 2 - Design Features). The road condition was field reviewed a second time (K.Newgard 9/1/2015). Three crossings were identified during the first field review. One crossing is on Stimson Land and this segment of road would not be treated since it is not under USFS jurisdiction. However, the crossing is considered at low risk for failure. There are two crossings on National Forest. One crossing will be treated, and the second crossing shows no sign of a scour channel, has rocky fill and presents almost no risk for failure. It will not be treated.

***[09, 99] Comment**: The DEIS indicates that the portion of O'Brien Creek on private land downstream of project activities is basically non-functioning, but somehow increased logging impacts won't be significant.*

Response: The DEIS discusses the existing condition for O'Brien Creek on pages 413-416. Much restoration has gone on in this watershed. Currently both sediment (page 416) and equivalent clearcut acres (ECA) are within reference ranges (page 423). The direct, indirect and cumualtive effects with regard to O'Brien Creek are in the DEIS pages 416, 417, 42, 423-428, and 433. Specifically, page 423 states that "Because of the low impact of the project on stream flows there is almost no risk of effect to the low gradient fine sediment reaches in O'Brien Creek." Page 428 goes on to say "There will be virtually no risk of sediment delivery to O'Brien Creek resulting from harvest and burn activities because of implementation of BMPs. " and that "The OLY project would reduce the sediment from roads in the project area through implementation of BMPs on haul roads, implementation of BMPs on other roads open to the public, storage work on roads closed to motorized access, and decommissioning activities on roads no longer needed." Page 433 states that "The cumulative effect of any action alternative of the OLY project, when

considered with ongoing and foreseeable actions, would improve water quality conditions in O'Brien Creek."

***[14, 02] Comment**: The EPA considers water resource protection one of the most important issues addressed through the NEPA analysis for vegetation management activities. As outlined in the Draft EIS, most treatments contemplated under the action alternatives (e.g., harvest, prescribed fire, and road construction) have the potential to impact aquatic resources, including surface and ground waters, wetlands, streams, riparian areas and their supporting hydrology. Water Quality: The Draft EIS identifies that the Kootenai River is the only stream in the project area that is currently on the Clean Water Act (CWA) Section 303(d) list, and that the reason it is on the list is due to hydrological changes caused by the construction and operation of the Libby Dam. First, we recommend ensuring that the 2014 Montana Department of environmental Quality (MDEQ) CW A 303(d) list was used for this analysis. If not, we recommend that the Final EIS be updated to include such information. In addition, although the Draft EIS notes that the Libby Dam is outside of the USFS's jurisdiction, we recommend disclosing the pollutants causing the Kootenai River impairment and whether a Total Maximum Daily Load (TMDl,) has be developed for the impaired water. If a TMDL has been developed for any impaired waters in the area of potential impacts, pollutant loads should comply with the TMDL allocations for point and nonpoint sources. Where new loads or changes in the relationships between point and nonpoint source loads are created, we recommend that the USFS work with MDEQ to revise TMDL documents and develop new allocation scenarios that ensure attainment of water quality standards. Where TMDL analyses for impaired waterbodies within or downstream of the project area still need to be developed, we recommend that proposed activities in the drainages of CW A impaired or threatened waterbodies be either carefully managed to prevent any worsening of the impairment or avoided altogether where such impacts cannot be prevented. Finally, we recommend the Final EIS disclose any impaired waterbodies downstream of the project area that may be impacted by project activities. A map identifying the location of all impaired stream segments within and downstream of the project will be a valuable addition to the Final EIS.*

Response: The DEIS discusses of 303d list watersheds on pages 405 and 406. Page 405 states, "No streams in this project area have been or are currently on the 303(d) list other than the Kootenai River which forms the southern boundary of the project area. The Kootenai River is on the 303(d) list due to hydrological changes caused by the construction and operation of Libby Dam which is not under the jurisdiction of the Forest Service." Therefore, 303d listed streams were not covered further in the document. The 2014 list of impaired waters and maps can be found in the project file.

***[14, 03] Comment**: In addition, although the Draft EIS notes that the Libby Dam is outside of the USFS's jurisdiction, we recommend disclosing the pollutants causing the Kootenai River impairment and whether a Total Maximum Daily Load (TMDl,) has be developed for the impaired water. If a TMDL has been developed for any impaired waters in the area of potential impacts, pollutant loads should comply with the TMDL allocations for point and nonpoint sources. Where new loads or changes in the relationships between point and nonpoint source loads are created, we recommend that the USFS work with MDEQ to revise*

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Response: The DEIS discusses of 303d list watersheds on pages 405 and 406. Page 405 states that "No streams in this project area have been or are currently on the 303(d) list other than the Kootenai River which forms the southern boundary of the project area. The Kootenai River is on the 303(d) list due to hydrological changes caused by the construction and operation of Libby Dam which is not under the jurisdiction of the Forest Service." Therefore, 303d listed streams were not covered further in the document. The 2014 list of impaired waters and maps can be found in the project file.

***[14, 04] Comment**: Finally, we recommend the Final EIS disclose any impaired waterbodies downstream of the project area that may be impacted by project activities. A map identifying the location of all impaired stream segments within and downstream of the project will be a valuable addition to the Final EIS.*

Response: The cumulative effects boundary for water resources is discussed on 428 of the DEIS. It states that "The cumulative effects area for the hydrologic analysis is limited to the watersheds where effects from timber harvest, prescribed burning, and road work could potentially be discernible. These watersheds are Arbo, Kilbrennan, Koot, China, and O'Brien. There are project activities along land areas that drain through mostly subsurface flow to the Yaak and Kootenai rivers. Water and sediment yield effects from these activities would not affect such large river systems." Therefore, effects would not be cumulative below the project area. However, the 2014 list of impaired water and maps is in the project file including the spatial arrangement of 303d streams that may be downstream of the project area.

***[14, 06] Comment**: Public Drinking Water Supply Sources: The Montana Department of Environmental Quality (MDEQ) has conducted source water assessments for groundwater and surface water sources of public drinking water supplies. The EPA recommends that Final EIS include a map, appropriate for public dissemination, showing the generalized locations of all source water assessment and protection areas associated with public drinking water supplies. Maps may be available from MDEQ or the EPA upon request. Please note that more specific maps, available from the MDEQ, should be utilized by the USFS when locating project activities. Please contact the MDEQ Source Water Protection Program Manager, Joe Meek, at 406-444-4806 or jmeek@mt.gov for more information. We also recommend the Final EIS include a discussion of potential project impacts, design criteria and mitigation options for protecting these high value drinking water resources from potential project impacts.*

Response: The DEIS states on page 405 that "Source water protection is provided in O'Brien Creek for the town of Troy.

This desired condition does not apply because O'Brien Creek is not a source water area for Troy. Troy gets its water from municipal wells." Page 414 goes on to explain that "O'Brien Creek used to be the water source for the city of Troy, and water is still withdrawn for non-potable uses. For a period of time there was a dam and millpond near the mouth of the creek. This infrastructure has mostly been removed and the stream is flowing unrestricted." No other source water areas were identified in the planning area.

Wild, Scenic and Recreational River

> ***[09, 105] Comment**: The DEIS states that "Approximately 328 acres of harvest units (295 acres of regeneration harvest and 33 acres of improvement harvest) would occur along the Yaak and Kootenai river segments within MA 2." The DEIS does not demonstrate that proposed logging and burning would be consistent with the RFP MA 2 Guideline for Timber (MA2-GDL-TBR-02).*

Response: DEIS page 317 has definitions of the two different river classifications of MA2 that are within the OLY project area. Scenic Rivers are those rivers or sections of rivers that are free of impoundments, with shorelines or watersheds still largely primitive and shorelines largely undeveloped, but accessible in places by roads. Recreational Rivers are those rivers or segments of rivers readily accessible by road or railroad that may have some development along their shorelines, and that may have undergone some impoundments or diversion in the past. This is further explained in the context of the OLY project by describing where those segments are classified on the Yaak and Kootenai Rivers. The segment of the Yaak River from the northernmost project boundary south to the Yaak Falls is classified as eligible Recreation River; the segment from the Yaak Falls south to the Kootenai River is classified as eligible Scenic River. The segment of the Kootenai River within the project boundary is classified as eligible Recreational River. No eligible Wild River segments occur within the project boundary. MA2-GDL-TBR-02 applies only to rivers or river segments classified as scenic or recreational and states that timber harvest is allowed to maintain or restore the values for which the eligible scenic or recreational river was identified. DEIS page 325 further explains the purpose of the different silvicultural prescriptions and proposed treatments within MA2 as they relates to the maintenance or restoration of the values of the recreational and scenic rivers. P. 320 explains the effects of the no action alternative in terms of vegetation and recreation. It states that vegetation growth will diminish viewing opportunities over time. Opportunities for gathering forest products including huckleberries, mushrooms, and firewood would continue to be dependent on weather and natural forces. Vegetation would continue to encroach upon existing openings and are expected to limit forage for wildlife and berry production over time in areas that are currently providing forage and berry production. This trend is also expected to continue on the ridges and openings in the absence of a fire event. DEIS page 242 compares the OLY alternatives' consistency to MA2-GDL-TBR-02. It states that Alternative 1 does not propose any treatments. Alternatives 2, 3, and 4 would treat 328, 293, and 291 acres of treatment in MA2, respectively. This is less than 13 percent of the total of MA2 in the project area, leaving natural ecological processes as the primary force within most of this MA. In addition, proposed treatments are designed to mimic ecological processes, meet the purpose and need of the project, and move these stands to the desired condition. Given the small area that would be treated, this project would remain neutral toward this desired condition.

Wildlife: (General)

***[09, 57] Comment**: "Proposed harvest and fuels treatments would result in the retention of remnant large tree species…" "…maintaining structural components such as large trees…" "Healthy trees of the desired species would be kept within harvest units where available, with emphasize placed on keeping the larger diameter trees." A critical flaw of the DEIS is, it provides no metrics for leaving trees of, vaguely described "large" size. Cumulatively the DEIS acknowledges that "Past vegetation management practices that targeted these old, large trees removed the relic seral species and further altered tree size and composition…" Without specifying the size of trees that will be found in units as only vaguely specified in prescriptions, it's unlikely that the decision of which trees or "clumps" to be retained will prioritize wildlife habitat needs. This is not an issue for which AWR wants to trust the FS. Events that occurred in the project area clearly demonstrate the problems with trusting the FS. See: http://www.wildrockies.org/forestfraud/*

Response: Forest Plan forest-wide direction for vegetation identifies the desired conditions for each size class. The size range for each of the four size classes (i.e., seed/sap, small, medium, and large) is defined in inches diameter breast height. The large size class includes trees 15 inches or greater diameter breast height. See desired condition FW-DC-VEG-02 and Figure 3 on page 12 of the Forest Plan. Also, "size class" is defined in the glossary of the FEIS for the 2015 Forest Plan and defines the size range for each category in diameter breast height.

***[09, 85] Comment**: "(O)pening up the overstory while retaining and promoting the development of large, fire and disease tolerant tree species like western larch would provide more structurally diverse and productive stands, stimulate the growth of forage species including huckleberries where present, and emulate ecological processes like fire that have been absent on the landscape." (DEIS at 473, emphasis added.) This is an example of the DEIS's pervasive use of canned, forest health/resilience/DC language that doesn't apply to the project area.*

Response: Please see the response to Letter 09, Comment 04.

Wildlife: Big Game

***[09, 52] Comment**: The DEIS claims to comply with big game guidelines by arbitrarily dismissing winter habitat as not "classic."*

Response: Big game winter ranges used in the OLY analysis are from Montana Fish, Wildlife & Parks winter range coverages, 1:100,000, which provide an approximation of the winter range found within the project area. Because these are approximations, the extent of the winter ranges or quality of habitat within those ranges may be adjusted based on local observations. FW-DC-WL-16 has direction that habitat for native ungulates is managed in coordination with state agencies. As described in the methodology section of the big game analysis (DEIS, page 710), the potential for effects of winter harvest to big game species in mapped winter range were field reviewed and discussed with the local State biologist. It was determined that the proposed winter harvest would continue to meet the intent of the big game guidelines for a variety of reasons,

including an assessment of the quality of the winter range conditions, size and shape of the unit, proximity to unharvested stands, and the long-term benefit of the proposed treatments to future winter range conditions. See the Big Game winter range effects discussion on pages 720-721 of the DEIS.

Wildlife: Bighorn Sheep

> ***[09, 47A] Comment**: If bighorn sheep need repeated population augmentation and is therefore nonviable, how can a project that creates adverse effects be consistent with the RFP?*

Response: Based on OLY's bighorn sheep effect analysis, it was determined that OLY's proposed activities "may impact individuals or their habitat, but will not likely contribute to a trend toward federal listing or cause a loss of viability to the population or species" (DEIS, page 600). There would be limited potential for disturbance to sheep during implementation of proposed activities. Also, the creation of more open habitat conditions would increase the availability and productivity of forage species as well as improve connectivity to other open habitats within the sheep range. A summary of the potential effects of proposed activities to bighorn sheep is found in the "Summary of Conclusions" (DEIS, pages 586 – 587) and "Statement of Findings" (DEIS, page 600) sections.

The following excerpt from the "Montana Bighorn Sheep Conservation Strategy" (MFWP 2010) explains the potential cause of the observed decline in population for this herd and why augmentation was selected as a management action:

The population began showing signs of decline throughout the late 1980s and early 1990s, and eventually experienced a drastic reduction in numbers during the 1994-95 winter. Causative factors for the decline were not identified, but a large wildfire on the sheep range during late summer 1994, with associated fire suppression activities, may have induced stress-related disease agents to reduce the herd by at least 50%. The population showed no signs of recovery over the succeeding five years due to the extremely severe winter of 1996-97 and chronically low lamb recruitment rates. At the same time, the sympatric mule deer population was also declining and the mountain lion population was increasing, which may have plunged the very small sheep population into a "predator trap." At that point, the decision was made to augment the existing population with additional sheep from various herds around Montana (pages 84 – 85).

Wildlife: Canada Lynx

> ***[08, 17] Comment**: With regard to the conversation about clearcuts abetting snowshoe hare habitat, which then can abet lynx, the relationship is more complicated than that—rarely if ever is nature so simple—and again I would urge smaller cutting units, and would recommend you commit to developing old forest conditions immediately adjacent to the proposed units; it's been my observation and experience that snowshoe hares in the Yaak favor this extreme edge, the patchwork of dynamic old-new continuum, rather than vast desert islands of clearcuts.*

Response: The vegetation management objectives (VEG O1, O2, O3, and O4) of the 2015 Forest Plan standard (FW-STD-WL-01) describe the objective to manage vegetation to mimic natural succession and disturbance processes, including the use of fire, which would provide a mosaic of habitat conditions that would maintain or improve winter snowshoe hare habitat for the conservation of lynx (emphasis added). Focus of management should occur within areas that have potential to improve winter snowshoe hare habitat but presently have understories that lack dense horizontal cover (DEIS page 521). Snowshoe hares and lynx use both young forest and mature multistory forest for foraging. The DEIS (page 516) describes how "Boreal forest landscapes are naturally in a state of change, through disturbance and succession processes as mentioned above, and result in a changing environment of habitat types, distribution, and juxtaposition (USFWS 2013a)." Therefore, limiting treatments to "smaller cutting units" may not represent past disturbance processes, like fire, that influenced lynx habitat historically. Rather, the OLY project's "Proposed vegetation management treatments are designed to re-introduce natural processes, such as wildfire, and better approximate historic stand patch size and species composition, retention of remnant large tree species while encouraging development/maintenance of a younger age class or structural stage, increased habitat diversity, and general movement towards the desired vegetative condition based on historic range of variation for this area" (DEIS, page 521).

There would be no creation of "vast desert islands of clearcuts" in lynx habitat. All proposed harvest units within the lynx analysis unit (LAU) are located along the lower elevation boundary (DEIS, map M-20) in an area that provides both lynx and non-lynx habitat (i.e., matrix or low elevation habitats). A maximum total of about 76 acres of regeneration harvest is proposed which would result in a negligible change from the amount of habitat occurring within a stem exclusion structural stage to an early stand initiation stage (DEIS, page 522). The treatments would contribute to the mosaic of habitat conditions, or "patchwork of dynamic old-new continuum" as the commenter describes, that includes young/old forest and lynx habitat/non-lynx habitat.

***[09, 45] Comment**: The DEIS mostly accepts stand data to be valid for analysis purposes, but as shown in the lynx analysis, not if it restricts logging. The inconsistency is not reconciled properly throughout the DEIS.*

Response: As explained in the methodology section of the Canada lynx analysis (DEIS, page 513), successional or structural stage is based on year of origin which is provided through stand data. Stands do not automatically transition from one structural stage to the next at a certain age; the transition is also influenced by environmental conditions and disturbance processes. Therefore, the validity of the stand data with respect to stand age in its use for habitat mapping was not being questioned or field validated. Rather, field reviews were verifying the structural stage that was mapped based on the assumption of when a stand is expected to transition from one structural stage to the next. Also, see Letter 09, Comment 68B.

***[09, 68] Comment**:*

{A} A big problem with the RFP (including the NRLMD) is that it allows with few exceptions, the same level of industrial forest management activities that occurred prior to Canada lynx ESA listing. The FS must conduct formal consultation on its Northern Rockies Lynx Management Direction (NRLMD) over the entire range of the NRLMD in light of the more recent Critical Habitat designations, as 9th Circuit case law requires. AWR participated

during the public process as the NRLMD was developed, and continues to believe that the RFP/NRLMD does not consider the best available science.

{B} The DEIS mostly accepts stand data to be valid for analysis purposes, but as shown in the lynx analysis, not if it restricts logging: "(H)arvest was proposed in stands tentatively mapped as multistory habitat prior to field validation. However, upon field validation these stands were found to be in a stem exclusion structural stage that does not provide snowshoe hare foraging habitat and were not multistory habitat in reality." Did the surveys target snowshoe hare occurrence data in these stands? Did the FS conduct surveys of all the lynx suitable habitat in the LAU? Did the FS conduct surveys of RFP "unsuitable" habitat in the project area to validate that assumption?

{A} Response: The 2015 Forest Plan standard FW-STD-WL-01 has vegetation standards that limit the amount and type of vegetation management treatments depending on the existing condition of the LAU, the structural condition of the stands proposed for treatment, and the treatment proposed. The OLY lynx analysis, beginning on page 511 of the DEIS, addresses all applicable direction and consistency with 2015 Forest Plan direction. Also, see the "Regulatory Framework Findings" section (page 531) where consistency with FW-STD-WL-01 and other Forest Plan Direction is described. Critical habitat was formally consulted on and documented in the Biological Opinion for the 2015 Forest Plan (USFWS 2013b).

The lynx section in the wildlife specialist's report for the 2015 Forest Plan, FEIS, Biological Assessment, and Biological Opinion contains an analysis of the effects from the 2015 Forest Plan on lynx and lynx critical habitat, including the updated designations that came out in 2014.

{B} Response: See Letter 09, Comment 45 for a response to the commenter's first statement above. All proposed vegetation management units within the LAU were surveyed and/or evaluated through other methods as described in the "Methodology" sections of the DEIS's lynx (page 513) and lynx critical habitat (page 538) analyses. This included habitat mapped as suitable and unsuitable, as well as non-lynx habitat or matrix habitat, therefore, certain stands were not targeted over others for review. The project file includes documentation of unit review. It is not clear what kind of data the commenter is referring to regarding "snowshoe hare occurrence data;" however, during the unit review it was noted when sign of snowshoe hares (i.e. pellets) was encountered. This is also documented within the "Lynx Habitat Field Review Notes" found within the project record.

***[09, 69] Comment**:*

{A} The DEIS doesn't provide a rationale for not discussing many of the RFP's lynx standards and guidelines.

{B} "For treatments within lynx habitat, regenerating stands in currently unsuitable habitat would provide future winter habitat within approximately 15 years and contribute early successional forage habitat to the landscape mosaic." This would prevent that particular unsuitable habitat from becoming suitable multi-story winter habitat, for a century or so. The RFP considers this acceptable within its rather arbitrary numbers limits.

{C} "Large areas of adjacent forest stands would continue to provide mature habitat for red squirrel and other prey species within the LAU." Are those areas in the categories of unsuitable for lynx, or winter multi-story?

{A} Response: In the "Resource Indicators and Measures" section of the lynx analysis (DEIS, page 512), it states that those "Objectives, standards, and guidelines considered but found 'not relevant' are found in the project file." Also, see the 2015 Forest Plan consistency statement for FW-STD-WL-01 (DEIS, page 533). For those not addressed in the DEIS, each is listed in this project file document with a statement as to why it was not considered relevant to the OLY project.

{B} Response: As mentioned above for Letter 08, Comment 17, two of the 2015 Forest Plan (FW-STD-WL-01) vegetation objectives are to 1) "Provide a mosaic of habitat conditions through time that support dense horizontal cover, and high densities of snowshoe hare. Provide winter snowshoe hare habitat in both the stand initiation structural stage and in mature, multi-story conifer vegetation" (Objective VEG 02) and 2) "Focus vegetation management in areas that have potential to improve winter snowshoe hare habitat, but presently have poorly developed understories that lack dense horizontal cover" (Objective VEG 04). The OLY project's proposed vegetation management treatments are consistent with these objectives and other applicable vegetation management standards and guidelines (DEIS's direct and indirect effects analysis on page 521 and consistency with the 2015 Forest Plan on page 533). Also, see the response to Letter 09, Comment 68A.

{C} Response: Red squirrels and other prey species can be found in mature stands of unsuitable, multistory, and non-lynx habitats. A mosaic of these habitat types are found adjacent to the proposed treatment areas (DEIS, map M-20, and project file).

***[09, 70] Comment**: What is the science that correlates the "2015 Forest Plan Guideline" for coarse woody debris and lynx denning habitat?*

Response: The DEIS lynx analysis did not correlate the 2015 Forest Plan guideline for coarse woody debris to lynx denning habitat conditions. Lynx require abundant coarse woody debris for denning and the proposed vegetation management units currently do not provide this condition. The discussion of coarse woody debris was to demonstrate that project design would retain the appropriate levels and size of down coarse woody for the given habitat type (consistent with FW-DC-WL-13) and that, over time, additional accumulations of coarse woody debris could potentially provide denning habitat in the future. This discussion also describes that denning habitat is expected to be found within the major draws and north facing slopes which provide productive growing conditions and (general) lack of management and fire. See the DEIS, page 525. In addition, the wildlife analysis for the 2015 Forest Plan (page 217) states that "Denning habitat is abundant on the KNF and is not limiting (Squires, personal communication, 9/6/12)."

***[09, 71] Comment**: "Although a portion of the OLY project is a fuels management project, none of these units occur within the LAU ..." Specifically, which units are the fuels management project?*

Response: Based on the definitions of fuels treatments and projects in the NRLMD (2015 Forest Plan FW-STD-WL-02), all fuels units would be considered the fuels management portion of the OLY project. The fuels units are described in Chapter 2 of the DEIS by alternative. In the lynx analysis, the statement provided in the comment is addressing the Terms and Conditions of the 2015 Biological Opinion (DEIS, page 530-531). Specifically, it is addressing fuels management projects that would occur within the Wildland Urban Interface, or WUI, that would utilize exemptions or exceptions to standards VEG 1, VEG 2, VEG 5, and VEG 6. Although all or part of three ecosystem burns would occur within the LAU, they "would not result in a change to the vegetation composition or structure and would not result in a measurable amount of increase in early stand initiation habitat in the LAU" (DEIS, page 522). No proposed fuels treatments that would utilize exemptions or exceptions to the vegetation standards are found within the LAU.

***[09, 72] Comment**: Would old growth be logged in the LAU?*

Response: No old growth would be logged within the LAU (DEIS map M-18 and M-20). Note that lynx habitat use is not associated with old growth conditions, although old growth may be used by lynx. Also, certain old growth habitat types such as dry Douglas-fir or ponderosa pine within the LAU are not the boreal forest types preferred by lynx.

***[10, 15] Comment**: Finally, the KFSC guidelines express a desire to address all four structural stages of lynx habitat in forest management. We support the district in staying within the bounds of the lynx amendment, treating stands in lynx habitat that are in the stem exclusion phase. We also urge the district to identify and develop a long-term plan around achieving desired levels of all four structural stages of lynx habitat across the project area.*

Response: Currently, there are no identified levels for the four structural stages of lynx habitat that are desired on the landscape. What management direction (FW-STD-WL-01) has identified are the limits as to the amount of early stand initiation habitat (i.e., unsuitable because it does not provide winter foraging conditions) that can be created through vegetation management activities within a LAU. This is for both existing levels and amount created over a given amount of time. Also, there are limits to the amount of habitat that currently provides winter foraging habitat (i.e., young forest and mature multistory forest) that can be reduced through exceptions or exemptions for specified activities such as fuels treatments within the WUI.

Lynx home ranges as represented by an LAU are large and the habitat conditions (type, distribution, and arrangement) are shaped by landscape level natural disturbance processes, especially wildfire; see "Lynx Habitat Condition" (DEIS, pages 515-516), These conditions have and will continue to change over time, including periods of time with low levels of suitable habitat and periods with high levels of suitable habitat. The potential to identify or manage for "desired levels" is limited and likely unrealistic due to factors such as: 1) often the location of lynx habitat is associated with management allocations such as inventoried roadless areas, unroaded areas, wilderness, backcountry areas, grizzly bear Core, etc. that limit the type of vegetation management treatments that could be proposed or would be desired in these areas, 2) the time scale to achieve desired results for stem exclusion and mature multistory habitats is long, and 3) any "desired conditions" beyond the limits set through existing management direction would be subjected to constant change based on conditions throughout the LAU. For example, vegetation management treatments could not be expected to account for or respond to large scale

changes in habitat conditions associated with a large stand replacing fire such as those that occurred in the project area in the recent past (e.g., Arbo Creek, Pulpit Mountain, or China Basin/Flagstaff Mountain areas). Also, the ERG (2012) report concludes that human-caused habitat changes such as would occur through vegetation management treatments and fire suppression are minor contributors to the effects on lynx habitat compared to current levels of in-growth and succession which "are recruiting suitable multi-storied habitat at a level great than that lost to disturbance" (page 79).

***[13, 07] Comment**: In addition, the KFSC guidelines express a desire to address all four structural stages of lynx habitat in forest management. We support the district in staying within the bounds of the lynx amendment by treating stands in lynx habitat that are in the stem exclusion phase. We also urge the district to identify and develop a long-term plan around achieving desired levels of all four structural stages of lynx habitat across the project area.*

Response: See the response to Letter 10, Comment 15.

Wildlife: Fisher

***[09, 48] Comment**:*

{A} "Forest-wide, fisher habitat is abundant at about 703,423 acres and exceeds the upper range of historic variation of approximately 671,150 acres (ERG 2012)." What are the results of fisher population data for the KNF that validate this claim of abundance of habitat? That statistic also discounts the especially high quality old-growth habitat that has been logged well below the HRV on the KNF.

{B} How much of the suitable fisher habitat in the project area has been validated by field survey?

{A} Response: Fisher occur at low densities throughout Montana (DEIS, page 621) due, at least in part, to large home ranges (DEIS, page 623). As described in the "Fisher Occurrence" section of the OLY fisher analysis (DEIS, pages 625 - 626), "Regional monitoring data indicate that fishers have been documented within and immediately adjacent to the project area several times between 2001 and 2009 (USFS 2012 and project file)" and these records include both male and female fisher. This data also documents other fisher occurrence on the Forest from both survey effort detections and trapping records.

Regarding the availability of old growth on the Forest, see response to Comment 09, Letter 64. Although old growth habitats can provide the structural characteristics important to fisher habitat use, fishers are not obligates of old growth. Therefore, availability of "old growth" stands per se was not part of the query design for the ERG study (ERG 2012), but would have been captured in the results as the study identified the structural elements important to fishers.

{B} Response: Each harvest unit and applicable fuels units were visited and assessed as to their suitability in providing for wildlife species, including fisher.

Wildlife: Grizzly Bear

***[08, 11] Comment**: The greatest limiting factor to grizzly bear recovery in the Yaak is human-caused mortality. I don't see any way that 2000 acres of new clearcuts in a single watershed—a vital watershed, both in terms of residential grizzlies as well as the desired passage of bears from the Yaak into the Cabinet Mountains, and vice versa—supports their needs in this regard. This makes the refugia of the roadless areas in this project—as in any project-all the more vital. The units that intrude/border the roadless areas do not protect/preserve this interior integrity but threaten it; they should be removed.*

Response: Please refer to the grizzly bear analysis for how the proposed vegetation management treatments contribute to the management of grizzly bear habitat (DEIS, beginning on page 442). See the response to Letter 10, Comment 03 regarding the units located near the inventoried roadless area (IRA) boundary.

It is Core habitat that provides security habitat and also functions as displacement areas for grizzly bears (DEIS, page 449) during periods of activity. Although IRAs can be found within Core because of their roadless condition, their boundaries do not necessarily coincide. As described in the grizzly bear analysis, "there are a few instances where IRA boundaries abut an open or gated road when Core does not" (DEIS, page 451). The units that the commenter is referring to are located along or in close proximity to the open East Side Road and this location is one of those instances where the IRA boundary occurs near the open roads where Core does not. Harvest of these units would not impact the integrity of Core habitat within the BMU. Note that Core percent would be maintained at 54 percent throughout the project. Please refer to the grizzly bear analysis for how the proposed activities would affect Core habitat within BMU 10 (DEIS, beginning page 456).

***[09, 76] Comment**: The DEIS and RFP don't recognize the likely downward trend for the CYE grizzly bear, the failure to approach recovery goals, and the need to repeatedly augment the population in order avoid virtual extirpation here.*

Response: Also see the response to Letter 09, Comment 73.

The wildlife specialist's report (Anderson 2014) for the 2015 Forest Plan includes more discussion in the grizzly bear analysis related to the "Affected Environment." This report does discuss augmentation and the reasons for augmentation (page 77) as well as both the probability of a downward population trend (page 78) and that not all of the population recovery goals in the CYRZ are being met (page 80). This information referenced Kasworm et al. (2012).

The 2015 Forest Plan incorporated the 2011 Access Amendment as a standard (FW-STD-WL-02) to be applied within the portion the KNF that falls within the CYE. FW-STD-WL-02 provides the habitat parameter standards by BMU for Core, OMRD, and TMRD as analyzed below and considers the best available science (Allen et al. 2011) for the CYE. The estimated grizzly bear population has increased since 1999 (20 bears) through the early 2000s (30 to 40 bears) to a current maximum estimate of 69 bears, although the actual number likely falls within the range between 37 and 69 bears (Kasworm et al. 2000, 2003, 2004, 2014). Similarly, an improvement in the calculated percent "probability of decline" (measured as a percent) has been observed since 2006, decreasing from 94 to 57 percent in 2012 (Kasworm et. al 2007, 2013) to 50 percent in 2013 (Kasworm et al. 2014)[8]. This suggests that the KNF's wheeled motorized access

management policy over the last decade has contributed to improving the grizzly population towards recovery goals within the CYE by improving BMU parameter levels with many now meeting or being better than the standards. Implementation of FW-STD-WL-02 would continue this trend. The edited version of Footnote [8] is found on p. 489 of the OLY FEIS.

> [8] The "probability of decline" reflects the probability that repeated calculations of the growth rate, using random combinations of values rather than the mean value from all years, would result in values of < 1 (i.e., a decreasing population). Therefore, although an improvement in the "probability of decline" does not directly indicate that the grizzly bear population is increasing, it means that the calculated growth rate is getting closer to 1.0 (i.e., a stable population). Even when the growth rate becomes just greater than 1.0 (i.e., an increasing population), there would still be some probability that the population is in decline due to portions of the bell curve still falling below 1.0. As of 2013, the growth rate reached 1.0 reflecting a stable population (Kasworm et al. 2014). A year later, the reported growth rate of 1.014 indicates an increasing population (Kasworm et al. 2015).

The OLY grizzly bear analysis describes that "an improvement in the calculated probability of decline has been observed since 2006, decreasing from 94 to 57 percent in 2012 (Kasworm et al. 2007, 2013) to 50 percent in 2013 (Kasworm et al. 2014)[8]" (DEIS, page 456). This demonstrates in an improvement since the analysis was completed for the Forest Plan. In addition, the following clarification of the relationship of the probability of decline to an increasing population is provided in the footnote (now edited and found on p. 489, OLY FEIS).

***[09, 78] Comment**: The DEIS doesn't consider most of the US taxpayer funded costs of grizzly bear management in the CYE to be significant for this analysis purposes, externalizing a lot of the cost of implementing the logging and other resource extraction directed by the RFP.*

Response: Management of grizzly bear habitat occurs regularly through other district and forest activities that are not funded through "logging or other resource extraction" type activities. This includes, for example, annual monitoring efforts, access management, monitoring and improvement of road restrictions, signage, installation of food storage boxes in campgrounds and other recreation sites, and enforcement of the food storage policy. During a vegetation management project such as OLY, funding for grizzly bear management is often associated with the "logging" because this activity is carrying out many of the project's planned activities for which potential effects to grizzly bear habitat is being accounted for (i.e., minimize effects during project and maintain/improve conditions post-project). However, not all grizzly bear habitat management that is associated with a vegetation management project is funded through the harvest activities. For example, watershed improvement work often occurs through other funding sources such as grants.

***[09, 83] Comment**:*

{A} The DEIS doesn't consider the cumulative effects of forestwide or CYE-wide management activities, which have an effect on population recovery and viability.

{B} "(W)ildlife, vegetation, and other resources benefit from treating the landscape with timber harvest within (grizzly bear) core areas." As stated above, we don't believe that the DEIS presents proper vegetation-related justifications for logging grizzly bear habitat.

{C} "Some units are located entirely within the influence of open roads in BMU 10, such as Alternative 2 Harvest Units 14, 18, 20, 25, 42, 43, 61, 68, 70, and 74 and are expected to have limited grizzly bear use currently." Does the RFP allow any of this acreage to be considered core (beyond the .31 mile road influence, of course)?

{A} Response: The grizzly bear analysis provides a lengthy discussion regarding the identification of the spatial context for grizzly bear analysis with BMU 10 being selected as the appropriate scale of analysis for determining direct, indirect, and cumulative effects for the OLY project (DEIS, page 445-446). The grizzly bear cumulative effects analysis considered all activities listed at the beginning of Chapter 3 (DEIS, starting page 91) for their effects to grizzly bears and grizzly bear habitat within BMU 10. See the grizzly bear cumulative effects analysis (DEIS, pages 497 – 504) and the project file.

{B} Response: This statement was pulled from the discussion regarding an "Alternative Considered but Eliminated from Detailed Study" in Chapter 2 of the DEIS (page 26). This discussion describes the benefits of proposed vegetation management treatments in roaded areas that currently provide grizzly bear Core habitat (i.e., roads are barriered to motorized use). The type of treatment, whether logging or prescribed fire for example, is based on the existing and desired vegetation conditions for the stands; for the particular areas in existing grizzly bear Core identified as needing treatment, harvest is the method that would best achieve the desired results.

The statement as provided by the commenter left out the first part of the sentence. The full sentence reads "Analysis in the effects section of this EIS shows that wildlife, vegetation, and other resources benefit from treating the landscape with timber harvest within these core areas." As such, the benefits of vegetation management treatments to grizzly bears and their habitat, other wildlife species, or other resources was not explained in detail here but rather referenced individual analyses. To clarify, grizzly bears are a generalist species and their habitat is found throughout BMU 10, both within and outside of existing Core areas, and includes a variety of habitat types and conditions suitable for a wide range of other wildlife species. The grizzly bear effects analysis describes how the proposed treatments, including harvest, would trend stands towards desired vegetation conditions and benefit grizzly bears (for example, increased mosaic of forage and cover, including the creation of edge habitats; increased availability and/or productivity of forage species; and the promotion of healthy stands that would continue to provide suitable conditions for grizzly bears). See the effects discussion in the grizzly bear analysis under the heading "Managing Habitat to Contribute to Grizzly Bear Recovery" for more detail (DEIS, pages 473 – 484). Also, see the effects analysis for the other wildlife species and how their habitat would benefit from proposed vegetation management treatments.

{C} Response: As described in the grizzly bear Core effects analysis (DEIS, page 461), unit 43 was one of three proposed units where a sliver of the unit just overlapped the Core boundary based on preliminary mapping of the units. For unit 43, this sliver totals about 0.3 acres (found in the project file) and is considered to be negligible with respect to potential impacts to Core and influencing grizzly bear use of the area.

***[09, 84] Comment**: "FW-GDL-WL-15. Grizzly Bear: Elements contained in the most recent "Interagency Grizzly Bear Guidelines," or a conservation strategy once a grizzly bear population is delisted, would be applied to management activities." The DEIS basically just claims that the project activities will trend toward RFP DCs, therefore these Guidelines are being followed. Not a real analysis.*

Response: See the response to Letter 09, Comment 73B.

***[09, 88] Comment**: "If severe wildfires occur, it is likely that large openings would be created with less vegetative diversity found within the burn boundary." Exaggerated, unless the FS clearcuts the bejeezus out of burned areas as was done following the 1994 fires, the Arbo Fire, and the Fourth of July fire.*

Response: The quoted sentence summarizes the potential effects of the No Action Alternative which discusses a tend toward higher severity stand replacing fires, especially in stands that historically experienced low and/or mixed severity fire regimes, due to an increase in shade-tolerant tree species and fuels loadings. And, "Due to the denser fuel conditions, resulting stand replacing fires in these stands often kill many of the overstory trees which historically survived mixed-severity wildfires" (DEIS, page 455). Proposed harvest and fuels treatments would maintain the overstory structure consisting of these early seral tree species where they occur and trend towards desired conditions.

Wildlife: Grizzly Bear Access Management

***[09, 73] Comment**:*

{A} For the record, AWR does not consider the RFP (including Access Amendment) to be based upon the best available science for insuring a recovered population of grizzly bears in the Cabinet-Yaak Ecosystem (CYE). We fully incorporate our comments and appeals of the Access Amendment within these comments.

{B} The RFP direction itself doesn't result in compliance with MS-1 requirements to favor this functionally endangered species. "(I)t is apparent that land uses which are, or can be made, compatible with grizzly bear recovery do not "compete" even if there is an impact on individual bears. … The determination of compatibility is based on the proposed federal action, not on individual components of such action." (484-485.) This is pretty weak logic.

{C} The allowance of helicopter impacts to core area is one example of the scientific deficiencies of the RFP.

{A} Response: This comment is not specific to the activities being proposed as part of the OLY project, but are related to 2015 Forest Plan direction. The FEIS for the 2015 Forest Plan describes the best science used to develop standard FW-STD-WL as well as discusses how FW-STD-WL-02 is particularly important for minimizing road impacts to grizzly bears by "limiting the availability of motorized routes providing more habitat for bears were the likelihood of human presence is lower. In these areas the chance of disturbance to grizzly bears is lower, as is the risk of mistaken identity or intentional illegal shooting of grizzly bears during the state's black bear

and big game hunting seasons, as well as during the rest of the bear year" (FEIS grizzly bear analysis, page 251). Also, see the Access Amendment's Appendix D which provides the "Analysis of Public Comment on the Draft Supplemental EIS."

{B} Response: This comment is not specific to the activities being proposed as part of the OLY project, but are related to 2015 Forest Plan direction. The grizzly bear analysis in the wildlife specialist's report for the 2015 Forest Plan states that the "Interagency Grizzly Bear Committee (IGBC) developed management guidelines for Federal land management agencies such as the Forest Service and the Bureau of Land Management (BLM) to use when conducting management actions on their lands so that grizzly bears are not jeopardized" (Anderson 2014, page 77). This was incorporated into the 2015 Forest Plan as guideline FW-GDL-WL-15 which states "Elements of the most recent 'Interagency Grizzly Bear Guidelines,' or a conservation strategy once a grizzly bear population is delisted, would be applied to management activities." The specialist's report, as well as the analysis in the FEIS, goes on to describe how components of the 2015 Forest Plan would address the key stressors under Forest Service control (FEIS, beginning page 521) and, therefore, demonstrates compliance.

The missing sentence in the provided statement from the OLY DEIS is that "IGBC Guidelines provide a detailed process for determining compatibility between land uses and grizzly bear recovery which utilizes the consultation process to assist in determining compatibility between proposed land uses and grizzly bear recovery (IGBC Guidelines page 6)." The OLY project has and continues to utilize the consultation process to evaluate the effects of the proposed activities to grizzly bears. Also, the DEIS states that "On NFS lands, the objectives of land management within grizzly bear habitat "are to maintain and enhance habitat and to minimize potential for grizzly-human conflicts." The grizzly bear analysis found within the OLY DEIS, pages 442 – 510, provides an in-depth analysis of how the project is providing for the maintenance and enhancement of habitat as well as minimizing the potential for grizzly-human conflicts by addressing the key stressors and other Forest Plan direction related to grizzly bear habitat management. Therefore, the analysis demonstrates compliance not only with 2015 Forest Plan direction but also with the Interagency Grizzly Bear Guidelines (FW-GDL-WL-15).

{C} Response: See the response to part A above. Also, the document "Guide to Effects Analysis of Helicopter Use in Grizzly Bear Habitat" (USFS and USFWS 2009) was developed to provide consistent management direction relative to aircraft-supported activities in grizzly bear habitat for this geographic area based upon review of relevant literature. The activities and potential effects described in the DEIS are consistent with this guidance (DEIS, pages 491-492).

***[09, 74] Comment**: The acceptance of habitat core "blocks" of inadequate size (Table 125) is another flaw of the RFP.*

Response: See the response to Letter 09, Comment 73.

***[09, 75] Comment**: Another flaw, the RFP allows quick spatial re-arrangement of core without adequate time for bears to adapt to the new habitat before much of the previous core is affected by roads and associated activities.*

Response: See the response to Letter 09, Comment 73.

***[09, 77] Comment**:*

{A} The RFP allows temporary reductions of core security—again this is a population that is functionally on its way to extirpation without continual population augmentation. The RFP allows substantial "administrative use" of otherwise closed roads and considers it negligible.

{B} The DEIS considers acres impacted to be meaningless if it doesn't result in a full percentage of reduction.

{A} Response: See response to Letter 09, Comment 73.

{B} Response: It is unclear if this is a general comment regarding grizzly bear Core analysis or if there is a particular activity to which this comment is referring to. Core standards are based on whole percentages (FW-STD-WL-02). The only reductions in Core that are not being offset through the in-kind replacement of Core elsewhere in the BMU, would be temporary reductions during watershed improvement work which is allowed under the 2015 Forest Plan. The calculation of Core percent is based on the acres contributing to Core habitat divided by the total BMU acres. And, yes, the resulting percentage is displayed and analyzed as a whole number. This calculation and use of Core percent is the same whether looking at the existing, during, or post project conditions. Therefore, when an activity such as the proposed watershed work temporarily reduces a small amount of Core acres it may or may not result in a change to the Core percent and depends on the amount reduced compared to the total BMU acres. No change in the percent simply reflects that the temporary impacts are negligible compared to the amount still available within the BMU. All impacts to Core acres are accounted for in Tables 130 – 133 and Tables 136 – 137 of the DEIS's grizzly bear analysis. Also, the effects of the activity, such as the potential for disturbance and displacement, are discussed in addition to the change in Core acres and resulting percentage (see "Summary of Effects to Core DEIS, page 463). Conversely, although the in-kind replacement of Core would result in an increase of approximately 13 acres of Core post project there would also be no change to Core percent. Again, this is because the increase is negligible compared to the amount of Core habitat already available within the BMU. Therefore, changes to Core acres even if small are not considered meaningless and are fully addressed within the grizzly bear analysis.

***[09, 79] Comment**: DEIS: "For this analysis, "barriered" also includes roads coded as impassable in the INFRA database. Roads that fall into either of these categories are not drivable due to either the physical placement of a barrier (e.g., berm or large rocks) or the in-growth of vegetation that has resulted in a barrier to motorized use." Is this definition identical to that used in the RFP?*

Response: The essential part of the definition for both barriered and impassable roads, as defined in the glossary for the Access Amendment (2015 Forest Plan standard FW-STD-WL-02), is that they "prohibit all motorized use, ATV, UTV and motorcycle use." The difference between the two categories, as described for its use in the DEIS, is simply the mechanism through which the road resulted in a condition that prohibits wheeled motorized use. These roads have the same effect to grizzly bear Core habitat or motorized route densities despite the slight difference in categorization and, therefore, are used in the same way as the 2015 Forest Plan for calculating grizzly bear habitat parameters.

***[09, 80] Comment**: "Passive decommissioning of NFSRs 2394B and 2394J would result in an increase of 10 acres of Core in this Core block and contributes to the in-kind replacement of Core acres for proposed timber harvest and associated road use that would impact Core." How can a landscape feature that is said elsewhere in the DEIS to have no effects be "passively" removed and then be said to increase core?*

Response: Determination of "no effect" will vary by the resource when considering both the current and proposed condition of a road. For example, roads such as these that are located in dry location with no stream crossings do not currently impact or pose a known future risk to the water resource (i.e., no effect). Therefore, the road does not require any treatment to maintain this hydrologically neutral condition. However, because roads influence considerations for wildlife such as human access, road densities, and security habitat, the removal of the road through passive decommissioning would improve conditions for a species such as grizzly bears (i.e., beneficial effect).

***[09, 81] Comment**: "Because the new segment of road is both similar in length and found within the same "footprint" of the original piece of road, this new construction would not impact TMRD." The DEIS is confusing effects on core habitat with effects on road density.*

Response: This statement is found within the TMRD discussion of the grizzly bear analysis (DEIS, page 469) and is referencing a new segment of road that would be constructed to bypass a small wetland. Depending on the length and spatial arrangement of the new road with other roads in the area as compared to the existing road, new road construction could influence both TMRD and grizzly bear Core habitat. Therefore, this action is also discussed with respect to the potential effects to grizzly bear Core habitat on page 460 of the DEIS. The grizzly bear analysis does not confuse the effects on grizzly bear habitat with the effects on road density, as the potential effects of the proposed road reroute is discussed in relation to both grizzly bear habitat parameters.

***[09, 87] Comment**: "To compensate for the loss of grizzly bear Core habitat …Stimson would provide for the in-kind replacement of Core by placing barriers on its roads #4407A, #4407C, portion of #4407E, #9905, #9909, and #9909B." Does the FS conduct monitoring of Stimson barriers to insure the barriers meet and maintain Access Management requirements?*

Response: The terms of the permit for this proposed activity would require that the barriers on these roads be effective at prohibiting all wheeled motorized use for a minimum of 10 years. An Access Agreement between the US Forest Service and Stimson Lumber Company would document the agreements made related to this proposed activity, including the requirement to install and maintain effective barriers. Also, the barriered roads would be located behind existing gates off of open and well used county roads which reduces the potential for the both the gate and the barriers to be breached. One of the gates accesses Yaak Mountain Lookout and is regularly monitored. The other road goes through private property and a series of gates and fences (see project file) which further reduces the potential for public motorized access to reach and breach the barrier.

Wildlife: Grizzly Bear and Over-Snow Use

***[09, 82] Comment**: The DEIS doesn't analyze or disclose the spatial or other extent of snowmobile use in the project area.*

Response: The DEIS's grizzly bear analysis discusses both existing snowmobile use (or "motorized over-snow vehicle") and effects to motorized over-snow vehicle use from proposed activities on pages 451 and 472 – 473, respectively.

Wildlife: Grizzly Bear Core

***[09, 86] Comment**:*

{A} "Core areas strive to contain the full range of seasonal habitats that are available in the BMU." The DEIS doesn't show how this is happening.

{B} The DEIS also justifies the logging because it might increase huckleberry production, but it fails to show that's much of a need, compared to other factors.

{A} Response: The existing, during, and post-project Core habitat is 54 percent which is better than the 52 percent standard (see DEIS, Tables 124 and 126 – 129), which means that Core habitat occurs on over half of the total acres within BMU 10. The availability of seasonal (and important habitats) are described in the "Existing Condition" and "Direct and Indirect Effects" sections of the grizzly bear analysis. These references include, for example:

• Pg. 451: "The largest Core block, comprised of approximately 45,485 acres, spans the entire length of the BMU from north to south in one contiguous block. This Core block includes lower elevation habitats associated with major drainages along the northern and southern borders and a high elevation ridgeline is the "backbone" of the area."

• Pg. 453: "Huckleberries (Vaccinium spp.) are an important food source for grizzly bears in this ecosystem (USFWS 1993). Huckleberries are found in scattered patches throughout much of the project area. Although predicted to occur across mid-elevation slopes, huckleberries have also been observed at both higher and lower elevation habitats (see project file notes)."

• Pg. 453: "Also, riparian habitats themselves are generally considered to be valuable feeding sites. Five main tributaries flow into the Kootenai River within the project area and include Arbo, Kilbrennan, O'Brien, Koot, and China Creeks. In addition, Hummingbird, Rabbit, and Lynx Creeks are large drainages within the project area that flow into O'Brien Creek before reaching the Kootenai River. Numerous smaller tributaries flow into these main streams, especially the large O'Brien Creek drainage." See DEIS map M-19 for the location of these streams and riparian areas with respect to Core habitat.

• Pg. 453: "Grizzly bears seek out sites that green up early in the spring and use by grizzly bears in the Yaak occurs below approximately 4,600 feet (1,400 meters, Kasworm et al. 2014). Most of the main drainages, including areas along the Yaak and Kootenai Rivers, are found below 4,600 feet and would provide spring foraging opportunities for grizzly bears within the project area."

• Pg. 453: Denning habitat generally occurs at higher elevations with a mean elevation of about 5,571 feet in the Yaak (1,698 meters, Kasworm et al. 2014). These higher elevation areas that support potential denning habitat are centered along the prominent ridgeline and peaks that run north to south in BMU 10 with side ridges extending to the east and west. Denning habitat is generally found within the two largest Core blocks in the BMU (see project file).

• Analysis maps displaying spring and denning habitats in relation to Core habitat can be found in the project file.

• Pg. 481: Predicted huckleberry occurrence within the OLY project area is found within the mid to high elevation areas and generally associated with Core habitat.

{B} Response: Actually, the grizzly bear analysis acknowledges that the potential for huckleberry production is limited due to the locations where they are predicted and/or observed to occur. As a result, "proposed treatments were not focused on the development and production of huckleberries as forage for grizzly bears" (DEIS, page 481). The introduction of the grizzly bear analysis (DEIS, page 442) describes the species as a generalist species that uses a variety of habitat types and seral conditions and that habitat use "is generally dictated by food availability and distribution, as well as security from human disturbance and human-caused mortality." The introduction of the "Managing Habitat to Contribute to Grizzly Bear Recovery" section summarizes the benefits of proposed vegetation management treatments to grizzly bear habitat (DEIS, page 473) with more detailed discussion found under subsequent sub-headings. Proposed harvest is one tool used to achieve the desired vegetation conditions; the treatment tool used depends on the existing and desired vegetation conditions of the stands.

Wildlife: Grizzly Bear Denning and Spring Emergence

> ***[05, 01] Comment**: By exchanging core, we lost 30 days of our access to the Pulpit area. What can be done to allow our continued use in this area? Options should include switching the core back once the logging in the project area is complete. Recognizing, that according to the information on page 472 no definitive date is stated for the "early part of the spring emergence" I would gather that it is also possible that after April 15 we could reenter this area road because the bears will have already left for better habitat, since there is no definitive date. On page 465, the core area temporarily impacted by activities are small and affect at most 1% of core. Our presence should also only affect that same amount of core and thus not have an adverse effect. I believe the core threshold is > 52% and BMU 10 has core at 54% so with a 1% loss for management activities, and our 1% use we would still be atthe 52% threshold.*

Response: The implementation of a forest order that would prohibit motorized over-snow use of this road after March 31 (DEIS, page 472) is not a requirement when proposing in-kind replacement of Core to allow for routine forest management in an area of existing Core. However, additional management activities are required to place the NFSR 4433 road system into a hydrologically stable condition. Also, the planned storage work includes specific design features to allow for continued snowmobile access as requested through public involvement. See "Special Provisions for Public Access on Decommissioned and Stored Roadways" in the design features in Chapter 2 (DEIS, page 78). Therefore, because we are proposing management activities on this road system and because the planned activity would also provide for continued snowmobile

access, the forest order to prohibit use after April 1 was identified to address 2015 Forest Plan direction (FW-GDL-WL-01). This guideline states that “Management activities should avoid or minimize disturbance in areas of predicted denning habitat during spring emergence (April 1 through May 1).” Note that the period of spring emergence includes the entire month of April, after which these roads are not legally open to snowmobile or other over-snow vehicle use. See page 507 under the “Regulatory Framework Findings” section for this guideline and project consistency with this guideline. Through implementation of the design features for this activity, continued snowmobile use of the area has been allowed although for a slightly shorter period of time.

Per design elements of FW-STD-WL-02, once an area has been effectively placed into Core it must remain in Core for a minimum of 10 years. Therefore, switching Core back once logging has been completed is not an option at this time. Also, doing so could negatively impact potential continued and/or future management of the proposed treatment areas especially Kilbrennan Ridge.

The temporary reduction in Core percent is associated with proposed watershed improvement work. Although this activity is allowed to occur within Core habitat and result in a temporary reduction in Core, it is recognized that this activity may result in short-term adverse effects to grizzly bears (DEIS, page 442 and 510). Also, consideration of snowmobile use in this area is not strictly considering the potential effects to Core, but because “Over-snow motorized use after bears have emerged from their dens in the spring (after April 1) has the potential to disturb bears if the activity is located near a den” (DEIS, page 451). Most of the proposed road storage work on the NFSR 4433 system, and associated snowmobile access to Pulpit Mountain, are within predicted grizzly bear denning habitat as well as the Pulpit Mountain area in general. Therefore, “To reduce potential disturbance effects to grizzly bears during this period, especially sows with cubs of the year, a forest order would prohibit motorized over-snow use of this road after March 31 to be consistent with the 2015 Forest Plan guideline FW-GDL-WL-01 (see Design Features, Chapter 2)” (DEIS, page 472).

The Biological Opinion for the 2015 Forest Plan anticipates that "incidental take may occur where late season snowmobiling overlaps with grizzly bear post-denning habitat. The incidental take is expected to be in the form of harassment to individual female grizzly bears and/or cubs caused by premature den emergence or premature displacement from the den site area, resulting in reduced fitness of females and cubs" (USFWS 2013b, page II-102). The Biological Opinion recognizes that 2015 Forest Plan direction (i.e., FW-STD-WL-05 and FW-GDL-WL-01) would restrict snowmobile and management activities in denning habitat during the spring emergence period until a winter travel plan is completed. Completion of a winter travel plan within five years of implementation of the 2015 Forest Plan is a Term and Condition from the Biological Opinion (USFWS 2013b, page II-105); its completion would result in "less temporal and spatial overlap of grizzly bears and snowmobiles . . . due to the decrease in acres where winter motorized use is allowed" (ibid, page II-59). Therefore, the identification of this forest order is not simply a part of OLY project planning and design, but rather it is a part of the bigger picture for grizzly bear management that not only addresses direction from the 2015 Forest Plan but also makes progress towards achieving direction from the Biological Opinion for the 2015 Forest Plan.

A temporary reduction in Core percent is only allowed for road decommissioning or stabilization activities. Also, there can be no permanent reduction in Core, as consulted on with U.S. Fish and Wildlife Service, until all BMUs within the recovery zone have achieved all habitat parameter standards.

Wildlife: Habitat Management and Species Viability

***[09, 44] Comment**: "(V)egetation management treatments designed to trend vegetation towards the desired conditions defined within the 2015 Forest Plan, such as those proposed by the Lower Yaak, Sheep, O'Brien (OLY) project, would provide a diversity of habitat conditions for the numerous wildlife species that inhabit the Forest." There it is—lock stock and barrel—the entire premise of FS management for wildlife on the KNF. It is based on a scientifically unproven assumption that managing "towards DCs" will result in abundant, well-distributed wildlife. There is no peer-reviewed science that validates such a claim, especially in the context of so many other factors on the KNF being outside the HRV, which the FS prefers to ignore.*

Response: This comment is not specific to the activities being proposed as part of the OLY project, but are related to 2015 Forest Plan direction. The wildlife analysis and response to comments in the 2015 Forest Plan FEIS describe why managing towards the desired conditions for vegetation/fire is the foundation for the sustainability of ecosystems on the Kootenai National Forest, which includes providing for species viability. As described in the response to comments, "it is natural disturbance processes that are expected to play the dominant role in determining the amount of habitat, types, and pattern into the future" which then "play the dominant role in determining species viability" (FEIS Appendix G, page 532). This "coarse filter" approach, therefore, "is based on the concept that the species native to the KNF evolved here with those natural disturbance processes and the amount, types, and pattern of habitat that exist under those processes" (ibid). Please refer to the ERG report (ERG 2012) and the 2015 Forest Plan wildlife analysis (FEIS, page 205) for a more in depth discussion of the role that natural disturbance processes play in providing wildlife habitat. Also, see the wildlife analysis for a more in depth discussion regarding use of the coarse filter approach to providing for species viability (FEIS, pages 207 – 208).

***[09, 46] Comment**: The complete lack of consideration of RFP wildlife population monitoring requirements in the DEIS for any but ESA species is a testament to the FS's failure to insure population viability of wildlife species of concern, such as Sensitive species.*

Response: There are no 2015 Forest Plan wildlife population monitoring requirements to be addressed within the OLY DEIS. For wildlife species analyzed at the project level that are not federally listed, required monitoring (MON-WDL-01) addresses how management activities are meeting Plan objectives and maintaining or improving habitat to achieved desired terrestrial habitat conditions (2015 Forest Plan Monitoring Guides, page 6). Also, see the response to Letter 09, Comments 47 and 54 for how the 2015 Forest Plan direction addresses species viability.

***[09, 47] Comment**: The Ninth Circuit Court of Appeals ruled that the Forest Service "must both describe the quantity and quality of habitat that is necessary to sustain the viability of the species in question and explain its methodology for measuring this habitat." (Lands Council v. McNair). Assuring viability of most wildlife species is forestwide issue. The RFP is not based upon scientific research regarding the forestwide amount and distribution of*

habitat needed to insure viability of wildlife species of concern. Furthermore, the FS maintains an inaccurate old-growth inventory. What is the FS's way of "describ(ing) the quantity and quality of habitat that is necessary to sustain the viability of the species in question" on the KNF? Also, please "explain (the) methodology for measuring this habitat." The DEIS fails to consider the extensive science that argues that the strategy of "moving towards" DCs for restoring wildlife habitat and populations is scientifically deficient. The Committee of Scientists, 1999 recommended management emphasis contrasts with the CNF's current management strategy merely emphasizing manipulation of habitat for insuring wildlife viability: …An emphasis on focal species, including their functional importance or their role in the conservation of other species, combines aspects of single-species and ecosystem management. It also leads to considering species directly, in recognition that focusing only on composition, structure, and processes may miss some components of biological diversity. (Committee of Scientists, 1999 emphasis added.) What is the FS doing to adopt the focal species approach? As discussed above, the KNF has failed to monitor populations of wildlife, in favor of striving towards DCs for habitat (actually, vegetation) in project planning. The Committee of Scientists (1999) state: Habitat alone cannot be used to predict wildlife populations…The presence of suitable habitat does not ensure that any particular species will be present or will reproduce. Therefore, populations of species must also be assessed and continually monitored. (Emphasis added.) One project claim to virtue is that large tree habitats would develop more rapidly in harvested stands than if they were left unmanaged. But again, this is merely hypothetical given that no monitoring has validated such an approach as actually providing the benefits to populations of wildlife species of concern. The Committee of Scientists (1999) report also stress the importance of monitoring as a necessary step for the Forest Service's overarching mission of sustainability: "Monitoring is the means to continue to update the baseline information and to determine the degree of success in achieving ecological sustainability." (Emphasis added.) The Committee of Scientists (1999) provide still more emphases on the importance of monitoring: The proposal is that the Forest Service monitor those species whose status allows inference to the status of other species, are indicative of the soundness of key ecological processes, or provide insights to the integrity of the overall ecosystem. This procedure is a necessary shortcut because monitoring and managing for all aspects of biodiversity is impossible. No single species is adequate to assess compliance to biological sustainability at the scale of the national forests. Thus, several species will need to be monitored. The goal is to select a small number of focal species whose individual status and trends will collectively allow an assessment of ecological integrity. That is, the individual species are chosen to provide complementary information and to be responsive to specific conservation issues. Thus, the Committee proposed for consideration a broad list of species categories reflecting the diversity of ecosystems and management issues within the NFS. The DEIS does not address this scientific opinion that disagrees with RFP assumptions about wildlife habitat management.

Response: As discussed in the question, species viability is determined at the Forest scale, and not the project scale. Forest Plan monitoring will transition to monitoring using focal species under the 2012 Planning Rule during fiscal year 2016. Forest plan monitoring, and the science supporting it, are beyond the scope of this project.

This comment is not specific to the activities being proposed as part of the OLY project, but are related to 2015 Forest Plan direction. We also note that your comment refers to the "CNF's current management strategy." We assume that your intent is to present the same concerns regarding the Kootenai National Forest, or KNF.

The FEIS for the 2015 Forest Plan responded to be the same series of comments (FEIS Appendix G, pages 532 – 533) and addresses how the 2015 Forest Plan direction addresses species viability. The following are points that summarize the response in the 2015 Forest Plan FEIS (please see the FEIS for the full response):

• Pages 532-533 says, "The KNF not only is taking a 'coarse filter' or ecosystem approach to management, but also a 'fine filter' approach to maintain viability. The fine filter approach includes providing direction in the revised Forest Plan for specific habitat components or to address the potential for certain effects to specific species or groups of species. This approach is apparent in many of the desired conditions, objectives, standards, and guidelines in the revised Forest Plan."

• Page 533: The FEIS's response points out that the Committee of Scientists (1999) report discusses the coarse filter approach and its applicability to species management (page 35 of the report). Their discussion is summed up by the following statement: "To the degree that future management scenarios can achieve these [reference] conditions, the more likely it is that the 'coarse filter' will achieve the objectives for ecological sustainability and the less likely that 'fine-filter' strategies will be needed for individual species."

• Page 533: Regarding the suggested need for species population monitoring, the FEIS points out that the commenter does not quote the entire passage from the Committee of Scientist's (1999) report. Based on the full context of this paragraph, the FEIS concludes "that the point of this paragraph appears to be that a 'fine filter' approach may be needed to supplement the 'coarse filter' approach to viability and sustainability" which the 2015 Forest Plan incorporates. Also, the Committee of Scientists recognize that it is unrealistic to monitor all species' populations due to limited time and funds.

The 2012 planning rule adopts a focal species approach for monitoring ecological integrity. The Kootenai National Forest is in the process of transitioning to the 2012 planning rule monitoring requirements.

Wildlife: Management Indicator Species (MIS)

***[09, 58] Comment**: The DEIS does not disclose the results of surveys for Forest Plan management indicator species in the project area. The KNF Northeast Yaak Draft Supplemental EIS (USDA Forest Service 2006c) the forestwide situation for the northern goshawk: Using the modeled nesting habitat acres from Johnson (ibid), the minimum PPI for the Forest would be 139 goshawk pair. The most recent data show 34 known or suspected pairs and an additional 10 known individual goshawks on the Forest (Kootenai NF records). The implications of having a potential population index (PPI) of 139 pair of goshawks on the Forest, with only 34 known or suspected pairs and an additional 10 known individual goshawks are quite serious for forestwide population viability. Liberally including even each "suspected" pair as part of the existing population, the total 34 pairs is only about 25% of the PPI. This is well below the 40% level the 1987 Forest Plan insisted proves population viability on the KNF. The available evidence indicates that the low number of goshawks in the project area and forestwide do not constitute minimum numbers and distribution indicative of a viable population on the KNF. Yet, the OLY DEIS failed to disclose or incorporate this information.*

Response: The northern goshawk is not a management indicator species for the 2015 Forest Plan. As described in the response to comments to the Forest Plan (FEIS Appendix G, page 525), "The KNF selected MIS species that provided a means to measure the difference between the Forest Plan alternatives, could be tied to forestwide objectives, and were species whose habitat was likely to be influenced by the management activities on the Forest done to move towards the desired conditions for vegetation in the revised Forest Plan. The KNF has opted for a landbird assemblage and elk as MIS after considering where, and what kind of, management activities are likely to occur under the revised Forest Plan." Also, "The MIS were not selected because of a viability concern but were instead selected because they provided a measurement tool as described above" (FEIS Appendix G, page 528).

The ERG report (ERG 2012) analyzed existing northern goshawk habitat and compared availability to the historic range of variation. They not only considered the total habitat available, but also the distribution of habitat and how conditions are expected to change over the next five decades. They concluded that the impacts to habitat availability is a result of natural disturbance processes and the existing habitat does not suggest "any significant risk to northern goshawks from a viability standpoint" (page 97). Also, the goshawks' territorial nature, which includes defending large territories, likely limits population density more than habitat availability (page 97). Finally, it should be noted that 2015 Forest Plan direction to protect raptor nests, including northern goshawks, discovered during project planning or implementation is guided by FW-GDL-WL-16.

***[09, 65] Comment**: By dumping its old-growth MIS during development of the RFP, the FS ignores the scientific information linking old growth to the pileated woodpecker.*

Response: This comment is not specific to the activities being proposed as part of the OLY project, but are related to 2015 Forest Plan development. The FEIS for the 2015 Forest Plan responded to comments regarding the desire to select additional species to serve as MIS for a variety of other habitats, including pileated for old growth habitat. The response states "the KNF does not have a species that is an obligate of old growth habitat or relies solely on old growth habitat. Pileated woodpeckers and northern goshawks are not good candidates because they are not solely dependent on old growth for their habitat needs" (FEIS Appendix G, page 525.)

Wildlife: Migratory Birds

***[09, 53] Comment**: The DEIS does not present analysis adequate for demonstrating that impacts on migratory birds will be avoided or minimized.*

Response: In the migratory bird analysis, the effects of vegetation management that would influence migratory bird use was discussed in depth (DEIS pages 758-765), as well as discussion regarding the potential for temporary disturbance and displacement which would be to individuals rather than to populations (DEIS page 765). Also, discussions of how potential impacts were minimized or avoided is provided within individual analyses for birds classified as sensitive species for the Forest. See analyses for American peregrine falcon (Specialist's Report), bald eagle (DEIS page 555), black-backed woodpecker (DEIS page 574), common loon (DEIS page

607), flammulated owl (DEIS page 643), and harlequin duck (Specialist's Report). The Specialist's Report is available in the project file.

Wildlife: Movement Corridors

***[08, 09] Comment**: It would also be helpful for the district/forest to create/supply maps of various wildlife corridor/movement for these large-scale projects. The implication otherwise seems to be that everything will be just fine, or, worse—and I don't believe this—that it doesn't matter. Regardless, it seems a glaring absence to not provide such documentation.*

Response: See the response to Letter 10, Comment 07.

***[08, 10] Comment**: (Along these lines, the area around Alvord Lake is vital wildlife habitat, not just residential but, just as importantly, corridor/migration habitat: black bear as well as grizzly bears, elk, moose). Retaining overstory and forest integrity in this area is extraordinarily vital—it's a unique bench/wetland, already compromised by roadbuilding in the past. This should be treated as a wildlife enhancement/recovery corridor zone, not a resumption to industrial output/extraction zone. Given its proximity to the Troy community and the development of an outdoor education center there, it's a fine candidate for a more deliberate type of forestry. But then, and all the more so, given the Kootenai's past, so too is pretty much all the rest of the forest.*

Response: For all three action alternatives, only two activities are proposed near Alvord Lake: recreational improvements associated with the existing trail and outdoor Classroom (DEIS Chapter 2, page 63) and fuels unit F-15 (DEIS Chapter 2, page 45 within Table 6). Unit F-15 is a small roadside treatment that would reduce the existing fuel loading along a road that accesses private property. No harvest is proposed around Alvord Lake and there would be no removal of the existing forest overstory or impact to forest integrity for wildlife use.

***[10, 07] Comment**: Sixth, KFSC has repeatedly asked the district to engage in a mapping exercise to identify wildlife linkage and movement areas and to show landscape scale connectivity considerations for wildlife. After much discussion on this issue, the district said they are not willing to make a connectivity map. We hope that moving forward the district will reconsider their position on this issue. We did notice, however, a lengthy discussion of connectivity in the wildlife analysis in the DEIS and it is apparent that the specialist considered new and best--available science and gave careful consideration to wildlife movement and linkage. This report is a step in the right direction toward our goal of showing how wildlife was considered at the landscape--level and identifying wildlife movement areas in the project file. One example of this consideration is on page 476--477 of the DEIS: "a corridor of untreated timber would be left between Harvest Units 33 and 34 in a low area mapped as having a stream. Although no active stream is found here, this low area may have been more likely to survive a low to moderate intensity fire and would provide edge habitat (i.e., area of adjacent cover and forage) between the two regeneration harvest units for wildlife moving through this potential linkage area." And again on page 477 of the DEIS: "regeneration harvest units of variable shape and size, ranging from approximately 15 to 51*

acres…are separated by untreated stands generally associated with streams and riparian habitat. The proposed treatments would result in vegetative diversity in the area, including the creation of edge habitat that provides cover in the untreated stands adjacent to forage opportunities in the treated units. This would facilitate movement from secure, non--motorized areas to the east to the timbered stands along the Yaak River to the west…" This kind of consideration goes a long way toward gaining the full support of our group, and in the future, we hope to see more concrete examples of how the district plans for wildlife movement as related to harvest areas in the project area.

Response: District personnel meet with representatives of the Kootenai Forest Stakeholders Coalition on February 20, 2015 to discuss, among other topics, the request for a wildlife linkage map. During this discussion, the district provided an overview of how the 2015 Forest Plan addresses movement corridors and linkage through desired conditions associated with Geographic Area, Management Area, and Forestwide direction. This includes landscape direction for providing movement between areas such as the Cabinet Mountains and the Yaak and more site or habitat specific direction such as the maintenance and enhancement of riparian and old growth habitats. The district went on to explain why the creation of a single "wildlife" map is not appropriate to evaluate wildlife movement areas within the project area. The following reasoning was presented during the meeting:

- All stands cannot be managed for all wildlife species: environmental conditions influence what type of habitat the stand could provide and each wildlife species, or possibly groups of species, have different habitat requirements. For example, actions that would provide suitable habitat and movement for flammulated owls would not support use by fishers and vice versa.
- Management and "corridors" need to be fluid to be able to adapt to natural events and would be a dynamic process based on both our management and natural processes. We cannot plan for long-term or permanent corridors and expect them to still be there or continue to be functional even in a few years. A large, high severity fire or an insect and disease outbreak could drastically change how wildlife uses the landscape.
- There are many acres within a planning area that would experience limited to no treatments due to things such as inaccessibility, nature of the area (e.g., non-timbered or steep and rocky), or management direction for that habitat type or identified management allocation (e.g., old growth and riparian habitats or wilderness, backcountry, botanical, and inventoried roadless areas) that contribute to wildlife movement. Use of these areas would largely be influenced by natural disturbance processes.
- A variety of maps were presented to provide a few examples of what resource specialist's consider when evaluating forest conditions and species habitat such as movement areas. These maps included individual maps for grizzly bear Core areas, the lynx analysis unit, and elk security areas as well as a single "vegetation" map that displayed satellite imagery, stream corridors, old growth, fire history, and past harvest treatments. For this second map, which was limited to existing vegetation related conditions, all of the imagery, lines, coded polygons, etc. can quickly make the map difficult to interpret and is subject to change.
- In summary, a single map is too exclusionary and too static of a representation of how a diverse group of wildlife species could use the project area. A single map cannot reconcile the differences for species like flammulated owl and fisher that are on opposite

ends of the spectrum when it comes to habitat use, or reflect how natural disturbance processes would influence or change an attempted mapping effort.

The FEIS for the 2015 Forest Plan also responded to a request to create a forestwide connectivity map for lynx and other species. It states that "fine-scale connectivity maps represent only snapshots in time and are inconsistent with the dynamic natural disturbance processes on the KNF" (FEIS Appendix G, page 514). This response reiterates that connectivity is species specific and a map for one would contradict the map for another species that has different habitat requirements. By treating for "desired conditions for vegetation and fire, then wildlife would experience habitat amounts, pattern, and connectivity similar to those found under the natural disturbance process they evolved with here on the Forest" (ibid).

We acknowledge and appreciate your recognition of the efforts made to address connectivity within the wildlife analyses.

Wildlife: Sensitive Species

***[09, 49] Comment**: As with most of the Sensitive wildlife, fishers receive no habitat protection emphasis in the RFP at all—just log it into DC!*

Response: This comment is not specific to the activities being proposed as part of the OLY project, but are related to 2015 Forest Plan direction. The 2015 Forest Plan considered both a coarse filter and fine filter approach to habitat management for wildlife (FEIS, pages 207 – 208). The coarse filter approach considers the current abundance and conditions of various habitats with ecological reference conditions as well as how ecological processes influence those conditions. By managing for desired vegetation conditions, the coarse filter approach would provide the type and amount of habitat suitable for most wildlife species. For certain species, as necessary, the fine filter approach captures specific habitat requirements or special management considerations that are not captured through the coarse filter approach. The wildlife analysis for the 2015 Forest Plan cites all the plan components that support fisher (FEIS, beginning page 285).

Fisher, as an example, is a species for which the fine filter approach was not necessary (i.e., no specific management direction was identified) as the coarse filter approach manages for the structural elements important for providing suitable habitat. This includes, but is not limited, to direction for old growth (FW-DC-VEG-03 and FW-DC-WL-11), larges trees and snags (FW-DC-VEG-02, FW-DC-VEG-07, FW-DC-VEG-11, FW-STD-VEG-01, FW-GDL-VEG-01, FW-GDL-VEG-02, FW-GDL-VEG-04, FW-GDL-VEG-05, FW-GDL-VEG-06, and FW-DC-WL-12), and down wood (FW-DC-VEG-08, FW-GDL-VEG-03, and FW-DC-WL-13). See the OLY DEIS fisher analysis for habitat management and consistency with 2015 Forest Plan direction.

The fine filter approach was identified and provided through 2015 Forest Plan direction for a variety of wildlife species, including other sensitive species. See the 2015 Forest Plan Forestwide direction for wildlife as well as the OLY DEIS sensitive species analyses for species specific direction.

***[09, 50] Comment**: The analysis for fishers, as for most wildlife, doesn't disclose the direct, indirect or cumulative impacts on important habitat components, such as snags, logs,*

foraging habitat configuration, connectivity, cover, prey species impacts, etc. Claims of improvement of habitat via big tree "promotion" and open-forest creation don't consider individual species habitat needs.

Response: Each species analysis addresses appropriate 2015 Forest Plan direction, including direction associated with desired conditions for vegetation (i.e., coarse filter approach) as well as species specific direction (i.e., fine filter approach). See Letter 09, Comment 49 and the wildlife analysis for the 2015 Forest Plan (FEIS, page 208) for a discussion of these two approaches. The fisher analysis includes an effects discussion relative to "Forest Structure" (i.e., trees and snags, down wood, old growth habitat, and riparian habitat (DEIS, pages 633 - 635) and "Landscape Characteristics and Fisher Use" (DEIS, pages 636 – 636) as well as a cumulative effects discussion relative to these conditions (DEIS, pages 638 – 639). See the other species analyses for similar effects discussion as appropriate to the species.

***[09, 51] Comment**: The analyses for Sensitive species also fail to analyze and consider the implications of motorized access on the species' populations.*

Response: The effects of motorized access and other human access (as influenced by motorized access) are addressed for several species, including bald eagle, bighorn sheep, common loon, gray wolf, peregrine falcon, and wolverine. The analyses of effects discusses how motorized and other human access can influence a species population through, for example, a potential for an increased risk of mortality or an increase in disturbance that results in reduced reproductive success. Please see the OLY DEIS wildlife analyses for these sensitive species. The peregrine falcon analysis is documented in the wildlife specialist's report found in the project file.

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Appendix A: Glossary and Acronyms

Glossary

A

ACTIVITY AREA: Area within the project area where activities are proposed.

ACTIVITY FUELS: See Slash

AFFECTED ENVIRONMENT: The natural, physical, and human-related environment that is sensitive to changes due to proposed actions.

AGE CLASSES: A distinct group of trees, or portion of growing stock recognized on the basis of age (i.e., seedling, pole, mature.)

AGGRADATION: When more sediment enters a reach than leaves it, there is a buildup of sediment. This is called aggradation.

AIR QUALITY: Refers to standards for various classes of land as designated by the Clean Air Act, P.L. 88-206: Jan. 1978

AIRSHED: A geographical area that, because of topography, meteorology, and climate, shares the same air.

ALLOWABLE SALE QUANTITY (ASQ): The quantity of timber that may be sold from the area of suitable land covered by the Forest Plan for a time period specified by the Plan. This quantity is usually expressed on an annual basis as “the average annual allowable sale quantity.”

ALTERNATIVE: A mix of management prescriptions applied to specific land areas to achieve a set of goals and objectives. Each alternative represents a different way of achieving a set of similar management objectives. Sometimes the term "action alternative" is used when it is desirable to recognize that there is a "no action" alternative under which the proposed activity would not take place.

ANALYSIS AREA: The geographic area defining the scope of analysis for a particular resource. This area may be larger than the project area when effects have potential to extend beyond the boundaries of the proposed action.

APPEAL: A request by any party dissatisfied with a decision of a forest officer to have that decision reviewed at a higher organizational level within the Forest Service and, where appropriate, by the Secretary.

B

BANKFULL: The level water reaches in the stream that is at or near the lowest terrace.

BEAR ANALYSIS AREA (BAA): Management subunits of a BMU approximately 5,000 to 15,000 acres in size.

BEAR MANAGEMENT UNIT (BMU): A geographic subdivision of grizzly bear habitat, which approximates the home range size of a reproductive, female grizzly bear (about 100 square miles in the Cabinet-Yaak ecosystem).

BEST MANAGEMENT PRACTICES: A set of practices in the Forest Plan which, when applied during implementation of a project, ensures that water related beneficial uses are protected and that State water quality standards are met.

BIG GAME: Those species of large mammals normally managed as a sport hunting resource.

BIOLOGICAL ASSESSMENT: Information (document) prepared by or under the direction of the Federal agency concerning listed and proposed threatened and endangered species and proposed critical habitat that may be present in the action area and the evaluation of potential effects of the action on such species and habitats.

BIOLOGICAL EVALUATION: A documented Forest Service review of programs or activities in sufficient detail to determine how an action or proposed action may affect any sensitive species.

BLIND DRAIN: A drainage structure installed in the subgrade of a road which intercepts, collects, and redirects subsurface water.

BLOWDOWN: See windthrow.

BOARD FOOT (BF): A unit of measurement equal to an unfinished board one foot square by one inch thick. Timber volumes are often expressed in terms of thousands of board feet (mbf).

BOGS: Perennially saturated areas that usually have wetland and riparian plants surrounding them.

BOLE: The trunk or main stem of the above ground part of a tree.

BROADCAST BURN: See prescribed burning.

C

CANOPY: The more or less continuous cover of branches and foliage formed collectively by the crowns of adjacent trees and other woody growth. Layers of canopy may be called stories.

CANOPY CLOSURE: The progressive reduction of space between tree crowns as they spread laterally; a measure of the percent of potential open space occupied by the collective tree crowns in a stand.

CAVE: A natural underground chamber that is open to the surface.

CAVITY: The hollow, excavated in snags by birds; used for roosting and reproduction by many birds and mammals.

CAVITY HABITAT: Snags, broken-topped live trees and down logs used by wildlife species that excavate and/or occupy cavities in these trees.

CAVITY NESTERS: Wildlife species that nest in cavities.

CLEARCUT HARVEST: A regeneration method under which the entire mature stand is cut. Some snags and potential snags may be left to benefit snag-dependent wildlife species.

CLEARCUT WITH RESERVES: A variation of the clearcutting method where reserve trees are left for all or part of a stand rotation and serve a specific function that is consistent with management objectives.

CLOSED CANOPY: The condition that exists when the canopy created by trees or shrubs or both is dense enough to exclude most of the direct sunlight from the forest floor.

CODE OF FEDERAL REGULATIONS (CFR): The official, legal tabulation or regulations directing Federal Government activities.

COLLABORATION OR COLLABORATIVE PROCESS: A structured manner in which a collection of people with diverse interests share knowledge, ideas, and resources while working together in an inclusive and cooperative manner toward a common purpose.

COMMUNITY: A group of one or more populations of plants and animals in a common spatial arrangement; an ecological term used in a broad sense to include groups of various sizes and degrees of integration.

COMPARTMENTS: A geographic area delineated by a watershed drainage for management planning purposes.

CONIFER: Any of a group of needle and cone bearing evergreen trees.

CONNECTORS. Strips or patches of vegetation used by wildlife to move between habitats.

CORE AREA: An area of secure habitat within a BMU that contains no motorized travel routes or high use non-motorized trails during the non-denning season and is more than 0.3 miles (500 meters) from a drivable road. Core areas do not include any gated roads but may contain roads that are impassible due to vegetation or constructed barriers. Core areas strive to contain the full range of seasonal habitats that are available in the BMU.

CORE SAMPLE: Stream bed material removed from the stream for analysis.

CORRIDORS: Areas of vegetation (may be linear or patch-like) available to wildlife to facilitate movement between habitats. Corridors may vary in size by species need. For big-game, forested areas of at least 600 feet in width is generally acceptable.

COVER: Vegetation used by wildlife for protection from predators, breeding and rearing of young (hiding cover), or to ameliorate conditions of weather (thermal cover).

COVER/FORAGE RATIO: The ratio, in percent, of the amount of area in cover conditions to that in forage conditions.

COVER TYPE: See forest cover type

CROWN FIRE: A fire burning into the crowns of the vegetation, generally associated with an intense understory fire.

CULTURAL RESOURCES: The physical remains of human activity (artifacts, ruins, burial mounds, petroglyphs, etc.) having scientific, prehistoric, or social values.

CUMULATIVE EFFECT: The impact on the environment which results from the incremental impact of the action when added to other actions. Cumulative impacts can also result from individually minor but collectively significant actions taking place over a period of time

CWD: Course woody debris is defined as material greater than 3 inches in diameter at the small end.

D

DEADFALL: Previously dead trees that have fallen.

DEBRIS: The scattered remains of some things broken or destroyed; ruins; rubble; fragments.

DECADENT: Deteriorating; when used in reference to stand condition there are inferences of the loss of trees from the overstory and of the presence of disease, or indications of loss of vigor in dominant trees so that the mean annual increment is negative.

DECISION AREA: The geographic area defining the scope of this document and the alternatives proposed by it.

DEGRADATION: This occurs when a stream has excess energy and more sediment leaves a reach than enters it. This is associated with channel scouring.

DECOMMISSION. Demolition, dismantling, removal, obliteration and/or disposal of a deteriorated or otherwise unneeded asset or component, including necessary cleanup work. This action eliminates the deferred maintenance needs for the fixed asset. Portions of an asset or component may remain if they do not cause problems nor require maintenance. (Financial Health – Common Definitions for Maintenance and Construction Terms, July 22, 1998.)

DENNING SITE: A place of shelter for an animal; also where an animal gives birth and raises young.

DETRIMENTAL SOIL DISTURBANCE: The condition where established threshold values for soil properties exceed and result in significant change. (FSH 2509.18, section 2.05, 9).

DESIRED FUTURE CONDITION: A portrayal of the land or resource conditions which are expected to result if goals and objectives are fully achieved.

DISPERSED RECREATION: Outdoor recreation in which visitors are diffused over relatively large areas. Where facilities or developments are provided, they are more for access and protection of the environment than for the comfort or convenience of the people.

DISPLACEMENT AREA: An area of suitable habitat reserved for use by a local population of a wildlife species while that population is displaced from, or caused to vacate, its former habitat by disturbance from human activities.

DISTURBANCE: Any event which affects the successional development of a plant community (examples: fire, insect attack, windthrow, timber harvest).

DIVERSITY: The relative distribution and abundance of different plant and animal communities and species within an area.

DOWN WOODY COMPONENT: A component of forest habitats used by wildlife for feeding, denning, and shelter. (See Old Growth Habitat.)

DRAINAGE EFFICIENCY: The net runoff for a given amount of precipitation in a drainage.

DUFF: An organic surface soil layer, below the litter layer, in which the original form of plant and animal matter cannot be identified with the unaided eye.

E

ECOLOGICAL INTEGRITY: The capability of supporting and maintaining a balanced, integrated, adaptive, community of organisms having species composition, diversity, and functional organization comparable to that of natural habitats of the region.

ECOLOGICAL SUSTAINABILITY: The maintenance or restoration of the composition, strucutre, and processes of ecosystems including the diversity of plant and animal communities and the productive capacity of ecological systems. Ecological integrity, historical range of variability, and vegetation response units are means of measuring ecological sustainability.

ECOSYSTEM: The complete system formed by the interaction of a group of organisms and their environment. In this context of activities on National Forest lands, humans are considered a part of the ecosystem.

ECOSYSTEM MANAGEMENT: A management practice and philosopy aimed at selecting, maintaining, and/or enhancing the ecological integrity of an ecosystem in order to ensure continued ecosystem health while providing resources, products, or non-consumptive values for humans.

ECOSYSTEM PRESCRIBED BURNING: Utilizes prescribed fire as a management tool to achieve vegetation desired conditions in non-harvest areas. It is the controlled application of fire to the landscape under specific environmental conditions to emulate a mixed fire severity.

ECOSYSTEM PROCESSES: Ecological functions such as photosynthesis, energy flow, nutrient cycling, water movement, disturbance, and succession.

EFFECTS (or impacts): Environmental consequences (the scientific and analytical basis for comparison of alternatives) as a result of a proposed action. Effects may be either direct, which are caused by the action and occur at the same time and place, or indirect, which are caused by the action and are later in time or farther removed in distance, but are still reasonably foreseeable, or cumulative.

ENDANGERED SPECIES: Any plant or animal species which is in danger of extinction throughout all or a significant portion of its range. (Endangered Species Act of 1973).

ENDEMIC: Plant or animal species occurring only in a restricted geographic area.

ENVIRONMENT: The aggregate of physical, biological, economic, and social factors affecting organisms in an area.

ENVIRONMENTAL ANALYSIS: An analysis of alternative actions and their predictable environmental effects, including physical, biological, economic, and social consequences and their interactions; short- and long-term effects; direct, indirect, and cumulative effects.

ENVIRONMENTAL ASSESSMENT (EA): A concise public document which serves to: (a) Briefly provide sufficient evidence and analysis for determining whether to prepare an EIS or a Finding of No Significant Impact; (b) Aid an agency's compliance with NEPA when no EIS is necessary; (c) Facilitate preparation of an EIS when necessary.

ENVIRONMENTAL IMPACT STATEMENT (EIS): A detailed statement prepared by the responsible official in which a major Federal action which significantly affects the quality of the human environment is described, alternatives to the proposed action provided, and effects analyzed.

EPHEMERAL STREAMS: Streams that flow only as a direct response to rainfall or snowmelt events. They have no baseflow.

EPIDEMIC: The populations of plants, animals, and diseases that buildup, often rapidly, to highly abnormal and generally injurious levels .

EQUIVALENT CLEARCUT AREA (ECA): Equivalent Clearcut Area is an indicator of basin condition and is calculated from the total amount of crown removal that has occurred from harvesting, road building, and other activities based on the current state of vegetative recovery.

ERG: Ecosystem Research Group

EROSION: Detachment or movement of soil or rock fragments by water, wind, ice, or gravity. Accelerated erosion is much more rapid than normal, natural, or geologic erosion, primarily as a result of the influence of activities of people animals, or natural catastrophes.

EVEN-AGED MANAGEMENT: Deliberate planned actions that result in stands of trees of essentially the same age, growing together. Clearcut, shelterwood, or seed tree cutting methods produce even-aged stands.

EXCAVATOR PILE: Waste woody material piled using an excavator or backhoe for later burning. These machines are preferred for piling because they cause less soil compaction than other machines and have the ability to create clean, well made piles, pull materials to be piled from between remaining trees and sort materials to leave residual Down Woody Debris.

EXTIRPATION: Complete loss.

F

FEDERAL REGISTER: A daily publication which reports Presidential and Federal Agency documents.

FLOODPLAIN: The lowland and relatively flat areas adjoining inland and coastal waters, including, at a minimum, that area subject to a 1 percent or greater chance of flooding in any given year.

FIRE PERIMETER: The outer edge limits of a fire-burned area.

FIRE REGIME: The combination of fire frequency characteristics, predictability, intensity, seasonality and extent in an ecosystem.

Class 1 Fire regimes are within the natural (historical) range, and the risk of losing key; ecosystem components is low. Vegetation attributes (species composition, structure, and pattern) are intact and functioning withinm the natural (historical) range.

Class 2 Fire regimes have been moderately altered from their natural (historical) range. Risk of losing key ecosystem components is moderate. Fire frequencies have departed from natural fesquencies by one or more return intervals (either increased or decreased). This result in moderate changes to one or more of the following: fire size, intensity and severity, and landscape patterns. Vegetation and fuel attributes have been moderately altered from their natural (historical range).

Class 3 Fire regimes have been substantially altered form their natural (historical) range. The risk of losing key ecosystem components is high. Fire frequencies have departed from natural frequencies by multiple return intervals. Dramatic changes occur to one or more of the following: fire size, intensity, severity, and landscape patterns. Vegetation attributes have been substantially altered from their natural (historical) range.

FIRE INTENSITY: A measure of the rate of heat released for a fire at a specific point in time, usually expressed in BTUs/second/foot. It includes both radiant and convectional heat.

FIRE SEVERITY: A qualitative assessment of the heat pulse directed toward the ground during a fire. Burn severity relates to soil heating, large fuel, and duff consumption, consumption of the litter and organic layer beneath trees and isolated shrubs, and mortality of buried plant parts.

FIRE TOLERANT: A plant which has properties or charistics which enable it to survive fire.

FORAGE: Vegetation used for food by wildlife, particularly big game wildlife and domestic livestock.

FORAGE AREAS: Vegetated areas with less than 60 percent combined canopy closure of tree and tall shrub (greater than 7 feet in height).

FOREST COVER TYPE: A descriptive classification of forestland based on the present vegetative species composition and/or locality (ie: lodgepole pine, mixed conifer). Most stands are given a classification (stratum label), based on aerial photo interpretation, that includes the forest cover type, the size class, density class, and stand development phase. For example: a stand with the stratum label of LP2W would be considered a lodgepole pine cover type (LP) that is of a pole/small sawtimber size class (2) and is well stocked with coniferous trees (W).

FOREST DEVELOPMENT ROAD: A forest road under the jurisdiction of the Forest Service. (PL 95-599), section 106 and FSM 7705. Also see 36 CFR 2161.2) These roads are not public roads. (FSM 7700)

FOREST HEALTH: An ecological perspective that looks at the resiliency of an ecosystem and its ability to be sustainable.

FOREST LAND: Land at least 10 percent occupied by forest trees or formerly having had such tree cover and not currently developed for nonforest use.

FROST HEAVING: Occurs when moist or saturated soils are frozen, causing seedlings which are not yet deeply rooted to be ejected from the soil. This occurs mostly in low elevation areas that have frost before there is a cover of snow.

FUELS: Combustible materials present in the forest which potentially contribute a significant fire hazard.

FUEL LOADING: The amount of available fuels, usually expressed in tons per acre.

FUELBED: The arrangement of available fuels, continuity and amount.

FUELS MANAGEMENT: Manipulation or reduction of fuels to meet Forest protection and management objectives while preserving and enhancing environmental quality.

G

GAP: An opening in the stand or canopy caused by some disturbance.

GENETIC INTROGRESSION : The entry or introduction of genetic material from one gene complex to another.

GRADIENT: The rise or fall of a ground surface expressed in degrees of slope.

H

HABITAT: The sum total of environmental conditions of a specific place occupied by a wildlife species or a population of such species.

HABITAT COMPONENT: A simple part, or a relatively complex entity regarded as a part, or an area or type of environment in which an organism or biological population normally lives or occurs.

HABITAT DIVERSITY: The variation in types, sizes, and shapes of landscape elements or vegetation types.

HABITAT EFFECTIVENESS: The ability of an area to support a species (individual or population) based on a potential of 100%.

HABITAT TYPE: An aggregation of all land areas potentially capable of producing similar plant communities at climax. Within the analysis area the following habitat types are present: western redcedar/queencup beadlily (531), western hemlock/queencup beadlily (571), western hemlock/menziesia (579), subalpine fir/queencup beadlily (620), subalpine fir/menziesia (670), subalpine fir/beargrass (690), subalpine fir/beargrass, grouse whortleberry (692), subalpine fir/grouse whortleberry, pinegrass (731), subalpine fir/alder (740).

HABITAT TYPE GROUP: A category of habitat types with similar ecological amplitudes and environmental conditions. Combined with information on stand conditions, habitat type groups can be used to develop silvicultural stand treatment priorities during the IDT process.

HAND PILE: Waste woody material piled by; hand for later burning.

HARDWOODS: A conventional term for the wood of broadleaf trees. In the decision area these trees are generally confined to areas near water.

HIDING COVER: Vegetation capable of hiding 90 percent of a standing adult deer or elk at 200 feet or less. Includes some shrub stands and all forested stand conditions with adequate tree stem density or shrub layer to hide animals. In some cases, topographic features also can provide hiding cover.

HIGH RISK: Individual or groups of trees that are live (green) but have the physical characteristics favorable to insect infestation. Trees in this category are subject to mortality and loss of economic value.

HOST TREE: A tree in which other organisms, parasites, or insects live for part of their life cycle.

I

IMPROVEMENT CUT: An intermediate treatment made in a stand, pole-sized or larger, primarily to improve composition and quality by removing less desirable trees of any species.

INDICATOR SPECIES: See management indicator species.

INDIRECT EFFECTS: Secondary effects which occur in locations other than the initial action or significantly later in time.

INFISH: (Inland Native Fish Strategy) On July 31, 1995, the Decision Notice for Inland Native Fish Strategy Environmental Assessment (INFISH) was signed. This strategy was developed to provide interim (approximately 18 months) direction to protect habitat and populations of native resident fish and supersedes the Kootenai Riparian Guidelines previously used.

INSTREAM FLOWS: The minimum water volume (cubic feet/second) in each stream necessary to meet seasonal streamflow requirements for maintaining aquatic ecosystems, visual quality, recreational opportunities and other uses.

INTERAGENCY GUIDELINES: A document which was originally developed in the Yellowstone grizzly bear ecosystem and later applied to all grizzly habitat through congressional mandate. Previously known as the "Yellowstone Guidelines" , it identifies important, specific management measures regarding the conduct of multiple use activities in grizzly bear habitat and parameters for identifying the sensitivity of grizzly bear habitat to human activities.

INTERDISCIPLINARY TEAM (IDT): A group of resource professionals with different expertise that collaborate to develop and evaluate resource management decisions.

INTERMEDIATE HARVEST: A collective term for any treatment or tending designed to enhance growth, quality, vigor, and composition of the stand after establishment or regeneration and prior to final harvest.

INTERMITTENT STORED SERVICE: Closed to traffic. The road is in a condition that there is little resource risk if maintenance is not performed (self-maintaining). (FSH 5409.17-94-2).

INTERMITTENT STREAM: A stream which flows only at certain times of the year when it receives water from springs or from some surface source such as melting snow.

INVENTORIED ROADLESS AREA: Roadless areas studied for wilderness designation. Forest Plan, Appendix C.

IRREVERSIBLE: A term that describes the loss of future options. Applies primarily to the effects of use of nonrenewable resources, such as minerals or cultural resources, or to those factors, such as soil productivity that are renewable only over long periods of time.

IRRETRIEVABLE: A term that applies to the loss of production, harvest, or use of natural resources. For example, some or all of the timber production from an area is lost irretrievably while an area is serving as a winter sports site. The production lost is irretrievable, but the action is not irreversible. If the use changes, it is possible to resume timber production.

L

LADDER FUELS: Small trees and understory shrubs that allow fire to burn up into the canopy of larger trees.

LANDING PILE: Mechanically piled waste woody materials lacated at the landing, where the loggers process, sort and load logs for transport to the mill. Landing piles are later burned.

LANDSCAPE: The aspect of the land that is characteristic of a particular region or area.

LANDTYPE: A unit of land with similar designated soil, vegetation, geology, topography, climate and drainage. The basis for mapping units in the land systems inventory.

LARGE WOODY MATERIAL: (Also large woody debris; LWD)- Branches and/or tree trunks located within a stream channel, originating from trees growing in or near the channel. Such material is considered "large" if it is of sufficient size that it remains at least partially submerged during all but major flood events. These materials are important in stream systems because they serve a variety of functions related to channel hydraulics and morphology. Functions would include flow energy reduction due to friction and turbulence on downstream side of debris, and sediment storage on upstream side of materials. LWD is delivered to stream channels by decay and/or windfall of trees in close proximity to stream channels.

LETHAL FIRES: A descriptor of fire response and effect in forested ecosystems of high-severity or sever fire that burns through the overstory and understory which consumes large woody surface fuels and may consume entire duff layer. Stand is essentially destroyed and will be replaced as stand is set back to initiation stage.

LIBERATION HARVEST: An intermediate harvest treatment made in a stand with an established understory but it is not past the sapling stage, in order to free the favored trees from competition of older, overtopping trees.

LIMITING FACTOR: The environmental influence through which the toleration limit of an organism is first reached, which acts, therefore, as the immediate restriction in one or more of its functions or activities or in its geographic distribution.

LODGEPOLE PINE: See explanation under timber type.

M

MACHINE PILE: Waste woody material mechanically piled by any machine including excavator, backhoe, cat, skidder, etc. For later burning.

MAINTENANCE LEVEL. Defines the level of service provided by, and maintenance required for, a specific road, consistent with road management objectives and maintenance criteria. (FSH 7709.58, Sec 12.3 – Transportation System Maintenance Handbook.)

MAINTENANCE LEVEL 1: Assigned to intermittent service roads during the time they are closed to vehicular traffic. The closure period must exceed 1 year. Basic custodial maintenance is performed to keep damage to adjacent resource at an acceptable level and to perpetuate the road to facilitate future management activities. Emphasis is normally given to maintaining drainage facilities and runoff patterns. Planned road deterioration may occur at this level. Appropriate traffic management strategies are "prohibit" and "eliminate". Roads receiving Level 1 maintenance may be of any type, class, or construction standard, and may be managed at any other maintenance level during the time they are open for traffic. However, while being maintained at level 1, they are closed to vehicular traffic, but may be open and suitable for non-motorized uses.

MAINTENANCE LEVEL 2: Assigned to roads open for use by high clearance vehicles. Passenger car traffic is not a consideration. Traffic is normally minor, usually consisting of one or a combination of administrative, permitted, dispersed recreation, or other specialized uses. Log haul may occur at this level. Appropriate traffic management strategies are either (1) discourage or prohibit passenger cars or (2) accept or discourage high clearance vehicles.

MAINTENANCE LEVEL 3: Assigned to roads open and maintained for travel by a prudent driver in a standard passenger car. User comfort and convenience are not considered priorities. Roads in this maintenance level are typically low speed, single lane with turnouts and spot surfacing. Some roads may be fully surfaced with either native or processed material. Appropriate traffic management strategies are either "encourage" or "accept." "Discourage" or "prohibit" strategies may be employed for certain classes of vehicles or users.

MAINTENANCE LEVEL 4: Assigned to roads that provide a moderate degree of user comfort and convenience at moderate travel speeds. Most roads are double lane and aggregate surfaced. However, some roads may be single lane. Some roads may be paved and/or dust abated. The most appropriate traffic management strategy is "encourage." However, the "prohibit" strategy may apply to specific classes of vehicles or users at certain times.

MAINTENANCE LEVEL 5: Assigned to roads that provide a high degree of user comfort and convenience. Normally, roads are double-lane, paved facilities. Some may be aggregate surfaced and dust abated. The appropriate traffic management strategy is "encourage."

MANAGEMENT AREA: Geographic areas, not necessarily contiguous, which have common management direction, consistent with the Forest Plan allocations.

MANAGEMENT DIRECTION: A statement of multiple use and other goals and objectives, along with the associated management prescriptions and standards and guidelines to direct resource management.

MANAGEMENT INDICATOR SPECIES (MIS): A species of wildlife, fish, or plant whose health and vigor are believed to accurately reflect the health and vigor of other species having similar habitat and protection needs to those of the selected indicator species.

MANAGEMENT SITUATIONS: The following classes identify management situations which are used to stratify grizzly bear habitat consistent with definitions in the Interagency Grizzly Bear guidelines:

> **SITUATION 1**: (Grizzly Bear Management Situation 1.) Habitat contains grizzly population centers and habitat components needed for the survival and recovery of the species. Management decisions will favor the needs of the grizzly. Habitat maintenance and improvement and grizzly/human conflict minimization will receive the highest management priority.
>
> **SITUATION 3**: (Grizzly Bear Management Situation 3.) Areas where grizzly presence is possible but infrequent. Developments such as campgrounds, resorts, or other high human use associated facilities, and human presence result in conditions which make grizzly presence untenable for humans and/or grizzlies. Grizzly habitat maintenance and improvement are not management considerations in these areas. Grizzly/human conflict minimization is a high priority management consideration.

MASS EROSION (also called mass wasting): Downslope movement of a unit of soil. Mass erosion includes landslides, debris flows, debris avalanches, debris torrents, slumps and soil creeping.

MATURE: On lands allocated for timber harvest, mature is defined as trees or stands that have reached rotation age, generally around 100 years. In the context of wildlife - Mature forest habitat with characteristics needed to provide habitat for species such as pine marten and pileated woodpecker (generally occurs around age 100).

MID-SERAL: A middle transitory stage in forest succession.

MITIGATION: Actions to avoid, minimize, reduce, eliminate, replace, or rectify the impact of a management practice.

MIXED CONIFER: See explanation under timber type.

MIXED LETHAL FIRES: A descriptor of fire response and effect in forested ecosystems of moderate fire, burns in surface fuels but may involve a tree understory. It consumes litter, upper duff, understory plants and foliage on understory trees. Individual and groups of overstory trees may torch out if fuel ladders exist. Enough of the stand's overstory survives to provide for the major portion of the regeneration that results.

MONITORING AND EVALUATION: The evaluation, on a sample basis, of Forest Plan management practices to determine how well objectives are being met, as well as the effects of those management practices on the land and environment.

MONOCULTURE: A pure stand of a single species.

MOSAIC: The intermingling of plant communities and their successional stages in such a manner as to give the impression of an interwoven design.

MOTOR VEHICLE: Any vehicle which is self-propelled, other than:

- A vehicle operated on rails; and
- Any wheelchair or mobility device, including one that is battery-powered, that is designed solely for use by a mobility-impaired person for locomotion, and that is suitable for use in an indoor pedestrian area. (36 CFR 212.1.)

MOTOR VEHICLE USE MAP: A map reflecting designated road, trails, and arias on an administrative unit or a Ranger District of the National Forest System. (36 CFR 212.1.)

MOUNTAIN PINE BEETLE: The common name for the bark beetle (Dendroctonous ponderosae, Hopkins) which is an insect pest that has caused more tree mortality in the intermountain west than any other

MULTI-STORY: A forest stand or plant community having more than two main canopy layers or "stories".

N

NATIONAL FOREST SYSTEM ROAD: A forest road other than a road which has been authorized by a legally documented right-of-way held by a State, county, or other local public road authority. (36 CFR 212.1.)

NATIONAL FOREST SYSTEM TRAIL: A forest trail other than a trail which has been authorized by a legally documented right-of-way held by a State, county, or other local public road authority. (36 CFR 212.1)

NEPA PROCESS: An interdisciplinary process, mandated by the National Environmental Policy Act, which concentrates decisionmaking around issues, concerns, alternatives and the effects of alternatives on the environment.

NRLMD: Northern Rockies Lynx Management Direction**NO ACTION ALTERNATIVE**: The No Action alternative is required by regulations implementing the National Environmental Policy Act (NEPA) (40 CFR 1502.14). The no action alternative provides a baseline for estimating the effects of other alternatives. Where a project activity is being evaluated, the no action alternative is defined as one where no action or activity would take place.

NONGAME SPECIES: All wild animals not subject to sport hunting, trapping or fishing regulations.

NON-LETHAL FIRES: A descriptor of fire response and effect in forested ecosystems of low-severity or cool fire. Has minimal impact on the site. It burns in surface fuels consuming only the litter, herbaceous fuels, and foliage and small twigs on woody undergrowth. Little heat travels downward through the duff. None of the large (commercial size) trees are killed.

NONSTOCKED: A stand of trees or aggregation of stands that have a stocking level below the minimum specified for meeting the prescribed management objectives.

NOXIOUS WEEDS: Rapidly spreading plants which can cause a variety of major ecological impacts to both agricultural and wild lands.

NUTRIENT: An element found in the soil that is needed for plant growth.

O

OBLITERATION: The reclamation and/or restoration of land to resource production from that of a transportation facility. This may include, but is not limited to, one or more of the following: ripping, seeding, pulling culverts, or recontouring.

OLD GROWTH HABITAT: Old growth is a distinct successional stage in the development of a timber stand that has special significance for wildlife, generally characterized by: (1) large diameter trees (often exceeding 20" dbh) with a relatively dense, often multilayer canopy. (2) the presence of large, standing dead or dying trees. (3) down and dead trees, (4) stand decadence associated with the presence of various fungi and heartrots, (5) and an average age often in excess of 200 years.

OLD GROWTH: Old growth stands are defined as those that meet the definitions in Green et al. 1992 (errata corrected 12/11). Those definitions include the discussion in that document titled "USE OF OLD GROWTH TYPE DESCRIPTIONS" (see pages 11 and 12). If that document is revised or replaced by the Northern Region, the updated version will be used.

OLD GROWTH (Recruitment Potential): Forest stands that do not meet the definition of old growth in Green et al. 1992 (errata corrected 12/11) but are being managed with the goal of meeting that definition in the future.

ONGOING ACTIONS: Actions initiated in the past which continue to take place.

OPEN ROAD DENSITY: A measure of the amount of open roads per area of land, usually expressed as miles per square mile

OUTBREAK: Sudden occurrence of a disease or insect pest.

OUTSLOPE: When the slope from inside of shoulder to outside of shoulder exceeds the alignment grade.

OVER-SNOW VEHICLE: A motor vehicle that is designed for use over snow and that runs on a track or tracks and/or a ski or skis, while in use over snow.

OVERMATURE: The condition that exists after an even-aged stand reaches maturity and decline in vigor, health and soundness.

OVERSTOCKED: Stands exceeding a prescribed standard or expected number of trees or basal area per acre.

OVERSTORY: The portion of trees in a forest which forms the uppermost layer of foliage.

P

PATCH: An area of vegetation that is relatively homogeneous internally with respect to composition and successional stage and that differs from what surrounds it.

PATHOGEN: An organism which causes disease in another organism.

PAYMENTS TO STATES (or Payments to Counties) The portion of receipts derived from Forest Service resource management that is distributed to State and county governments as the Forest Service 25 percent fund payments.

PCE: Primary Constituent Element

PEAK FLOW: The greatest flow attained during the melting of the winter snowpack.

PERENNIAL STREAMS: Streams that flow continuously throughout the year.

PHYSIOGRAPHIC AREA (PA): Large areas of associated landtypes used in the mid-scale analysis of ecosystems. These areas typically have similar features in geology, soil types, fire occurrence and vegetative communities.

PLANT ASSOCIATION: A potential natural plant community of definite floristic composition and uniform appearance.

PLANTATIONS: Areas in the forest where trees have been planted.

POPULATION: In statistics, the aggregate of all units forming the subject of study; otherwise, a community of individuals that share a common gene pool.

PRE-COMMERCIAL THINNING A felling made in an immature stand in order primarily to accelerate diameter increment but also, by suitable selection, to improve the average form of the trees that remain. Usually occurs in crowded (by crown competition or stems per acre) stands to give remaining trees (a prescribed desired number of trees) a competitive advantage for full development.

PREFERRED ALTERNATIVE: The agency's preferred alternative, one or more, that is identified in the impact statement (40 CFR 1502.14).

PRESCRIBED BURNING: The intentional application of fire to wildland fuels in either their natural or modified state under such conditions as to allow the fire to be confined to a predetermined area and at the same time to produce the intensity of heat and rate of spread required to further certain planned objectives (ie: silviculture, wildlife management, reduction of fuel hazard, etc.).

PRESCRIBED FIRE: A wildland fire burning under preplanned specified conditions to accomplish specific planned objectives. It may result from either a planned or unplanned ignition.

PRESCRIPTION: Management practices selected and scheduled for application on a designated area to attain specific goals and objectives.

PRIMARY CONSTITUENT ELEMENTS: Elements required to in analyzing critical bull trout habitat.

PROGRAMMATIC EIS: An environmental impact statement that establishes a broad management direction for an area by establishing a goal, objective, standard, management prescription and monitoring and evaluation requirement for different types of activities which are permitted. It also can establish what activities are not permitted within the specific area(s). This document does not mandate or authorize the permitted activities to proceed.

PROJECT AREA: The geographic area defining the scope of this document and the alternatives proposed by it.

PROJECT FILE: An assemblage of documents that contains all the information developed or used during an environmental analysis. This information may be summarized in an Environmental Assessment or an Environmental Impact Statement. The project file becomes part of the administrative record for judicial review in case of legal action.

R

RANGER DISTRICT: An administrative subdivision of the Forest, supervised by a District Ranger who reports to the Forest Supervisor.

RANGE OF VARIABILITY: The spectrum of conditions possible in ecosystem composition, structure, and function considering both temporal and spatial factors**.**

REBURN: Re-ignition and burning on incompletely burned fuels.

RECONDITIONING: This work consists of cleaning ditches and culverts, including inlets and outlets; removing slide material; scarifying turnouts, and approach road connections.

RECONTOUR: A form of obliteration where the road prism is eliminated by pulling back fill material to re-establish the natural sideslope.

RECORD OF DECISION: A concise public document disclosing the decision made following preparation of an EIS and the rationale used by the deciding officer to reach that decision.

RECREATION OPPORTUNITY SPECTRUM (ROS): A range of possible combinations or recreation activities, settings, and experience opportunities, from Primitive to Urban, arranged along a continuum. Classes used herein are:

> **Primitive (PRIM)**: Area is characterized by essentially unmodified natural environment of fairly large size. Interaction between users is very low and evidence of other area users in minimal. The area is managed to be essentially free from evidence of man-induced restrictions and controls. Motorized use within the area is not permitted.
>
> **Semi-Primitive Non-Motorized (SPNM)**: Area is characterized by a predominantly natural or natural-appearing environment of moderate-to-large size. Interaction between users is low, but there is often evidence of other users. The area is managed in such a way that minimum on-site controls and restrictions may be present, but are subtle. Motorized use is not permitted.
>
> **Semi-Primitive Motorized (SPM)**: Area is characterized by a predominately natural or natural-appearing environment of moderate-large size. Concentration of users is low, but there is often evidence of other area users. The area is managed in such a way that minimum on-site controls and restrictions may be present, but are subtle. Motorized use is permitted.
>
> **Roaded Natural Appearing (RNA)**: Area is characterized by predominantly natural appearing environment with moderate evidences of the sights and sounds

of man. Such evidences usually harmonize with the natural environment. Interaction between users may be low to moderate, but with evidence of other users prevalent. Resource modification and utilization practices are evident, but harmonize with the natural environment. Conventional motorized use is provided for in the construction standards and design facilities.

Rural (R): Area is characterized by substantially modified natural environment. Resource modification and utilization practices are primarily to enhance specific recreation activities and to maintain vegetative cover and soil. Sights and sounds of man are readily evident, and the interaction between users if often moderate to high. A considerable number of facilities are designed for use by a large number of people. Facilities are often provided for special activities. Moderate densities are provided far away from developed sites. Facilities for intensified motorized use and parking are available.

RECRUITMENT POTENTIAL (old growth): Forest stands that do not meet the definition of old growth in Green et al. 1992 (errata corrected 12/11) but are being managed with the goal of meeting that definition in the future.

REFORESTATION: The natural or artificial restocking of an area with forest trees. It may include tree planting and seeding measures to obtain natural regeneration.

REGENERATION: This term may refer to the crop (seedlings, saplings) itself.

REGENERATION CUT: The renewal of a tree crop, whether by natural or artificial means. It is a cutting procedure by which a new age class is created. The major methods are clearcutting, seed-tree, shelterwood, selection, and coppice. Regeneration methods are grouped into four categories: coppice, even-aged, two-aged, and uneven-aged.

REGENERATION HARVEST: Used in reference to clearcut, seedtree and shelterwood harvest methods which remove an existing stand to prepare a site for regeneration.

REHABILITATION: Returning of land to farm use or to productivity in conformity with a prior land use plan, including a stable ecological state that does not contribute substantially to environmental deterioration and is consistent with surrounding aesthetic values.

RELIC: A tree that has survived several stand replacing events.

RESERVE TREE: Trees retained after the regeneration period (pole sized or larger) under the clearcutting, seed tree, or shelterwood methods.

RESIDUAL TREE: Trees remaining after any harvest.

REASONABLY FORESEEABLE ACTIONS: Those actions which are proposed to take place or are imminent.

RESTOCKING: The process of adding additional trees by planting or seeding to bring the stocking up to prescribed conditions.

RESTORATION: The act of returning to historic site conditions or ecological processes that existed before the disruption or interruption of these processes.

RESTRICTED ROAD: A National Forest road or segment which is restricted from a certain type of use or all uses during certain seasons of the year or yearlong. The use being restricted and the time period must be specified. The closure is legal when the Forest Supervisor has issued an Order and posted that Order in accordance with 36 CFR 261.

RHIZOME: A rootlike stem under or on top of the ground, ordinarily in a horizontal position, which usually sends out roots from its lower surface and leafy shoots from its upper surface.

RIFFLE STABILITY INDEX (RSI): A system of measure that predicts channel substrate stability.

RIPARIAN AREAS/HABITATS: Land areas where the vegetation and microclimate are influenced by perennial and/or intermittent water.

RIPARIAN MANAGEMENT OBJECTIVES (RMOs): Quantifiable measures of stream and streamside conditions that define good fish habitat and serve as indicators against which attainment or progress toward attainment of goals will be measured.

RIPARIAN HABITAT CONSERVATION AREAS (RHCAs): Portions of watersheds where riparian-dependent resources receive primary emphasis, and management activities are subject to specific standards and guidelines. RHCAs include traditional riparian corridors, wetlands, intermittent headwater streams, and other areas where proper ecological functioning is crucial to maintenance of the stream's water, sediment, woody debris, and nutrient delivery systems.

RIPPING: A form of soil decompaction; a method of aerating the surface and subsurface material of a road, landing, and/or skid trail to allow water infiltration by tilling the soil with a piece of machinery equipped with ripper bars.

ROAD: A motor vehicle route over 50 inches wide, unless identified and managed as a trail (36 CFR 212).

ROAD CONSTRUCTION OR RECONSTRUCTION: Supervising, inspecting, actual building, and incurrence of all costs incidental to the construction or reconstruction of a road (36 CFR 212).

ROAD DECOMMISSIONING: Removal of a road from the National Forest Road System after an interdisciplinary travel analysis identifies it as being not needed for long-term resource management. There are two types of decommissioning: Active and Passive.

> **Active Decommissioning**: Physical work is done on the ground to place the road in a hydrologically stable condition. This work includes, but is not limited to, removing culverts, restoring natural stream channels, recontouring unstable fillslopes, waterbarring, ripping, placing slash and duff on the treated road surface, and seeding in some places.
>
> **Passive Decommissioning**: The road prism has been determined to be hydrologically stable and is allowed to naturalize without ground disturbing activities. The natural vegetation renders the road impassable to motorized vehicles.

ROAD MAINTENANCE: The upkeep of the entire Forest Development Transportation Facility including surface and shoulders, parking and side areas, structures, and such traffic-control devices as are necessary for its safe and efficient utilization.

ROAD MANAGEMENT OBJECTIVE: Defines the intended purpose of an individual road based on management area direction and access management objectives. Road management objectives contain design criteria, operation criteria, and maintenance criteria. (FSM 7721.31 and FSH 7790.55--33).

ROADLESS: Area characterized by its lack of roads; i.e. unroaded.

ROOT CROWNS: The point at or just below the surface of the ground where the stem and root join.

ROOT DISEASE: A fungal organism which lives in organic matter i the soil and invades the living roots systems of trees.

ROSGEN CHANNEL CLASSIFICATION: A system of measure that utilizes various channel features to rate a stream or river into reproducible classes.

ROTATION: The planned number of years required to establish (including the regeneration period) and grow timber crops to a specified condition or maturity for regeneration harvest.

S

SALMONIDS : Members of the family of elongate soft-finned fishes Salmonidae - the trout and salmon family.

SALVAGE HARVEST: The cutting of trees that are dead, dying, or deteriorating before they lose commercial value as sawtimber. The removed trees are generally overmature, damaged by fire, wind, insects, fungi or other injurious agencies.

SCOPING: The procedures by which the Forest Service determines the extent of analysis necessary for a proposed action, i.e., the range of actions, alternatives, and impacts to be addressed, identification of significant issues related to a proposed action, and establishing the depth of environmental analysis, data, and task assignments needed.

SCREE: Refers to slopes covered with loose rock fragments, including the accumulation of rock at a cliff or slope base (talus) as well as loose, unstable material lying on slopes without cliffs.

SEDIMENT: Any material carried in suspension by water, which will ultimately settle to the bottom. Sediment has two main sources: from the channel area itself and from disturbed sites.

SEDIMENT TRAP: Any natural or man-made feature in a stream that traps sediment.

SEED TREE: A tree selected as a natural seed source within a shelterwood or seedtree harvest cut; sometimes also reserved for seed collection.

SEEDTREE HARVEST: A regeneration method under an even-aged silvicultural system. A portion of the mature stand, usually 10-15 trees/acre, is retained as a source of seed for regeneration of the stand. The seed trees are intended for removal after regeneration is considered to be established. Note: where there is no intention of removing the seed trees once the stand is regenerated, a seedtree seed cut with reserves is the appropriate silvicultural system.

SEEDLINGS AND SAPLINGS: Non-commercial-size young trees, generally occurring in plantations.

SENSITIVE LANDTYPE: The landtypes most vulnerable to slumping and associated erosion, particularly when subject to natural or management related disturbance.

SENSITIVE SPECIES: Those species identified by the Regional Forester for which population viability is a concern as evidenced by significant current or predicted downward trends in (a) population numbers or density, or (b) habitat capability that would reduce a species' existing distribution.

SENSITIVITY LEVEL: A particular degree or measure of viewer interest in the scenic qualities of the landscape.

SERAL STAGE: A transitory or developmental stage of a biotic community in an ecological succession (does not include climax successional stage or pioneer stage).

SEROTINOUS: Late in developing; particularly applied to plants that flower or fruit late in the season and to fruit and cones that remain closed for a year or more after the seeds mature, but also to bud opening, leaf shedding, etc. Applies to the nature of lodgepole pine cones, as a positive adaptive trait for fire dependent ecosystems.

SHELTERWOOD HARVEST: A regeneration method under an even-aged silvicultural system. A portion of the mature stand is retained as a source of seed and site protection during the regeneration period.

SHRUB: A plant with persistent woody stems and relatively low growth form; usually produces several basal shoots as opposed to a single bole; differs from a tree by its low stature and nonarborescent form.

SIGNIFICANT: As used in NEPA, requires consideration of both context and intensity. Context means that the significance of an action must be analyzed in several contexts such as society as a whole, and the affected region, interests, and locality. Intensity refers to the severity of impacts (40 CFR 1508.27).

SILVICULTURE: The art and science of growing and tending forest vegetation, i.e., controlling the establishment, composition, and growth of forests, for specific management goals.

SILVICULTURAL DIAGNOSIS: The process of comparing existing stand conditions to a desired condition or "target stand", and determining a need for treatment to bring the stand to the desired condition.

SILVICULTURAL SYSTEM: A management process whereby forests are tended, harvested, and replaced, resulting in a forest of distinctive form. Systems are classified according to the method of carrying out the cuttings that remove the mature crop and provide for regeneration, and according to the type of forest thereby produced.

SITE PREPARATION: A general term for a variety of activities that remove or treat competing vegetation, slash, and other debris that may inhibit the establishment of regeneration.

SIZE CLASS: A classification of forest stands based on live trees in the stand. The classification uses a four letter acronym based on descriptive adjectives. For example, a stand that is designated as a size class MLRS is a mature stand (M) that is considered low risk to damaging insects or disease (LR) and is stocked with sawtimber sized trees of a specified diameter and stocking level (S).

SLASH: The residue left on the ground after felling and other silvicultural operations and/or accumulating there as a result of storm, fire, girdling, or poisoning of trees.

SLASH BURNING: The treatment or burning of slash so as to reduce fire or insect hazards.

SNAG: A standing dead tree usually without merchantable value for timber products, but may have characteristics of benefit to some cavity nesting wildlife species.

SNAG DEPENDENT WILDLIFE: Wildlife species that are dependent on snags for nesting or roosting habitat or for food.

SPECIAL USE PERMIT: A permit issued under established laws and regulations to an individual, organization, or company for occupancy or use of National Forest land for some special purpose.

SPECIES: A unit of classification of plants and animals consisting of the largest and most inclusive array of sexually reproducing and cross-fertilizing individuals which share a common gene pool.

SPECIFIED ROAD: A Forest System Road, including related transportation facilities and appurtenances, shown on a Timber Sale Area Map and listed in Table A9 of the Timber Sale Contract.

STAGNATION: Refers to stand growth, implying that there is a failure to express dominance due to poor site conditions, competition of other trees that limit development of the crowns which suppresses individual tree growth and over all stand development. Usually diameter growth is severely limited and height growth still occurs but slowly.

STAND: A community of trees or other vegetation uniform in composition, constitution, spatial arrangement, or condition to be distinguishable from adjacent communities.

STAND COMPOSITION: The representation of tree species in a forest stand, expressed by some measure of dominance (ie % volume, number, basal area).

STAND DENSITY: A measure of the degree of crowding of trees within stocked areas, commonly expressed by various growing-space ratios such as crown length to tree height, crown diameter to diameter at breast height, crown diameter to tree height, or of stem spacing to tree height.

STAND REPLACING FIRE: A fire that kills most or all of a stand, and causes a new stand to be started.

STAND STRUCTURE: The horizontal and vertical arrangement of the vegetation in a stand.

STANDARD: A particular action, level of performance, or threshold specified by the Forest Plan for resource protection or accomplishment of management objectives. Unlike "guidelines" which are optional, standards specified in the Forest Plan are mandatory.

STOCKED: Stands falling within a prescribed standard or expected number of trees or basal area per acre.

STOCKING: The degree to which trees occupy the land, measured by basal area and/or number of trees by size and spacing, compared with a stocking standard; that is, the basal area and/or number of trees required to fully utilize the land's growth potential.

STREAM CHANNEL STABILITY: A classification system that utilizes ocular estimates of various channel, bank, and riparian area features to evaluate channel health.

STREAM ORDER: It is often convenient to classify streams within a drainage basin by systematically defining the network of branches. Each nonbranching channel segment (smallest size) is designated a first-order stream. A stream which receives only first-order segments is termed a second-order stream, and so on. The order of a particular drainage basin is determined by the order of the principle or largest segment.

STRUCTURAL DIVERSITY: The variation in sizes and shapes of landscape elements, as well as diversity of pattern (ie: heterogeneity).

SUCCESSION: The changes in vegetation and in animal life that take place as the plant community evolves from bare ground to climax.

SUCCESSIONAL STAGE: A stage or recognizable condition of a plant community which occurs during its development from bare ground to climax.

SUMMER RANGE: A range, usually at higher elevation, used by deer and elk during the summer; a summer range is usually much more extensive than a winter range.

SUITABLE FOREST LAND: Forest land (as defined in CFR 219.3, 219.14) for which technology is available that will insure timber production without irreversible resource damage to soils, productivity, or watershed conditions; for which there is reasonable assurance that such lands can be adequately restocked (as provided in CFR 219.4); and for which there is management direction that indicates that timber production is an appropriate use of that area.

SUPPRESSED: Refers to individual trees, very slowly growing trees with crowns entirely below the general level of the crown cover, receiving no direct light either from above or from the sides, common in stands that are considered overstocked.

SURFACE EROSION: Downslope movement of individual particles of soil by water transport. Surface erosion includes sheet erosion, riling and gullying.

T

TEMPORARY ROADS: Any short-lived road not intended to be a part of the forest development transportation system and not necessary for future resource management. (FSM 7705. Also see Timber Sale Contract 2400-6T).

THERMAL COVER: Vegetation used by animals to modify the adverse effects of weather. A forest stand that is at least 40 feet in height with tree canopy cover of at least 70 percent provides thermal cover. These stand conditions are achieved in closed sapling-pole stands and by all older stands unless the canopy cover is reduced below 70 percent. Deciduous stands may serve as thermal cover in summer, but not in winter.

THINNING: A cutting made to reduce stand density of trees primarily to improve growth, enhance forest health, or recover potential mortality.

THREATENED SPECIES: Any species of plant or animal which is likely to become endangered within the foreseeable future throughout all or a significant portion of its range.

TIERING: The use of a previously written environmental document with a broad scope to cover discussion of issues common to both.

TIMBER TYPES: A descriptive classification of forestland based on present occupancy of an area by tree species (ie: lodgepole, mixed conifer). More appropriately called forest cover types, this category is further defined by the composition of its vegetation and/or environmental factors that influence its locality. See Appendix A (Silvicultural Prescriptions) for more information.

TRAMPLING: A method of treating fuels by knocking down by walking over or through small trees with a piece of machinery.

TURBIDITY: An optical measure of how fine sediment inhibits the transmission light in a given water sample due to scattering and absorption by suspended particles.

TWO-STORIED: A forest stand or plant community having two main canopy layers or "stories".

U

UNAUTHORIZED ROAD OR TRAIL*:* A road or trail that is not a forest road or trail or a temporary road or trail and that is not included in a forest transportation atlas (36 CFR 215). Sometimes refered to as Undetermined as defined in the Infra Travel Routes Database Data Dictionary.

UNDERBURN: Understory fuels treatment.

UNDERSTORY: Vegetation (trees or shrubs) growing under the canopy formed by taller trees.

UNDETERMINED ROADS: Roads on National Forest System lands that are not managed as part of the forest transportation system, such as unplanned roads, abandoned travel ways, and off-road vehicle tracks that have not been designated and managed as a trail; and those roads that were once under permit or other authorization and were not decommissioned upon the termination of the authorization. (Infra data dictionary.)

UNSUITABLE FOREST LAND: Lands not selected for timber production in Step II and III of the suitability analysis during the development of the Forest Plan due to: (1) the multiple-use objectives for the alternative preclude timber production, (2) other management objectives for the alternative limit timber production activities to the point where management requirements cannot be met, and (3) the lands are not cost-efficient over the planning horizon in meeting forest objectives that include timber production. Land not appropriate for timber production shall be designated as unsuitable in the Forest Plan.

V

VEGETATION RESPONSE UNIT: An aggregation of lands with similar patterns in potential natural communities, soils, hydrologic function, landform and topography, climate, air quality,

and natural processes (ie: nutrient and biomass cycling, sucession, productivity, and fire regimes). Each VRU has an associated description of its ecological structure, composition, and function. VRUs provide a means to describe and define the components of ecosystems

VERTICAL DIVERSITY: The diversity in an area that results from the complexity of the above ground structure of the vegetation; the more tiers of vegetation or the more diverse the species makeup is, the higher the degree of vertical diversity

VIABLE POPULATION: A wildlife population of sufficient size to maintain its existence over time in spite of normal fluctuations in population levels.

VIEWSHED: Sub-units of the landscape where the visitor's view is contained by topography similar to a watershed.

VISUAL QUALITY OBJECTIVE (VQO): A system of indicating the potential expectations of the visual resource by considering the frequency an area is viewed and the type of landscape.

> **Maximum Modification**: A Visual Quality Objective meaning man's activity may dominate the characteristic landscape but should appear as a natural occurrence when viewed as background.
>
> **Modification**: A Visual Quality Objective meaning man's activity may dominate the characteristic landscape but must, at the same time, utilize naturally established form, line, color, and texture. It should appear as a natural occurrence when viewed in foreground or middleground.
>
> **Partial Retention**: A Visual Quality Objective which in general means man's activities may be evident but must remain subordinate to the characteristic landscape.
>
> **Preservation**: A Visual Quality Objective that provides for ecological change only.
>
> **Retention**: A Visual Quality Objective which in general means man's activities are not evident to the casual forest visitor.
>
> **Sensitivity Level**: A particular degree or measure of viewer interest in the scenic qualities of the landscape.
>
> **Variety Class**: Diversity of landscape character

VARIETY CLASS: A particular level of visual variety or diversity of landscape character.

VISUAL RESOURCE: The composite of landforms, water features, vegetative patterns and cultural features which create the visual environment.

W

WATER ROUTING: Spring snowmelt and storm runoff intercepted and redirected by roads, ditches, and trails.

WATER YIELD: The measured output of the Forest's streams.

WILDERNESS: All lands included in the National Wilderness Preservation System by public law; generally defined as undeveloped Federal land retaining its primeval character and influence without permanent improvements or human habitation.

WILDFIRE: Any fire not designated and managed as a prescribed fire with an approved prescription.

WINDTHROW: The action of wind uprooting trees.

WINTER RANGE: A range, usually at lower elevation, used by migratory deer and elk during the winter months; usually better defined and smaller than summer ranges.

Y

YARDING: A method of bringing logs in to a roadside area or landing, for truck transport. Methods may include forms of skyline cable logging systems, ground-based skidding, balloon, helicopter, etc.

Acronyms and Abbreviations

Acronym	Description
AEUI	Aquatic Ecological Unit Inventory
AIRFA	American Indian Religious Freedom Act of 1978
ALT	Alternative
BA	Biological Assessment
BAA	Bear Analysis Area
BCR	Bird Conservation Regions
BE	Biological Evaluation
BFW	Bank Full Width
BMP	Best Management Practices
BMU	Bear Management Unit
BO	Biological Opinion
CCF	Hundred Cubic Feet
CEQ	Council on Environmental Quality
CFR	Code of Federal Regulation
CFS	Cubic Feet Per Second
CWA	Clean Water Act
CWD	Coarse Woody Debris
CYE	Cabinet-Yaak Ecosystem
DBH	Diameter Breast Height
DEIS	Draft Environmental Impact Statement
EA	Environmental Assessment
ECA	Equivalent Clearcut Acres
EIS	Environmental Impact Statement
EMU	Elk Mangement Unit
EPA	United States Environmental Protection Agency
ESA	Endangered Species Act
FDR	Forest Development Road
FEIS	Final Environmental Impact Statement
FP	Forest Plan
FSH	Forest Service Handbook
FSM	Forest Service Manual
GIS	Global Information Systems
HE	Habitat Effectiveness

HFRA	Healthy Forest Restoration Act
IDT	Interdisciplinary Team
IGBC	Interagency Grizzly Bear Committee
IGBG	Interagency Grizzly Bear Guidelines
INFISH	Inland Native Fish Strategy
IRA	Inventoried Roadless Area
KNF	Kootenai National Forest
KV	Knutson-Vandenberg Act of 1924
LAU	Lynx Analysis Unit
MA	Management Area
MIS	Management Indicator Species
MBF	Thousand Board Feet
MBTSG	Montana Bull Trout Scientific Group
MDEQ	Montana Department of Environmental Quality
MDFWP	Montana Dept. Fish Wildlife and Parks
MMBF	Million Board Feet
MFWP	Montana Fish Wildlife and Parks
MNHP	Montana Natural Heritage Program
MOU	Memorandum of Understanding
MS	Management Situation
NCDE	Northern Continental Divide Ecosystem
NEPA	National Environmental Policy Act
NFMA	National Forest Management Act
NFS	National Forest System
NFSR	National Forest System Road
NFST	National Forest System Trail
NRIS	Natural Resource Information System
NRLMD	Norther Rockies Lynx Management Direction
OG	Old Growth
OMRD	Open Motorized Road Density
ORD	Open Road Density
PA	Physiographic Area
PCE	Primary Constituent Elements
PFA	Post-Fledgling Area
PFI	Peak Flow Increase
PL	Public Law

PM	Particulate Matter
PNV	Present Net Value
PPI	Potential Population Increase
PSD	Prevention of Significant Deterioration
PTES	Proposed, Threatened, Endangered and Sensitive Plants
RARE I & II	Roadless Area Review and Evaluation I & II
RHCA	Riparian Habitat Conservation Area
RMO	Road Management Objective
ROG	Replacement Old Growth
ROS	Recreation Opportunity Spectrum
RSI	Riffle Stability Index
SCS	Stream Channel Stability
SHPO	State Historic Preservation Officer
SIP	State Implementation Plan
SWCP	Soil and Water Conservation Practices
TES	Threatened and Endangered Species
TMDL	Total Maximum Daily Load
TMRD	Total Motorized Access Route Density
USC	United States Code
USDA	United States Department of Agriculture
USDI	United States Department of the Interior
USGS	United States Geological Survey
USFS	United States Forest Service
USFWS	USDI-Fish and Wildlife Service
VQO	Visual Quality Objectives
VRU	Vegetation Response Unit
VMS	Visual Management system
WQLS	Water quality Limited Segments
WUI	Wildland Urban Interface

Appendix B: Best Management Practices (BMP)

Introduction

Federal agency compliance with pollution control is addressed through Section 313 of the Clean Water Act, Executive Order 12580 (January 23, 1987), National Nonpoint Source Policy (December 12, 1984), USDA Nonpoint Source Water Quality Policy (December 5, 1986) and the Environmental Protection Agency in their guidance "Nonpoint Source Controls and Water Quality Standards" (August 19, 1987). In order to comply with State and local non-point pollution controls the Forest Service will apply Best Management Practices (BMPs) to all possible non-point sources which may result from management activities proposed in this FEIS. These BMPs are the Soil and Water Conservation Practices described in the Forest Service Handbook (FSH) 2509.22.

BMPs are the primary mechanism for achievement of water quality standards (EPA, 1987). This appendix describes the Forest Service's BMP process in detail, and lists the key Soil and Water Conservation Practices that have been selected to be used in the action alternatives analyzed in this FEIS.

BMPs include, but are not limited to, structural, and non-structural controls, operations, and maintenance procedures. BMPs can be applied before, during, or after pollution-producing activities to reduce or eliminate the introduction of pollutants into the receiving watershed (40 CFR 130.2, EPA Water Quality Standards Regulation). BMPs are usually applied as a system of practices rather than a single practice. They are selected on the basis of site-specific conditions that reflect natural background conditions and political, social, economic, and technical feasibility.

The Forest Plan states that soil and water conservation practices, as outlined in the Soil and Water Conservation Practices Handbook (FSH 2509.22, May 1988), will be incorporated into all land use project plans as a principal mechanism for controlling non-point pollution sources, meeting soil and water quality goals, and protecting beneficial uses. Activities found not to comply with the soil and water conservation practices or State standards will be brought into compliance, modified, or stopped (USDA Forest Service, 1987a, pp. 11-23). Montana State Water Quality Standards require the use of reasonable land, soil, and water conservation practices (analogous to BMPs) as the controlling mechanism for non-point pollution. The use of BMPs is also required in the Memorandum of Understanding between the Forest Service and the State of Montana as part of the agency's responsibility as the designated water quality management agency on National Forest System lands.

BMP Implementation Process

In cooperation with the State, the Forest Service's primary strategy for the control of non-point sources of pollution is based on the implementation of preventive practices (i.e., BMPs). The BMPs have been designed and selected to protect the identified beneficial uses of the watershed.

The Forest Service non-point source management system consists of the following steps:

1. BMP Selection and Design - Water quality goals are identified in the Forest Plan. These goals meet or exceed applicable legal requirements including State water quality regulations, the Clean Water Act, and the National Forest Management Act. Environmental assessments for projects are tiered to Forest Plans using the National Environmental Policy Act process. The

appropriate BMPs are selected for each project by an interdisciplinary team. In each new location, there is flexibility to design different BMPs depending on local conditions and values and downstream beneficial uses of water. The BMP selection and design are dictated by the proposed activity, water quality objectives, soils, topography, geology, vegetation, and climate. Environmental impacts and water quality protection options are evaluated, and alternative mixes of practices are considered. A final collection of practices are selected that not only protect water quality but meet other resource needs. These final selected practices constitute the BMPs for the project.

2. BMP Application - The BMPs are translated into contract provisions, special use permit requirements, project plan specifications, and so forth. This ensures that the operator or person responsible for applying the BMPs actually is required to do so. Site-specific BMP prescriptions are taken from plan-to-ground by a combination of project layout and resource specialists (hydrology, fisheries, soils, etc.). This is when final adjustments to fit BMP prescriptions to the site are made.
3. BMP Monitoring - When the resource activity begins (e.g., timber harvest or road building), timber sale administrators, engineering representatives, resource specialists, and others ensure the BMPs are implemented according to plan. BMP implementation monitoring is done before, during, and after resource activity implementation. This monitoring answers the question: Did we do what we said we were going to do? Once BMPs have been implemented, further monitoring is done to evaluate if the BMPs are effective in meeting management objectives and protecting beneficial uses. If monitoring indicates that water quality standards are not being met or beneficial uses are not being protected, corrective action will consider the following:

   Is the BMP technically sound? Is it really best or is there a better practice that is technically sound and feasible to implement?

   Was the BMP applied entirely as designated? Was it only partially implemented? Were personnel, equipment, funds, or training lacking which resulted in inadequate or incomplete implementation?

   Do the parameters and criteria that constitute water quality standards adequately reflect human-induced changes to water quality and beneficial uses?
4. Feedback - Feedback on the results of BMP evaluation is both short- and long-term in nature. Where corrective action is needed, immediate response will be undertaken. This action may include: modification of the BMP, modification of the activity, ceasing the activity, or possibly modification of the State water quality standard. Cumulative effects over the long-term may also lead to the need for possible corrective actions.

KNF BMP SELECTION AND DESIGN FORM (KNF-BMP-1)
(Revised 3/08 for D-4)
SITE-SPECIFIC BEST MANAGEMENT PRACTICES

Description of the soil and water conservation practices from the Forest Service Soil and Water Conservation Handbook (FSH 2509.22) will be applied in all alternatives. The location where the practices will be applied is specified in the table below. For a more detailed description of a specific BMP, refer to the Soil and Water Conservation Handbook.

ER - Engineering Representative

FP - Kootenai Forest Plan

IDT - Interdisciplinary Team

INFISH - Inland Native Fish Strategy

KNF - Kootenai National Forest

PSF - Pre-sale Forester

RHCA - Riparian Habitat Conservation Area

SAM - Sale Area Map

SMZ - Streamside Management Zone

SPS – Special Project Specification

SWCP - Soil and Water Conservation Practice

TSA - Timber Sale Administrator

TSC - Timber Sale Contract

WCP	SWCP OBJECTIVE	APPLICABLE UNITS/ROADS	CONSIDERATIONS FOR BEST MANAGEMENT PRACTICES	PROJECT SPECIFIC RECOMMENDED BEST MANAGEMENT PRACTICES	PERSON(S) RESPONSIBLE	CONTRACT PROVISIONS
14.01	TIMBER SALE PLANNING - To incorporate soil and water resource considerations into Timber Sale Planning	All Units	IDT considers watershed characteristics and expected responses to proposed activities. EIS identifies BMPs and Design Features needed to protect soil and water resources. Timber sale contracts include provisions to protect water quality, soil quality, and other resources as directed by the Decision.	OLY project design considered water and soil quality impacts. TSC will include Design Features from Decision.	IDT	N/A
14.02	TIMBER HARVEST UNIT DESIGN - To insure that timber harvest unit design will secure favorable conditions of water flow, maintain water quality and soil productivity, and reduce soil erosion and sedimentation.	All Units	Proposed activities are evaluated to estimate the potential watershed response. Prescriptions are designed to assure an acceptable level of protection for soil and water resources. Management protects soil/water resources by project design, implementing the Forest Plan including INFISH, and applying the results of past monitoring.	Cumulative effects analysis and unit design were performed by IDT. The proposed actions are consistent with the Forest Plan and best management practices. OLY unit boundaries were located so as to protect water and soil resources.	IDT	N/A
14.03	USE OF SALE AREA MAPS (SAMs) FOR DESIGNATING SOIL AND WATER PROTECTION NEEDS - To delineate the location of protected areas and available water sources and ensure their recognition, proper consideration, and protection on the ground.	All Units	The IDT and PSF will identify water courses to be protected, locate unit boundaries accordingly, and prepare SAMs showing water features and wet areas requiring protection. PSA will prepare implementation notes for TSA detailing specific soil and water resource concerns by unit. TSA will review areas of concern with Purchaser before operations. Default RHCAs widths are used unless modified through further analysis.	Default RHCA widths are used for this project. Where possible streams were excluded from units. Small streams, springs and wet areas that occur within the units will be buffered. No harvest or slash disposal activities will occur within designated RHCAs.	IDT; PSF; TSA	B(T)1.1 B(T)6.5 C(T)6.50#
14.04	LIMITING THE OPERATION PERIOD OF TIMBER SALE ACTIVITIES - To minimize soil erosion, sedimentation, and a loss in soil productivity by insuring that the Purchaser conducts his/her operations in a timely manner.	See Design Features and Mitigations	If required, limited operating periods are specified in the Decision. The PSF prepares a contract that includes provision C(T)6.316 and/or C(T)6.4#. Activities restricted to limited operating periods may include both harvesting and mechanical slash treatment.	OLY units with required winter harvest and frozen ground conditions are identified in the Design Features. Mechanized slash treatment will be restricted to dry or frozen conditions.	IDT; PSF; TSA	B(T)6.31 B(T)6.311 B(T)6.6 C(T)6.6 C(T)6.316# C(T)6.4#

WCP	SWCP OBJECTIVE	APPLICABLE UNITS/ROADS	CONSIDERATIONS FOR BEST MANAGEMENT PRACTICES	PROJECT SPECIFIC RECOMMENDED BEST MANAGEMENT PRACTICES	PERSON(S) RESPONSIBLE	CONTRACT PROVISIONS
14.05	PROTECTION OF UNSTABLE AREAS - To protect unstable areas and avoid triggering mass movements of the soil mantle and resultant erosion and sedimentation.	All Units	BMPs are specified to prevent irreversible soil and water damage on unstable soil types. Landslide-prone areas are protected as RHCAs. TSA will inform Hydrologist and PSF if it appears logging operations may cause a mass failure.	Based on ground verification, no landslide prone areas are located within proposed treatment areas.	Hydrologist; PSF; TSA	C(T)6.4#
14.06	RIPARIAN AREA DESIGNATION - To minimize the adverse effects on riparian areas with prescriptions that manage nearby logging and related land disturbance activities.	All Units	Management in or near streams and wetlands in the decision area will comply with the Forest Plan and the State SMZ law. These features and appropriate boundaries will be included on the sale area map and marked on the ground. This information will be included in the timber sale contract.	Default RHCA widths will be used. Field evalution dtermines there will be no effecto to riparian function, RMOs or water quality.	IDT; PSF; TSA	B(T)1.1 B(T)6.5, C(T)6.4# C(T)6.41# C(T)6.50#
14.07	DETERMINING TRACTOR-LOGGABLE GROUND - To protect water quality from degradation caused by tractor logging ground disturbance.	All Units	IDT identifies tractor ground during transportation and timber sale planning process. Slopes in tractor units should generally be less than 40%. PSF will prepare a TSC that includes provisions stating areas and conditions under which tractors can operate.	Tractor units have been determined through field verification of slope steepness and other ground conditions..	IDT; PSF	N/A

WCP	SWCP OBJECTIVE	APPLICABLE UNITS/ROADS	CONSIDERATIONS FOR BEST MANAGEMENT PRACTICES	PROJECT SPECIFIC RECOMMENDED BEST MANAGEMENT PRACTICES	PERSON(S) RESPONSIBLE	CONTRACT PROVISIONS
14.08	TRACTOR SKIDDING DESIGN - To minimize erosion and sedimentation and protect soil productivity by designing skidding patterns to best fit the terrain.	All Units	PSF proposes economically feasible harvest plan for each unit that meets Forest Plan standards and guidelines and minimizes adverse impacts to soil and water resources. PSF reviews difficult or complex situations with TSA during planning. TSA approves all skidding operations after consultation with Purchaser and consideration of which design will yield the least impact to the soil resource. Existing skid trails are used to the extent feasible. IDT documents project requirements in Design Features and recommendations in implementation notes. During implementation potential changes to direction in Design Features and/or implementation notes are reviewed with the appropriate personnel to assure compliance with NEPA and the Forest Plan.	See Design Features. Unit specific concerns that are not contractual requirements will be included in implementation notes after review with TSA.	IDT; TSA; Hydrologist	B(T)6.422 C(T)6.4#
14.09	SUSPENDED LOG YARDING IN TIMBER HARVESTING - To protect the soil from excessive disturbance and accelerated erosion and maintain the integrity of the riparian areas and other sensitive areas.	Not Applicable	If cable logging occurs through riparian areas, full suspension will be required. These areas will be identified by the IDT and PSF will include in TSC.		IDT; PSF; TSA	B(T)6.42 C(T)6.4# C(T)6.50#
14.10	LOG LANDING LOCATION AND DESIGN - To locate in such a way as to avoid soil erosion and water quality degradation.	All Units	TSA approves landing locations proposed by Purchaser. Approved landing locations will meet the criteria of minimal size, least excavation needed, located outside RHCAs, no side-cast material into sensitive areas, and control of runoff that may carry sediment into streams.	Skid trails and landings will be located or mitigated so that sediment does not enter stream channels. Streams will be identified on SAM and/or in implementation notes.	TSA	B(T)6.422 C(T)6.422

WCP	SWCP OBJECTIVE	APPLICABLE UNITS/ROADS	CONSIDERATIONS FOR BEST MANAGEMENT PRACTICES	PROJECT SPECIFIC RECOMMENDED BEST MANAGEMENT PRACTICES	PERSON(S) RESPONSIBLE	CONTRACT PROVISIONS
14.11	LOG LANDING EROSION PREVENTION AND CONTROL- To reduce erosion and subsequent sedimentation from log landing through the use of mitigating measures.	All Units	PSF, Hydrologist and ER will consult on designing road BMP work so that cross drainage is installed in appropriate locations that prevent sedimentation in streams. TSA assesses what is necessary to prevent erosion and takes necessary action to protect soil and water resources during operations including temporary construction/installation of drainage structures and other sediment control measures. Landings will be rehabilitated to the full extent possible under the TSC considering future activities.	Landing conditions will be reviewed by IDT after completion of harvest area activities and additional rehabilitation needs will be determined. Funding will be sought for additional work identified that cannot be completed under the TSC.	TSA; IDT; District Ranger	C(T)6.6 B(T)6.64 B(T)6.6
14.12	EROSION PREVENTION AND CONTROL MEASURES DURING THE TIMBER SALE OPERATION - To ensure that the Purchaser's operations shall be conducted reasonably to minimize soil erosion.	All Units	TSA ensures that erosion control is kept current. TSA shuts down operations when unacceptable resource damage is occurring.	See Design Features for units designated as winter harvest to protect soil and water resources.	PSF; TSA	B(T)6.6 B(T)6.64 C(T)6.6 C(T)6.601# C(T)6.633# B(T)6.661
14.13	SPECIAL EROSION PREVENTION MEASURES ON AREAS DISTURBED BY HARVEST ACTIVITIES - To prevent erosion and sedimentation on disturbed areas.	All Units			TSA; IDT	C(T)6.601# C(T)6.32# C(T)6.633#

WCP	SWCP OBJECTIVE	APPLICABLE UNITS/ROADS	CONSIDERATIONS FOR BEST MANAGEMENT PRACTICES	PROJECT SPECIFIC RECOMMENDED BEST MANAGEMENT PRACTICES	PERSON(S) RESPONSIBLE	CONTRACT PROVISIONS
14.14	REVEGETATION OF AREAS DISTURBED BY HARVEST ACTIVITIES - To establish a vegetative cover on disturbed areas to prevent erosion and sedimentation.	All Units	IDT establishes vegetation and fertilizer mix to be used in the project area consistent with KNF policy. PSF puts in contract. TSA is responsible for seeing that revegetation work required by Purchaser is done correctly and in a timely manner.	On roadways and landings seed disturbed areas with KNF approved seed mix for roads. On temporary roads and skid trails within units seed only where specified or where natural vegetation and slash do not appear adequate for erosion control. In these cases use KNF approved mix for skid trails.	IDT; PSF; TSA	C(T)6.01# C(T)6.633#
14.15	EROSION CONTROL ON SKID TRAILS - To protect water quality by minimizing erosion and sedimentation derived from skid trails.	All Units	Erosion control measures may be recommended by the IDT, but site-specifically adjusted by the TSA. TSA will ensure erosion control is kept current and installed before winter. Maintenance of erosion control structures by the Purchaser may be necessary and requested by the TSA.	Pull slash across trails and lightly tamped into the ground so as to trap runoff in lieu of waterbars. Use waterbars where slash is unavailable or inadequate. Seed trails where needed to prevent erosion or control weeds.	IDT; PSF; TSA	C(T)6.6 B(T)6.6 B(T)6.64 B(T)6.65 B(T)6.66
14.16	MEADOW PROTECTION DURING TIMBER HARVESTING - To avoid damage to the ground cover, soil, and water in meadows.	Not Applicable	IDT identifies areas needing special protection. PSF will verify the areas needing protection and prepare the contract to prevent damage to meadows. The TSA will be responsible for on-the-ground protection of meadows. If meadows are found by the TSA during operations, it is their responsibility to either afford them the proper protection or pursue a contract modification.	No meadows have been identified within the timber sale units.	IDT; PSF; TSA	B(T)1.1 B(T)5.1 B(T)6.422 B(T)6.61 C(T)6.4# C(T)6.62#

WCP	SWCP OBJECTIVE	APPLICABLE UNITS/ROADS	CONSIDERATIONS FOR BEST MANAGEMENT PRACTICES	PROJECT SPECIFIC RECOMMENDED BEST MANAGEMENT PRACTICES	PERSON(S) RESPONSIBLE	CONTRACT PROVISIONS
14.17	STREAM CHANNEL PROTECTION (IMPLEMENTATION AND ENFORCEMENT) - Protect natural stream flows; provide unobstructed passage of flows; reduce sediment input; and restore flow if diverted by timber sale activity.	All Units	IDT has identified the location of channels in the decision area. PSF will prepare a SAM locating the channels needing protection. Layout crew marks boundaries and trees according SMZ and FP guidelines. TSA will review any proposed stream channel crossings by skid trails or temporary roads with hydrologist. An Alternative Practice or 124 Permit may be required. TSA will see that TSC items are carried out on the ground.	Default RHCA widths apply.	IDT; PSF; TSA	B(T)1.1 B(T)6.5 B(T)6.6 C(T)6.50# C(T)6.6
14.18	EROSION CONTROL STRUCTURE MAINTENANCE - To insure that constructed erosion control structures are stabilized and working effectively.	All Units	During the period of the TSC, the Purchaser is responsible for maintaining the erosion control features. TSA ensures contract compliance.		TSA	B(T)6.67
14.19	ACCEPTANCE OF TIMBER SALE EROSION CONTROL MEASURES BEFORE SALE CLOSURE - To assure the adequacy of required erosion control work on timber sales.	All Units	TSA reviews erosion control work in each harvest unit for implementation and effectiveness. Erosion control measures are not considered acceptable if they do not meet standards or do not protect soil/water values. TSA documents acceptance of erosion control features in daily diary. TSA informs IDT where problems with effective implementation are encountered.		TSA	B(T)6.36
14.20	SLASH TREATMENT IN SENSITIVE AREAS - To protect water quality by protecting sensitive tributary areas from degradation that would result from using mechanized equipment for slash disposal.	All Units	All activities will comply with the KNF Forest Plan and State SMZ law. Mechanical fuels treatments should not be prescribed for areas with slopes greater than 40%. TSA will not permit piling operations if high soil moistures will result in rutting. Prescribed burning ignition will not occur within RHCAs.	Mechanical piling is limited to units with slopes less than 40%.	IDT; TSA	B(T)6.5 C(T)6.50# B(T)6.7 C(T)6.7 C(T)6.71 C(T)6.753

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14.22	MODIFICATION OF THE TSC - To modify the TSC if new circumstances or conditions indicate the timber sale will cause irreversible damage to soil, water, or watershed values.	All Units	If TSC is not adequate to protect soil/water resources, the TSA and Contracting Officer are responsible for recommending modification of the TSC. IDT and District Ranger will be consulted on problem and proposed remedy.		TSA; Contracting Officer; IDT; District Ranger	B(T)8.3
15.01	GENERAL GUIDELINES FOR TRANSPORTATION PLANNING - To introduce soil and water resource considerations into transportation planning.	All Roads	Complete or update transportation analysis. The IDT evaluates watershed characteristics and response of soil and water resources to existing transportation system, proposed transportation alternatives and road-related activities.	A transportation analysis for the OLY area has been completed and identified roads of most concern for soil and water resources. Opportunities for addressing these concerns have been identified and prioritized.	IDT; ER	N/A
15.02	GENERAL GUIDELINES FOR THE LOCATION AND DESIGN OF ROADS AND TRAILS - To locate and design roads and trails with minimal soil and water impact while considering all design criteria.	All New Permanent or Temporary Roads	The IDT ensure that location and design of roads have considered best options for soil and water resource protection. Mitigation measures have been identified to protect the soil and water resources. Design and contract will be prepared by the ER that meets the soil and water resource protection requirements.	Two new permanent road segments are planned in order to decrease the impacts of the existing road on water resources. For any temporary roads: Design temporary roads so as to minimize total ground disturbance considering skidding and landing needs. Avoid unstable or wet soils during location. Avoid slopes over 50%. Apply appropriate design features and BMPs at stream crossings to minimize sediment delivery.	IDT; ER	N/A
15.03	ROAD AND TRAIL EROSION CONTROL PLAN - To prevent, limit, and mitigate erosion, sedimentation, and resulting water quality degradation during construction by timely implementation of erosion control practices.	All Roads	IDT identifies priority road-related work. Engineering works with specialists on BMP design for sites of special concern and implements BMP work according to Decision. ER prepares contract that has adequate BMPs. ER will see that erosion control measures are completed in a timely manner. ER/TSA documents compliance in daily diary.	BMPs that would minimize sediment delivery to stream crossings on the timber sale haul roads have been identified and will be included in the timber sale contract. See Design Features.	ER; SA	B(T)6.31 B(T)6.6 B(T)6.312

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15.04	TIMING OF CONSTRUCTION ACTIVITIES - To minimize erosion by conducting operations during minimal runoff periods.	All Roads	Road work should only be performed when ground conditions are suitable. Wet or frozen conditions prevent good compaction and can result in excessive sedimentation. IDT identifies any unusual timing restrictions. PSA puts appropriate timing into TSC. ER/TSA permit construction within allowed periods and when ground conditions are such that water quality impacts are minimized.	No special timing for road work required other than normal operating season.	IDT; ER; SA	B(T)6.31 B(T)6.312 B(T)6.6 SPS 204
15.05	SLOPE STABILIZATION AND PREVENTION OF MASS FAILURES - To reduce sedimentation by minimizing the chances for road-related mass failures, including landslides and embankment slumps.	All Roads	IDT identifies slope stability concerns and recommended solutions. PSF and ER translate required design features into TSC. ER/TSA implement required mitigation and review any concerns/changes with hydrologist.			N/A
15.06	MITIGATION OF SURFACE EROSION AND STABILIZATION OF SLOPES - To minimize soil erosion from road cutslopes, fill slopes, and travel ways.	All Roads	Stabilization techniques are included in contract provisions. Compliance is ensured by ER.	Seed and fertilize any disturbed areas caused by road maintenance, reconstruction or new construction. . Buttress cut slopes and catch basins that may slump and plug ditches or culverts.	ER	SPS 203, SPS 204 SPS 206A SPS 210 SPS 412 SPS 619 SPS 625 SPS 626 SPS 630 B(T)5.3 B(T)6.31 B(T)6.6 B(T)6.62 B(T)6.66 B(T)6.312 C(T)6.6 C(T)6.601

WCP	SWCP OBJECTIVE	APPLICABLE UNITS/ROADS	CONSIDERATIONS FOR BEST MANAGEMENT PRACTICES	PROJECT SPECIFIC RECOMMENDED BEST MANAGEMENT PRACTICES	PERSON(S) RESPONSIBLE	CONTRACT PROVISIONS
15.07	CONTROL OF PERMANENT ROAD DRAINAGE - To minimize the erosive effects of concentrated water and degradation of water quality by proper design and construction of road drainage systems and drainage control structures.	All Permanent Roads	Hydrologist works with ER to identify road segments and road/stream crossings that need BMP work. Work necessary to prevent sediment delivery to streams is identified in Design Features and included in TSC.	See Design Features for BMP work identified for this project.	Hydrologist; ER	B(T)5.3 C(T)5.31 B(T)6.311 B(T)6.6 C(T)6.6
15.08	PIONEER ROAD CONSTRUCTION - To minimize sediment production and mass wasting associated with pioneer road construction.	Not Applicable	ER will be responsible for enforcing contract specifications. The Purchaser is responsible for submitting an operating plan that includes erosion control measures.		ER	B(T)6.6 B(T)5.23 B(T)6.31 B(T)6.312 B(T)6.311 SPS 204
15.09	TIMELY EROSION CONTROL MEASURES ON INCOMPLETE ROADS AND STREAM CROSSING PROJECTS - To minimize erosion of and sedimentation from disturbed ground on incomplete projects.	All Roads	Avoid construction during wet periods. Use slash filter windrows and sediment traps where needed. Seed and fertilize disturbed areas. Protective measures will be kept current on all areas of disturbed, erosion-prone areas.ER/TSA ensures contract compliance.		ER; TSA	B(T)6.31 B(T)6.6 B(T)5.23 B(T)6.66 C(T)6.6
15.10	CONTROL OF ROAD CONSTRUCTION, EXCAVATION, AND SIDE-CAST MATERIAL - To reduce sedimentation from unconsolidated excavated and side-cast material caused by road construction, reconstruction, or maintenance.	All Roads	Do not sidecast material into waterways or sensitive areas. Consider replacement or extension of culverts that are not long enough to protect stream from sidecast of roadway material during road blading. Protective measures will be kept current on all areas of disturbed, erosion-prone areas. ER/TSA ensure contract compliance.		ER; TSA	BT5.3 CT5.31 SPS 203 SPS 204

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15.11	SERVICING AND REFUELING EQUIPMENT - To prevent contamination of waters from accidental spills of fuels, lubricants, bitumens, and other harmful materials.	All Units and Roads	ER/TSA will approve location, size, and uses of service refueling and fuel storage areas. Fueling should not occur within RHCAs or in locations where fuel spills could contaminate water bodies or riparian areas. ER/TSA will ensure contract compliance. ER/TSA will follow KNF Hazardous Substance Spill Plan in case of accidents.		ER; TSA	B(T)6.222 B(T)6.34 B(T)6.341
15.12	CONTROL OF CONSTRUCTION IN RIPARIAN AREAS - To minimize the adverse effects on riparian areas from roads.	All Roads	Construction of proposed new and temporary roads will comply with Forest Plan and Montana SMZ Law. All construction will be performed so as to minimize impact to water quality and the riparian area. ER/TSA will pay particular attention to activities in riparian areas.	Road width will be kept to the minimum at stream crossings. Excess material will not be sidecast into riparian area. Cross drainage will be provided on approaches so that surface runoff is diverted before crossing. Culverts will be installed during periods of low or no flow and according to specifications. Erosion control measures will be implemented.	ER; TSA	B(T)6.5 B(T)6.62 C(T)6.50 SPS 206 SPS 206A
15.13	CONTROLLING IN-CHANNEL EXCAVATION - To minimize stream channel disturbances and related sediment production.	All Roads	See 15.12.	See 15.12.	ER; TSA	B(T)6.5 SPS 204 SPS 206 SPS 206A
15.14	DIVERSION OF FLOWS AROUND CONSTRUCTION SITES - To minimize downstream sedimentation by insuring all stream diversions are carefully planned.	All Roads	Divert stream flow around construction sites. Live stream crossings require a State 124 permit. The ER will acquire permit in consultation with hydrologist.		ER; Hydrologist	B(T)6.5 B(T)6.31 C(T)6.50 C(T)6.52 C(T)6.6

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15.15	STREAM CROSSINGS ON TEMPORARY ROADS - To keep temporary roads from unduly damaging streams, disturbing channels, or obstructing fish passage.	Temporary Roads	Avoid temporary road locations with stream crossings if possible. Live streams require a State 124 permit. TSA will acquire permits in consultation with an engineering representative or hydrologist	There are no stream crossings on temporary roads proposed for this project.	Hydrologist; Aquatic Specialist; PSF; TSA	
15.16	BRIDGE AND CULVERT INSTALLATION - To minimize sedimentation and turbidity resulting from excavation for in-channel structures.	All Roads	The hydrologist and ER will cooperate on design and mitigations. The ER will ensure the design and contract language are sufficient to protect water resources. Live streams require a State 124 permit. ER will acquire permits in consultation with hydrologist.	Perform culvert removal and installation work during suitable ground conditions and low flow periods in accordance with terms of the applicable Montana 124 permit, and, if applicable, the FWS Biological OpinionTerms and Conditions for bull trout.	Hydrologist; Aquatic Specialist; ER	C(T)6.5
15.17	REGULATION OF BORROW PITS, GRAVEL SOURCES, AND QUARRIES - To minimize sediment production from borrow pits, gravel sources, and quarries and limit channel disturbance in those gravel sources suitable for development in floodplains.		ER will consult hydrologist if there are water quality concerns. ER ensures contract compliance		ER	B(T)6.5 C(T)6.50
15.18	DISPOSAL OF RIGHT-OF-WAY AND ROADSIDE DEBRIS - To insure that debris generated during road construction is kept out of streams and prevent slash and debris from subsequently obstructing channels.	All Roads	Proposed road construction will adhere to the Forest Plan guidelines and Montana SMZ law. The TSC requires that debris and slash generated during road construction will not be side cast into streams.		ER	Std Spec 201 SPS 201

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15.19	STREAM BANK PROTECTION – To minimize sediment production from stream banks and structural abutments in natural waterways.	All Roads	Take precautions to minimize or eliminate disturbance to stream banks. Maintain instream structures. Protective measures will be kept current on all areas of disturbed soils. TSA and ER ensure contract compliance.		ER;TSA	Std Spec 619
15.20	WATER SOURCE DEVELOPMENT CONSISTENT WITH WATER QUALITY PROTECTION - To supply water for road construction and maintenance and fire protection while maintaining water quality.	All Roads and Units	Take precautions to eliminate the transfer of aquatic invasive species between waterbodies.	Ensure all equipment operated in or adjacent to the waterbody is clean of aquatic invasive species, as well as oil and grease, and is well maintained. Avoid drafting from water bodies with known infestations of aquatic invasive species.	ER; FMO; Aquatic Specialist	Std Spec 207
15.21	MAINTENANCE OF ROADS - To maintain all roads in a manner that provides for soil and water protection by minimizing rutting, failures, side-cast, and blockage of drainage facilities.	All Roads	Road maintenance associated with a timber sale is the responsibility of Purchaser. The ER/TSA will ensure that the Purchaser maintains roads according to the appropriate maintenance level.		ER; SA	B(T)5.12 B(T)5.3 B(T)6.6 C(T)6.6 C(T)5.9 C(T)5.42 C(T)5.31 B(T)6.31
15.22	ROAD SURFACE TREATMENT TO PREVENT LOSS OF MATERIALS - To minimize the erosion of road surface materials and, consequently, reduce the likelihood of sediment production.	All Roads	Maintenance of road surface includes proper blading and/or dust abatement. Use crushed gravel where necessary. Protective measures will be kept current on all areas of disturbed, erosion-prone areas. ER ensures contract compliance.		ER	B(T)5.3 C(T)5.31 C(T)5.314

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15.23	TRAFFIC CONTROL DURING WET PERIODS - To reduce the potential for road surface disturbance during wet weather and reduce sedimentation.	All Roads	Road restrictions and traffic control measures will be implemented on roads when damage would occur during spring breakup and wet weather. Avoid hauling during wet periods.		ER; TSA	B(T)6.6 C(T)6.6 C(T)5.316 C(T)5.41
15.24	SNOW REMOVAL CONTROLS - To minimize the impact of snow melt on road surfaces and embankments and reduce the probability of sediment production resulting from snow removal operations.	All Winter Haul Roads	Snow removal will be kept current on all roads associated with winter logging operations. TSC requires opening sections of berm to allow water to leave road surface. Where a berm cannot be avoided or is desired, insure proper drainage by opening sections of the berm to allow surface water to leave the road. The TSA ensures compliance with contract provisions.		TSA	C(T)5.316 Std Spec 203.09
15.25	OBLITERATION OF TEMPORARY ROADS - To reduce sediment generated from temporary roads by obliterating them at the completion of their intended use.	All Temporary Roads	Temporary roads will be fully recontoured, and slash will be pulled back onto the disturbed surface. To the extent possible the top soil should be placed back on top as the road is recontoured. The TSA will ensure contract compliance.	Temporary roads will be obliterated by recontouring, ripping, and placement of duff and slash. Any stream crossings will be completely recontoured.	TSA	B(T)6.63 C(T)6.6 C(T)6.632 C(T)6.633
18.03	PROTECTION OF SOIL AND WATER FROM PRESCRIBED BURNING EFFECTS - To maintain soil productivity, minimize erosion, and prevent ash, sediment, nutrients, and debris from entering surface water.	All Units	Broadcast burning adjacent to riparian areas will adhere to Forest Plan and Montana SMZ law. Prescribed burn plans identify the conditions necessary to prevent soil damage and meet site preparation objectives. The IDT will monitor results.	No ignition will occur within the RHCAs of harvest units.	Fuels Specialist; IDT	N/A

Appendix C: OLY Harvest Treatment Summary

Alternative 2 – Harvest Treatment Summary

Unit #	MA/Suitability	Acres	Current Condition	Proposed Treatment	Logging System/ Season	Objectives	Purpose and Need				
							Promote resilient vegetation	Maintain or improve water quality	Provide wildlife security and forage	Provide wood products	Hazardous fuels reduction
1	6	54	Mixed conifer WL, DF, LP, PP, w/ dense understory. Mix of dry/moist forest types. In WUI.	Improvement cut w/ openings. Slash, grapple pile	Tractor	Improve health and vigor of manageable component of WL, PP, DF. Initiate regeneration, provide browse, reduce fuel loadings	X		X	X	X
3A	6	12	Mixed conifer DF, PP, WL, GF, LP, WH w/ root rot in DF. In WUI	Clear cut w/reserves, slash, grapple pile	Tractor	Initiate regeneration, promote resilience, reduce fuel loading, provide browse	X		X	X	X
3B	6	13	Mixed conifer DF, PP, WL, GF, LP, WH w/ root rot in DF. In WUI	Seed tree w/ reserves, slash, grapple pile	Tractor	Initiate regeneration, promote resilience, reduce fuel loading, provide browse	X		X	X	X
4	6	176	Mixed conifer WL, DF, PP, LP, GF, WP w/ patchy understory w/ root disease. In WUI.	Improvement cut, slash, underburn	Tractor	Improve health and vigor of manageable component of WL, PP, DF. Promote resilience, reduce fuel loading, provide browse	X		X	X	X

Unit #	MA/Suitability	Acres	Current Condition	Proposed Treatment	Logging System/ Season	Objectives	Purpose and Need				
							Promote resilient vegetation	Maintain or improve water quality	Provide wildlife security and forage	Provide wood products	Hazardous fuels reduction
5	6	8	Mixed conifer DF, WRC, WL, GF, H, PP w/ multi-layer understory. In WUI.	Seed tree w/reserves, slash, grapple pile	Tractor	Initiate regeneration, promote resilience, reduce fuel loading, provide browse	X		X	X	X
6	6	42	Open stand DF, WL, PP w/ insect and disease issues. In WUI.	Improvement cut with seed tree or shelterwood openings, slash, grapple pile	Tractor	Initiate regeneration, promote resilience, reduce fuel loading, provide browse	X		X	X	X
7	6	8	Multi-layer overstory DF, PP, GF, WP, GF, WRC w/ root disease in DF. In WUI.	Seed tree w/reserves, slash, grapple pile	Tractor	Initiate regeneration, promote resilience, reduce fuel loading, provide browse	X		X	X	X
8	6	66	Mixed conifer DF, PP, WL w/GF, WRC in lower portion. In WUI.	Improvement cut, slash, underburn	Tractor	Improve health and vigor of manageable component of WL, PP, DF. Promote resilience, reduce fuel loading provide browse	X		X	X	X
8A	6	4	Mixed conifer DF, PP, WL, GF, WRC. In WUI.	Improvement cut, slash, grapple pile	Tractor	Improve health and vigor of manageable component of WL, PP, DF. Promote resilience, reduce fuel loading provide browse	X		X	X	X
9	6	16	Mixed conifer WL, GF, PP, WRC, WP, DF w/ root disease issues. In WUI.	Seed tree w/reserves, slash, grapple pile	Tractor	Initiate regeneration, promote resilience, reduce fuel loading, provide browse	X		X	X	X

Unit #	MA/Suitability	Acres	Current Condition	Proposed Treatment	Logging System/ Season	Objectives	Purpose and Need				
							Promote resilient vegetation	Maintain or improve water quality	Provide wildlife security and forage	Provide wood products	Hazardous fuels reduction
11	6	11	DF, PP stand w/ DF understory; absence of PP reproduction. In WUI.	Seed tree w/reserves, slash, underburn	Tractor	Initiate regeneration, promote resilience, reduce fuel loading, provide browse	X		X	X	X
12	6	25	Mixed conifer DF, GF, WRC, PP w/ dense GF understory and mid-canopy. In WUI.	Seed tree w/reserves, slash, grapple pile	Tractor	Initiate regeneration, promote resilience, reduce fuel loading, provide browse	X		X	X	X
14	6	70	Mixed conifer WL, DF, GF, PP, WP, LP w/ GF understory. Cankers and root disease noted. In WUI	Clear cut w/reserves, slash, underburn	Tractor/ Winter	Initiate regeneration, promote resilience, reduce fuel loading, provide browse	X		X	X	X
15	6	27	Two-storied stand of DF w/ PP, WP, WL present. DF in poor health. In WUI.	Seed tree w/reserves, slash, underburn	Tractor	Initiate regeneration, promote resilience, reduce fuel loading, provide browse	X		X	X	X
16	6	6	Mixed conifer PP, DF, WL, LP, GF, WRC w/ incidental root disease. In WUI.	Improvement cut, slash, underburn	Tractor	Improve health and vigor of manageable component of PP, WL, DF. Promote resilience, provide browse, reduce fuel loading	X		X	X	X

Unit #	MA/Suitability	Acres	Current Condition	Proposed Treatment	Logging System/ Season	Objectives	Purpose and Need				
							Promote resilient vegetation	Maintain or improve water quality	Provide wildlife security and forage	Provide wood products	Hazardous fuels reduction
18	6	81	Mixed conifer GF, SAF, WL, DF, LP w/ moderate blowdown and root disease. In WUI.	Clear cut w/reserves, slash, underburn	Tractor	Initiate regeneration, promote resilience, reduce fuel loading	X			X	X
20	6	109	Mixed conifer GF, DF, WL w/ moderate to heavy root disease in GF. In WUI.	Seed tree w/reserves, slash, underburn	Skyline	Initiate regeneration, promote resilience, reduce fuel loading	X			X	X
21	6	129	Dry site DF, PP w/ low to moderate incidence of root disease in DF. In WUI.	Improvement cut, slash, underburn	Skyline	Improve health and vigor of manageable component of PP, DF. Promote resilience, protect old growth character, provide browse, reduce fuel loading	X		X	X	X
23	6	24	Mixed conifer DF, GF, WL, WH w/ root disease in DF, GF. In WUI.	Improvement cut with openings, slash, grapple pile	Tractor	Improve health and vigor of manageable component of PP, WL, DF. Promote resilience, provide browse, reduce fuel loading	X		X	X	X

Unit #	MA/Suitability	Acres	Current Condition	Proposed Treatment	Logging System/ Season	Objectives	Purpose and Need				
							Promote resilient vegetation	Maintain or improve water quality	Provide wildlife security and forage	Provide wood products	Hazardous fuels reduction
24	6	25	Mixed conifer PP, WL, DF, GF w/ low incidence of root disease in DF. In WUI.	Improvement cut, slash, underburn	Skyline	Improve health and vigor of manageable component of PP, WL, DF. Promote resilience, provide browse, reduce fuel loading	X		X	X	X
25	6	65	Mixed conifer of GF, WH, DF, WL, LP, WRC, PP w/ low incidence of root disease in DF, GF. In WUI.	Clear cut w/reserves, slash, grapple pile	Tractor	Initiate regeneration, promote resilience, reduce fuel loading, provide browse	X		X	X	X
27	6	11	Two-storied stand of PP, WL, DF w/ low incidence of root disease in DF. In WUI.	Improvement cut, slash, underburn	Skyline	Improve health and vigor of manageable component of WL, PP, DF. Provide browse, reduce fuel loadings	X		X	X	X
28	6	80	Older plantation of PP w/ LP, GF, DF natural regen. PP is off-site. In WUI.	Improvement cut, selective thin understory, yard tops	Tractor	Improve health and vigor of manageable component of PP, WL, DF. Provide browse, reduce fuel loadings	X		X	X	X
29	6	25	Multi-stored DF, WL, WRC, WP, PP, GF, LP, ES. In WUI.	Seed tree w/reserves, slash, grapple pile	Tractor	Initiate regeneration, promote resilience, reduce fuel loading, provide browse	X		X	X	X

Unit #	MA/Suitability	Acres	Current Condition	Proposed Treatment	Logging System/ Season	Objectives	Purpose and Need				
							Promote resilient vegetation	Maintain or improve water quality	Provide wildlife security and forage	Provide wood products	Hazardous fuels reduction
30	6	37	Mixed conifer DF, GF, WL, WRC, PP, WP, LP, WH w/ patchy GF seedling/sapling understory. In WUI.	Shelterwood w/reserves, slash, grapple pile	Tractor	Initiate regeneration, promote resilience, reduce fuel loading, provide browse	X		X	X	X
31B	6	60	Mixed conifer LP, GF, WP, DF, WL, WH, WRC w/ heavy Mountain Pine Beetle activity in LP. In WUI.	Clear cut w/reserves, slash, grapple pile	Tractor	Initiate regeneration, promote resilience, reduce fuel loading, provide browse	X		X	X	X
32	2 and 6	34	Mixed PP, DF, WL with an open to moderate understory. DF in poor health; evidence of root rot. In WUI.	Improvement cut, slash, underburn	Tractor	Improve health and vigor of manageable component of PP, WL, DF. Promote resilience, protect developing old growth character, provide browse, reduce fuel loading	X		X	X	X
33	2 and 6	30	Older plantation of PP, LP w/ thick GF/DF understory. PP is off-site. In WUI.	Clear cut w/reserves, slash, underburn	Tractor/ Winter	Initiate regeneration, promote resilience, reduce fuel loading, provide browse	X		X	X	X
34	6	56	Mixed conifer stand of LP, GF, DF, WL, WH w/ root rot in DF/GF. In WUI	Seed tree w/reserves, slash, underburn	Tractor/ Winter	Initiate regeneration, promote resilience, reduce fuel loading, provide browse	X		X	X	X

Unit #	MA/Suitability	Acres	Current Condition	Proposed Treatment	Logging System/ Season	Objectives	Purpose and Need				
							Promote resilient vegetation	Maintain or improve water quality	Provide wildlife security and forage	Provide wood products	Hazardous fuels reduction
35	2	12	Dense mixed conifer stand of GF, LP, WL, DF, WRC, WP, WH w/abundant ladder fuels. In WUI.	Seed tree w/reserves, slash, grapple pile	Tractor/ Winter	Initiate regeneration, promote resilience, reduce fuel loading, provide browse	X		X	X	X
35A	2	2	Mixed conifer LP dominated overstory w/ GF, WL, WP. Thick GF understory.	Clear cut w/reserves, slash, grapple pile	Tractor/ Winter	Improve health and vigor of manageable component WL and WP. Promote resilience, reduce fuel loading, provide browse	X		X	X	X
35B	2	3	Mixed age stand of PP, LP w/DF and WL. Areas of pole-size LP. In WUI.	Improvement cut, slash, grapple pile	Tractor/ Winter	Improve health and vigor of manageable component of PP, WL, DF. Provide browse, reduce fuel loadings	X		X	X	X
36	2	4	Dense mixed conifer stand of GF, LP, WL, DF, WRC, WP, WH w/abundant ladder fuels. In WUI.	Seed tree w/reserves, slash, grapple pile	Tractor/ Winter	Initiate regeneration, promote resilience, reduce fuel loading, provide browse	X		X	X	X
37	6	73	Mixed conifer DF, GF, WL, WRC, PP, LP w/ GF in understory. Root rot in DF. In WUI.	Seed tree w/reserves, slash, underburn	Tractor/ Winter	Initiate regeneration, promote resilience, reduce fuel loading, provide browse	X		X	X	X

Unit #	MA/Suitability	Acres	Current Condition	Proposed Treatment	Logging System/ Season	Objectives	Purpose and Need				
							Promote resilient vegetation	Maintain or improve water quality	Provide wildlife security and forage	Provide wood products	Hazardous fuels reduction
37A	6	34	Stand of DF, PP, WL w/ root rot in DF w. little understory. In WUI.	Improvement cut, slash, underburn	Skyline	Improve health and vigor of manageable component of WL, PP, DF. Provide browse, reduce fuel loadings	X		X	X	X
38	6	71	Older plantation of PP, LP GF w/ root disease in LP, PP, GF. PP is off-site but not deteriorating too badly. Light understory. In WUI.	Improvement cut w/ seed tree or shelterwood openings, slash, grapple pile	Tractor	Improve health and vigor of manageable component of PP, WL, DF. Initiate regeneration, provide browse, reduce fuel loadings	X		X	X	X
38A	6	6	Older plantation of PP, LP w/ understory of GF, DF, WP. In WUI.	Clear cut w/reserves, slash, underburn	Tractor	Initiate regeneration, promote resilience, reduce fuel loading, provide browse	X		X	X	X
39	6	52	Mixed conifer WRC, WH, GF, PP, DF, WP, LP w/ dense understory w/ observations of root rot. In WUI.	Seed tree w/reserves, slash, grapple pile	Tractor	Initiate regeneration, promote resilience, reduce fuel loading, provide browse	X		X	X	X
40	2 and 6	109	Multi-storied, multi-aged GF, WL, DF, PP, WRC, LP, WP w/ GF understory. In WUI.	Seed tree w/reserves, slash, grapple pile	Tractor	Initiate regeneration, promote resilience, reduce fuel loading, provide browse	X		X	X	X

Unit #	MA/Suitability	Acres	Current Condition	Proposed Treatment	Logging System/ Season	Objectives	Purpose and Need				
							Promote resilient vegetation	Maintain or improve water quality	Provide wildlife security and forage	Provide wood products	Hazardous fuels reduction
41B	2 and 6	15	Mixed conifer DF, PP, LP, WL. In WUI.	Seed tree w/reserves, slash, grapple pile	Tractor/ Winter	Initiate regeneration, promote resilience, reduce fuel loading, provide browse	X		X	X	X
42	2 and 6	85	Mixed conifer DF, WL, PP, LP w/ root disease, DF bark beetles, Mountain Pine beetle. In WUI.	Seed tree w/reserves, slash, underburn	Skyline	Initiate regeneration, promote resilience, reduce fuel loading, provide browse	X		X	X	X
43	6	48	Mixed conifer DF, LP, GF, WRC, WH, WL w/ dense understory. Root disease in DF; Mountain Pine beetle in LP. In WUI.	Seed tree w/reserves, slash, grapple pile	Tractor	Initiate regeneration, promote resilience, reduce fuel loading, provide browse	X			X	X
44	6	20	Mixed conifer GF, DF, WH, LP, WL, WRC w/ root disease and dense understory GF, WH. In WUI.	Seed tree w/reserves, slash, grapple pile	Tractor	Initiate regeneration, promote resilience, reduce fuel loading, provide browse	X		X	X	X
45	6	33	DF, PP, LP. Severe root rot in DF. In WUI.	Clear cut w/reserves, slash, underburn	Tractor	Initiate regeneration, promote resilience, reduce fuel loading, provide browse	X		X	X	X
45A	6	63	Generally understocked stand DF, PP, LP w/WL, GF. In WUI.	Seed tree w/reserves, slash, underburn	Tractor	Initiate regeneration, promote resilience, reduce fuel loading, provide browse	X		X	X	X

Unit #	MA/Suitability	Acres	Current Condition	Proposed Treatment	Logging System/ Season	Objectives	Purpose and Need				
							Promote resilient vegetation	Maintain or improve water quality	Provide wildlife security and forage	Provide wood products	Hazardous fuels reduction
45B	6	26	Stand of DF, PP, LP. Healthy but dense. In WUI.	Improvement cut, slash, underburn	Tractor	Improve health and vigor of manageable component of WL, PP, DF. Provide browse, reduce fuel loadings	X		X	X	X
45C	6	35	Mixed conifer DF, GF, WL, WRC w/ patchy stocking and evidence of root rot. In WUI.	Seed tree w/reserves, slash, grapple pile	Tractor/ Winter	Initiate regeneration, promote resilience, reduce fuel loading, provide browse	X		X	X	X
46	6	16	Older plantation of PP, LP, DF, WL. In WUI.	Improvement cut, fell damaged residual, selective thin, slash, grapple pile	Tractor/ Winter	Improve health and vigor of manageable component of WL, PP, DF. Provide browse, reduce fuel loadings	X		X	X	X
47	6	17	Older plantation of PP, DF, LP, WL w/ insect and disease issues. PP is off site and sustaining significant mortality. In WUI.	Clear cut w/reserves, slash, underburn	Tractor	Initiate regeneration, promote resilience, reduce fuel loading, provide browse	X		X	X	X
48	6	23	Older plantation of PP, DF, WL, LP w/ insect and disease issues. PP is off site w/ significant mortality. In WUI.	Clear cut w/reserves, slash, underburn	Tractor/ Winter	Initiate regeneration, promote resilience, reduce fuel loading, provide browse	X		X	X	X

Unit #	MA/Suitability	Acres	Current Condition	Proposed Treatment	Logging System/ Season	Objectives	Purpose and Need				
							Promote resilient vegetation	Maintain or improve water quality	Provide wildlife security and forage	Provide wood products	Hazardous fuels reduction
49	6	6	Older plantation of PP, LP, DF w/ insect and disease issues. PP is off site and sustaining significant mortality. In WUI.	Clear cut w/reserves, slash, underburn	Tractor	Initiate regeneration, promote resilience, reduce fuel loading, provide browse	X		X	X	X
50	6	21	Older PP plantation w/ health issues and ingrowth. PP is off site but not experiencing significant mortality. In WUI.	Improvement cut, fell damaged residual, selective thin, slash, grapple pile	Tractor	Improve health and vigor of manageable component of WL, PP, DF. Provide browse, reduce fuel loadings	X		X	X	X
51	6	36	Older plantation of PP, DF, LP, WL w/ insect and disease issues. PP is off site and sustaining significant mortality. In WUI.	Clear cut w/reserves, slash, underburn	Tractor/ Winter	Initiate regeneration, promote resilience, reduce fuel loading, provide browse	X		X	X	X
52	6	56	Mixed conifer DF, LP, WL w/ root rot in DF. Workable PP, WL component. In WUI.	Improvement cut w/ openings, fell damaged residual, underburn	Tractor	Improve health and vigor of manageable component of WL, DF. Initiate regeneration, provide browse, reduce fuel loadings	X		X	X	X

Unit #	MA/Suitability	Acres	Current Condition	Proposed Treatment	Logging System/ Season	Objectives	Purpose and Need				
							Promote resilient vegetation	Maintain or improve water quality	Provide wildlife security and forage	Provide wood products	Hazardous fuels reduction
52A	6	39	DF dominated w/LP, WL, PP, GF. Significant root disease in DF/GF. Light to moderate understory. In WUI.	Clear cut w/reserves, slash, grapple pile	Tractor	Initiate regeneration, promote resilience, reduce fuel loading, provide browse	X		X	X	X
52B	2 and 6	65	DF dominated w/LP, WL, PP. Significant root disease in DF. Light to moderate understory. In WUI.	Seed tree w/reserves, slash, underburn	Tractor/ Winter	Initiate regeneration, promote resilience, reduce fuel loading, provide browse	X			X	X
52C	6	31	DF, PP, LP, WL w/light understory. Low levels of root disease.	Improvement cut w/ seed tree or shelterwood openings, fell damaged residual, underburn	Tractor/ Winter	Improve health and vigor of manageable component of PP, WL, DF. Provide browse, reduce fuel loadings	X		X	X	X
52D	6	14	DF, WL, GF, WP with moderate understory and high levels of root disease in DF/GF. In WUI.	Clear cut w/reserves, slash, grapple pile	Tractor/ Winter	Initiate regeneration, promote resilience, reduce fuel loading, provide browse	X		X	X	X
53	6	49	Older plantation of PP, DF, LP, WL w/ insect and disease issues. PP is off site and sustaining significant mortality. In WUI.	Clear cut w/reserves, slash, underburn	Tractor	Initiate regeneration, promote resilience, reduce fuel loading, provide browse	X		X	X	X

Unit #	MA/Suitability	Acres	Current Condition	Proposed Treatment	Logging System/ Season	Objectives	Purpose and Need				
							Promote resilient vegetation	Maintain or improve water quality	Provide wildlife security and forage	Provide wood products	Hazardous fuels reduction
54	6	24	Dense, stagnant stand of DF, LP w/ incidental PP, WL w/ root rot in DF. In WUI.	Clear cut w/reserves, slash, grapple pile	Tractor	Initiate regeneration, promote resilience, reduce fuel loading, provide browse	X			X	X
55	6	31	Fairly open stand of DF, PP, LP, WL w/light understory.	Improvement cut, slash, underburn	Tractor	Improve health and vigor of manageable component of PP, DF. Provide browse, reduce fuel loadings	X		X	X	X
55A	2 and 6	10	DF, PP, LP, WL w/ patches of dense DF/LP regeneration.	Improvement cut, slash, underburn	Tractor	Improve health and vigor of manageable component of PP, WL, DF. Provide browse, reduce fuel loadings	X		X	X	X
55B	2	18	DF, WL, PP, LP w/severe root disease in the DF. Light understory. In WUI.	Shelterwood w/reserves, slash, underburn	Tractor	Initiate regeneration, promote resilience, reduce fuel loading, provide browse	X		X	X	X
56	2 and 6	29	Mixed conifer WRC, WH, WL, GF, DF, LP, WP w/ dense understory of WRC/WH/GF. Root rot noted. In WUI.	Seed tree w/reserves, slash, grapple pile	Tractor	Initiate regeneration, promote resilience, reduce fuel loading, provide browse	X		X	X	X

Unit #	MA/Suitability	Acres	Current Condition	Proposed Treatment	Logging System/ Season	Objectives	Purpose and Need				
							Promote resilient vegetation	Maintain or improve water quality	Provide wildlife security and forage	Provide wood products	Hazardous fuels reduction
57	6	68	Mixed conifer WRC, WH, WL, GF, DF, WP w/ dense WRC/WH understory. Stagnant. Root disease in DF/GF. In WUI.	Seed tree w/reserves, slash, underburn	Tractor/ Winter	Initiate regeneration, promote resilience, reduce fuel loading, provide browse	X		X	X	X
58	2	15	Mixed conifer DF, WRC, GF, LP, WL, WH w/dense WRC understory.	Seed tree w/reserves, slash, grapple pile	Tractor	Initiate regeneration, promote resilience, reduce fuel loading, provide browse	X		X	X	X
59	2	11	Mixed conifer WRC/WH, GF, LP, DF, WL w/dense GF, WH understory. In WUI.	Seed tree w/reserves, slash, grapple pile	Tractor	Initiate regeneration, promote resilience, reduce fuel loading, provide browse	X		X	X	X
60	2 and 6	24	Mixed conifer GF, WRC, WH, WL, DF, WP w/moderate understory.	Seed tree w/reserves, slash, grapple pile	Tractor/ Winter	Initiate regeneration, promote resilience, reduce fuel loading, provide browse	X		X	X	X
61	2 and 6	51	Mixed conifer WH, LP, WRC, GF, WL, DF w/moderate understory and patches of dense, suppressed LP.	Clear cut w/reserves, slash, grapple pile	Tractor/ Winter	Initiate regeneration, promote resilience, reduce fuel loading, provide browse	X		X	X	X

Unit #	MA/Suitability	Acres	Current Condition	Proposed Treatment	Logging System/ Season	Objectives	Purpose and Need				
							Promote resilient vegetation	Maintain or improve water quality	Provide wildlife security and forage	Provide wood products	Hazardous fuels reduction
61A	2 and 6	34	Mixed conifer WH, LP, WRC, GF, WL, DF w/moderate understory and patches of dense, suppressed LP.	Clear cut w/reserves, slash, grapple pile	Tractor	Initiate regeneration, promote resilience, reduce fuel loading, provide browse	X		X	X	X
62	2 and 6	24	Mixed conifer LP, WL, WRC, GF, DF w/ pockets of dense GF understory	Seed tree w/reserves, slash, grapple pile	Tractor	Initiate regeneration, promote resilience, reduce fuel loading, provide browse	X			X	X
63	6	10	Mixed conifer WH, WL, GF, DF, WP, WRC, LP. In WUI.	Improvement cut, fell damaged residuals, grapple pile	Tractor/ Winter	Improve health and vigor of WL, PP, DF component. Provide browse, reduce fuel loadings, protect developing old growth character	X		X	X	X
68	6	70	Scattered PP overstory w/in DF dominated stand. Root disease present in DF.	Shelterwood w/reserves, slash, underburn	Skyline	Initiate regeneration, promote resilience, reduce fuel loading, provide browse	X			X	X
69	6	27	Mixed conifer DF, GF, PP, WL, WP.	Seed tree w/reserves, slash, underburn	Skyline	Initiate regeneration, promote resilience, reduce fuel loading, provide browse	X		X	X	X

Unit #	MA/Suitability	Acres	Current Condition	Proposed Treatment	Logging System/ Season	Objectives	Purpose and Need				
							Promote resilient vegetation	Maintain or improve water quality	Provide wildlife security and forage	Provide wood products	Hazardous fuels reduction
70	6	67	DF stand w/ scattered PP, WL, GF w/ severe root disease and bark beetles.	Seed tree w/reserves, slash, underburn	Skyline	Initiate regeneration, promote resilience, reduce fuel loading, provide browse	X			X	X
71	6	39	Stand of WL, DF, GF w/ root rot pockets.	Seed tree w/reserves, slash, underburn	Skyline	Initiate regeneration, promote resilience, reduce fuel loading, provide browse	X		X	X	X
73	6	18	DF stand w/scattered PP. Root disease in DF.	Seed tree w/reserves, slash, underburn	Skyline	Initiate regeneration, promote resilience, reduce fuel loading, provide browse	X		X	X	X
74	6	100	Stand of dense DF w/ remnant DF/PP. Root disease noted.	Seed tree w/reserves, slash, underburn	Skyline	Initiate regeneration, promote resilience, reduce fuel loading, provide browse	X		X	X	X
75	6	50	DF dominated stand w/scattered large PP. Root disease noted.	Improvement cut with seed tree or shelterwood openings, slash, underburn	Skyline	Improve health and vigor of manageable component of PP, DF. Provide browse, protect developing old growth character, reduce fuel loadings	X		X	X	X

Unit #	MA/Suitability	Acres	Current Condition	Proposed Treatment	Logging System/ Season	Objectives	Purpose and Need				
							Promote resilient vegetation	Maintain or improve water quality	Provide wildlife security and forage	Provide wood products	Hazardous fuels reduction
77	6	41	Older PP plantation w/ LP, DF, WL, GF and moderate DF/GF understory. PP is off-site and suffering significant mortality.	Clear cut w/reserves, slash, underburn	Tractor	Initiate regeneration, promote resilience, reduce fuel loading, provide browse	X		X	X	X
Total		**3,127**									

Unit #	MA/Suitability	Acres	Current Condition	Proposed Treatment	Logging System/ Season	Objectives	Purpose and Need				
							Promote resilient vegetation	Maintain or improve water quality	Provide wildlife security and forage	Provide wood products	Hazardous fuels reduction
1	6	54	Mixed conifer WL, DF, LP, PP, w/ dense understory. Mix of dry/moist forest types. In WUI.	Improvement cut w/ seed tree or shelterwood openings. Slash, grapple pile	Tractor	Improve health and vigor of manageable component of WL, PP, DF. Initiate regeneration, provide browse, reduce fuel loadings	X		X	X	X
3A	6	12	Mixed conifer DF, PP, WL, GF, LP, WH w/ root rot in DF. In WUI	Clear cut w/reserves, slash, grapple pile	Tractor	Initiate regeneration, promote resilience, reduce fuel loading, provide browse	X		X	X	X
3B	6	13	Mixed conifer DF, PP, WL, GF, LP, WH w/ root rot in DF. In WUI	Seed tree w/ reserves, slash, grapple pile	Tractor	Initiate regeneration, promote resilience, reduce fuel loading, provide browse	X		X	X	X
4	6	176	Mixed conifer WL, DF, PP, LP, GF, WP w/ patchy understory w/ root disease. In WUI.	Improvement cut, slash, underburn	Tractor	Improve health and vigor of manageable component of WL, PP, DF. Promote resilience, reduce fuel loading, provide browse	X		X	X	X
5	6	8	Mixed conifer DF, WRC, WL, GF, H, PP w/ multi-layer understory. In WUI.	Seed tree w/reserves, slash, grapple pile	Tractor	Initiate regeneration, promote resilience, reduce fuel loading, provide browse	X		X	X	X

Unit #	MA/Suitability	Acres	Current Condition	Proposed Treatment	Logging System/ Season	Objectives	Purpose and Need				
							Promote resilient vegetation	Maintain or improve water quality	Provide wildlife security and forage	Provide wood products	Hazardous fuels reduction
6	6	42	Open stand DF, WL, PP w/ insect and disease issues. In WUI.	Improvement cut with seed tree or shelterwood openings, slash, grapple pile	Tractor	Improve health and vigor of manageable component of WL, PP, DF. Initiate regeneration, provide browse, reduce fuel loadings	X		X	X	X
7	6	8	Multi-layer overstory DF, PP, GF, WP, GF, WRC w/ root disease in DF. In WUI.	Seed tree w/reserves, slash, grapple pile	Tractor	Initiate regeneration, promote resilience, reduce fuel loading, provide browse	X		X	X	X
8	6	66	Mixed conifer DF, PP, WL w/GF, WRC in lower portion. In WUI.	Improvement cut, slash, underburn	Tractor	Improve health and vigor of manageable component of WL, PP, DF. Promote resilience, reduce fuel loading provide browse	X		X	X	X
8A	6	4	Mixed conifer DF, PP, WL, GF, WRC. In WUI.	Improvement cut, slash, grapple pile	Tractor	Improve health and vigor of manageable component of WL, PP, DF. Promote resilience, reduce fuel loading provide browse	X		X	X	X
9	6	16	Mixed conifer WL, GF, PP, WRC, WP, DF w/ root disease issues. In WUI.	Seed tree w/reserves, slash, grapple pile	Tractor	Initiate regeneration, promote resilience, reduce fuel loading, provide browse	X		X	X	X

Unit #	MA/Suitability	Acres	Current Condition	Proposed Treatment	Logging System/ Season	Objectives	Purpose and Need				
							Promote resilient vegetation	Maintain or improve water quality	Provide wildlife security and forage	Provide wood products	Hazardous fuels reduction
11	6	11	DF, PP stand w/ DF understory; absence of PP reproduction. In WUI.	Seed tree w/reserves, slash, underburn	Tractor	Initiate regeneration, promote resilience, reduce fuel loading, provide browse	X		X	X	X
12	6	25	Mixed conifer DF, GF, WRC, PP w/ dense GF understory and mid-canopy. In WUI.	Seed tree w/reserves, slash, grapple pile	Tractor	Initiate regeneration, promote resilience, reduce fuel loading, provide browse	X		X	X	X
14	6	70	Mixed conifer WL, DF, GF, PP, WP, LP w/ GF understory. Cankers and root disease noted. In WUI	Clear cut w/reserves, slash, underburn	Tractor/ Winter	Initiate regeneration, promote resilience, reduce fuel loading, provide browse	X		X	X	X
15	6	27	Two-storied stand of DF w/ PP, WP, WL present. DF in poor health. In WUI.	Seed tree w/reserves, slash, underburn	Tractor	Initiate regeneration, promote resilience, reduce fuel loading, provide browse	X		X	X	X
16	6	6	Mixed conifer PP, DF, WL, LP, GF, WRC w/ incidental root disease. In WUI.	Improvement cut, slash, underburn	Tractor	Improve health and vigor of manageable component of PP, WL, DF. Promote resilience, provide browse, reduce fuel loading	X		X	X	X
18	6	81	Mixed conifer GF, SAF, WL, DF, LP w/ moderate blowdown and root disease. In WUI.	Clear cut w/reserves, slash, underburn	Tractor	Initiate regeneration, promote resilience, reduce fuel loading	X			X	X

Unit #	MA/Suitability	Acres	Current Condition	Proposed Treatment	Logging System/ Season	Objectives	Purpose and Need				
							Promote resilient vegetation	Maintain or improve water quality	Provide wildlife security and forage	Provide wood products	Hazardous fuels reduction
20	6	109	Mixed conifer GF, DF, WL w/ moderate to heavy root disease in GF. In WUI.	Seed tree w/reserves, slash, underburn	Skyline	Initiate regeneration, promote resilience, reduce fuel loading	X			X	X
21	6	129	Dry site DF, PP w/ low to moderate incidence of root disease in DF. In WUI.	Improvement cut, slash, underburn	Skyline	Improve health and vigor of manageable component of PP, DF. Promote resilience, protect old growth character, provide browse, reduce fuel loading	X		X	X	X
23	6	24	Mixed conifer DF, GF, WL, WH w/ root disease in DF, GF. In WUI.	Improvement cut with seed tree or shelterwood openings, slash, grapple pile	Tractor	Improve health and vigor of manageable component of PP, WL, DF. Promote resilience, provide browse, reduce fuel loading, initiate regeneration	X		X	X	X
24	6	25	Mixed conifer DF, GF, WL, WH w/ root disease in DF, GF, in WUI	Improvement cut, slash, underburn	Skyline	Improve health and vigor of manageable component of PP, WL, DF. Promote resilience, provide browse, reduce fuel loading	X		X	X	X

Unit #	MA/Suitability	Acres	Current Condition	Proposed Treatment	Logging System/ Season	Objectives	Purpose and Need				
							Promote resilient vegetation	Maintain or improve water quality	Provide wildlife security and forage	Provide wood products	Hazardous fuels reduction
25	6	65	Mixed conifer of GF, WH, DF, WL, LP, WRC, PP w/ low incidence of root disease in DF, GF. In WUI.	Clear cut w/reserves, slash, grapple pile	Tractor	Initiate regeneration, promote resilience, reduce fuel loading, provide browse	X		X	X	X
27	6	11	Two-storied stand of PP, WL, DF w/ low incidence of root disease in DF. In WUI.	Improvement cut, slash, underburn	Skyline	Improve health and vigor of manageable component of WL, PP, DF. Provide browse, reduce fuel loadings	X		X	X	X
28	6	80	Older plantation of PP w/ LP, GF, DF natural regen. PP is off-site. In WUI.	Improvement cut, selective thin understory, slash and pile	Tractor	Improve health and vigor of manageable component of PP, WL, DF. Provide browse, reduce fuel loadings	X		X	X	X
29	6	25	Multi-stored DF, WL, WRC, WP, PP, GF, LP, ES. In WUI.	Seed tree w/reserves, slash, grapple pile	Tractor	Initiate regeneration, promote resilience, reduce fuel loading, provide browse	X		X	X	X
30	6	37	Mixed conifer DF, GF, WL, WRC, PP, WP, LP, WH w/ patchy GF seedling/sapling understory. In WUI.	Shelterwood w/reserves, slash, grapple pile	Tractor	Initiate regeneration, promote resilience, reduce fuel loading, provide browse	X		X	X	X

Unit #	MA/Suitability	Acres	Current Condition	Proposed Treatment	Logging System/ Season	Objectives	Purpose and Need				
							Promote resilient vegetation	Maintain or improve water quality	Provide wildlife security and forage	Provide wood products	Hazardous fuels reduction
31B	6	60	Mixed conifer LP, GF, WP, DF, WL, WH, WRC w/ heavy Mountain Pine Beetle activity in LP. In WUI.	Clear cut w/reserves, slash, grapple pile	Tractor	Initiate regeneration, promote resilience, reduce fuel loading, provide browse	X		X	X	X
32	2 and 6	34	Mixed PP, DF, WL with an open to moderate understory. DF in poor health; evidence of root rot. In WUI.	Improvement cut, slash, underburn	Tractor	Improve health and vigor of manageable component of PP, WL, DF. Promote resilience, protect developing old growth character, provide browse, reduce fuel loading	X		X	X	X
33	2 and 6	30	Older plantation of PP, LP w/ thick GF/DF understory. PP is off-site. In WUI.	Clear cut w/reserves, slash, underburn	Tractor/ Winter	Initiate regeneration, promote resilience, reduce fuel loading, provide browse	X		X	X	X
34	6	40	Mixed conifer stand of LP, GF, DF, WL, WH w/ root rot in DF/GF. In WUI	Seed tree w/reserves, slash, underburn	Tractor/ Winter	Initiate regeneration, promote resilience, reduce fuel loading, provide browse	X		X	X	X
37	6	68	Mixed conifer DF, GF, WL, WRC, PP, LP w/ GF in understory. Root rot in DF. In WUI.	Seed tree w/reserves, slash, underburn	Tractor, Winter	Initiate regeneration, promote resilience, reduce fuel loading, provide browse	X		X	X	X

Unit #	MA/Suitability	Acres	Current Condition	Proposed Treatment	Logging System/ Season	Objectives	Purpose and Need				
							Promote resilient vegetation	Maintain or improve water quality	Provide wildlife security and forage	Provide wood products	Hazardous fuels reduction
37A	6	34	Stand of DF, PP, WL w/ root rot in DF w. little understory. In WUI.	Improvement cut, slash, underburn	Skyline	Improve health and vigor of manageable component of WL, PP, DF. Provide browse, reduce fuel loadings	X		X	X	X
38	6	71	Older plantation of PP, LP GF w/ root disease in LP, PP, GF. PP is off-site but not deteriorating too badly. Light understory. In WUI.	Improvement cut w/ seed tree or shelterwood openings, slash, grapple pile	Tractor	Improve health and vigor of manageable component of PP, WL, DF. Initiate regeneration, provide browse, reduce fuel loadings	X		X	X	X
38A	6	6	Older plantation of PP, LP w/ understory of GF, DF, WP. In WUI.	Clear cut w/reserves, slash, underburn	Tractor	Initiate regeneration, promote resilience, reduce fuel loading, provide browse	X		X	X	X
39	6	52	Mixed conifer WRC, WH, GF, PP, DF, WP, LP w/ dense understory w/ observations of root rot. In WUI.	Seed tree w/reserves, slash, grapple pile	Tractor	Initiate regeneration, promote resilience, reduce fuel loading, provide browse	X		X	X	X
40	2 and 6	109	Multi-storied, multi-aged GF, WL, DF, PP, WRC, LP, WP w/ GF understory. In WUI.	Seed tree w/reserves, slash, grapple pile	Tractor	Initiate regeneration, promote resilience, reduce fuel loading, provide browse	X		X	X	X

Unit #	MA/Suitability	Acres	Current Condition	Proposed Treatment	Logging System/ Season	Objectives	Purpose and Need				
							Promote resilient vegetation	Maintain or improve water quality	Provide wildlife security and forage	Provide wood products	Hazardous fuels reduction
42	2 and 6	85	Mixed conifer DF, WL, PP, LP w/ root disease, DF bark beetles, Mountain Pine beetle. In WUI.	Seed tree w/reserves, slash, underburn	Skyline	Initiate regeneration, promote resilience, reduce fuel loading, provide browse	X		X	X	X
43	6	48	Mixed conifer DF, LP, GF, WRC, WH, WL w/ dense understory. Root disease in DF; Mountain Pine beetle in LP. In WUI.	Seed tree w/reserves, slash, grapple pile	Tractor	Initiate regeneration, promote resilience, reduce fuel loading, provide browse	X			X	X
44	6	20	Mixed conifer GF, DF, WH, LP, WL, WRC w/ root disease and dense understory GF, WH. In WUI.	Seed tree w/reserves, slash, grapple pile	Tractor	Initiate regeneration, promote resilience, reduce fuel loading, provide browse	X		X	X	X
45	6	33	DF, PP, LP. Severe root rot in DF. In WUI.	Clear cut w/reserves, slash, underburn	Tractor	Initiate regeneration, promote resilience, reduce fuel loading, provide browse	X		X	X	X
45A	6	63	Generally understocked stand DF, PP, LP w/WL, GF. In WUI.	Seed tree w/reserves, slash, underburn	Tractor	Initiate regeneration, promote resilience, reduce fuel loading, provide browse	X		X	X	X
45B	6	26	Stand of DF, PP, LP. Healthy but dense. In WUI.	Improvement cut, slash, underburn	Tractor	Improve health and vigor of manageable component of WL, PP, DF. Provide browse, reduce fuel loadings	X		X	X	X

Unit #	MA/Suitability	Acres	Current Condition	Proposed Treatment	Logging System/ Season	Objectives	Purpose and Need				
							Promote resilient vegetation	Maintain or improve water quality	Provide wildlife security and forage	Provide wood products	Hazardous fuels reduction
45C	6	35	Mixed conifer DF, GF, WL, WRC w/ patchy stocking and evidence of root rot. In WUI.	Seed tree w/reserves, slash, grapple pile	Tractor/ Winter	Initiate regeneration, promote resilience, reduce fuel loading, provide browse	X		X	X	X
46	6	16	Older plantation of PP, LP, DF, WL. In WUI.	Improvement cut, slash, grapple pile	Tractor/ Winter	Improve health and vigor of manageable component of WL, PP, DF. Provide browse, reduce fuel loadings	X		X	X	X
47	6	17	Older plantation of PP, DF, LP, WL w/ insect and disease issues. PP is off site and sustaining significant mortality. In WUI.	Clear cut w/reserves, slash, underburn	Tractor	Initiate regeneration, promote resilience, reduce fuel loading, provide browse	X		X	X	X
48	6	23	Older plantation of PP, DF, WL, LP w/ insect and disease issues. PP is off site w/ significant mortality. In WUI.	Clear cut w/reserves, slash, underburn	Tractor/ Winter	Initiate regeneration, promote resilience, reduce fuel loading, provide browse	X		X	X	X
49	6	6	Older plantation of PP, LP, DF w/ insect and disease issues. PP is off site and sustaining significant mortality. In WUI.	Clear cut w/reserves, slash, underburn	Tractor	Initiate regeneration, promote resilience, reduce fuel loading, provide browse	X		X	X	X

Unit #	MA/Suitability	Acres	Current Condition	Proposed Treatment	Logging System/ Season	Objectives	Purpose and Need				
							Promote resilient vegetation	Maintain or improve water quality	Provide wildlife security and forage	Provide wood products	Hazardous fuels reduction
50	6	21	Older PP plantation w/ health issues and ingrowth. PP is off site but not experiencing significant mortality. In WUI.	Improvement cut, slash, grapple pile	Tractor	Improve health and vigor of manageable component of WL, PP, DF. Provide browse, reduce fuel loadings	X		X	X	X
51	6	36	Older plantation of PP, DF, LP, WL w/ insect and disease issues. PP is off site and sustaining significant mortality. In WUI.	Clear cut w/reserves, slash, underburn	Tractor/ Winter	Initiate regeneration, promote resilience, reduce fuel loading, provide browse	X		X	X	X
52	6	56	Mixed conifer DF, LP, WL w/ root rot in DF. Workable PP, WL component. In WUI.	Improvement cut w/ seed tree or shelterwood openings, slash, underburn	Tractor	Improve health and vigor of manageable component of PP, WL, DF. Initiate regeneration, provide browse, reduce fuel loadings	X		X	X	X
52A	6	39	DF dominated w/LP, WL, PP, GF. Significant root disease in DF/GF. Light to moderate understory. In WUI.	Clear cut w/reserves, slash, grapple pile	Tractor	Initiate regeneration, promote resilience, reduce fuel loading, provide browse	X		X	X	X

Unit #	MA/Suitability	Acres	Current Condition	Proposed Treatment	Logging System/ Season	Objectives	Purpose and Need				
							Promote resilient vegetation	Maintain or improve water quality	Provide wildlife security and forage	Provide wood products	Hazardous fuels reduction
52B	2 and 6	65	DF dominated w/LP, WL, PP. Significant root disease in DF. Light to moderate understory. In WUI.	Seed tree w/reserves, slash, underburn	Tractor/ Winter	Initiate regeneration, promote resilience, reduce fuel loading, provide browse	X			X	X
52C	6	31	DF, PP, LP, WL w/light understory. Low levels of root disease.	Improvement cut w/ seed tree or shelterwood openings, slash, underburn	Tractor/ Winter	Improve health and vigor of manageable component of PP, WL, DF. Provide browse, reduce fuel loadings, initiate regeneration	X		X	X	X
52D	6	14	DF, WL, GF, WP with moderate understory and high levels of root disease in DF/GF. In WUI.	Clear cut w/reserves, slash, grapple pile	Tractor/ Winter	Initiate regeneration, promote resilience, reduce fuel loading, provide browse	X		X	X	X
53	6	49	Older plantation of PP, DF, LP, WL w/ insect and disease issues. PP is off site and sustaining significant mortality. In WUI.	Clear cut w/reserves, slash, underburn	Tractor	Initiate regeneration, promote resilience, reduce fuel loading, provide browse	X		X	X	X
54	6	24	Dense, stagnant stand of DF, LP w/ incidental PP, WL w/ root rot in DF. In WUI.	Clear cut w/reserves, slash, grapple pile	Tractor	Initiate regeneration, promote resilience, reduce fuel loading, provide browse	X			X	X

Unit #	MA/Suitability	Acres	Current Condition	Proposed Treatment	Logging System/ Season	Objectives	Purpose and Need				
							Promote resilient vegetation	Maintain or improve water quality	Provide wildlife security and forage	Provide wood products	Hazardous fuels reduction
55	6	31	Fairly open stand of DF, PP, LP, WL w/light understory.	Improvement cut w/ seed tree or shelterwood openings, slash, underburn	Tractor	Improve health and vigor of manageable component of PP, DF. Provide browse, reduce fuel loadings, initiate regeneration	X		X	X	X
55A	2 and 6	10	DF, PP, LP, WL w/ patches of dense DF/LP regeneration.	Improvement cut, slash, underburn	Tractor	Improve health and vigor of manageable component of PP, WL, DF. Provide browse, reduce fuel loadings	X		X	X	X
55B	2	18	DF, WL, PP, LP w/severe root disease in the DF. Light understory. In WUI.	Shelterwood w/reserves, slash, underburn	Tractor	Initiate regeneration, promote resilience, reduce fuel loading, provide browse	X		X	X	X
56	2 and 6	29	Mixed conifer WRC, WH, WL, GF, DF, LP, WP w/ dense understory of WRC/WH/GF. Root rot noted. In WUI.	Seed tree w/reserves, slash, grapple pile	Tractor	Initiate regeneration, promote resilience, reduce fuel loading, provide browse	X		X	X	X
57	6	68	Mixed conifer WRC, WH, WL, GF, DF, WP w/ dense WRC/WH understory. Stagnant. Root disease in DF/GF. In WUI.	Seed tree w/reserves, slash, underburn	Tractor/ Winter	Initiate regeneration, promote resilience, reduce fuel loading, provide browse	X		X	X	X

Unit #	MA/Suitability	Acres	Current Condition	Proposed Treatment	Logging System/ Season	Objectives	Purpose and Need				
							Promote resilient vegetation	Maintain or improve water quality	Provide wildlife security and forage	Provide wood products	Hazardous fuels reduction
58	2	15	Mixed conifer DF, WRC, GF, LP, WL, WH w/dense WRC understory.	Seed tree w/reserves, slash, grapple pile	Tractor	Initiate regeneration, promote resilience, reduce fuel loading, provide browse	X		X	X	X
59	2	11	Mixed conifer WRC/WH, GF, LP, DF, WL w/dense GF, WH understory. In WUI.	Seed tree w/reserves, slash, grapple pile	Tractor	Initiate regeneration, promote resilience, reduce fuel loading, provide browse	X		X	X	X
60	2 and 6	24	Mixed conifer GF, WRC, WH, WL, DF, WP w/moderate understory.	Seed tree w/reserves, slash, grapple pile	Tractor/ Winter	Initiate regeneration, promote resilience, reduce fuel loading, provide browse	X		X	X	X
61	2 and 6	51	Mixed conifer WH, LP, WRC, GF, WL, DF w/moderate understory and patches of dense, suppressed LP.	Clear cut w/reserves, slash, grapple pile	Tractor/ Winter	Initiate regeneration, promote resilience, reduce fuel loading, provide browse	X		X	X	X
61A	2 and 6	34	Mixed conifer WH, LP, WRC, GF, WL, DF w/moderate understory and patches of dense, suppressed LP.	Clear cut w/reserves, slash, grapple pile	Tractor	Initiate regeneration, promote resilience, reduce fuel loading, provide browse	X		X	X	X
62	2 and 6	24	Mixed conifer LP, WL, WRC, GF, DF w/ pockets of dense GF understory	Seed tree w/reserves, slash, grapple pile	Tractor	Initiate regeneration, promote resilience, reduce fuel loading, provide browse	X			X	X

Unit #	MA/Suitability	Acres	Current Condition	Proposed Treatment	Logging System/ Season	Objectives	Purpose and Need				
							Promote resilient vegetation	Maintain or improve water quality	Provide wildlife security and forage	Provide wood products	Hazardous fuels reduction
63	6	10	Mixed conifer WH, WL, GF, DF, WP, WRC, LP. In WUI.	Improvement cut, slash, grapple pile	Tractor/ Winter	Improve health and vigor of WL, PP, DF component. Provide browse, reduce fuel loadings, protect developing old growth character	X		X	X	X
68	6	70	Scattered PP overstory w/in DF dominated stand. Root disease present in DF.	Shelterwood w/reserves, slash, underburn	Skyline	Initiate regeneration, promote resilience, reduce fuel loading, provide browse	X			X	X
69	6	27	Mixed conifer DF, GF, PP, WL, WP.	Seed tree w/reserves, slash, underburn	Skyline	Initiate regeneration, promote resilience, reduce fuel loading, provide browse	X		X	X	X
70	6	67	DF stand w/ scattered PP, WL, GF w/ severe root disease and bark beetles.	Seed tree w/reserves, slash, underburn	Skyline	Initiate regeneration, promote resilience, reduce fuel loading, provide browse	X			X	X
71	6	39	Stand of WL, DF, GF w/ root rot pockets.	Seed tree w/reserves, slash, underburn	Skyline	Initiate regeneration, promote resilience, reduce fuel loading, provide browse	X		X	X	X
73	6	18	DF stand w/scattered PP. Root disease in DF.	Seed tree w/reserves, slash, underburn	Skyline	Initiate regeneration, promote resilience, reduce fuel loading, provide browse	X		X	X	X

Unit #	MA/Suitability	Acres	Current Condition	Proposed Treatment	Logging System/ Season	Objectives	Purpose and Need				
							Promote resilient vegetation	Maintain or improve water quality	Provide wildlife security and forage	Provide wood products	Hazardous fuels reduction
74	6	100	Stand of dense DF w/ remnant DF/PP. Root disease noted.	Seed tree w/reserves, slash, underburn	Skyline	Initiate regeneration, promote resilience, reduce fuel loading, provide browse	X		X	X	X
75	6	50	DF dominated stand w/scattered large PP. Root disease noted.	Improvement cut with seed tree or shelterwood openings, slash, underburn	Skyline	Improve health and vigor of manageable component of PP, DF. Provide browse, protect developing old growth character, reduce fuel loadings, initiate regeneration.	X		X	X	X
77	6	41	Older PP plantation w/ LP, DF, WL, GF and moderate DF/GF understory. PP is off-site and suffering significant mortality.	Clear cut w/reserves, slash, underburn	Tractor	Initiate regeneration, promote resilience, reduce fuel loading, provide browse	X		X	X	X
Total		**3,069**									

Unit #	MA/Suitability	Acres	Current Condition	Proposed Treatment	Logging System/ Season	Objectives	Purpose and Need				
							Promote resilient vegetation	Maintain or improve water quality	Provide wildlife security and forage	Provide wood products	Hazardous fuel reduction
1	6	54	Mixed conifer WL, DF, LP, PP, w/ dense understory. Mix of dry/moist forest types. In WUI.	Improvement cut w/ seed tree or shelterwood openings. Slash, grapple pile	Tractor	Improve health and vigor of manageable component of WL, PP, DF. Initiate regeneration, provide browse, reduce fuel loadings	X		X	X	X
3A	6	12	Mixed conifer DF, PP, WL, GF, LP, WH w/ root rot in DF. In WUI	Clear cut w/reserves, slash, grapple pile	Tractor	Initiate regeneration, promote resilience, reduce fuel loading, provide browse	X		X	X	X
3B	6	13	Mixed conifer DF, PP, WL, GF, LP, WH w/ root rot in DF. In WUI	Seed tree w/ reserves, slash, grapple pile	Tractor	Initiate regeneration, promote resilience, reduce fuel loading, provide browse	X		X	X	X
4	6	176	Mixed conifer WL, DF, PP, LP, GF, WP w/ patchy understory w/ root disease. In WUI.	Improvement cut, slash, underburn	Tractor	Improve health and vigor of manageable component of WL, PP, DF. Promote resilience, reduce fuel loading, provide browse	X		X	X	X
5	6	8	Mixed conifer DF, WRC, WL, GF, H, PP w/ multi-layer understory. In WUI.	Seed tree w/reserves, slash, grapple pile	Tractor	Initiate regeneration, promote resilience, reduce fuel loading, provide browse	X		X	X	X

Unit #	MA/Suitability	Acres	Current Condition	Proposed Treatment	Logging System/ Season	Objectives	Purpose and Need				
							Promote resilient vegetation	Maintain or improve water quality	Provide wildlife security and forage	Provide wood products	Hazardous fuel reduction
6	6	42	Open stand DF, WL, PP w/ insect and disease issues. In WUI.	Improvement cut with seed tree or shelterwood openings, slash, grapple pile	Tractor	Improve health and vigor of manageable component of WL, PP, DF. Promote resilience, reduce fuel loading, provide browse, initiate regeneration.	X		X	X	X
7	6	8	Multi-layer overstory DF, PP, GF, WP, GF, WRC w/ root disease in DF. In WUI.	Seed tree w/reserves, slash, grapple pile	Tractor	Initiate regeneration, promote resilience, reduce fuel loading, provide browse	X		X	X	X
8	6	66	Mixed conifer DF, PP, WL w/GF, WRC in lower portion. In WUI.	Improvement cut, slash, underburn	Tractor	Improve health and vigor of manageable component of WL, PP, DF. Promote resilience, reduce fuel loading provide browse	X		X	X	X
8A	6	4	Mixed conifer DF, PP, WL, GF, WRC. In WUI.	Improvement cut, slash, grapple pile	Tractor	Improve health and vigor of manageable component of WL, PP, DF. Promote resilience, reduce fuel loading provide browse	X		X	X	X
9	6	16	Mixed conifer WL, GF, PP, WRC, WP, DF w/ root disease issues. In WUI.	Seed tree w/reserves, slash, grapple pile	Tractor	Initiate regeneration, promote resilience, reduce fuel loading, provide browse	X		X	X	X

Unit #	MA/Suitability	Acres	Current Condition	Proposed Treatment	Logging System/ Season	Objectives	Purpose and Need				
							Promote resilient vegetation	Maintain or improve water quality	Provide wildlife security and forage	Provide wood products	Hazardous fuel reduction
11	6	11	DF, PP stand w/ DF understory; absence of PP reproduction. In WUI.	Seed tree w/reserves, slash, underburn	Tractor	Initiate regeneration, promote resilience, reduce fuel loading, provide browse	X		X	X	X
12	6	25	Mixed conifer DF, GF, WRC, PP w/ dense GF understory and mid-canopy. In WUI.	Seed tree w/reserves, slash, grapple pile	Tractor	Initiate regeneration, promote resilience, reduce fuel loading, provide browse	X		X	X	X
14	6	24	Mixed conifer WL, DF, GF, PP, WP, LP w/ GF understory. Cankers and root disease noted. In WUI	Clear cut w/reserves, slash, underburn	Tractor/ Winter	Initiate regeneration, promote resilience, reduce fuel loading, provide browse	X		X	X	X
14A	6	23	Mixed conifer WL, DF, GF, PP, WP, LP w/ GF understory. Cankers and root disease noted. In WUI	Clear cut w/reserves, slash, underburn	Tractor/ Winter	Initiate regeneration, promote resilience, reduce fuel loading, provide browse	X		X	X	X
15	6	27	Two-storied stand of DF w/ PP, WP, WL present. DF in poor health. In WUI.	Seed tree w/reserves, slash, underburn	Tractor	Initiate regeneration, promote resilience, reduce fuel loading, provide browse	X		X	X	X

Unit #	MA/Suitability	Acres	Current Condition	Proposed Treatment	Logging System/ Season	Objectives	Purpose and Need				
							Promote resilient vegetation	Maintain or improve water quality	Provide wildlife security and forage	Provide wood products	Hazardous fuel reduction
16	6	6	Mixed conifer PP, DF, WL, LP, GF, WRC w/ incidental root disease. In WUI.	Improvement cut, slash, underburn	Tractor	Improve health and vigor of manageable component of PP, WL, DF. Promote resilience, provide browse, reduce fuel loading	X		X	X	X
18	6	40	Mixed conifer GF, SAF, WL, DF, LP w/ moderate blowdown and root disease. In WUI.	Clear cut w/reserves, slash, underburn	Tractor	Initiate regeneration, promote resilience, reduce fuel loading	X			X	X
20	6	37	Mixed conifer GF, DF, WL w/ moderate to heavy root disease in GF. In WUI.	Seed tree w/reserves, slash, underburn	Skyline	Initiate regeneration, promote resilience, reduce fuel loading	X			X	X
21	6	129	Dry site DF, PP w/ low to moderate incidence of root disease in DF. In WUI.	Improvement cut, slash, underburn	Skyline	Improve health and vigor of manageable component of PP, DF. Promote resilience, protect old growth character, provide browse, reduce fuel loading	X		X	X	X

Unit #	MA/Suitability	Acres	Current Condition	Proposed Treatment	Logging System/ Season	Objectives	Purpose and Need				
							Promote resilient vegetation	Maintain or improve water quality	Provide wildlife security and forage	Provide wood products	Hazardous fuel reduction
23	6	24	Mixed conifer DF, GF, WL, WH w/ root disease in DF, GF. In WUI.	Improvement cut with openings seed tree or shelterwood openings, slash, grapple pile	Tractor	Improve health and vigor of manageable component of PP, WL, DF. Promote resilience, provide browse, reduce fuel loading, initiate regeneration.	X		X	X	X
24	6	25	Mixed conifer DF, GF, WL, WH w/ root disease in DF, GF. In WUI.	Improvement cut, slash, underburn	Skyline	Improve health and vigor of manageable component of PP, WL, DF. Promote resilience, provide browse, reduce fuel loading	X		X	X	X
25	6	10	Mixed conifer of GF, WH, DF, WL, LP, WRC, PP w/ low incidence of root disease in DF, GF. In WUI.	Clear cut w/reserves, slash, grapple pile	Tractor	Initiate regeneration, promote resilience, reduce fuel loading, provide browse	X		X	X	X
25A	6	20	Mixed conifer of GF, WH, DF, WL, LP, WRC, PP w/ low incidence of root disease in DF, GF. In WUI.	Clear cut w/reserves, slash, grapple pile	Tractor	Initiate regeneration, promote resilience, reduce fuel loading, provide browse	X		X	X	X

Unit #	MA/Suitability	Acres	Current Condition	Proposed Treatment	Logging System/ Season	Objectives	Purpose and Need				
							Promote resilient vegetation	Maintain or improve water quality	Provide wildlife security and forage	Provide wood products	Hazardous fuel reduction
25B	6	11	Mixed conifer of GF, WH, DF, WL, LP, WRC, PP w/ low incidence of root disease in DF, GF. In WUI.	Clear cut w/reserves, slash, grapple pile	Tractor	Initiate regeneration, promote resilience, reduce fuel loading, provide browse	X		X	X	X
27	6	11	Two-storied stand of PP, WL, DF w/ low incidence of root disease in DF. In WUI.	Improvement cut, slash, underburn	Skyline	Improve health and vigor of manageable component of WL, PP, DF. Provide browse, reduce fuel loadings	X		X	X	X
28	6	80	Older plantation of PP w/ LP, GF, DF natural regen. PP is off-site. In WUI.	Improvement cut, slash, grapple pile	Tractor	Improve health and vigor of manageable component of PP, WL, DF. Provide browse, reduce fuel loadings	X		X	X	X
29	6	25	Multi-stored DF, WL, WRC, WP, PP, GF, LP, ES. In WUI.	Seed tree w/reserves, slash, grapple pile	Tractor	Initiate regeneration, promote resilience, reduce fuel loading, provide browse	X		X	X	X
30	6	37	Mixed conifer DF, GF, WL, WRC, PP, WP, LP, WH w/ patchy GF seedling/sapling understory. In WUI.	Shelterwood w/reserves, slash, grapple pile	Tractor	Initiate regeneration, promote resilience, reduce fuel loading, provide browse	X		X	X	X

Unit #	MA/Suitability	Acres	Current Condition	Proposed Treatment	Logging System/ Season	Objectives	Purpose and Need				
							Promote resilient vegetation	Maintain or improve water quality	Provide wildlife security and forage	Provide wood products	Hazardous fuel reduction
31A	6	26	Mixed conifer LP, GF, WP, DF, WL, WH, WRC w/ heavy Mountain Pine Beetle activity in LP. In WUI.	Improvement cut w/ seed tree or shelterwood openings, slash, grapple pile	Tractor	Improve health and vigor of manageable component of WL, DF, WP, WRC. Promote resilience, reduce fuel loading, provide browse, initiate regeneration.	X		X	X	X
31B	6	33	Mixed conifer LP, GF, WP, DF, WL, WH, WRC w/ heavy Mountain Pine Beetle activity in LP. In WUI.	Clear cut w/reserves, slash, grapple pile	Tractor	Initiate regeneration, promote resilience, reduce fuel loading, provide browse	X		X	X	X
32	2 and 6	34	Mixed PP, DF, WL with an open to moderate understory. DF in poor health; evidence of root rot. In WUI.	Improvement cut, slash, underburn	Tractor	Improve health and vigor of manageable component of PP, WL, DF. Promote resilience, protect developing old growth character, provide browse, reduce fuel loading	X		X	X	X
33	2 and 6	30	Older plantation of PP, LP w/ thick GF/DF understory. PP is off-site. In WUI.	Clear cut w/reserves, slash, underburn	Tractor/ Winter	Initiate regeneration, promote resilience, reduce fuel loading, provide browse	X		X	X	X

Unit #	MA/Suitability	Acres	Current Condition	Proposed Treatment	Logging System/ Season	Objectives	Purpose and Need				
							Promote resilient vegetation	Maintain or improve water quality	Provide wildlife security and forage	Provide wood products	Hazardous fuel reduction
34	6	40	Mixed conifer stand of LP, GF, DF, WL, WH w/ root rot in DF/GF. In WUI	Seed tree w/reserves, slash, underburn	Tractor/ Winter	Initiate regeneration, promote resilience, reduce fuel loading, provide browse	X		X	X	X
35	2	10	Mixed age stand of PP, LP w/DF and WL. Areas of pole-size LP. In WUI.	Seed tree w/reserves, slash, grapple pile	Tractor/ Winter	Initiate regeneration, promote resilience, provide browse, reduce fuel loadings	X		X	X	X
35A	2	2	Mixed age stand of PP, LP w/DF and WL. Areas of pole-size LP. In WUI.	Clearcut w/reserves, slash, grapple pile	Tractor/ Winter	Initiate regeneration, promote resilience provide browse, reduce fuel loadings	X		X	X	X
35B	2	3	Mixed age stand of PP, LP w/DF and WL. Areas of pole-size LP. In WUI.	Improvement cut, slash, grapple pile	Tractor/ Winter	Improve health and vigor of manageable component of PP, WL, DF. Provide browse, reduce fuel loadings	X		X	X	X
36	2	4	Mixed age stand of PP, LP w/DF and WL. Areas of pole-size LP. In WUI.	Seed tree w/reserves, slash, grapple pile	Tractor/ Winter	Initiate regeneration, promote resilience, provide browse, reduce fuel loadings	X		X	X	X
37	6	40	Stand of DF, PP, WL w/ root rot in DF w. little understory. In WUI.	Seed tree w/reserves, slash, underburn	Tractor/ Winter	Initiate regeneration, promote resilience, provide browse, reduce fuel loadings	X		X	X	X

Unit #	MA/Suitability	Acres	Current Condition	Proposed Treatment	Logging System/ Season	Objectives	Purpose and Need				
							Promote resilient vegetation	Maintain or improve water quality	Provide wildlife security and forage	Provide wood products	Hazardous fuel reduction
37A	6	34	Stand of DF, PP, WL w/ root rot in DF w. little understory. In WUI.	Improvement cut, slash, underburn	Skyline	Improve health and vigor of manageable component of WL, PP, DF. Provide browse, reduce fuel loadings	X		X	X	X
37C	6	9	Stand of DF, PP, WL w/ root rot in DF w. little understory. In WUI.	Seed tree w/reserves, slash, underburn	Tractor	Initiate regeneration, promote resilience, provide browse, reduce fuel loadings	X		X	X	X
38	6	71	Older plantation of PP, LP GF w/ root disease in LP, PP, GF. PP is off-site but not deteriorating too badly. Light understory. In WUI.	Improvement cut w/ seed tree or shelterwood openings, slash, grapple pile	Tractor	Improve health and vigor of manageable component of PP, WL, DF, Initiate regeneration, provide browse, reduce fuel loadings	X		X	X	X
39	6	41	Mixed conifer WRC, WH, GF, PP, DF, WP, LP w/ dense understory w/ observations of root rot. In WUI.	Seed tree w/reserves, slash, grapple pile	Tractor	Initiate regeneration, promote resilience, reduce fuel loading, provide browse	X		X	X	X
40	2 and 6	41	Multi-storied, multi-aged GF, WL, DF, PP, WRC, LP, WP w/ GF understory. In WUI.	Seed tree w/reserves, slash, grapple pile	Tractor	Initiate regeneration, promote resilience, reduce fuel loading, provide browse	X		X	X	X

Unit #	MA/Suitability	Acres	Current Condition	Proposed Treatment	Logging System/ Season	Objectives	Purpose and Need				
							Promote resilient vegetation	Maintain or improve water quality	Provide wildlife security and forage	Provide wood products	Hazardous fuel reduction
40A	2 and 6	40	Multi-storied, multi-aged GF, WL, DF, PP, WRC, LP, WP w/ GF understory. In WUI.	Seed tree w/reserves, slash, grapple pile	Tractor	Initiate regeneration, promote resilience, reduce fuel loading, provide browse	X		X	X	X
42	2 and 6	35	Mixed conifer DF, WL, PP, LP w/ root disease, DF bark beetles, Mountain Pine beetle. In WUI.	Seed tree w/reserves, slash, underburn	Skyline	Initiate regeneration, promote resilience, reduce fuel loading, provide browse	X		X	X	X
42A	2 and 6	28	Mixed conifer DF, WL, PP, LP w/ root disease, DF bark beetles, Mountain Pine beetle. In WUI.	Seed tree w/reserves, slash, underburn	Skyline	Initiate regeneration, promote resilience, reduce fuel loading, provide browse	X		X	X	X
43	6	40	Mixed conifer DF, LP, GF, WRC, WH, WL w/ dense understory. Root disease in DF; Mountain Pine beetle in LP. In WUI.	Seed tree w/reserves, slash, grapple pile	Tractor	Initiate regeneration, promote resilience, reduce fuel loading, provide browse	X			X	X
44	6	20	Mixed conifer GF, DF, WH, LP, WL, WRC w/ root disease and dense understory GF, WH. In WUI.	Seed tree w/reserves, slash, grapple pile	Tractor	Initiate regeneration, promote resilience, reduce fuel loading, provide browse	X		X	X	X

Unit #	MA/Suitability	Acres	Current Condition	Proposed Treatment	Logging System/ Season	Objectives	Purpose and Need				
							Promote resilient vegetation	Maintain or improve water quality	Provide wildlife security and forage	Provide wood products	Hazardous fuel reduction
45	6	18	DF, PP, LP. Severe root rot in DF. In WUI.	Clear cut w/reserves, slash, underburn	Tractor	Initiate regeneration, promote resilience, reduce fuel loading, provide browse	X		X	X	X
45A	6	40	Generally understocked stand DF, PP, LP w/WL, GF. In WUI.	Seed tree w/reserves, slash, underburn	Tractor	Initiate regeneration, promote resilience, reduce fuel loading, provide browse	X		X	X	X
45B	6	26	Stand of DF, PP, LP. Healthy but dense. In WUI.	Improvement cut, slash, underburn	Tractor	Improve health and vigor of manageable component of WL, PP, DF. Provide browse, reduce fuel loadings	X		X	X	X
45C	6	8	Mixed conifer DF, GF, WL, WRC w/ patchy stocking and evidence of root rot. In WUI.	Seed tree w/reserves, slash, grapple pile	Tractor/ Winter	Initiate regeneration, promote resilience, reduce fuel loading, provide browse	X		X	X	X
46	6	16	Older plantation of PP, LP, DF, WL. In WUI.	Improvement cut, slash, grapple pile	Tractor/ Winter	Improve health and vigor of manageable component of WL, PP, DF. Provide browse, reduce fuel loadings	X		X	X	X
47		17	Older plantation of PP w/DF, LP. PP is off site. Severe root rot in PP. In WUI.	Clear cut w/reserves, slash, underburn	Tractor	Initiate regeneration, promote resilience, reduce fuel loading, provide browse	X		X	X	X

Unit #	MA/Suitability	Acres	Current Condition	Proposed Treatment	Logging System/ Season	Objectives	Purpose and Need				
							Promote resilient vegetation	Maintain or improve water quality	Provide wildlife security and forage	Provide wood products	Hazardous fuel reduction
48	6	23	Older plantation of PP, DF, WL, LP w/ insect and disease issues. PP is off site w/ significant mortality. In WUI.	Clear cut w/reserves, slash, underburn	Tractor/ Winter	Initiate regeneration, promote resilience, reduce fuel loading, provide browse	X		X	X	X
50	6	21	Older PP plantation w/ health issues and ingrowth. PP is off site but not experiencing significant mortality. In WUI.	Improvement cut, slash, grapple pile	Tractor	Improve health and vigor of manageable component of WL, PP, DF. Provide browse, reduce fuel loadings	X		X	X	X
51	6	36	Older plantation of PP, DF, LP, WL w/ insect and disease issues. PP is off site and sustaining significant mortality. In WUI.	Clear cut w/reserves, slash, underburn	Tractor/ Winter	Initiate regeneration, promote resilience, reduce fuel loading, provide browse	X		X	X	X
52	6	56	Mixed conifer DF, LP, WL w/ root rot in DF. Workable PP, WL component. In WUI.	Improvement cut w/ seed tree or shelterwood openings, slash, underburn	Tractor	Improve health and vigor of manageable component of WL, DF. Initiate regeneration, provide browse, reduce fuel loadings	X		X	X	X

Unit #	MA/Suitability	Acres	Current Condition	Proposed Treatment	Logging System/ Season	Objectives	Purpose and Need				
							Promote resilient vegetation	Maintain or improve water quality	Provide wildlife security and forage	Provide wood products	Hazardous fuel reduction
52A	6	39	DF dominated w/LP, WL, PP, GF. Significant root disease in DF/GF. Light to moderate understory. In WUI.	Clear cut w/reserves, slash, grapple pile	Tractor	Initiate regeneration, promote resilience, reduce fuel loading, provide browse	X		X	X	X
52B	2 and 6	26	DF dominated w/LP, WL, PP. Significant root disease in DF. Light to moderate understory. In WUI.	Seed tree w/reserves, slash, underburn	Tractor/ Winter	Initiate regeneration, promote resilience, reduce fuel loading, provide browse	X			X	X
52C	6	31	DF, PP, LP, WL w/light understory. Low levels of root disease.	Improvement cut w/ seed tree or shelterwood openings, slash, underburn	Tractor/ Winter	Improve health and vigor of manageable component of PP, WL, DF. Provide browse, reduce fuel loadings, inititate regeneration	X		X	X	X
52E	2 and 6	16	DF dominated w/LP, WL, PP. Significant root disease in DF. Light to moderate understory. In WUI.	Seed tree w/reserves, slash, underburn	Tractor/ Winter	Initiate regeneration, promote resilience, reduce fuel loading, provide browse	X			X	X
53	6	25	Older plantation of PP, DF, LP, WL w/ insect and disease issues. PP is off site and sustaining significant mortality. In WUI.	Clear cut w/reserves, slash, underburn	Tractor	Initiate regeneration, promote resilience, reduce fuel loading, provide browse	X		X	X	X

Unit #	MA/Suitability	Acres	Current Condition	Proposed Treatment	Logging System/ Season	Objectives	Purpose and Need				
							Promote resilient vegetation	Maintain or improve water quality	Provide wildlife security and forage	Provide wood products	Hazardous fuel reduction
53A		17	Older plantation of PP, DF, LP, WL w/ insect and disease issues. PP is off site and sustaining significant mortality. In WUI.	Clear cut w/reserves, slash, underburn	Tractor	Initiate regeneration, promote resilience, reduce fuel loading, provide browse	X		X	X	X
54	6	24	Dense, stagnant stand of DF, LP w/ incidental PP, WL w/ root rot in DF. In WUI.	Clear cut w/reserves, slash, grapple pile	Tractor	Initiate regeneration, promote resilience, reduce fuel loading, provide browse	X			X	X
55	6	31	Fairly open stand of DF, PP, LP, WL w/light understory.	Improvement cut w/ seed tree or shelterwood openings, slash, underburn	Tractor	Improve health and vigor of manageable component of PP, DF. Provide browse, reduce fuel loadings, initiate regeneration	X		X	X	X
55A	2 and 6	10	DF, PP, LP, WL w/ patches of dense DF/LP regeneration.	Improvement cut, slash, underburn	Tractor	Improve health and vigor of manageable component of PP, WL, DF. Provide browse, reduce fuel loadings	X		X	X	X
55B	2	18	DF, WL, PP, LP w/severe root disease in the DF. Light understory. In WUI.	Shelterwood w/reserves, slash, underburn	Tractor	Initiate regeneration, promote resilience, reduce fuel loading, provide browse	X		X	X	X

Unit #	MA/Suitability	Acres	Current Condition	Proposed Treatment	Logging System/ Season	Objectives	Purpose and Need				
							Promote resilient vegetation	Maintain or improve water quality	Provide wildlife security and forage	Provide wood products	Hazardous fuel reduction
56	2 and 6	29	Mixed conifer WRC, WH, WL, GF, DF, LP, WP w/ dense understory of WRC/WH/GF. Root rot noted. In WUI.	Seed tree w/reserves, slash, grapple pile	Tractor	Initiate regeneration, promote resilience, reduce fuel loading, provide browse	X		X	X	X
57	6	30	Mixed conifer WRC, WH, WL, GF, DF, WP w/ dense WRC/WH understory. Stagnant. Root disease in DF/GF. In WUI.	Seed tree w/reserves, slash, underburn	Tractor/ Winter	Initiate regeneration, promote resilience, reduce fuel loading, provide browse	X		X	X	X
57A	6	18	Mixed conifer WRC, WH, WL, GF, DF, WP w/ dense WRC/WH understory. Stagnant. Root disease in DF/GF. In WUI.	Seed tree w/reserves, slash, underburn	Tractor/ Winter	Initiate regeneration, promote resilience, reduce fuel loading, provide browse	X		X	X	X
58	2	15	Mixed conifer DF, WRC, GF, LP, WL, WH w/dense WRC understory.	Seed tree w/reserves, slash, grapple pile	Tractor	Initiate regeneration, promote resilience, reduce fuel loading, provide browse	X		X	X	X
59	2	11	Mixed conifer WRC/WH, GF, LP, DF, WL w/dense GF, WH understory. In WUI.	Seed tree w/reserves, slash, grapple pile	Tractor	Initiate regeneration, promote resilience, reduce fuel loading, provide browse	X		X	X	X

Unit #	MA/Suitability	Acres	Current Condition	Proposed Treatment	Logging System/ Season	Objectives	Purpose and Need				
							Promote resilient vegetation	Maintain or improve water quality	Provide wildlife security and forage	Provide wood products	Hazardous fuel reduction
60	2 and 6	24	Mixed conifer GF, WRC, WH, WL, DF, WP w/moderate understory.	Seed tree w/reserves, slash, grapple pile	Tractor/ Winter	Initiate regeneration, promote resilience, reduce fuel loading, provide browse	X		X	X	X
61	2 and 6	25	Mixed conifer WH, LP, WRC, GF, WL, DF w/moderate understory and patches of dense, suppressed LP.	Clear cut w/reserves, slash, grapple pile	Tractor/ Winter	Initiate regeneration, promote resilience, reduce fuel loading, provide browse	X		X	X	X
61A	2 and 6	34	Mixed conifer WH, LP, WRC, GF, WL, DF w/moderate understory and patches of dense, suppressed LP.	Clear cut w/reserves, slash, grapple pile	Tractor	Initiate regeneration, promote resilience, reduce fuel loading, provide browse	X		X	X	X
61B	2 and 6	15	Mixed conifer WH, LP, WRC, GF, WL, DF w/moderate understory and patches of dense, suppressed LP.	Clear cut w/reserves, slash, grapple pile	Tractor/ Winter	Initiate regeneration, promote resilience, reduce fuel loading, provide browse	X		X	X	X
62	2 and 6	24	Mixed conifer LP, WL, WRC, GF, DF w/ pockets of dense GF understory	Seed tree w/reserves, slash, grapple pile	Tractor	Initiate regeneration, promote resilience, reduce fuel loading, provide browse	X			X	X

Unit #	MA/Suitability	Acres	Current Condition	Proposed Treatment	Logging System/ Season	Objectives	Purpose and Need				
							Promote resilient vegetation	Maintain or improve water quality	Provide wildlife security and forage	Provide wood products	Hazardous fuel reduction
63	6	10	Mixed conifer WH, WL, GF, DF, WP, WRC, LP. In WUI.	Improvement cut, slash, grapple pile	Tractor/ Winter	Improve health and vigor of WL, PP, DF component. Provide browse, reduce fuel loadings, protect developing old growth character	X		X	X	X
68	6	27	Scattered PP overstory w/in DF dominated stand. Root disease present in DF.	Shelterwood w/reserves, slash, underburn	Skyline	Initiate regeneration, promote resilience, reduce fuel loading, provide browse	X			X	X
68A	6	25	Scattered PP overstory w/in DF dominated stand. Root disease present in DF.	Shelterwood w/reserves, slash, underburn	Skyline	Initiate regeneration, promote resilience, reduce fuel loading, provide browse	X			X	X
69	6	27	Mixed conifer DF, GF, PP, WL, WP.	Seed tree w/reserves, slash, underburn	Skyline	Initiate regeneration, promote resilience, reduce fuel loading, provide browse	X		X	X	X
70	6	25	DF stand w/ scattered PP, WL, GF w/ severe root disease and bark beetles.	Seed tree w/reserves, slash, underburn	Skyline	Initiate regeneration, promote resilience, reduce fuel loading, provide browse	X			X	X
70A	6	23	DF stand w/ scattered PP, WL, GF w/ severe root disease and bark beetles.	Seed tree w/reserves, slash, underburn	Skyline	Initiate regeneration, promote resilience, reduce fuel loading, provide browse	X			X	X

Unit #	MA/Suitability	Acres	Current Condition	Proposed Treatment	Logging System/ Season	Objectives	Purpose and Need				
							Promote resilient vegetation	Maintain or improve water quality	Provide wildlife security and forage	Provide wood products	Hazardous fuel reduction
71	6	39	Stand of WL, DF, GF w/ root rot pockets.	Seed tree w/reserves, slash, underburn	Skyline	Initiate regeneration, promote resilience, reduce fuel loading, provide browse	X		X	X	X
73	6	18	DF stand w/scattered PP. Root disease in DF.	Seed tree w/reserves, slash, underburn	Skyline	Initiate regeneration, promote resilience, reduce fuel loading, provide browse	X		X	X	X
74	6	32	Stand of dense DF w/ remnant DF/PP. Root disease noted.	Seed tree w/reserves, slash, underburn	Skyline	Initiate regeneration, promote resilience, reduce fuel loading, provide browse	X		X	X	X
74A	6	40	Stand of dense DF w/ remnant DF/PP. Root disease noted.	Seed tree w/reserves, slash, underburn	Skyline	Initiate regeneration, promote resilience, reduce fuel loading, provide browse	X		X	X	X
75	6	50	DF dominated stand w/scattered large PP. Root disease noted.	Improvement cut with seed tree or shelterwood openings, slash, underburn	Skyline	Improve health and vigor of manageable component of PP, DF. Provide browse, protect developing old growth character, reduce fuel loadings, initiate regeneration	X		X	X	X

Unit #	MA/Suitability	Acres	Current Condition	Proposed Treatment	Logging System/ Season	Objectives	Purpose and Need				
							Promote resilient vegetation	Maintain or improve water quality	Provide wildlife security and forage	Provide wood products	Hazardous fuel reduction
77	6	25	Older PP plantation w/ LP, DF, WL, GF and moderate DF/GF understory. PP is off-site and suffering significant mortality.	Clear cut w/reserves, slash, underburn	Tractor	Initiate regeneration, promote resilience, reduce fuel loading, provide browse	X		X	X	X
Total		**2,606**									

Appendix C: Glossary of Terms

Glossary of Terms

CC – Clear cut regeneration harvest; leaves approximately 5 - 25 trees per acre for structure, future DWD; snag replacements

DBH – diameter of a tree at breast height (4.5 feet above the ground)

DF – Douglas-fir

DMT – dwarf mistletoe (a parasitic plant)

DWD – Downed Woody Debris

ES – Engelmann spruce

GF – grand fir

Improvement cut – thinning of mature trees to improve tree and forage growth/health

Jackpot burn – burning only the concentrations of fuel

LP – lodgepole pine

MPB – Mountain Pine Beetle

PP – ponderosa pine

Regeneration cut – harvest designed to regenerate the stand

RR – Root rot, root disease

SAF – Subalpine fir

Seed tree cut with reserve trees regeneration harvest – leaves approximately 5-15 trees per acre for seed, shelter

Shelterwood cut regeneration harvest - leaves approximately 15-30 trees per acre for seed, shelter

Skyline – Cable yarding where one end of the log is suspended

Tractor – rubber tire or track based machine for log skidding

WH – western hemlock

WL – western larch

WP – western white pine

WRC – western redcedar

WUI – wildland urban interface

Appendix D – OLY Fuels Treatment Summary

Alternative 2 – OLY Fuels Treatment Summary

Unit #	MA	Treatment Acres	Current Condition	Proposed Treatment	Objectives	Purpose and Need			
						Promote resilient vegetation		Improved wildlife forage opportunities	Reduce hazardous fuels within the WUI
						Promote early seral species	Restore fire's ecosystem role		
F1*	5a	172	Higher elevation site. Forage and berry production reduced due to tree canopy closure, encroachment, lack of fire, and/or browse pressure.	Aerial and/or hand ignition will be used to create a mixed severity fire. Timeframe: spring/late summer/fall	Objective A	X	X	X	
F2	2, 6	76	Lower elevation site with drier habitat and associated species (e.g., ponderosa pine). Forage and berry production reduced due to tree canopy closure, encroachment, lack of fire, and/or browse pressure.	Fuels augmentation involving selective slashing of understory less than 6 inch DBH will precede hand ignition to create a low severity fire. Timeframe: spring/fall	Objective B	X	X	X	
F3	2,6	83	Lower elevation site with drier habitat and associated species (e.g., ponderosa pine). Forage and berry production reduced due to tree canopy closure, encroachment, lack of fire, and/or browse pressure.	Hand ignition will be used to create a mixed severity fire. Timeframe: spring/fall	Objective B	X	X	X	

Unit #	MA	Treatment Acres	Current Condition	Proposed Treatment	Objectives	Purpose and Need			
						Promote resilient vegetation		Improved wildlife forage opportunities	Reduce hazardous fuels within the WUI
						Promote early seral species	Restore fire's ecosystem role		
F4	6	17	Lower elevation site with drier habitat and associated species (e.g., ponderosa pine). Forage and berry production reduced due to tree canopy closure, encroachment, lack of fire, and/or browse pressure.	Fuels augmentation involving selective slashing of understory less than 6 inch DBH will precede hand ignition to create a low severity fire. Timeframe: spring/fall	Objective B	X	X	X	
F5	6	88	Lower elevation site with drier habitat and associated species (e.g., ponderosa pine). Forage and berry production reduced due to tree canopy closure, encroachment, lack of fire, and/or browse pressure.	Fuels augmentation involving selective slashing of understory less than 6 inch DBH will precede hand and/or aerial ignition to create a low severity fire. Timeframe: spring/fall	Objective B	X	X	X	
F6	6	43	Lower elevation site with drier habitat and associated species (e.g., ponderosa pine). Forage and berry production reduced due to tree canopy closure, encroachment, lack of fire, and/or browse pressure.	Aerial and/or hand ignition will be used to create a mixed severity fire. Timeframe: spring/fall	Objective A	X	X	X	
F7	6	9	Lower elevation site associated with private property. Existing fuel loads and ladder fuels contribute to increased fire risk and hamper potential fire-fighting efforts.	Selective slashing of understory less than 4" DBH. Slash will be either lop and scattered, hand piled or a combination of both.	Objective D				X

Unit #	MA	Treatment Acres	Current Condition	Proposed Treatment	Objectives	Purpose and Need			
						Promote resilient vegetation		Improved wildlife forage opportunities	Reduce hazardous fuels within the WUI
						Promote early seral species	Restore fire's ecosystem role		
F8	6	23	Lower elevation site associated with private property. Existing fuel loads and ladder fuels contribute to increased fire risk and hamper potential fire-fighting efforts.	Selective slashing of understory less than 6 inch DBH. Slash will be either lop and scattered, hand piled or a combination of both.	Objective D				X
F9	6	18	Lower elevation site with drier habitat and associated species (e.g., ponderosa pine). Forage and berry production reduced due to tree canopy closure, encroachment, lack of fire, and/or browse pressure.	Selective slashing of understory less than 6 inch DBH. Slash will be lopped and scattered	Objective C	X		X	X
F10	6	23	Lower elevation site with drier habitat and associated species (e.g., ponderosa pine). Forage and berry production reduced due to tree canopy closure, encroachment, lack of fire, and/or browse pressure.	Selective slashing of understory less than 6 inch DBH. Slash will be lopped and scattered	Objective C	X		X	X
F11	2, 6	49	Lower elevation site with drier habitat and associated species (e.g., ponderosa pine). Forage and berry production reduced due to tree canopy closure, encroachment, lack of fire, and/or browse pressure.	Fuels augmentation involving selective slashing of understory less than 6 inch DBH will precede hand ignition to create a low severity fire. Timeframe: spring/fall	Objective B	X	X	X	X

Unit #	MA	Treatment Acres	Current Condition	Proposed Treatment	Objectives	Purpose and Need			
						Promote resilient vegetation		Improved wildlife forage opportunities	Reduce hazardous fuels within the WUI
						Promote early seral species	Restore fire's ecosystem role		
F12	6	107	Lower elevation site with drier habitat and associated species (e.g., ponderosa pine). Forage and berry production reduced due to tree canopy closure, encroachment, lack of fire, and/or browse pressure.	Fuels augmentation involving selective slashing of understory less than 6 inch DBH will precede hand and/or aerial ignition to create a low severity fire. Timeframe: spring/fall	Objective B	X	X	X	X
F13	6	231	Lower elevation site with drier habitat and associated species (e.g., ponderosa pine). Forage and berry production reduced due to tree canopy closure, encroachment, lack of fire, and/or browse pressure.	Aerial and/or hand ignition will be used to create a mixed severity fire. Timeframe: spring/late summer/fall	Objective A	X	X	X	
F15	6	5	Lower elevation site associated with private property. Existing fuel loads and ladder fuels contribute to increased fire risk and hamper potential fire-fighting efforts.	Selective slashing of understory less than 6 inch DBH. Slash will be either lop and scattered, hand piled or a combination of both.	Objective D				X
F16	2	14	Lower elevation site associated with private property. Existing fuel loads have been reduced through past treatment.	Hand ignition will be used to create a low severity fire. Timeframe: spring/fall	Objective D				X
F17	2, 6	12	Lower elevation site associated with private property. Existing fuel loads have been reduced through past treatment.	Hand ignition will be used to create a low severity fire. Timeframe: spring/fall	Objective D				X

Unit #	MA	Treatment Acres	Current Condition	Proposed Treatment	Objectives	Purpose and Need			
						Promote resilient vegetation		Improved wildlife forage opportunities	Reduce hazardous fuels within the WUI
						Promote early seral species	Restore fire's ecosystem role		
F18	2	14	Lower elevation site associated with private property. Existing fuel loads and ladder fuels contribute to increased fire risk and hamper potential fire-fighting efforts.	Selective slashing of understory less than 6 inch DBH. Slash will be hauled by hand to the road and chipped.	Objective D				X
F19	6	339	Higher elevation site. Forage and berry production reduced due to tree canopy closure, encroachment, lack of fire, and/or browse pressure.	Aerial and/or hand ignition will be used to create a mixed severity fire. Timeframe: spring/late summer/fall	Objective A	X	X	X	
F20	6	4	Lower elevation site associated with private property. Existing fuel loads and ladder fuels contribute to increased fire risk and hamper potential fire-fighting efforts.	Selective slashing of understory less than 6 inch DBH. Slash will be either lop and scattered, hand piled or a combination of both.	Objective D				X
F22	6	8	Lower elevation site associated with private property. Existing fuel loads and ladder fuels contribute to increased fire risk and hamper potential fire-fighting efforts.	Selective slashing of understory less than 6 inch DBH. Slash will be grapple piled and burned.	Objective D				X

Unit #	MA	Treatment Acres	Current Condition	Proposed Treatment	Objectives	Purpose and Need			
						Promote resilient vegetation		Improved wildlife forage opportunities	Reduce hazardous fuels within the WUI
						Promote early seral species	Restore fire's ecosystem role		
F25	6	242	Lower elevation site with drier habitat and associated species (e.g., ponderosa pine). Forage and berry production reduced due to tree canopy closure, encroachment, lack of fire, and/or browse pressure.	Aerial and/or hand ignition will be used to create a mixed severity fire. Timeframe: spring/late summer/fall	Objective A	X	X	X	X
F26	6	4	Lower elevation site associated with private property. Existing fuel loads and ladder fuels contribute to increased fire risk and hamper potential fire-fighting efforts.	Selective slashing of understory less than 6 inch DBH. Slash will be grapple piled and burned.	Objective D				X
F27	6	11	Lower elevation site with drier habitat and associated species (e.g., ponderosa pine). Forage and berry production reduced due to tree canopy closure, encroachment, lack of fire, and/or browse pressure.	Fuels augmentation involving selective slashing of understory less than 6 inch DBH will precede hand and/or aerial ignition to create a low severity fire. Timeframe: spring/fall	Objective B	X	X	X	
F28	6	21	Lower elevation site with drier habitat and associated species (e.g., ponderosa pine). Forage and berry production reduced due to tree canopy closure, encroachment, lack of fire, and/or browse pressure.	Fuels augmentation involving selective slashing of understory less than 6 inch DBH will precede hand and/or aerial ignition to create a low severity fire. Timeframe: spring/fall	Objective B	X	X	X	X

Unit #	MA	Treatment Acres	Current Condition	Proposed Treatment	Objectives	Purpose and Need			
						Promote resilient vegetation		Improved wildlife forage opportunities	Reduce hazardous fuels within the WUI
						Promote early seral species	Restore fire's ecosystem role		
F29	6	3	Lower elevation site associated with private property. Existing fuel loads and ladder fuels contribute to increased fire risk and hamper potential fire-fighting efforts.	Selective slashing of understory less than 6 inch DBH. Slash will be either lop and scattered, hand piled or a combination of both.	Objective D				X
F30	2	4	Lower elevation site associated with private property. Existing fuel loads and ladder fuels contribute to increased fire risk and hamper potential fire-fighting efforts.	Hand ignition will be used to create a low severity fire. Timeframe: spring/fall	Objective D	X	X	X	X
F31	6	96	Lower elevation site associated with private property. Existing fuel loads and ladder fuels contribute to increased fire risk and hamper potential fire-fighting efforts.	Fuels augmentation involving selective slashing of understory less than 6 inch DBH will precede spot hand piling and/or hand ignition to create a low severity fire. Timeframe: spring/fall	Objective D	X	X	X	X
Total acres		**1716**							

*Represents fuels units located within Inventoried Roadless Areas.

Unit #	MA	Treatment Acres	Current Condition	Proposed Treatment	Objectives	Purpose and Need			
						Promote resilient vegetation		Improved wildlife forage opportunities	Reduce hazardous fuels within the WUI
						Promote early seral species	Restore fire's ecosystem role		
F1*	5a	172	Higher elevation site. Forage and berry production reduced due to tree canopy closure, encroachment, lack of fire, and/or browse pressure.	Aerial and/or hand ignition will be used to create a mixed severity fire. Timeframe: spring/late summer/fall	Objective A	X	X	X	
F2	2, 6	76	Lower elevation site with drier habitat and associated species (e.g., ponderosa pine). Forage and berry production reduced due to tree canopy closure, encroachment, lack of fire, and/or browse pressure.	Fuels augmentation involving selective slashing of understory less than 6 inch DBH will precede hand ignition to create a low severity fire. Timeframe: spring/fall	Objective B	X	X	X	
F3	2,6	83	Lower elevation site with drier habitat and associated species (e.g., ponderosa pine). Forage and berry production reduced due to tree canopy closure, encroachment, lack of fire, and/or browse pressure.	Hand ignition will be used to create a mixed severity fire. Timeframe: spring/fall	Objective B	X	X	X	
F4	6	17	Lower elevation site with drier habitat and associated species (e.g., ponderosa pine). Forage and berry production reduced due to tree canopy closure, encroachment, lack of fire, and/or browse pressure.	Fuels augmentation involving selective slashing of understory less than 6 inch DBH will precede hand ignition to create a low severity fire. Timeframe: spring/fall	Objective B	X	X	X	

Unit #	MA	Treatment Acres	Current Condition	Proposed Treatment	Objectives	Purpose and Need			
						Promote resilient vegetation		Improved wildlife forage opportunities	Reduce hazardous fuels within the WUI
						Promote early seral species	Restore fire's ecosystem role		
F5	6	88	Lower elevation site with drier habitat and associated species (e.g., ponderosa pine). Forage and berry production reduced due to tree canopy closure, encroachment, lack of fire, and/or browse pressure.	Fuels augmentation involving selective slashing of understory less than 6 inch DBH will precede hand and/or aerial ignition to create a low severity fire. Timeframe: spring/fall	Objective B	X	X	X	
F6	6	43	Lower elevation site with drier habitat and associated species (e.g., ponderosa pine). Forage and berry production reduced due to tree canopy closure, encroachment, lack of fire, and/or browse pressure.	Aerial and/or hand ignition will be used to create a mixed severity fire. Timeframe: spring/fall	Objective A	X	X	X	
F7	6	9	Lower elevation site associated with private property. Existing fuel loads and ladder fuels contribute to increased fire risk and hamper potential fire-fighting efforts.	Selective slashing of understory less than 4" DBH. Slash will be either lop and scattered, hand piled or a combination of both.	Objective D				X
F8	6	23	Lower elevation site associated with private property. Existing fuel loads and ladder fuels contribute to increased fire risk and hamper potential fire-fighting efforts.	Selective slashing of understory less than 6 inch DBH. Slash will be either lop and scattered, hand piled or a combination of both.	Objective D				X

Unit #	MA	Treatment Acres	Current Condition	Proposed Treatment	Objectives	Purpose and Need			
						Promote resilient vegetation		Improved wildlife forage opportunities	Reduce hazardous fuels within the WUI
						Promote early seral species	Restore fire's ecosystem role		
F9	6	18	Lower elevation site with drier habitat and associated species (e.g., ponderosa pine). Forage and berry production reduced due to tree canopy closure, encroachment, lack of fire, and/or browse pressure.	Selective slashing of understory less than 6 inch DBH. Slash will be lopped and scattered	Objective C	X		X	X
F10	6	23	Lower elevation site with drier habitat and associated species (e.g., ponderosa pine). Forage and berry production reduced due to tree canopy closure, encroachment, lack of fire, and/or browse pressure.	Selective slashing of understory less than 6 inch DBH. Slash will be lopped and scattered	Objective C	X		X	X
F11	2, 6	49	Lower elevation site with drier habitat and associated species (e.g., ponderosa pine). Forage and berry production reduced due to tree canopy closure, encroachment, lack of fire, and/or browse pressure.	Fuels augmentation involving selective slashing of understory less than 6 inch DBH will precede hand ignition to create a low severity fire. Timeframe: spring/fall	Objective B	X	X	X	X
F12	6	107	Lower elevation site with drier habitat and associated species (e.g., ponderosa pine). Forage and berry production reduced due to tree canopy closure, encroachment, lack of fire, and/or browse pressure.	Fuels augmentation involving selective slashing of understory less than 6 inch DBH will precede hand and/or aerial ignition to create a low severity fire. Timeframe: spring/fall	Objective B	X	X	X	X

Unit #	MA	Treatment Acres	Current Condition	Proposed Treatment	Objectives	Purpose and Need			
						Promote resilient vegetation		Improved wildlife forage opportunities	Reduce hazardous fuels within the WUI
						Promote early seral species	Restore fire's ecosystem role		
F13	6	231	Lower elevation site with drier habitat and associated species (e.g., ponderosa pine). Forage and berry production reduced due to tree canopy closure, encroachment, lack of fire, and/or browse pressure.	Aerial and/or hand ignition will be used to create a mixed severity fire. Timeframe: spring/late summer/fall	Objective A	X	X	X	
F15	6	5	Lower elevation site associated with private property. Existing fuel loads and ladder fuels contribute to increased fire risk and hamper potential fire-fighting efforts.	Selective slashing of understory less than 6 inch DBH. Slash will be either lop and scattered, hand piled or a combination of both.	Objective D				X
F16	2	14	Lower elevation site associated with private property. Existing fuel loads have been reduced through past treatment.	Hand ignition will be used to create a low severity fire. Timeframe: spring/fall	Objective D				X
F17	2, 6	12	Lower elevation site associated with private property. Existing fuel loads have been reduced through past treatment.	Hand ignition will be used to create a low severity fire. Timeframe: spring/fall	Objective D				X
F18	2	14	Lower elevation site associated with private property. Existing fuel loads and ladder fuels contribute to increased fire risk and hamper potential fire-fighting efforts.	Selective slashing of understory less than 6 inch DBH. Slash will be hauled by hand to the road and chipped.	Objective D				X

Unit #	MA	Treatment Acres	Current Condition	Proposed Treatment	Objectives	Purpose and Need			
						Promote resilient vegetation		Improved wildlife forage opportunities	Reduce hazardous fuels within the WUI
						Promote early seral species	Restore fire's ecosystem role		
F19	6	339	Higher elevation site. Forage and berry production reduced due to tree canopy closure, encroachment, lack of fire, and/or browse pressure.	Aerial and/or hand ignition will be used to create a mixed severity fire. Timeframe: spring/late summer/fall	Objective A	X	X	X	
F20	6	4	Lower elevation site associated with private property. Existing fuel loads and ladder fuels contribute to increased fire risk and hamper potential fire-fighting efforts.	Selective slashing of understory less than 6 inch DBH. Slash will be either lop and scattered, hand piled or a combination of both.	Objective D				X
F22	6	8	Lower elevation site associated with private property. Existing fuel loads and ladder fuels contribute to increased fire risk and hamper potential fire-fighting efforts.	Selective slashing of understory less than 6 inch DBH. Slash will be grapple piled and burned.	Objective D				X
F25	6	242	Lower elevation site with drier habitat and associated species (e.g., ponderosa pine). Forage and berry production reduced due to tree canopy closure, encroachment, lack of fire, and/or browse pressure.	Aerial and/or hand ignition will be used to create a mixed severity fire. Timeframe: spring/late summer/fall	Objective A	X	X	X	X

Unit #	MA	Treatment Acres	Current Condition	Proposed Treatment	Objectives	Purpose and Need			
						Promote resilient vegetation		Improved wildlife forage opportunities	Reduce hazardous fuels within the WUI
						Promote early seral species	Restore fire's ecosystem role		
F26	6	4	Lower elevation site associated with private property. Existing fuel loads and ladder fuels contribute to increased fire risk and hamper potential fire-fighting efforts.	Selective slashing of understory less than 6 inch DBH. Slash will be grapple piled and burned.	Objective D				X
F27	6	11	Lower elevation site with drier habitat and associated species (e.g., ponderosa pine). Forage and berry production reduced due to tree canopy closure, encroachment, lack of fire, and/or browse pressure.	Fuels augmentation involving selective slashing of understory less than 6 inch DBH will precede hand and/or aerial ignition to create a low severity fire. Timeframe: spring/fall	Objective B	X	X	X	
F28	6	21	Lower elevation site with drier habitat and associated species (e.g., ponderosa pine). Forage and berry production reduced due to tree canopy closure, encroachment, lack of fire, and/or browse pressure.	Fuels augmentation involving selective slashing of understory less than 6 inch DBH will precede hand and/or aerial ignition to create a low severity fire. Timeframe: spring/fall	Objective B	X	X	X	X
F29	6	3	Lower elevation site associated with private property. Existing fuel loads and ladder fuels contribute to increased fire risk and hamper potential fire-fighting efforts.	Selective slashing of understory less than 6 inch DBH. Slash will be either lop and scattered, hand piled or a combination of both.	Objective D				X

Unit #	MA	Treatment Acres	Current Condition	Proposed Treatment	Objectives	Purpose and Need			
						Promote resilient vegetation		Improved wildlife forage opportunities	Reduce hazardous fuels within the WUI
						Promote early seral species	Restore fire's ecosystem role		
F31	6	96	Lower elevation site associated with private property. Existing fuel loads and ladder fuels contribute to increased fire risk and hamper potential fire-fighting efforts.	Fuels augmentation involving selective slashing of understory less than 6 inch DBH will precede spot hand piling and/or hand ignition to create a low severity fire. Timeframe: spring/fall	Objective D	X	X	X	X
F32 (Old 41B)	2, 6	15	Lower elevation site associated with private property. Existing fuel loads and ladder fuels contribute to increased fire risk and hamper potential fire-fighting efforts.	Hand ignition will be used to create a low severity fire. Timeframe: spring/fall Slash, hand pile, burn hand piles	Objective D				X
F33 (old 35)	2	10	Lower elevation site associated with private property. Existing fuel loads and ladder fuels contribute to increased fire risk and hamper potential fire-fighting efforts.	Selective slashing of understory less than 6 inch DBH. Slash will be hauled by hand to the road and chipped.	Objective D				X
F34 (old 35A)	2	2	Lower elevation site associated with private property. Existing fuel loads and ladder fuels contribute to increased fire risk and hamper potential fire-fighting efforts.	Selective slashing of understory less than 6 inch DBH. Slash will be hauled by hand to the road and chipped.	Objective D				X

Unit #	MA	Treatment Acres	Current Condition	Proposed Treatment	Objectives	Purpose and Need			
						Promote resilient vegetation		Improved wildlife forage opportunities	Reduce hazardous fuels within the WUI
						Promote early seral species	Restore fire's ecosystem role		
F35 (old 35B)	2	3	Lower elevation site associated with private property. Existing fuel loads and ladder fuels contribute to increased fire risk and hamper potential fire-fighting efforts.	Selective slashing of understory less than 6 inch DBH. Slash will be hauled by hand to the road and chipped.	Objective D				X
F36 (old 36)	2	2	Lower elevation site associated with private property. Existing fuel loads and ladder fuels contribute to increased fire risk and hamper potential fire-fighting efforts.	Selective slashing of understory less than 6 inch DBH. Slash will be hauled by hand to the road and chipped.	Objective D				X
Total acres		**1,744**							

*Represents fuels units located within Inventoried Roadless Areas.

Unit #	MA	Treatment Acres	Current Condition	Proposed Treatment	Objectives	Purpose and Need			
						Promote resilient vegetation		Improved wildlife forage opportunities	Reduce hazardous fuels within the WUI
						Promote early seral species	Restore fire's ecosystem role		
F1*	5a	172	Higher elevation site. Forage and berry production reduced due to tree canopy closure, encroachment, lack of fire, and/or browse pressure.	Aerial and/or hand ignition will be used to create a mixed severity fire. Timeframe: spring/late summer/fall	Objective A	X	X	X	
F2	2, 6	76	Lower elevation site with drier habitat and associated species (e.g., ponderosa pine). Forage and berry production reduced due to tree canopy closure, encroachment, lack of fire, and/or browse pressure.	Fuels augmentation involving selective slashing of understory less than 6 inch DBH will precede hand ignition to create a low severity fire. Timeframe: spring/fall	Objective B	X	X	X	
F3	2,6	83	Lower elevation site with drier habitat and associated species (e.g., ponderosa pine). Forage and berry production reduced due to tree canopy closure, encroachment, lack of fire, and/or browse pressure.	Hand ignition will be used to create a mixed severity fire. Timeframe: spring/fall	Objective B	X	X	X	
F4	6	17	Lower elevation site with drier habitat and associated species (e.g., ponderosa pine). Forage and berry production reduced due to tree canopy closure, encroachment, lack of fire, and/or browse pressure.	Fuels augmentation involving selective slashing of understory less than 6 inch DBH will precede hand ignition to create a low severity fire. Timeframe: spring/fall	Objective B	X	X	X	
F5	6	88	Lower elevation site with drier habitat and associated species (e.g., ponderosa pine). Forage and berry production reduced due to tree canopy closure, encroachment, lack of fire, and/or browse pressure.	Fuels augmentation involving selective slashing of understory less than 6 inch DBH will precede hand and/or aerial ignition to create a low severity fire. Timeframe: spring/fall	Objective B	X	X	X	

Unit #	MA	Treatment Acres	Current Condition	Proposed Treatment	Objectives	Purpose and Need			
						Promote resilient vegetation		Improved wildlife forage opportunities	Reduce hazardous fuels within the WUI
						Promote early seral species	Restore fire's ecosystem role		
F6	6	43	Lower elevation site with drier habitat and associated species (e.g., ponderosa pine). Forage and berry production reduced due to tree canopy closure, encroachment, lack of fire, and/or browse pressure.	Aerial and/or hand ignition will be used to create a mixed severity fire. Timeframe: spring/fall	Objective A	X	X	X	
F7	6	9	Lower elevation site associated with private property. Existing fuel loads and ladder fuels contribute to increased fire risk and hamper potential fire-fighting efforts.	Selective slashing of understory less than 4" DBH. Slash will be either lop and scattered, hand piled or a combination of both.	Objective D				X
F8	6	23	Lower elevation site associated with private property. Existing fuel loads and ladder fuels contribute to increased fire risk and hamper potential fire-fighting efforts.	Selective slashing of understory less than 6 inch DBH. Slash will be either lop and scattered, hand piled or a combination of both.	Objective D				X
F9	6	18	Lower elevation site with drier habitat and associated species (e.g., ponderosa pine). Forage and berry production reduced due to tree canopy closure, encroachment, lack of fire, and/or browse pressure.	Selective slashing of understory less than 6 inch DBH. Slash will be lopped and scattered	Objective C	X		X	X
F10	6	23	Lower elevation site with drier habitat and associated species (e.g., ponderosa pine). Forage and berry production reduced due to tree canopy closure, encroachment, lack of fire, and/or browse pressure.	Selective slashing of understory less than 6 inch DBH. Slash will be lopped and scattered	Objective C	X		X	X

Unit #	MA	Treatment Acres	Current Condition	Proposed Treatment	Objectives	Purpose and Need			
						Promote resilient vegetation		Improved wildlife forage opportunities	Reduce hazardous fuels within the WUI
						Promote early seral species	Restore fire's ecosystem role		
F11	2, 6	49	Lower elevation site with drier habitat and associated species (e.g., ponderosa pine). Forage and berry production reduced due to tree canopy closure, encroachment, lack of fire, and/or browse pressure.	Fuels augmentation involving selective slashing of understory less than 6 inch DBH will precede hand ignition to create a low severity fire. Timeframe: spring/fall	Objective B	X	X	X	X
F12	6	107	Lower elevation site with drier habitat and associated species (e.g., ponderosa pine). Forage and berry production reduced due to tree canopy closure, encroachment, lack of fire, and/or browse pressure.	Fuels augmentation involving selective slashing of understory less than 6 inch DBH will precede hand and/or aerial ignition to create a low severity fire. Timeframe: spring/fall	Objective B	X	X	X	X
F13	6	231	Lower elevation site with drier habitat and associated species (e.g., ponderosa pine). Forage and berry production reduced due to tree canopy closure, encroachment, lack of fire, and/or browse pressure.	Aerial and/or hand ignition will be used to create a mixed severity fire. Timeframe: spring/late summer/fall	Objective A	X	X	X	
F15	6	5	Lower elevation site associated with private property. Existing fuel loads and ladder fuels contribute to increased fire risk and hamper potential fire-fighting efforts.	Selective slashing of understory less than 6 inch DBH. Slash will be either lop and scattered, hand piled or a combination of both.	Objective D				X
F16	2	14	Lower elevation site associated with private property. Existing fuel loads have been reduced through past treatment.	Hand ignition will be used to create a low severity fire. Timeframe: spring/fall	Objective D				X

Unit #	MA	Treatment Acres	Current Condition	Proposed Treatment	Objectives	Purpose and Need			
						Promote resilient vegetation		Improved wildlife forage opportunities	Reduce hazardous fuels within the WUI
						Promote early seral species	Restore fire's ecosystem role		
F17	2, 6	12	Lower elevation site associated with private property. Existing fuel loads have been reduced through past treatment.	Hand ignition will be used to create a low severity fire. Timeframe: spring/fall	Objective D				X
F18	2	14	Lower elevation site associated with private property. Existing fuel loads and ladder fuels contribute to increased fire risk and hamper potential fire-fighting efforts.	Selective slashing of understory less than 6 inch DBH. Slash will be hauled by hand to the road and chipped.	Objective D				X
F19	6	339	Higher elevation site. Forage and berry production reduced due to tree canopy closure, encroachment, lack of fire, and/or browse pressure.	Aerial and/or hand ignition will be used to create a mixed severity fire. Timeframe: spring/late summer/fall	Objective A	X	X	X	
F20	6	4	Lower elevation site associated with private property. Existing fuel loads and ladder fuels contribute to increased fire risk and hamper potential fire-fighting efforts.	Selective slashing of understory less than 6 inch DBH. Slash will be either lop and scattered, hand piled or a combination of both.	Objective D				X
F22	6	8	Lower elevation site associated with private property. Existing fuel loads and ladder fuels contribute to increased fire risk and hamper potential fire-fighting efforts.	Selective slashing of understory less than 6 inch DBH. Slash will be grapple piled and burned.	Objective D				X
F25	6	242	Lower elevation site with drier habitat and associated species (e.g., ponderosa pine). Forage and berry production reduced due to tree canopy closure, encroachment, lack of fire, and/or browse pressure.	Aerial and/or hand ignition will be used to create a mixed severity fire. Timeframe: spring/late summer/fall	Objective A	X	X	X	X

Unit #	MA	Treatment Acres	Current Condition	Proposed Treatment	Objectives	Purpose and Need			
						Promote resilient vegetation		Improved wildlife forage opportunities	Reduce hazardous fuels within the WUI
						Promote early seral species	Restore fire's ecosystem role		
F26	6	4	Lower elevation site associated with private property. Existing fuel loads and ladder fuels contribute to increased fire risk and hamper potential fire-fighting efforts.	Selective slashing of understory less than 6 inch DBH. Slash will be grapple piled and burned.	Objective D				X
F27	6	11	Lower elevation site with drier habitat and associated species (e.g., ponderosa pine). Forage and berry production reduced due to tree canopy closure, encroachment, lack of fire, and/or browse pressure.	Fuels augmentation involving selective slashing of understory less than 6 inch DBH will precede hand and/or aerial ignition to create a low severity fire. Timeframe: spring/fall	Objective B	X	X	X	
F28	6	21	Lower elevation site with drier habitat and associated species (e.g., ponderosa pine). Forage and berry production reduced due to tree canopy closure, encroachment, lack of fire, and/or browse pressure.	Fuels augmentation involving selective slashing of understory less than 6 inch DBH will precede hand and/or aerial ignition to create a low severity fire. Timeframe: spring/fall	Objective B	X	X	X	X
F29	6	3	Lower elevation site associated with private property. Existing fuel loads and ladder fuels contribute to increased fire risk and hamper potential fire-fighting efforts.	Selective slashing of understory less than 6 inch DBH. Slash will be either lop and scattered, hand piled or a combination of both.	Objective D				X
F30	2	4	Lower elevation site associated with private property. Existing fuel loads and ladder fuels contribute to increased fire risk and hamper potential fire-fighting efforts.	Hand ignition will be used to create a low severity fire. Timeframe: spring/fall	Objective D	X	X	X	X

Unit #	MA	Treatment Acres	Current Condition	Proposed Treatment	Objectives	Purpose and Need			
						Promote resilient vegetation		Improved wildlife forage opportunities	Reduce hazardous fuels within the WUI
						Promote early seral species	Restore fire's ecosystem role		
F31	6	96	Lower elevation site associated with private property. Existing fuel loads and ladder fuels contribute to increased fire risk and hamper potential fire-fighting efforts.	Fuels augmentation involving selective slashing of understory less than 6 inch DBH will precede spot hand piling and/or hand ignition to create a low severity fire. Timeframe: spring/fall	Objective D	X	X	X	X
F32	2,6	15	Lower elevation site associated with private property. Existing fuel loads and ladder fuels contribute to increased fire risk and hamper potential fire-fighting efforts.	Selective slashing of understory less than 6 inch DBH. Slash will be hand piled and burned.	Objective D				X
Total acres		**1731**							

*Represents fuels units located within Inventoried Roadless Areas

Objective A: Reintroduce fire on the landscape maintain existing open conditions; stimulate forage/browse reproduction for big game and other wildlife species; potential for improved huckleberry production in higher elevation locations, where present, that would benefit grizzly bear recovery efforts.

Objective B: Reintroduce fire on the landscape; thin encroaching conifers with fuel augmentation (slashing) where needed; promote ponderosa pine restoration and improve future suitability for flammulated owl use; promote growing conditions that maintain or encourage the development of old growth characteristics; improve browse and forage availability in big game winter ranges and spring foraging habitat for grizzly bear.

Objective C: Simulate fire's role on the landscape by thinning encroaching conifers; promote ponderosa pine restoration which includes the maintenance/development of old growth characteristics through improved growing conditions; maintain existing browse and forage by reducing competition and overstory cover; improve suitability for flammulated owl use.

Objective D: Reducing and/or maintaining low fuel conditions in the wildland urban interface; increasing defensible space around private property; and improving accessibility for emergency responders and public in the event of a wildfire.

Appendix E – OLY Access Management Plan and Map

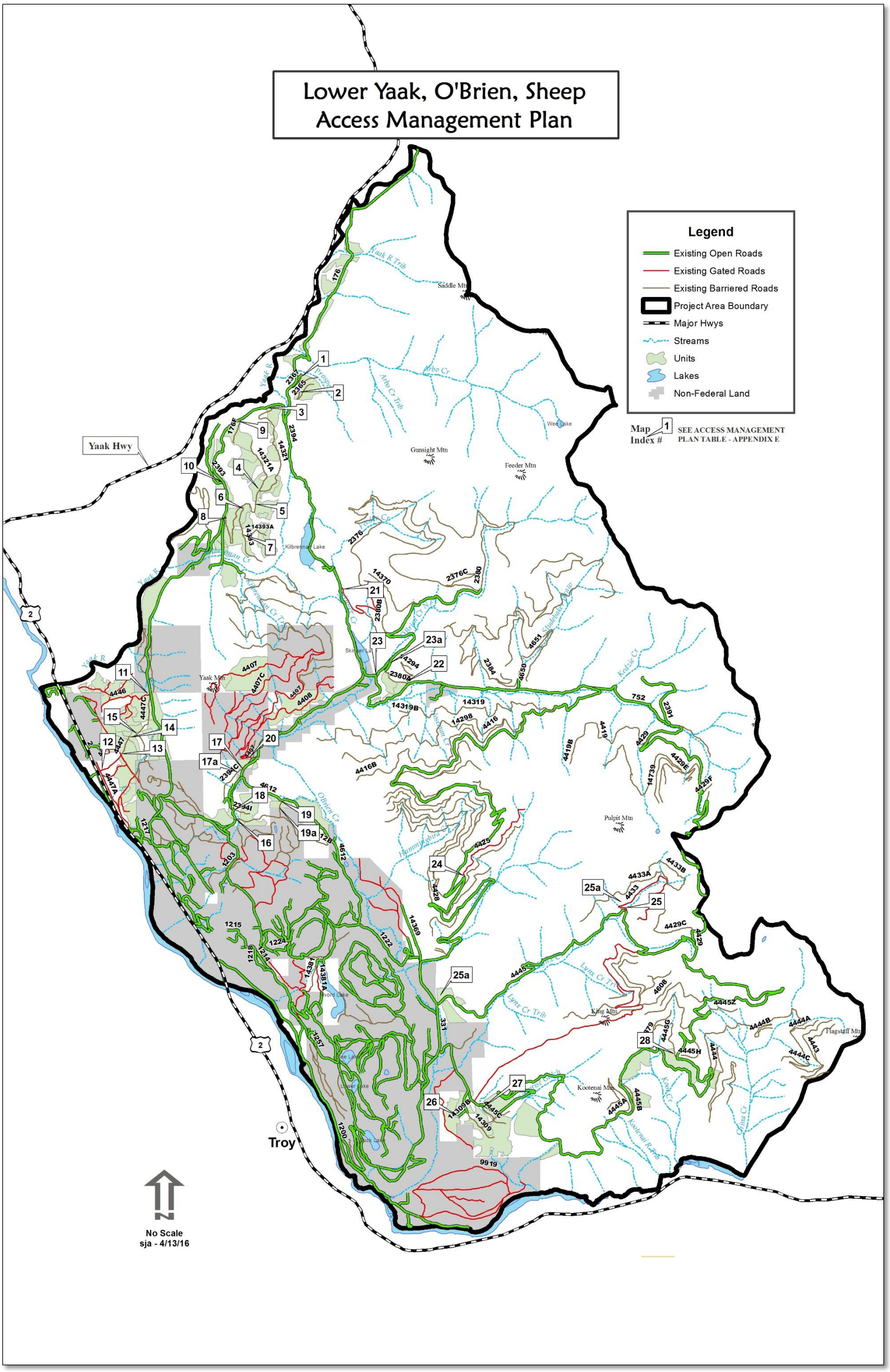
Map Index	Road	Location (Milepost)	Proposed Action	Timing	Reason For Action	Who
1	2365	MP 0.0	Remove Barrier	During Road Reconstruction	Harvest Access	Purchaser
1	2365	MP 0.0	Install Gate	During Road Reconstruction	Wildlife Habitat Security	Purchaser
1	2365	MP 0.0	Public motorized use restricted; lock gate nights and weekends	During Road Work and Harvest Activities	Wildlife Habitat Security	Purchaser
1	2365	MP 0.0	Close gate; maintained as gated road for administrative use	Following Harvest Activities	Wildlife Habitat Security	Purchaser
2	2365	MP 0.3	Install barrier at the end of haul route	During Road Reconstruction	Wildlife Habitat Security	Purchaser
3	14321	MP 3.6 (north end)	Remove Barrier	During Road Reconstruction	Harvest Access	Purchaser
3	14321	MP 3.6 (north end)	Install Gate	During Road Reconstruction	Wildlife Habitat Security	Purchaser
3	14321	MP 3.6 (north end)	Public motorized use restricted; lock gate nights and weekends	During Road Work and Harvest Activities	Wildlife Habitat Security	Purchaser
3	14321	MP 3.6 (north end)	Close gate; maintained as gated road for administrative use	Following Harvest Activities	Wildlife Habitat Security	Purchaser
4	14321A	MP 0.0	Remove Barrier	During Road Reconstruction	Harvest Access	Purchaser
4	14321A	MP 0.0	Restrict public motorized access via gates on 14321; see map indices 3 and 8	During Road Work and Harvest Activities	Wildlife Habitat Security	Purchaser
5	14321	MP 1.6	New construction associated with rerouted segment; ties into NFSR 14393A at MP 0.3	During Road Reconstruction	Stream Restoration	Purchaser
6	14393	MP 0.0	Remove Barrier	During Road Reconstruction	Harvest Access	Purchaser
6	14393	MP 0.0	Restrict public motorized access, this road system is located behind the gates on 14321; see map indices 3 and 8	During Road Work and Harvest Activities	Wildlife Habitat Security	Purchaser

Map Index	Road	Location (Milepost)	Proposed Action	Timing	Reason For Action	Who
7	14393A	MP 0.0	Remove Barrier	During Road Reconstruction	Harvest Access	Purchaser
7	14393A	MP 0.0	Restrict public motorized access, this road system is located behind the gates on 14321; see map indices 3 and 8	During Road Work and Harvest Activities	Wildlife Habitat Security	Purchaser
8	14321	MP 0.0 (south end)	Remove Barrier	During Road Reconstruction	Harvest Access	Purchaser
8	14321	MP 0.0 (south end)	Install Gate	During Road Reconstruction	Wildlife Habitat Security	Purchaser
8	14321	MP 0.0 (south end)	Public motorized use restricted; lock gate nights and weekends	During Road Work and Harvest Activities	Wildlife Habitat Security	Purchaser
8	14321	MP 0.0 (south end)	Close gate; maintained as gated road for administrative use	Following Harvest Activities	Wildlife Habitat Security	Purchaser
9	176F	MP 0.0	Remove Barrier	During Road Reconstruction	Harvest Access	Purchaser
9	176F	MP 0.0	Install Temporary Gate	During Road Reconstruction	Wildlife Habitat Security	Purchaser
9	176F	MP 0.0	Public motorized use restricted; lock gate nights and weekends	During Road Work and Harvest Activities	Wildlife Habitat Security	Purchaser
9	176F	MP 0.0	Install Barrier	Following Harvest Activities	Wildlife Habitat Security	Purchaser
10	2393	MP 0.1	Install Barrier	Following Harvest and Burning Activities	Wildlife Habitat Security	USFS
11	4446	MP 0.0	Public motorized use restricted; lock gate nights and weekends	During Road Work and Harvest Activities	Wildlife Habitat Security	Purchaser
11	4446	MP 0.0	Close gate; maintained as gated road for administrative use	Following Harvest Activities	Wildlife Habitat Security	Purchaser
12	4447	MP 0.0	Public motorized use restricted; lock gate nights and weekends	During Road Work and Harvest Activities	Wildlife Habitat Security	Purchaser
12	4447	MP 0.0	Close gate; maintained as gated road for administrative use	Following Harvest Activities	Wildlife Habitat Security	Purchaser
13	4447	MP 0.5	Remove Barrier**	During Road Reconstruction	Harvest Access	Purchaser

Map Index	Road	Location (Milepost)	Proposed Action	Timing	Reason For Action	Who
13	4447	MP 0.5	Restrict public motorized access, this road system is located behind the gate on 4447; see map index 12	During Road Work and Harvest Activities	Wildlife Habitat Security	Purchaser
14	4447	MP 0.9	Install Barrier (at the end of Unit 37)	During Road Reconstruction	Wildlife Habitat Security	Purchaser
15	4447C	MP 0.0	Remove Barrier**	During Road Reconstruction	Harvest Access	Purchaser
15	4447C	MP 0.0	Install Barrier	Following Harvest Activities	Wildlife Habitat Security	Purchaser
16	2394A	MP 0.0	Remove Barrier**	During Road Reconstruction	Harvest Access	Purchaser
16	2394A	MP 0.0	Install Gate	During Road Reconstruction	Wildlife Habitat Security	Purchaser
16	2394A	MP 0.0	Public motorized use restricted; lock gate nights and weekends	During Road Work and Harvest Activities	Wildlife Habitat Security	Purchaser
16	2394A	MP 0.0	Close gate; maintained as gated road for administrative use	Following Harvest Activities	Wildlife Habitat Security	Purchaser
17	2394C	MP 0.0	Remove Barrier**	During Road Reconstruction	Harvest Access	Purchaser
17	2394C	MP 0.0	Install Barrier	Following Harvest Activities	Wildlife Habitat Security	Purchaser
17A	2394C	MP 0.1	Install Barrier (where it crosses unit boundary)	During Road Reconstruction	Wildlife Security	Purchaser
18	2394I	MP 0.0	Remove Barrier**	During Road Reconstruction	Harvest Access	Purchaser
18	2394I	MP 0.0	Install Temporary Gate	During Road Reconstruction	Wildlife Habitat Security	Purchaser
18	2394I	MP 0.0	Public motorized use restricted; lock gate nights and weekends	During Road Work and Harvest Activities	Wildlife Habitat Security	Purchaser
18	2394I	MP 0.0	Install Barrier	Following Harvest Activities	Wildlife Habitat Security	Purchaser
19	9933	MP 0.0	Remove Barrier**	During Road Reconstruction	Harvest Access	Purchaser
19	9933	MP 0.0	Install Barrier	Following Harvest Activities	Wildlife Habitat Security	Purchaser
19A	9933	MP 0.1	Install Barrier (at end of unit boundary)	During Road Reconstruction	Wildlife Habitat Security	Purchaser
20	4407	MP 0.0	Public motorized use restricted; lock gate Nights and weekends	During Road Work and Harvest Activities	Wildlife Habitat Security	Purchaser

Map Index	Road	Location (Milepost)	Proposed Action	Timing	Reason For Action	Who
20	4407	MP 0.0	Close gate; maintained as gated road for administrative use	Following Harvest Activities	Wildlife Habitat Security	Purchaser
21	2376	MP 0.0	Remove Gate, Install Barrier	Prior to most harvest activities; See Design Features for exceptions	Wildlife Habitat Security	Purchaser
22	2380A	MP 0.7	Remove Barrier**	During Road Reconstruction	Harvest Access	Purchaser
22	2380A	MP 0.7	Install Barrier	Following Harvest Activities	Wildlife Habitat Security	Purchaser
23	2380	MP 0.0	Actively decommission to junction with NFSR 2380A*	Funding Dependent	Stream Restoration	USFS
23A	2380A	MP 0.0	Reconstruct entire length from NFSR 2380 to the junction with NFSR 752, to allow public access to North Fork O'Brien*	Prior to decommissioning section of NFSR 2380*	Stream Restoration	USFS
24	4425	MP 0.0	Remove Gate, Install Barrier	Prior to most harvest activities; See Design Features for exceptions	Wildlife Habitat Security	Purchaser
25	4433	MP 0.0	Remove Gate, Install Barrier	Following completion of watershed improvement work; would occur prior to most harvest activities; See Design Features for exceptions	Wildlife Habitat Security	Access Management
25	4433	MP 0.0	Forest order prohibiting over-snow vehicle motorized use in the spring after March 31 (including the 4433A and B spurs and other associated spur roads in the 4433 road system)	Following completion of watershed improvement work	Wildlife Habitat Security	Access Management
25A	4445	MP 29.43 at junction with NFSR 331 to MP 19.27 at junction with NFSR 4433.	Forest order prohibiting over-snow vehicle motorized use in the spring after March 31	Following completion of watershed improvement work on NFSR 4433; see map index 25		

Map Index	Road	Location (Milepost)	Proposed Action	Timing	Reason For Action	Who
26	14309B	MP 0.2	New construction associated with rerouted segment; begins at MP 0.16 on 14309B and connects to NFSR 14309 at MP 0.58	During Road Reconstruction	Harvest Access	Purchaser
26	14309B	MP 0.2	Install Gate	During Road Reconstruction	Wildlife Habitat Security	Purchaser
26	14309B	MP 0.2	Public motorized use restricted; lock gate nights and weekends	During Road Work and Harvest Activities	Wildlife Habitat Security	Purchaser
26	14309B	MP 0.2	Close gate; maintained as gated road for administrative use	Following Harvest Activities	Wildlife Habitat Security	Purchaser
27	4445C	MP 0.0	Remove Barrier**	During Road Reconstruction	Harvest Access	Purchaser
27	4445C	MP 0.0	Install Gate	During Road Reconstruction	Wildlife Habitat Security	Purchaser
27	4445C	MP 0.0	Public motorized use restricted; lock gate nights and weekends	During Road Work and Harvest Activities	Wildlife Habitat Security	Purchaser
27	4445C	MP 0.0	Close gate; maintained as gated road for administrative use	Following Harvest Activities	Wildlife Habitat Security	Purchaser
28	4445G	MP 0.0	Remove Barrier	During Road Reconstruction	Harvest Access	Purchaser
28	4445G	MP 0.0	Install Temporary Gate	During Road Reconstruction	Wildlife Habitat Security	Purchaser
28	4445G	MP 0.0	Public motorized use restricted; lock gate nights and weekends	During Road Work and Harvest Activities	Wildlife Habitat Security	Purchaser
28	4445G	MP 0.0	Install Barrier	Following Harvest Activities	Wildlife Habitat Security	Purchaser


Lower Yaak, O'Brien, Sheep
Access Management Plan
Legend
Existing Open Roads
Existing Gated Roads
Existing Barriered Roads
Project Area Boundary
Major Hwys
Streams
Units
Lakes
Non-Federal Land
Map Index #
SEE ACCESS MANAGEMENT PLAN TABLE - APPENDIX E
Yaak Hwy
Troy
Saddle Mtn
Gunsight Mtn
Feeder Mtn
Yaak Mtn
Pulpit Mtn
King Mtn
Kootenai Mtn
Flagstaff Mtn
Kilbrennan Lake
Skinner Lake
Wed Lake
Lower Lake
Duck Lake
No Scale
sja - 4/13/16

Appendix F – Past Harvest Activities in the Project Area

FACTS ID	Unit ID	Unit Acres	Type of Harvest Activity	Timber Sale Name	Completion Date	Equipment Type Code
A140100104		97	Liberation Cut		10/1/1958	401
A140100105		48	Salvage Cut (intermediate treatment, not regeneration)	East Side Salvage	11/1/1982	401
A140100105	4	48	Harvest Without Restocking	East Side Salvage	10/1/1983	401
A140100105	5	48	Harvest Without Restocking	East Side Salvage	10/1/1983	401
A140100105	1	48	Salvage Cut (intermediate treatment, not regeneration)	Skunk Cabbage	11/1/1992	424
A140100105	2	48	Salvage Cut (intermediate treatment, not regeneration)	Skunk Cabbage	11/1/1992	424
A140100106	9	14	Stand Clearcut (EA/RH/FH)	East Side Salvage	7/1/1983	401
A140100106		14	Salvage Cut (intermediate treatment, not regeneration)		6/1/1975	401
A140100108	2	180	Salvage Cut (intermediate treatment, not regeneration)	East Side Salvage	7/1/1983	401
A140100108		180	Liberation Cut		10/1/1958	401
A140100131	10	10	Salvage Cut (intermediate treatment, not regeneration)	East Side Salvage	7/1/1983	401
A140100131		10	Salvage Cut (intermediate treatment, not regeneration)		6/1/1975	401
A140100132	8	16	Salvage Cut (intermediate treatment, not regeneration)	East Side Salvage	7/1/1984	401
A140100132		16	Salvage Cut (intermediate treatment, not regeneration)		6/1/1975	401
A140100147	7	6	Stand Clearcut (EA/RH/FH)	East Side Salvage	10/1/1984	401
A140100147	3	6	Salvage Cut (intermediate treatment, not regeneration)	East Side Salvage	7/1/1983	401
A140100147	3	6	Salvage Cut (intermediate treatment, not regeneration)	East Side Salvage	10/1/1984	401
A140100150	6	10	Stand Clearcut (EA/RH/FH)	East Side Salvage	6/1/1983	401
A140100150		10	Salvage Cut (intermediate treatment, not regeneration)		6/1/1975	401
A140100150		10	Salvage Cut (intermediate treatment, not regeneration)		10/1/1963	401
A140100153		5	Salvage Cut (intermediate treatment, not regeneration)		10/1/1974	401
A180100001		0	Stand Clearcut (EA/RH/FH)		10/1/1971	000
A490200314		1	Group Selection Cut (UA/RH/FH)		6/1/1977	401
A500200102		4	Seed-tree Seed Cut (with and without leave trees) (EA/RH/NFH)	Lower Arbo	11/1/1981	401

FACTS ID	Unit ID	Unit Acres	Type of Harvest Activity	Timber Sale Name	Completion Date	Equipment Type Code
A500200102		4	Salvage Cut (intermediate treatment, not regeneration)		10/1/1974	401
A500200107		17	Stand Clearcut (EA/RH/FH)		6/1/1966	401
A500200108		33	Salvage Cut (intermediate treatment, not regeneration)		7/1/1983	401
A500200109		2	Stand Clearcut (EA/RH/FH)	Arbo Creek Blowdown	7/1/1983	401
A500200110		19	Stand Clearcut (EA/RH/FH)		10/1/1974	401
A500200111		5	Stand Clearcut (EA/RH/FH)	Arbo Creek Blowdown	10/1/1981	401
A500200113		2	Stand Clearcut (EA/RH/FH)	Arbo Creek Blowdown	7/1/1983	401
A500200115		39	Stand Clearcut (EA/RH/FH)		10/1/1974	401
A500200116		4	Stand Clearcut (EA/RH/FH)	Arbo Creek Blowdown	7/1/1983	401
A500200118		23	Stand Clearcut (EA/RH/FH)		10/1/1974	401
A500200120	6	33	Stand Clearcut (w/ leave trees) (EA/RH/FH)	Arbo Fire Salvage	3/1/1994	430
A500200121	3	2	Two-aged Seed-tree Seed and Removal Cut (w/ reserves) (2A/RH/FH)	Prospect Creek	6/1/1982	401
A500200122	2	15	Stand Clearcut (w/ leave trees) (EA/RH/FH)	Arbo Fire Salvage	3/1/1994	430
A500200123	4	17	Two-aged Seed-tree Seed and Removal Cut (w/ reserves) (2A/RH/FH)	Prospect Creek	8/1/1988	401
A500200124	4	23	Two-aged Seed-tree Seed and Removal Cut (w/ reserves) (2A/RH/FH)	Prospect Creek	8/1/1988	401
A500200125	10	12	Stand Clearcut (w/ leave trees) (EA/RH/FH)	Arbo Fire Salvage	10/1/1993	466
A500200126	1	46	Stand Clearcut (w/ leave trees) (EA/RH/FH)	Arbo Fire Salvage	11/1/1992	424
A500200127	5	11	Two-aged Seed-tree Seed and Removal Cut (w/ reserves) (2A/RH/FH)	Prospect Creek	7/1/1988	401
A500200128	7	26	Stand Clearcut (w/ leave trees) (EA/RH/FH)	Arbo Fire Salvage	5/1/1994	430
A500200129	6	33	Two-aged Seed-tree Seed and Removal Cut (w/ reserves) (2A/RH/FH)	Prospect Creek	8/1/1988	401
A500200131	7	12	Two-aged Seed-tree Seed and Removal Cut (w/ reserves) (2A/RH/FH)	Prospect Creek	10/1/1988	401
A500200134	9	1	Stand Clearcut (EA/RH/FH)	Prospect Creek	8/1/1981	401
A500200135	8	11	Two-aged Seed-tree Seed and Removal Cut (w/ reserves) (2A/RH/FH)	Prospect Creek	12/1/1988	401
A500200138	11	8	Two-aged Shelterwood Establishment and Removal Cut (w/ reserves) (2A/RH/FH)	Prospect Creek	10/1/1988	401
A500200139	13	21	Stand Clearcut (EA/RH/FH)	Prospect Creek	7/1/1988	401

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A500200140	14	14	Two-aged Shelterwood Establishment and Removal Cut (w/ reserves) (2A/RH/FH)	Prospect Creek	7/1/1988	401
A500200150	10	36	Two-aged Seed-tree Seed and Removal Cut (w/ reserves) (2A/RH/FH)	Prospect Creek	4/1/1988	401
A500200151	13	21	Stand Clearcut (EA/RH/FH)	Arbo Fire Salvage	7/1/1994	424
A500200155	9	20	Stand Clearcut (EA/RH/FH)	Arbo Fire Salvage	7/1/1994	424
A500200156	15	32	Stand Clearcut (w/ leave trees) (EA/RH/FH)	Arbo Fire Salvage	7/1/1994	480
A500200174	3	20	Stand Clearcut (w/ leave trees) (EA/RH/FH)	Arbo Fire Salvage	8/1/1993	424
A500200175	4	31	Stand Clearcut (w/ leave trees) (EA/RH/FH)	Arbo Fire Salvage	8/1/1993	424
A500200176	5	18	Stand Clearcut (w/ leave trees) (EA/RH/FH)	Arbo Fire Salvage	8/1/1993	424
A500200179	12	3	Stand Clearcut (w/ leave trees) (EA/RH/FH)	Arbo Fire Salvage	10/1/1993	424
A500200180	16	15	Stand Clearcut (EA/RH/FH)	Arbo Fire Salvage	10/1/1993	424
A500400102		91	Salvage Cut (intermediate treatment, not regeneration)	Arbo Firewood Salvage	1/1/1984	401
A500400103		77	Salvage Cut (intermediate treatment, not regeneration)	Arbo Firewood Salvage	1/1/1984	401
A500400104		32	Stand Clearcut (EA/RH/FH)		10/1/1969	401
A500400105		72	Salvage Cut (intermediate treatment, not regeneration)		10/1/1969	401
A500400122	6	2	Stand Clearcut (w/ leave trees) (EA/RH/FH)	Arbo Fire Salvage	5/1/1994	430
A500400123	1	6	Two-aged Seed-tree Seed and Removal Cut (w/ reserves) (2A/RH/FH)	Prospect Creek	7/1/1988	401
A500400134		16	Liberation Cut		10/1/1974	401
A500400135		11	Liberation Cut		10/1/1974	401
A500400136		47	Liberation Cut		10/1/1974	401
A500400137		14	Salvage Cut (intermediate treatment, not regeneration)	Lean To	7/1/1985	401
A500400139		46	Liberation Cut		10/1/1974	401
A500400140		47	Salvage Cut (intermediate treatment, not regeneration)		10/1/1969	401
A500400141		39	Stand Clearcut (EA/RH/FH)		6/1/1966	401
A500400142		8	Stand Clearcut (EA/RH/FH)	Arbo Creek Blowdown	6/1/1983	401
A500400144		3	Improvement Cut	Arbo Creek Blowdown	1/1/1983	401

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A500400147		3	Stand Clearcut (EA/RH/FH)	Arbo Creek Blowdown	9/1/1983	401
A500400148		28	Salvage Cut (intermediate treatment, not regeneration)	Arbo Firewood Salvage	1/1/1984	401
A500400149		14	Salvage Cut (intermediate treatment, not regeneration)	Arbo Firewood Salvage	1/1/1984	401
A500400151	8	12	Stand Clearcut (w/ leave trees) (EA/RH/FH)	Arbo Fire Salvage	8/1/1993	424
A500500144	14	21	Stand Clearcut (w/ leave trees) (EA/RH/FH)	Arbo Fire Salvage	7/1/1994	424
A500500145	3	10	Two-aged Seed-tree Seed and Removal Cut (w/ reserves) (2A/RH/FH)	Prospect Creek	6/1/1982	401
A500500146	2	4	Stand Clearcut (EA/RH/FH)	Prospect Creek	6/1/1982	401
A500500158	11	17	Stand Clearcut (w/ leave trees) (EA/RH/FH)	Arbo Fire Salvage	5/1/1994	430
A500500159	2	5	Stand Clearcut (w/ leave trees) (EA/RH/FH)	Arbo Fire Salvage	3/1/1994	430
A510100107		9	Liberation Cut		6/1/1975	401
A510100109		5	Stand Clearcut (EA/RH/FH)		10/1/1959	401
A510100120	1	77	Salvage Cut (intermediate treatment, not regeneration)	East Windy	11/1/1992	401
A510100120	1	0	Salvage Cut (intermediate treatment, not regeneration)	East Windy	11/1/1992	401
A510100121		5	Permanent Land Clearing		9/1/1983	205
A510100122		41	Liberation Cut		10/1/1971	401
A510100122		0	Liberation Cut		10/1/1971	401
A510100124		18	Liberation Cut		6/1/1975	401
A510100125		21	Stand Clearcut (EA/RH/FH)		10/1/1961	401
A510100132		39	Stand Clearcut (EA/RH/FH)		10/1/1960	401
A510100135		6	Stand Clearcut (EA/RH/FH)		10/1/1961	401
A510100137		18	Stand Clearcut (EA/RH/FH)		10/1/1961	401
A510100145		37	Improvement Cut	Sears Ridge Christmas Tree	2/1/1983	401
A510100146		49	Improvement Cut	Sears Ridge Christmas Tree	2/1/1983	401
A510100148		16	Improvement Cut	Sears Ridge Christmas Tree	2/1/1983	401
A510100150		17	Stand Clearcut (EA/RH/FH)		10/1/1962	401
A510100151		35	Commercial Thin		6/1/1975	401

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A510100153		26	Stand Clearcut (EA/RH/FH)		10/1/1971	401
A510100153		0	Stand Clearcut (EA/RH/FH)		10/1/1971	401
A510100154	6	25	Salvage Cut (intermediate treatment, not regeneration)	Yaak-Kilbrennan	8/1/1981	401
A510100160	21	9	Two-aged Shelterwood Establishment and Removal Cut (w/ reserves) (2A/RH/FH)	Yaak-Kilbrennan	6/1/1985	401
A510100163	22	2	Stand Clearcut (EA/RH/FH)	Yaak-Kilbrennan	6/1/1985	401
A510100171		82	Improvement Cut	Sears Ridge Christmas Tree	12/1/1982	401
A510100171		82	Stand Clearcut (EA/RH/FH)		10/1/1970	401
A510100179		22	Stand Clearcut (EA/RH/FH)		10/1/1970	401
A510100180		23	Stand Clearcut (EA/RH/FH)		10/1/1961	401
A510100185		34	Group Selection Cut (UA/RH/FH)		10/1/1950	401
A510100187		59	Group Selection Cut (UA/RH/FH)		10/1/1950	401
A510100189		24	Stand Clearcut (EA/RH/FH)		10/1/1961	401
A510100194		3	Salvage Cut (intermediate treatment, not regeneration)	Cold Bear	9/1/1982	401
A510100194		0	Salvage Cut (intermediate treatment, not regeneration)	Cold Bear	9/1/1982	401
A510100195		14	Salvage Cut (intermediate treatment, not regeneration)	Cold Bear	9/1/1982	401
A510100195		0	Salvage Cut (intermediate treatment, not regeneration)	Cold Bear	9/1/1982	401
A510100196		24	Two-aged Seed-tree Seed and Removal Cut (w/ reserves) (2A/RH/FH)	Cold Bear	9/1/1982	454
A510100209	3	18	Stand Clearcut (EA/RH/FH)	Yaak-Kilbrennan	3/1/1981	401
A510100212	3	60	Salvage Cut (intermediate treatment, not regeneration)	Yack-Back	10/1/1986	401
A510100213	2	4	Salvage Cut (intermediate treatment, not regeneration)	Yack-Back	10/1/1986	401
A510100214	3	5	Stand Clearcut (EA/RH/FH)	Yaak-Kilbrennan	10/1/1980	401
A510100215	3	37	Stand Clearcut (w/ leave trees) (EA/RH/FH)	Match Salvage	8/1/1989	401
A510100215	1	37	Stand Clearcut (EA/RH/FH)	Yack-Back	10/1/1986	401
A510100222	5	14	Stand Clearcut (EA/RH/FH)	Yaak-Kilbrennan	10/1/1980	401
A510100227	10	8	Stand Clearcut (EA/RH/FH)	Yaak-Kilbrennan	10/1/1980	401

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A510100228	4	6	Salvage Cut (intermediate treatment, not regeneration)	Yack-Back	10/1/1986	401
A510100235		18	Single-tree Selection Cut (UA/RH/FH)	Kilbrennan Scraps	10/1/1986	401
A510100235	15	18	Stand Clearcut (EA/RH/FH)	Yaak-Kilbrennan	10/1/1980	401
A510100235	8	18	Stand Clearcut (EA/RH/FH)	Yaak-Kilbrennan	9/1/1980	454
A510100236		32	Salvage Cut (intermediate treatment, not regeneration)	Kilbrennan Scraps	10/1/1986	401
A510100236		0	Salvage Cut (intermediate treatment, not regeneration)	Kilbrennan Scraps	10/1/1986	401
A510100237	13	2	Stand Clearcut (EA/RH/FH)	Yaak-Kilbrennan	8/1/1981	401
A510100239	1	49	Stand Clearcut (EA/RH/FH)	Nowayunder	8/1/1987	401
A510100239	20	49	Shelterwood Establishment Cut (with or without leave trees) (EA/RH/NFH)	Yaak-Kilbrennan	6/1/1985	401
A510100247	1	3	Permanent Land Clearing	Yaak Mountain Lookout	12/15/2006	491
A510100247	1	5	Permanent Land Clearing	Yaak Mountain Lookout	12/15/2006	491
A510100247	1	0	Permanent Land Clearing	Yaak Mountain Lookout	12/15/2006	491
A510100247	1	9	Permanent Land Clearing	Yaak Mountain Lookout	12/15/2006	491
A510100247	1	0	Permanent Land Clearing	Yaak Mountain Lookout	12/15/2006	491
A510100247	1	1	Permanent Land Clearing	Yaak Mountain Lookout	12/15/2006	491
A510100278		17	Liberation Cut		10/1/1971	401
A510100294		4	Stand Clearcut (EA/RH/FH)	Sears Wildlife Posts	6/1/1982	401
A510100297		14	Improvement Cut	Handshake Cedar	12/1/1983	401
A510100297		14	Stand Clearcut (EA/RH/FH)		10/1/1961	401
A510100298		7	Improvement Cut	Handshake Cedar	12/1/1983	401
A510100298		7	Stand Clearcut (EA/RH/FH)		10/1/1961	401
A510100299		5	Stand Clearcut (EA/RH/FH)		10/1/1961	401
A510100701		0	Stand Clearcut (EA/RH/FH)		6/1/1980	000
A510100701		153	Stand Clearcut (EA/RH/FH)		6/1/1980	000
A510100701		0	Stand Clearcut (EA/RH/FH)		6/1/1980	000

FACTS ID	Unit ID	Unit Acres	Type of Harvest Activity	Timber Sale Name	Completion Date	Equipment Type Code
A510100703		0	Permanent Land Clearing		6/1/1980	000
A510100703		33	Permanent Land Clearing		6/1/1980	000
A510100704		0	Salvage Cut (intermediate treatment, not regeneration)		6/1/1985	000
A510100704		94	Salvage Cut (intermediate treatment, not regeneration)		6/1/1985	000
A510100705		16	Permanent Land Clearing		6/1/1980	000
A510100706		0	Two-aged Seed-tree Seed and Removal Cut (w/ reserves) (2A/RH/FH)		6/1/1988	000
A510100706		18	Two-aged Seed-tree Seed and Removal Cut (w/ reserves) (2A/RH/FH)		6/1/1988	000
A510200121	3	25	Two-aged Shelterwood Establishment and Removal Cut (w/ reserves) (2A/RH/FH)	Feeder Creek	8/1/1983	401
A510200133	3	49	Two-aged Shelterwood Establishment and Removal Cut (w/ reserves) (2A/RH/FH)	Feeder Creek	3/1/1983	401
A510200139	14	1	Two-aged Shelterwood Establishment and Removal Cut (w/ reserves) (2A/RH/FH)	Feeder Creek	10/1/1985	401
A510200142		48	Stand Clearcut (EA/RH/FH)		10/1/1971	401
A510200143	13	12	Stand Clearcut (EA/RH/FH)	Feeder Creek	10/1/1985	401
A510200145	11	13	Stand Clearcut (EA/RH/FH)	Feeder Creek	10/1/1985	401
A510200146	10	15	Stand Clearcut (EA/RH/FH)	Feeder Creek	10/1/1986	401
A510200148	8	13	Stand Clearcut (EA/RH/FH)	Feeder Creek	7/1/1985	401
A510200151		39	Stand Clearcut (EA/RH/FH)		10/1/1971	401
A510200152	4	12	Salvage Cut (intermediate treatment, not regeneration)	Feeder Creek	8/1/1985	401
A510200166	1	52	Stand Clearcut (EA/RH/FH)	Feeder Creek	8/1/1983	401
A510200168	5	1	Stand Clearcut (EA/RH/FH)	Feeder Creek	7/1/1985	401
A510200169	6	9	Stand Clearcut (EA/RH/FH)	Feeder Creek	8/1/1984	401
A510200170		34	Stand Clearcut (EA/RH/FH)		10/1/1962	401
A510200171		30	Stand Clearcut (EA/RH/FH)		10/1/1971	401
A510200172		29	Stand Clearcut (EA/RH/FH)		10/1/1962	401
A510200173	12	8	Stand Clearcut (EA/RH/FH)	Feeder Creek	10/1/1985	401

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A510200175		7	Stand Clearcut (EA/RH/FH)		10/1/1965	401
A510200176		31	Stand Clearcut (EA/RH/FH)		10/1/1962	401
A510200181		32	Stand Clearcut (EA/RH/FH)		10/1/1962	401
A510200183		35	Stand Clearcut (EA/RH/FH)		10/1/1967	401
A510200186		50	Stand Clearcut (EA/RH/FH)		10/1/1962	401
A510200187		20	Stand Clearcut (EA/RH/FH)		10/1/1962	401
A510200188		14	Stand Clearcut (EA/RH/FH)		10/1/1962	401
A510200198	1	6	Stand Clearcut (EA/RH/FH)	Match Salvage	6/1/1989	401
A510200199	12	5	Stand Clearcut (EA/RH/FH)	Match Salvage	6/1/1989	401
A510200205		5	Seed-tree Seed Cut (with and without leave trees) (EA/RH/NFH)	Lower Arbo	11/1/1981	401
A510200205		5	Salvage Cut (intermediate treatment, not regeneration)		10/1/1974	401
A510200206		56	Salvage Cut (intermediate treatment, not regeneration)		8/1/1982	401
A510200208		19	Stand Clearcut (EA/RH/FH)		6/1/1966	401
A510200212	12	69	Salvage Cut (intermediate treatment, not regeneration)	Prospect Creek	6/1/1988	401
A520100102	1	2	Harvest Without Restocking	Highway Two	5/1/1986	401
A520100107	1G	3	Stand Clearcut (EA/RH/FH)	Yaak-Kilbrennan	11/1/1983	401
A520100108	1F	2	Stand Clearcut (EA/RH/FH)	Yaak-Kilbrennan	11/1/1983	401
A520100109	1E	6	Stand Clearcut (EA/RH/FH)	Yaak-Kilbrennan	11/1/1983	401
A520100110	1H	2	Stand Clearcut (EA/RH/FH)	Yaak-Kilbrennan	11/1/1983	401
A520100111	1I	1	Stand Clearcut (EA/RH/FH)	Yaak-Kilbrennan	11/1/1983	401
A520100112	1D	2	Stand Clearcut (EA/RH/FH)	Yaak-Kilbrennan	11/1/1983	401
A520100113	1A	5	Stand Clearcut (EA/RH/FH)	Yaak-Kilbrennan	6/1/1985	401
A520100114	1B	0	Stand Clearcut (EA/RH/FH)	Yaak-Kilbrennan	11/1/1983	401
A520100115	1C	3	Stand Clearcut (EA/RH/FH)	Yaak-Kilbrennan	11/1/1983	401
A520100141		78	Stand Clearcut (EA/RH/FH)		6/1/1966	401
A520100141		0	Stand Clearcut (EA/RH/FH)		6/1/1966	401

FACTS ID	Unit ID	Unit Acres	Type of Harvest Activity	Timber Sale Name	Completion Date	Equipment Type Code
A520100141		0	Stand Clearcut (EA/RH/FH)		6/1/1966	401
A520100143		26	Stand Clearcut (EA/RH/FH)		10/1/1970	401
A520100143		0	Stand Clearcut (EA/RH/FH)		10/1/1970	401
A520100144		26	Stand Clearcut (EA/RH/FH)		10/1/1969	401
A520100144		0	Stand Clearcut (EA/RH/FH)		10/1/1969	401
A520100145	2C	5	Stand Clearcut (EA/RH/FH)	Yaak-Kilbrennan	6/1/1985	401
A520100146	2A	7	Stand Clearcut (EA/RH/FH)	Yaak-Kilbrennan	9/1/1984	401
A520100148	2B	2	Stand Clearcut (EA/RH/FH)	Yaak-Kilbrennan	9/1/1984	401
A520100150	3	41	Liberation Cut	Lower Sears Flat Lp	9/1/1985	401
A520100150		41	Liberation Cut		6/1/1974	401
A520100152		69	Stand Clearcut (EA/RH/FH)		6/1/1966	401
A520100152		0	Stand Clearcut (EA/RH/FH)		6/1/1966	401
A520100153		5	Stand Clearcut (EA/RH/FH)	Lower Yaak Wildlife	9/1/1982	401
A520100153		5	Commercial Thin		10/1/1974	401
A520100154		92	Liberation Cut		6/1/1975	401
A520100154		0	Liberation Cut		6/1/1975	401
A520100154		0	Liberation Cut		6/1/1975	401
A520100156	1	15	Harvest Without Restocking	Review Ssts	10/1/1997	401
A520100156	2	15	Harvest Without Restocking	Review Ssts	10/1/1997	401
A520100156	1	0	Harvest Without Restocking	Review Ssts	10/1/1997	401
A520100156	2	0	Harvest Without Restocking	Review Ssts	10/1/1997	401
A520100156	7	15	Harvest Without Restocking	View Two Re-Ad	4/1/1995	424
A520100156	7	0	Harvest Without Restocking	View Two Re-Ad	4/1/1995	424
A520100157	1	35	Harvest Without Restocking	View Two Re-Ad	6/1/1995	424
A520100157	1	0	Harvest Without Restocking	View Two Re-Ad	6/1/1995	424
A520100157	1	0	Harvest Without Restocking	View Two Re-Ad	6/1/1995	424

FACTS ID	Unit ID	Unit Acres	Type of Harvest Activity	Timber Sale Name	Completion Date	Equipment Type Code
A520100158	1	18	Single-tree Selection Cut (UA/RH/FH)	Lower Sears Flat Lp	7/1/1985	401
A520100158	1	0	Single-tree Selection Cut (UA/RH/FH)	Lower Sears Flat Lp	7/1/1985	401
A520100160	2	7	Single-tree Selection Cut (UA/RH/FH)	Lower Sears Flat Lp	7/1/1985	401
A520100160	2	7	Harvest Without Restocking	View Two Re-Ad	5/1/1995	424
A520100161		39	Group Selection Cut (UA/RH/FH)		10/1/1973	401
A520100161		0	Group Selection Cut (UA/RH/FH)		10/1/1973	401
A520100164		31	Stand Clearcut (EA/RH/FH)		6/1/1969	401
A520100193		12	Commercial Thin		6/1/1974	401
A520100193	2	12	Harvest Without Restocking	View Two Re-Ad	6/1/1995	424
A520100197		15	Liberation Cut		10/1/1974	401
A520100197		15	Commercial Thin		6/1/1975	401
A520100197		0	Liberation Cut		10/1/1974	401
A520100197		0	Commercial Thin		6/1/1975	401
A520100197	4	15	Harvest Without Restocking	View Two Re-Ad	6/1/1995	424
A520100197	4	0	Harvest Without Restocking	View Two Re-Ad	6/1/1995	424
A520100198	4	8	Harvest Without Restocking	View Two Re-Ad	6/1/1995	424
A520100198	4	0	Harvest Without Restocking	View Two Re-Ad	6/1/1995	424
A520100201		6	Stand Clearcut (EA/RH/FH)		6/1/1966	401
A520100702		0	Shelterwood Establishment Cut (with or without leave trees) (EA/RH/NFH)		6/1/1982	000
A520100702		0	Shelterwood Establishment Cut (with or without leave trees) (EA/RH/NFH)		6/1/1982	000
A520100702		83	Shelterwood Establishment Cut (with or without leave trees) (EA/RH/NFH)		6/1/1982	000
A520100702		0	Shelterwood Establishment Cut (with or without leave trees) (EA/RH/NFH)		6/1/1982	000
A520100705		0	Stand Clearcut (EA/RH/FH)		6/1/1983	000

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A520100705		64	Stand Clearcut (EA/RH/FH)		6/1/1983	000
A520100705		31	Stand Clearcut (EA/RH/FH)		6/1/1983	000
A520100709		0	Salvage Cut (intermediate treatment, not regeneration)		6/1/1985	000
A520100709		162	Salvage Cut (intermediate treatment, not regeneration)		6/1/1985	000
A520100710		30	Permanent Land Clearing		6/1/1955	000
A520100711		0	Permanent Land Clearing		6/1/1950	000
A520100711		0	Permanent Land Clearing		6/1/1950	000
A520100711		88	Permanent Land Clearing		6/1/1950	000
A520100712		0	Liberation Cut		6/1/1983	000
A520100712		39	Liberation Cut		6/1/1983	000
A520100713		0	Stand Clearcut (EA/RH/FH)		6/1/1987	000
A520100713		379	Stand Clearcut (EA/RH/FH)		6/1/1987	000
A520100713		0	Stand Clearcut (EA/RH/FH)		6/1/1987	000
A520100714		0	Seed-tree Seed Cut (with and without leave trees) (EA/RH/NFH)		6/1/1987	000
A520100714		0	Seed-tree Final Cut (EA/NRH/FH)		6/1/1996	000
A520100714		53	Seed-tree Seed Cut (with and without leave trees) (EA/RH/NFH)		6/1/1987	000
A520100714		53	Seed-tree Final Cut (EA/NRH/FH)		6/1/1996	000
A520100715		14	Commercial Thin		6/1/1999	000
A520100716		0	Seed-tree Seed Cut (with and without leave trees) (EA/RH/NFH)		6/1/1987	000
A520100716		0	Seed-tree Final Cut (EA/NRH/FH)		6/1/1996	000
A520100716		61	Seed-tree Seed Cut (with and without leave trees) (EA/RH/NFH)		6/1/1987	000
A520100716		61	Seed-tree Final Cut (EA/NRH/FH)		6/1/1996	000
A520100716		0	Seed-tree Seed Cut (with and without leave trees) (EA/RH/NFH)		6/1/1987	000
A520100716		0	Seed-tree Final Cut (EA/NRH/FH)		6/1/1996	000
A520100717		0	Salvage Cut (intermediate treatment, not regeneration)		6/1/1996	000
A520100717		0	Salvage Cut (intermediate treatment, not regeneration)		6/1/1996	000

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A520100717		68	Salvage Cut (intermediate treatment, not regeneration)		6/1/1996	000
A520100717		0	Salvage Cut (intermediate treatment, not regeneration)		6/1/1996	000
A520100718		32	Liberation Cut		6/1/1987	000
A520100718		32	Liberation Cut		6/1/1997	000
A520100722		0	Liberation Cut		6/1/1994	000
A520100722		0	Liberation Cut		6/1/2002	000
A520100722		179	Liberation Cut		6/1/1994	000
A520100722		179	Liberation Cut		6/1/2002	000
A520100728		0	Stand Clearcut (w/ leave trees) (EA/RH/FH)		6/1/2002	000
A520100728		14	Stand Clearcut (w/ leave trees) (EA/RH/FH)		6/1/2002	000
A520100729		0	Liberation Cut		6/1/2002	000
A520100729		6	Liberation Cut		6/1/2002	000
A520200107	3	9	Two-aged Shelterwood Establishment and Removal Cut (w/ reserves) (2A/RH/FH)	King Ranch	11/1/1988	401
A520200107	3	0	Two-aged Shelterwood Establishment and Removal Cut (w/ reserves) (2A/RH/FH)	King Ranch	11/1/1988	401
A520200108	4	3	Harvest Without Restocking	King Ranch	11/1/1988	401
A520200109	6	2	Stand Clearcut (EA/RH/FH)	King Ranch	3/1/1989	401
A520200110	7	4	Stand Clearcut (EA/RH/FH)	King Ranch	3/1/1989	401
A520200110	7	0	Stand Clearcut (EA/RH/FH)	King Ranch	3/1/1989	401
A520200113		15	Group Selection Cut (UA/RH/FH)	Obrien Cleanup	10/1/1985	401
A520200115	10	4	Liberation Cut	King Ranch	11/1/1988	401
A520200115	10	0	Liberation Cut	King Ranch	11/1/1988	401
A520200117	8	30	Stand Clearcut (EA/RH/FH)	King Ranch	12/1/1988	401
A520200117	8	0	Stand Clearcut (EA/RH/FH)	King Ranch	12/1/1988	401
A520200118	9	3	Stand Clearcut (EA/RH/FH)	King Ranch	1/1/1989	401

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A520200118	9	0	Stand Clearcut (EA/RH/FH)	King Ranch	1/1/1989	401
A520200121	1	27	Stand Clearcut (EA/RH/FH)	King Ranch	3/1/1989	401
A520200121	2	27	Stand Clearcut (EA/RH/FH)	King Ranch	3/1/1989	401
A520200121	1	0	Stand Clearcut (EA/RH/FH)	King Ranch	3/1/1989	401
A520200121	2	0	Stand Clearcut (EA/RH/FH)	King Ranch	3/1/1989	401
A520200123	1	5	Salvage Cut (intermediate treatment, not regeneration)	King Pin Salvage Sst	2/1/1997	424
A520200123	1	0	Salvage Cut (intermediate treatment, not regeneration)	King Pin Salvage Sst	2/1/1997	424
A520200124		0	Liberation Cut		6/1/1969	401
A520200124		0	Liberation Cut		6/1/1969	401
A520200124		20	Liberation Cut		6/1/1969	401
A520200127		33	Group Selection Cut (UA/RH/FH)		10/1/1979	401
A520200127		0	Group Selection Cut (UA/RH/FH)		10/1/1979	401
A520200127		0	Group Selection Cut (UA/RH/FH)		10/1/1979	401
A520200128	4	1	Stand Clearcut (EA/RH/FH)	Obrien Cleanup	6/1/1986	401
A520200128	4	0	Stand Clearcut (EA/RH/FH)	Obrien Cleanup	6/1/1986	401
A520200133	3	6	Commercial Thin	Crossed Out	1/31/2007	420
A520200139	2	0	Improvement Cut	Cross Roads	7/1/2004	401
A520200139	1	0	Improvement Cut	Cross Roads	8/1/2004	401
A520200139	2	0	Improvement Cut	Cross Roads	7/1/2004	401
A520200139	1	0	Improvement Cut	Cross Roads	8/1/2004	401
A520200139	2	0	Improvement Cut	Cross Roads	7/1/2004	401
A520200139	1	0	Improvement Cut	Cross Roads	8/1/2004	401
A520200139	2	52	Improvement Cut	Cross Roads	7/1/2004	401
A520200139	1	52	Improvement Cut	Cross Roads	8/1/2004	401
A520200701		9	Permanent Land Clearing		6/1/1965	000
A520200702		0	Salvage Cut (intermediate treatment, not regeneration)		6/1/1980	000

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A520200702		122	Salvage Cut (intermediate treatment, not regeneration)		6/1/1980	000
A520200702		0	Salvage Cut (intermediate treatment, not regeneration)		6/1/1980	000
A520200703		16	Stand Clearcut (w/ leave trees) (EA/RH/FH)		6/1/1994	000
A520200703		0	Stand Clearcut (w/ leave trees) (EA/RH/FH)		6/1/1994	000
A520200704		63	Stand Clearcut (EA/RH/FH)		6/1/1985	000
A520200704		0	Stand Clearcut (EA/RH/FH)		6/1/1985	000
A520200705		50	Liberation Cut		6/1/1992	000
A520200706		0	Salvage Cut (intermediate treatment, not regeneration)		6/1/1975	000
A520200706		7	Salvage Cut (intermediate treatment, not regeneration)		6/1/1975	000
A520200707		0	Permanent Land Clearing		6/1/1960	000
A520200707		0	Permanent Land Clearing		6/1/1960	000
A520200707		51	Permanent Land Clearing		6/1/1960	000
A520200708		101	Seed-tree Seed Cut (with and without leave trees) (EA/RH/NFH)		6/1/1983	000
A520200708		101	Seed-tree Final Cut (EA/NRH/FH)		6/1/1993	000
A520200708		0	Seed-tree Seed Cut (with and without leave trees) (EA/RH/NFH)		6/1/1983	000
A520200708		0	Seed-tree Final Cut (EA/NRH/FH)		6/1/1993	000
A520200709		67	Stand Clearcut (EA/RH/FH)		6/1/1978	000
A520200709		0	Stand Clearcut (EA/RH/FH)		6/1/1978	000
A520200711		0	Salvage Cut (intermediate treatment, not regeneration)		6/1/1988	000
A520200711		6	Salvage Cut (intermediate treatment, not regeneration)		6/1/1988	000
A520200712		22	Liberation Cut		6/1/1994	000
A520200712		0	Liberation Cut		6/1/1994	000
A520200712		0	Liberation Cut		6/1/1994	000
A520200713		0	Liberation Cut		6/1/1994	000
A520200713		148	Liberation Cut		6/1/1994	000
A520200713		0	Liberation Cut		6/1/1994	000

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A520200714		31	Stand Clearcut (EA/RH/FH)		6/1/1988	000
A520200715		0	Shelterwood Preparatory Cut (EA/NRH/NFH)		6/1/1985	000
A520200715		47	Shelterwood Preparatory Cut (EA/NRH/NFH)		6/1/1985	000
A520200716		0	Liberation Cut		6/1/1969	000
A520200716		39	Liberation Cut		6/1/1969	000
A520200716		0	Liberation Cut		6/1/1969	000
A520200718		0	Two-aged Seed-tree Seed and Removal Cut (w/ reserves) (2A/RH/FH)		6/1/1992	000
A520200718		26	Two-aged Seed-tree Seed and Removal Cut (w/ reserves) (2A/RH/FH)		6/1/1992	000
A520200719		0	Stand Clearcut (EA/RH/FH)		6/1/1985	000
A520200719		19	Stand Clearcut (EA/RH/FH)		6/1/1985	000
A520200720		0	Commercial Thin		6/1/2000	000
A520200720		170	Commercial Thin		6/1/2000	000
A520200720		0	Commercial Thin		6/1/2000	000
A520200721		13	Permanent Land Clearing		6/1/1975	000
A520200722		0	Salvage Cut (intermediate treatment, not regeneration)		6/1/1985	000
A520200722		97	Salvage Cut (intermediate treatment, not regeneration)		6/1/1985	000
A520200723		69	Commercial Thin		6/1/2000	000
A520200723		0	Commercial Thin		6/1/2000	000
A520200724		0	Permanent Land Clearing		6/1/1975	000
A520200724		3	Permanent Land Clearing		6/1/1975	000
A520200725		40	Commercial Thin		6/1/2000	000
A520200726		35	Commercial Thin		6/1/2000	000
A520200726		0	Commercial Thin		6/1/2000	000
A520200727		20	Stand Clearcut (EA/RH/FH)		6/1/1985	000
A520200728		48	Liberation Cut		6/1/1997	000
A520200729		182	Stand Clearcut (EA/RH/FH)		6/1/1983	000

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A520200729		0	Stand Clearcut (EA/RH/FH)		6/1/1983	000
A520200729		0	Stand Clearcut (EA/RH/FH)		6/1/1983	000
A520200729		0	Stand Clearcut (EA/RH/FH)		6/1/1983	000
A520200730		9	Stand Clearcut (EA/RH/FH)		6/1/1980	000
A520200730		28	Stand Clearcut (EA/RH/FH)		6/1/1980	000
A520200731		0	Salvage Cut (intermediate treatment, not regeneration)		6/1/1985	000
A520200731		57	Salvage Cut (intermediate treatment, not regeneration)		6/1/1985	000
A520200732		0	Two-aged Seed-tree Seed and Removal Cut (w/ reserves) (2A/RH/FH)		6/1/1985	000
A520200732		0	Two-aged Shelterwood Final Removal Cut (w/ reserves) (2A/NRH/FH)		6/1/2000	000
A520200732		0	Two-aged Seed-tree Seed and Removal Cut (w/ reserves) (2A/RH/FH)		6/1/1985	000
A520200732		0	Two-aged Shelterwood Final Removal Cut (w/ reserves) (2A/NRH/FH)		6/1/2000	000
A520200732		144	Two-aged Seed-tree Seed and Removal Cut (w/ reserves) (2A/RH/FH)		6/1/1985	000
A520200732		144	Two-aged Shelterwood Final Removal Cut (w/ reserves) (2A/NRH/FH)		6/1/2000	000
A520200732		0	Two-aged Seed-tree Seed and Removal Cut (w/ reserves) (2A/RH/FH)		6/1/1985	000
A520200732		0	Two-aged Shelterwood Final Removal Cut (w/ reserves) (2A/NRH/FH)		6/1/2000	000
A520200735		0	Salvage Cut (intermediate treatment, not regeneration)		6/1/1975	000
A520200735		97	Salvage Cut (intermediate treatment, not regeneration)		6/1/1975	000
A520200735		0	Salvage Cut (intermediate treatment, not regeneration)		6/1/1975	000
A520200735		0	Salvage Cut (intermediate treatment, not regeneration)		6/1/1975	000
A520200736		0	Permanent Land Clearing		6/1/1990	000
A520200736		7	Permanent Land Clearing		6/1/1990	000
A520200737		8	Liberation Cut		6/1/1985	000
A520200737		0	Liberation Cut		6/1/1985	000
A520200738		0	Salvage Cut (intermediate treatment, not regeneration)		6/1/1985	000
A520200738		224	Salvage Cut (intermediate treatment, not regeneration)		6/1/1985	000
A520200738		0	Salvage Cut (intermediate treatment, not regeneration)		6/1/1985	000

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A520200740		0	Permanent Land Clearing		6/1/1975	000
A520200740		9	Permanent Land Clearing		6/1/1975	000
A520200741		58	Permanent Land Clearing		6/1/1960	000
A520200741		0	Permanent Land Clearing		6/1/1960	000
A520200742		0	Permanent Land Clearing		6/1/1955	000
A520200742		28	Permanent Land Clearing		6/1/1955	000
A520200743		25	Permanent Land Clearing		6/1/1980	000
A520200744		114	Salvage Cut (intermediate treatment, not regeneration)		6/1/1985	000
A520200745		0	Permanent Land Clearing		6/1/1990	000
A520200745		58	Permanent Land Clearing		6/1/1990	000
A520200749		90	Seed-tree Seed Cut (with and without leave trees) (EA/RH/NFH)		6/1/1985	000
A520200749		90	Seed-tree Removal Cut (w/ leave trees) (EA/NRH/FH)		6/1/2001	000
A520200749		0	Seed-tree Seed Cut (with and without leave trees) (EA/RH/NFH)		6/1/1985	000
A520200749		0	Seed-tree Removal Cut (w/ leave trees) (EA/NRH/FH)		6/1/2001	000
A520200750		21	Seed-tree Seed Cut (with and without leave trees) (EA/RH/NFH)		6/1/1985	000
A520200751		170	Stand Clearcut (EA/RH/FH)		6/1/1980	000
A520200751		0	Stand Clearcut (EA/RH/FH)		6/1/1980	000
A520200751		0	Stand Clearcut (EA/RH/FH)		6/1/1980	000
A520200752		71	Stand Clearcut (EA/RH/FH)		6/1/1980	000
A520200752		0	Stand Clearcut (EA/RH/FH)		6/1/1980	000
A520200752		7	Stand Clearcut (EA/RH/FH)		6/1/1980	000
A520200753		52	Seed-tree Seed Cut (with and without leave trees) (EA/RH/NFH)		6/1/1983	000
A520200753		1	Seed-tree Seed Cut (with and without leave trees) (EA/RH/NFH)		6/1/1983	000
A520200753		0	Seed-tree Seed Cut (with and without leave trees) (EA/RH/NFH)		6/1/1983	000
A520200754		153	Liberation Cut		6/1/1997	000
A520200754		0	Liberation Cut		6/1/1997	000

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A520200754		0	Liberation Cut		6/1/1997	000
A520200754		0	Liberation Cut		6/1/1997	000
A520200755		56	Commercial Thin		6/1/1997	000
A520200755		0	Commercial Thin		6/1/1997	000
A520200755		0	Commercial Thin		6/1/1997	000
A520200756		71	Seed-tree Seed Cut (with and without leave trees) (EA/RH/NFH)		6/1/1980	000
A520200756		71	Seed-tree Final Cut (EA/NRH/FH)		6/1/2002	000
A520200756		0	Seed-tree Seed Cut (with and without leave trees) (EA/RH/NFH)		6/1/1980	000
A520200756		0	Seed-tree Final Cut (EA/NRH/FH)		6/1/2002	000
A520200760		0	Permanent Land Clearing		6/1/1955	000
A520200760		46	Permanent Land Clearing		6/1/1955	000
A520200760		0	Permanent Land Clearing		6/1/1955	000
A520200760		0	Permanent Land Clearing		6/1/1955	000
A520200761		0	Permanent Land Clearing		6/1/1980	000
A520200761		0	Permanent Land Clearing		6/1/1980	000
A520200761		17	Permanent Land Clearing		6/1/1980	000
A520200762		0	Liberation Cut		6/1/1992	000
A520200762		0	Liberation Cut		6/1/1992	000
A520200762		0	Liberation Cut		6/1/1992	000
A520200762		39	Liberation Cut		6/1/1992	000
A520200763		30	Salvage Cut (intermediate treatment, not regeneration)		6/1/1990	000
A520200763		0	Salvage Cut (intermediate treatment, not regeneration)		6/1/1990	000
A520200763		0	Salvage Cut (intermediate treatment, not regeneration)		6/1/1990	000
A520200764		0	Shelterwood Preparatory Cut (EA/NRH/NFH)		6/1/1980	000
A520200764		77	Shelterwood Preparatory Cut (EA/NRH/NFH)		6/1/1980	000
A520200764		0	Shelterwood Preparatory Cut (EA/NRH/NFH)		6/1/1980	000

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A520200764		0	Shelterwood Preparatory Cut (EA/NRH/NFH)		6/1/1980	000
A520200764		0	Shelterwood Preparatory Cut (EA/NRH/NFH)		6/1/1980	000
A520200765		0	Liberation Cut		6/1/1997	000
A520200765		0	Liberation Cut		6/1/1997	000
A520200765		33	Liberation Cut		6/1/1997	000
A520200765		0	Liberation Cut		6/1/1997	000
A520200766		0	Salvage Cut (intermediate treatment, not regeneration)		6/1/1988	000
A520200766		43	Salvage Cut (intermediate treatment, not regeneration)		6/1/1988	000
A520200767		0	Seed-tree Seed Cut (with and without leave trees) (EA/RH/NFH)		6/1/1983	000
A520200767		0	Seed-tree Seed Cut (with and without leave trees) (EA/RH/NFH)		6/1/1983	000
A520200767		45	Seed-tree Seed Cut (with and without leave trees) (EA/RH/NFH)		6/1/1983	000
A520200769		32	Two-aged Seed-tree Seed and Removal Cut (w/ reserves) (2A/RH/FH)		6/1/1996	000
A520200770		81	Two-aged Seed-tree Seed and Removal Cut (w/ reserves) (2A/RH/FH)		6/1/1996	000
A520200770		1	Two-aged Seed-tree Seed and Removal Cut (w/ reserves) (2A/RH/FH)		6/1/1996	000
A520200770		0	Two-aged Seed-tree Seed and Removal Cut (w/ reserves) (2A/RH/FH)		6/1/1996	000
A520200771		109	Two-aged Seed-tree Seed and Removal Cut (w/ reserves) (2A/RH/FH)		6/1/1996	000
A520200771		46	Two-aged Seed-tree Seed and Removal Cut (w/ reserves) (2A/RH/FH)		6/1/1996	000
A520200772		17	Two-aged Seed-tree Seed and Removal Cut (w/ reserves) (2A/RH/FH)		6/1/1997	000
A520200772		0	Two-aged Seed-tree Seed and Removal Cut (w/ reserves) (2A/RH/FH)		6/1/1997	000
A520200772		70	Two-aged Seed-tree Seed and Removal Cut (w/ reserves) (2A/RH/FH)		6/1/1997	000
A520200773		23	Stand Clearcut (EA/RH/FH)		6/1/1985	000
A520200774		0	Two-aged Seed-tree Seed and Removal Cut (w/ reserves) (2A/RH/FH)		6/1/1985	000
A520200774		0	Two-aged Shelterwood Final Removal Cut (w/ reserves) (2A/NRH/FH)		6/1/2001	000
A520200774		0	Two-aged Seed-tree Seed and Removal Cut (w/ reserves) (2A/RH/FH)		6/1/1985	000
A520200774		0	Two-aged Shelterwood Final Removal Cut (w/ reserves) (2A/NRH/FH)		6/1/2001	000
A520200774		48	Two-aged Seed-tree Seed and Removal Cut (w/ reserves) (2A/RH/FH)		6/1/1985	000

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A520200774		48	Two-aged Shelterwood Final Removal Cut (w/ reserves) (2A/NRH/FH)		6/1/2001	000
A520200775		0	Two-aged Seed-tree Seed and Removal Cut (w/ reserves) (2A/RH/FH)		6/1/1983	000
A520200775		0	Two-aged Seed-tree Seed and Removal Cut (w/ reserves) (2A/RH/FH)		6/1/1983	000
A520200775		60	Two-aged Seed-tree Seed and Removal Cut (w/ reserves) (2A/RH/FH)		6/1/1983	000
A520200776		0	Permanent Land Clearing		6/1/1970	000
A520200776		16	Permanent Land Clearing		6/1/1970	000
A520200777		13	Salvage Cut (intermediate treatment, not regeneration)		6/1/1995	000
A520200777		0	Salvage Cut (intermediate treatment, not regeneration)		6/1/1995	000
A520200778		0	Shelterwood Preparatory Cut (EA/NRH/NFH)		6/1/1985	000
A520200778		198	Shelterwood Preparatory Cut (EA/NRH/NFH)		6/1/1985	000
A520200778		0	Shelterwood Preparatory Cut (EA/NRH/NFH)		6/1/1985	000
A520200778		18	Shelterwood Preparatory Cut (EA/NRH/NFH)		6/1/1985	000
A520200778		0	Shelterwood Preparatory Cut (EA/NRH/NFH)		6/1/1985	000
A520200779		0	Permanent Land Clearing		6/1/1965	000
A520200779		16	Permanent Land Clearing		6/1/1965	000
A520200780		182	Liberation Cut		6/1/1996	000
A520200780		51	Liberation Cut		6/1/1996	000
A520200782		0	Seed-tree Seed Cut (with and without leave trees) (EA/RH/NFH)		6/1/1996	000
A520200782		28	Seed-tree Seed Cut (with and without leave trees) (EA/RH/NFH)		6/1/1996	000
A520200787		0	Salvage Cut (intermediate treatment, not regeneration)		6/1/1994	000
A520200787		73	Salvage Cut (intermediate treatment, not regeneration)		6/1/1994	000
A520200787		0	Salvage Cut (intermediate treatment, not regeneration)		6/1/1994	000
A520200788		0	Two-aged Seed-tree Seed and Removal Cut (w/ reserves) (2A/RH/FH)		6/1/1970	000
A520200788		96	Two-aged Seed-tree Seed and Removal Cut (w/ reserves) (2A/RH/FH)		6/1/1970	000
A520200791		0	Salvage Cut (intermediate treatment, not regeneration)		6/1/1980	000
A520200791		0	Salvage Cut (intermediate treatment, not regeneration)		6/1/1990	000

FACTS ID	Unit ID	Unit Acres	Type of Harvest Activity	Timber Sale Name	Completion Date	Equipment Type Code
A520200791		65	Salvage Cut (intermediate treatment, not regeneration)		6/1/1980	000
A520200791		65	Salvage Cut (intermediate treatment, not regeneration)		6/1/1990	000
A520200792		0	Liberation Cut		6/1/1995	000
A520200792		293	Liberation Cut		6/1/1995	000
A520200792		0	Liberation Cut		6/1/1995	000
A520200792		0	Liberation Cut		6/1/1995	000
A520200792		0	Liberation Cut		6/1/1995	000
A520200793		0	Salvage Cut (intermediate treatment, not regeneration)		6/1/1990	000
A520200793		0	Salvage Cut (intermediate treatment, not regeneration)		6/1/1990	000
A520200793		0	Salvage Cut (intermediate treatment, not regeneration)		6/1/1990	000
A520200793		68	Salvage Cut (intermediate treatment, not regeneration)		6/1/1990	000
A520200794		14	Permanent Land Clearing		6/1/1975	000
A520200795		0	Salvage Cut (intermediate treatment, not regeneration)		6/1/1990	000
A520200795		33	Salvage Cut (intermediate treatment, not regeneration)		6/1/1990	000
A520200796		0	Liberation Cut		6/1/1988	000
A520200796		0	Liberation Cut		6/1/1988	000
A520200796		21	Liberation Cut		6/1/1988	000
A520200797		0	Two-aged Seed-tree Seed and Removal Cut (w/ reserves) (2A/RH/FH)		6/1/1980	000
A520200797		40	Two-aged Seed-tree Seed and Removal Cut (w/ reserves) (2A/RH/FH)		6/1/1980	000
A520200798		0	Liberation Cut		6/1/1988	000
A520200798		0	Liberation Cut		6/1/1988	000
A520200798		125	Liberation Cut		6/1/1988	000
A520200799		33	Shelterwood Preparatory Cut (EA/NRH/NFH)		6/1/1990	000
A520200799		0	Shelterwood Preparatory Cut (EA/NRH/NFH)		6/1/1990	000
A520200800		0	Salvage Cut (intermediate treatment, not regeneration)		6/1/1995	000
A520200800		7	Salvage Cut (intermediate treatment, not regeneration)		6/1/1995	000

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A520200800		0	Salvage Cut (intermediate treatment, not regeneration)		6/1/1995	000
A520200804		9	Seed-tree Seed Cut (with and without leave trees) (EA/RH/NFH)		6/1/1985	000
A520200805		0	Shelterwood Preparatory Cut (EA/NRH/NFH)		6/1/1991	000
A520200805		43	Shelterwood Preparatory Cut (EA/NRH/NFH)		6/1/1991	000
A520200805		1	Shelterwood Preparatory Cut (EA/NRH/NFH)		6/1/1991	000
A520200806		7	Stand Clearcut (EA/RH/FH)		6/1/1985	000
A520200807		0	Stand Clearcut (EA/RH/FH)		6/1/1983	000
A520200807		0	Stand Clearcut (EA/RH/FH)		6/1/1983	000
A520200807		18	Stand Clearcut (EA/RH/FH)		6/1/1983	000
A520200807		1	Stand Clearcut (EA/RH/FH)		6/1/1983	000
A520200808		249	Seed-tree Seed Cut (with and without leave trees) (EA/RH/NFH)		6/1/1996	000
A520200808		249	Seed-tree Final Cut (EA/NRH/FH)		6/1/2001	000
A520200808		0	Seed-tree Seed Cut (with and without leave trees) (EA/RH/NFH)		6/1/1996	000
A520200808		0	Seed-tree Final Cut (EA/NRH/FH)		6/1/2001	000
A520200810		25	Seed-tree Seed Cut (with and without leave trees) (EA/RH/NFH)		6/1/2002	000
A520200811		0	Stand Clearcut (EA/RH/FH)		6/1/1987	000
A520200811		16	Stand Clearcut (EA/RH/FH)		6/1/1987	000
A520200811		0	Stand Clearcut (EA/RH/FH)		6/1/1987	000
A520200812		118	Commercial Thin		6/1/1997	000
A520200812		118	Salvage Cut (intermediate treatment, not regeneration)		6/1/1990	000
A520200812		0	Commercial Thin		6/1/1997	000
A520200812		0	Salvage Cut (intermediate treatment, not regeneration)		6/1/1990	000
A530100101	3	2	Stand Clearcut (EA/RH/FH)	Yaak-Kilbrennan	3/1/1981	401
A530100106		115	Salvage Cut (intermediate treatment, not regeneration)	Kilbrennan Scraps	10/1/1986	401
A530100112		44	Group Selection Cut (UA/RH/FH)		10/1/1971	401
A530100112		0	Group Selection Cut (UA/RH/FH)		10/1/1971	401

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A530100114		12	Group Selection Cut (UA/RH/FH)		10/1/1959	401
A530100115		22	Single-tree Selection Cut (UA/RH/FH)		10/1/1959	401
A530100115		0	Single-tree Selection Cut (UA/RH/FH)		10/1/1959	401
A530100120	10	23	Shelterwood Preparatory Cut (EA/NRH/NFH)	North Obrien	5/1/1986	401
A530100121	8	11	Stand Clearcut (EA/RH/FH)	North Obrien	6/1/1987	401
A530100122	9	55	Liberation Cut	North Obrien	6/1/1987	401
A530100122		55	Single-tree Selection Cut (UA/RH/FH)		10/1/1959	401
A530100123		38	Commercial Thin		6/1/1974	401
A530100124		41	Stand Clearcut (EA/RH/FH)		10/1/1971	401
A530100124		0	Stand Clearcut (EA/RH/FH)		10/1/1971	401
A530100125		62	Stand Clearcut (EA/RH/FH)		10/1/1971	401
A530100125		7	Stand Clearcut (EA/RH/FH)		10/1/1971	401
A530100126	7A	15	Seed-tree Seed Cut (with and without leave trees) (EA/RH/NFH)	Feeder Creek	9/1/1983	401
A530100126	7	15	Salvage Cut (intermediate treatment, not regeneration)	Feeder Creek	8/1/1985	401
A530100126	7A	2	Seed-tree Seed Cut (with and without leave trees) (EA/RH/NFH)	Feeder Creek	9/1/1983	401
A530100126	7	2	Salvage Cut (intermediate treatment, not regeneration)	Feeder Creek	8/1/1985	401
A530100127	7	15	Salvage Cut (intermediate treatment, not regeneration)	Feeder Creek	8/1/1985	401
A530100140	7A	6	Stand Clearcut (EA/RH/FH)	North Obrien	6/1/1986	401
A530100140		6	Group Selection Cut (UA/RH/FH)		10/1/1959	401
A530100141	7	29	Salvage Cut (intermediate treatment, not regeneration)	North Obrien	6/1/1986	401
A530100141		29	Group Selection Cut (UA/RH/FH)		10/1/1959	401
A530100155	6	11	Salvage Cut (intermediate treatment, not regeneration)	North Obrien	6/1/1986	401
A530100156		38	Stand Clearcut (EA/RH/FH)		10/1/1970	401
A530100164		7	Stand Clearcut (EA/RH/FH)		10/1/1962	401
A530100168		50	Liberation Cut		10/1/1967	401
A530100168		1	Liberation Cut		10/1/1967	401

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A530100179		12	Stand Clearcut (EA/RH/FH)		10/1/1967	401
A530100180		26	Liberation Cut		10/1/1967	401
A530100180		1	Liberation Cut		10/1/1967	401
A530100181		19	Salvage Cut (intermediate treatment, not regeneration)	N Fk Obrien Ced Salv	12/1/1981	401
A530100181		0	Salvage Cut (intermediate treatment, not regeneration)	N Fk Obrien Ced Salv	12/1/1981	401
A530100182		28	Liberation Cut		10/1/1967	401
A530100182		0	Liberation Cut		10/1/1967	401
A530100213		106	Stand Clearcut (w/ leave trees) (EA/RH/FH)		10/1/1959	401
A530100213		0	Stand Clearcut (w/ leave trees) (EA/RH/FH)		10/1/1959	401
A530100214		32	Stand Clearcut (w/ leave trees) (EA/RH/FH)		10/1/1959	401
A530100216		84	Liberation Cut		6/1/1979	401
A530100216		1	Liberation Cut		6/1/1979	401
A530100218		42	Stand Clearcut (EA/RH/FH)		10/1/1978	401
A530100220	4	23	Salvage Cut (intermediate treatment, not regeneration)	North Obrien	6/1/1986	401
A530100220	4	0	Salvage Cut (intermediate treatment, not regeneration)	North Obrien	6/1/1986	401
A530100221		42	Stand Clearcut (EA/RH/FH)		10/1/1970	401
A530100221		1	Stand Clearcut (EA/RH/FH)		10/1/1970	401
A530100225		35	Stand Clearcut (EA/RH/FH)		6/1/1978	401
A530100226	1	16	Two-aged Seed-tree Seed and Removal Cut (w/ reserves) (2A/RH/FH)	Skinner Salvage	11/1/1996	494
A530100229	11	87	Salvage Cut (intermediate treatment, not regeneration)	North Obrien	10/1/1987	401
A530100229	5	87	Salvage Cut (intermediate treatment, not regeneration)	North Obrien	5/1/1987	401
A530100229	3	87	Salvage Cut (intermediate treatment, not regeneration)	North Obrien	6/1/1987	401
A530100229	11	2	Salvage Cut (intermediate treatment, not regeneration)	North Obrien	10/1/1987	401
A530100229	5	2	Salvage Cut (intermediate treatment, not regeneration)	North Obrien	5/1/1987	401
A530100229	3	2	Salvage Cut (intermediate treatment, not regeneration)	North Obrien	6/1/1987	401
A530100231	2	8	Stand Clearcut (EA/RH/FH)	North Obrien	10/1/1987	401

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A530100236	1	8	Two-aged Seed-tree Seed and Removal Cut (w/ reserves) (2A/RH/FH)	North Obrien	9/1/1986	401
A530100236	1	0	Two-aged Seed-tree Seed and Removal Cut (w/ reserves) (2A/RH/FH)	North Obrien	9/1/1986	401
A530100237		9	Stand Clearcut (EA/RH/FH)		10/1/1955	401
A530100237		0	Stand Clearcut (EA/RH/FH)		10/1/1955	401
A530100245		26	Two-aged Seed-tree Seed and Removal Cut (w/ reserves) (2A/RH/FH)		8/1/1974	401
A530100255	X	23	Stand Clearcut (EA/RH/FH)	North Obrien	4/1/1992	401
A530100258		15	Single-tree Selection Cut (UA/RH/FH)		10/1/1959	401
A530200101		93	Salvage Cut (intermediate treatment, not regeneration)	Three Moose Cedar	8/1/1983	401
A530200101		93	Salvage Cut (intermediate treatment, not regeneration)		10/1/1974	401
A530200104		30	Group Selection Cut (UA/RH/FH)		10/1/1957	401
A530200106		55	Salvage Cut (intermediate treatment, not regeneration)	Oberhoffers Sanit.	10/1/1984	401
A530200114		31	Liberation Cut	Studebaker Pulp	9/1/1981	401
A530200114		31	Liberation Cut		10/1/1957	401
A530200120		29	Salvage Cut (intermediate treatment, not regeneration)	Studebaker Fks Cedar	8/1/1982	401
A530200121		22	Stand Clearcut (EA/RH/FH)	Studebaker Burn Salv	8/1/1983	401
A530200121		22	Stand Clearcut (EA/RH/FH)	Studebaker Pulp	9/1/1981	401
A530200123	4	98	Stand Clearcut (w/ leave trees) (EA/RH/FH)	Studebaker Fire Salv	11/1/1998	430
A530200128		70	Group Selection Cut (UA/RH/FH)		10/1/1957	401
A530200129		91	Salvage Cut (intermediate treatment, not regeneration)	Moose Up Cedar	8/1/1984	401
A530200129		91	Salvage Cut (intermediate treatment, not regeneration)	Studebaker Fks Cedar	8/1/1982	401
A530200132		14	Stand Clearcut (EA/RH/FH)		10/1/1954	401
A530200135		24	Stand Clearcut (EA/RH/FH)		10/1/1961	401
A530200137		24	Stand Clearcut (EA/RH/FH)		10/1/1969	401
A530200140		19	Stand Clearcut (EA/RH/FH)		6/1/1964	401
A530200141		10	Stand Clearcut (EA/RH/FH)		6/1/1964	401
A530200149	12	3	Stand Clearcut (w/ leave trees) (EA/RH/FH)	Studebaker Fire Salv	7/1/1997	430

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A530200150	5	20	Stand Clearcut (w/ leave trees) (EA/RH/FH)	Studebaker Fire Salv	1/1/1998	424
A530200153		58	Stand Clearcut (EA/RH/FH)		6/1/1964	401
A530200157		53	Stand Clearcut (EA/RH/FH)		10/1/1961	401
A530200159		21	Stand Clearcut (EA/RH/FH)		10/1/1961	401
A530200166	2	34	Stand Clearcut (w/ leave trees) (EA/RH/FH)	Studebaker Fire Salv	11/1/1997	430
A530200168	1	26	Stand Clearcut (w/ leave trees) (EA/RH/FH)	Studebaker Fire Salv	12/1/1997	424
A530200170		104	Liberation Cut		10/1/1969	401
A530300102	1	14	Stand Clearcut (EA/RH/FH)	Noseeum	7/1/1988	401
A530300104	2	95	Salvage Cut (intermediate treatment, not regeneration)	Pulpit Ridge Prep	7/1/1984	401
A530300105	2	17	Stand Clearcut (EA/RH/FH)	Noseeum Longline	7/1/1983	401
A530300108	1	3	Stand Clearcut (EA/RH/FH)	Pulpit Ridge Prep	10/1/1983	401
A530300108	2	3	Single-tree Selection Cut (UA/RH/FH)	Pulpit Ridge Prep	7/1/1984	401
A530300110	10	4	Stand Clearcut (w/ leave trees) (EA/RH/FH)	Pulpit Fire Salvage	10/1/1996	401
A530300114	11	8	Stand Clearcut (w/ leave trees) (EA/RH/FH)	Pulpit Fire Salvage	10/1/1996	401
A530300119	5	35	Stand Clearcut (w/ leave trees) (EA/RH/FH)	Studebaker Fire Salv	1/1/1999	430
A530300120	1	25	Stand Clearcut (EA/RH/FH)	Noseeum Longline	10/1/1982	401
A530300120	3	25	Single-tree Selection Cut (UA/RH/FH)	Noseeum Longline	7/1/1983	401
A530300120	4	25	Liberation Cut	Noseeum Longline	10/1/1982	401
A530300121	7	80	Stand Clearcut (w/ leave trees) (EA/RH/FH)	Studebaker Fire Salv	12/1/1998	430
A530300122		12	Liberation Cut		6/1/1969	401
A530300124		16	Salvage Cut (intermediate treatment, not regeneration)	Lower Pulpit Cedar 2	6/1/1984	401
A530300126	9A	22	Stand Clearcut (w/ leave trees) (EA/RH/FH)	Studebaker Fire Salv	9/1/1998	430
A530300127	4	20	Salvage Cut (intermediate treatment, not regeneration)	Upper Obrien	11/1/1983	401
A530300128		75	Improvement Cut	Studebaker Fir Xmas	12/1/1982	401
A530300128		75	Liberation Cut		6/1/1969	401
A530300129		20	Liberation Cut		6/1/1969	401

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A530300129		20	Salvage Cut (intermediate treatment, not regeneration)		7/1/1986	401
A530300132		57	Stand Clearcut (w/ leave trees) (EA/RH/FH)	Laramie Creek Salv	7/1/1984	401
A530300132		57	Stand Clearcut (EA/RH/FH)	Studebaker Pulp	9/1/1981	401
A530300132		57	Salvage Cut (intermediate treatment, not regeneration)		7/1/1983	401
A530300134	18	6	Stand Clearcut (w/ leave trees) (EA/RH/FH)	Studebaker Fire Salv	10/1/1997	430
A530300135		11	Salvage Cut (intermediate treatment, not regeneration)	Lower Kedzie	8/1/1983	401
A530300136	12	27	Stand Clearcut (w/ leave trees) (EA/RH/FH)	Studebaker Fire Salv	3/1/1997	424
A530300137		6	Stand Clearcut (EA/RH/FH)		6/1/1969	401
A530300137	14	6	Stand Clearcut (w/ leave trees) (EA/RH/FH)	Studebaker Fire Salv	1/1/1998	424
A530300138	7A	11	Stand Clearcut (w/ leave trees) (EA/RH/FH)	Studebaker Fire Salv	3/1/1997	424
A530300140	11	52	Stand Clearcut (w/ leave trees) (EA/RH/FH)	Studebaker Fire Salv	6/1/1997	430
A530300145	10	40	Stand Clearcut (w/ leave trees) (EA/RH/FH)	Studebaker Fire Salv	1/1/1999	430
A530300147	9	17	Stand Clearcut (w/ leave trees) (EA/RH/FH)	Studebaker Fire Salv	2/1/1997	424
A530300148		12	Liberation Cut	Kedzie Ridge	10/1/1976	401
A530300149		24	Liberation Cut	Kedzie Ridge	10/1/1976	401
A530300150		129	Liberation Cut	Kedzie Ridge	10/1/1976	401
A530300151	8	35	Salvage Cut (intermediate treatment, not regeneration)	Upper Obrien	6/1/1984	401
A530300152		27	Salvage Cut (intermediate treatment, not regeneration)	Lower Pulpit iii	6/1/1984	401
A530300155		64	Salvage Cut (intermediate treatment, not regeneration)	Lower Pulpit Cedar 2	6/1/1984	401
A530300159	8	79	Stand Clearcut (w/ leave trees) (EA/RH/FH)	Studebaker Fire Salv	9/1/1998	430
A530300161		34	Stand Clearcut (EA/RH/FH)		10/1/1961	401
A530300162		35	Stand Clearcut (EA/RH/FH)		6/1/1969	401
A530300165		43	Stand Clearcut (EA/RH/FH)		6/1/1969	401
A530300170	13	39	Stand Clearcut (w/ leave trees) (EA/RH/FH)	Studebaker Fire Salv	10/1/1997	430
A530300173		110	Improvement Cut	Pulpit Basin Christmas Tree	12/1/1982	401
A530300173		110	Stand Clearcut (EA/RH/FH)		6/1/1969	401

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A530300178	9C	9	Stand Clearcut (w/ leave trees) (EA/RH/FH)	Studebaker Fire Salv	2/1/1997	424
A530300179	16	3	Stand Clearcut (w/ leave trees) (EA/RH/FH)	Studebaker Fire Salv	11/1/1997	424
A530300180	15	19	Stand Clearcut (w/ leave trees) (EA/RH/FH)	Studebaker Fire Salv	11/1/1997	430
A530300186	5	104	Salvage Cut (intermediate treatment, not regeneration)	Upper Obrien	11/1/1983	401
A530300186	7	104	Salvage Cut (intermediate treatment, not regeneration)	Upper Obrien	6/1/1984	401
A530300187		49	Stand Clearcut (EA/RH/FH)		10/1/1964	401
A530300189		16	Stand Clearcut (EA/RH/FH)		6/1/1968	401
A530300192	2	4	Stand Clearcut (EA/RH/FH)	Upper Obrien	5/1/1984	401
A530300193		15	Stand Clearcut (EA/RH/FH)		10/1/1964	401
A530300194	1	5	Stand Clearcut (EA/RH/FH)	Upper Obrien	5/1/1984	401
A530300195		20	Stand Clearcut (EA/RH/FH)		10/1/1964	401
A530300201		42	Stand Clearcut (EA/RH/FH)		10/1/1971	401
A530300202		24	Liberation Cut		10/1/1971	401
A530300203		61	Stand Clearcut (EA/RH/FH)		10/1/1971	401
A530300204		10	Stand Clearcut (EA/RH/FH)		10/1/1971	401
A530300205		14	Salvage Cut (intermediate treatment, not regeneration)	Pulpit Mountain Blowdown	9/1/1982	401
A530300206		7	Stand Clearcut (EA/RH/FH)	Pulpit Mountain Blowdown	9/1/1982	401
A530300226		13	Salvage Cut (intermediate treatment, not regeneration)	Obrien Mountain	11/1/1982	401
A530300227		11	Salvage Cut (intermediate treatment, not regeneration)	Obrien Mountain	11/1/1982	401
A530300228		8	Stand Clearcut (EA/RH/FH)	Obrien Mountain	11/1/1982	401
A530300229		9	Salvage Cut (intermediate treatment, not regeneration)	Obrien Mountain	11/1/1982	401
A530300232		81	Stand Clearcut (EA/RH/FH)		10/1/1967	401
A530300233		44	Stand Clearcut (EA/RH/FH)		10/1/1967	401
A530300235		24	Salvage Cut (intermediate treatment, not regeneration)	Pulpit Mountain Blowdown	9/1/1982	401
A530300236		111	Salvage Cut (intermediate treatment, not regeneration)	Pickle City Cedar	9/1/1983	401
A530300237		18	Single-tree Selection Cut (UA/RH/FH)		6/1/1968	401

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A530300240		39	Stand Clearcut (EA/RH/FH)		10/1/1964	401
A530300242	3	4	Stand Clearcut (EA/RH/FH)	Upper Obrien	9/1/1984	401
A530300243		13	Stand Clearcut (EA/RH/FH)		10/1/1964	401
A530300244	6	5	Stand Clearcut (EA/RH/FH)	Upper Obrien	5/1/1984	401
A530300245	6A	6	Stand Clearcut (EA/RH/FH)	Upper Obrien	6/1/1985	401
A530300246		18	Stand Clearcut (EA/RH/FH)		10/1/1967	401
A530300247		40	Stand Clearcut (EA/RH/FH)		10/1/1967	401
A530300272	5	64	Salvage Cut (intermediate treatment, not regeneration)	Upper Obrien	11/1/1983	401
A530300280		22	Stand Clearcut (EA/RH/FH)		6/1/1968	401
A530300282		24	Stand Clearcut (EA/RH/FH)		10/1/1956	401
A530300283		46	Stand Clearcut (EA/RH/FH)		10/1/1962	401
A530300284		100	Liberation Cut	Kedzie Ridge	10/1/1976	401
A530300286		132	Liberation Cut	Kedzie Ridge	10/1/1976	401
A530300289		26	Liberation Cut	Kedzie Ridge	10/1/1976	401
A530300290		10	Liberation Cut	Kedzie Ridge	6/1/1974	401
A530300291		14	Liberation Cut	Kedzie Ridge	10/1/1976	401
A530300293		65	Liberation Cut	Kedzie Ridge	6/1/1975	401
A530400105	7	1	Stand Clearcut (EA/RH/FH)	King Ranch	3/1/1989	401
A530400115	8	42	Stand Clearcut (EA/RH/FH)	Noseeum	7/1/1988	401
A530400115	8	0	Stand Clearcut (EA/RH/FH)	Noseeum	7/1/1988	401
A530400120	4	16	Stand Clearcut (EA/RH/FH)	Noseeum	6/1/1986	401
A530400122	3	30	Stand Clearcut (EA/RH/FH)	Noseeum	9/1/1986	401
A530400126	5	48	Stand Clearcut (EA/RH/FH)	Noseeum	8/1/1987	401
A530400131	9	42	Stand Clearcut (EA/RH/FH)	Noseeum	8/1/1987	401
A530400136	11	27	Stand Clearcut (EA/RH/FH)	Noseeum	11/1/1988	401
A530400137	6	34	Stand Clearcut (EA/RH/FH)	Noseeum	8/1/1986	401

FACTS ID	Unit ID	Unit Acres	Type of Harvest Activity	Timber Sale Name	Completion Date	Equipment Type Code
A530400141	12	26	Stand Clearcut (EA/RH/FH)	Noseeum	7/1/1986	401
A530400146	7	39	Salvage Cut (intermediate treatment, not regeneration)	Noseeum Sanit. ii	10/1/1986	401
A530400151		154	Stand Clearcut (EA/RH/FH)		10/1/1963	401
A530400151		154	Stand Clearcut (EA/RH/FH)		10/1/1969	401
A530400154	8	65	Salvage Cut (intermediate treatment, not regeneration)	Noseeum Sanit. ii	10/1/1986	401
A530400155		23	Stand Clearcut (EA/RH/FH)		10/1/1963	401
A530400160		13	Stand Clearcut (EA/RH/FH)		10/1/1963	401
A530400161		2	Stand Clearcut (EA/RH/FH)		10/1/1963	401
A530400162		13	Stand Clearcut (EA/RH/FH)		10/1/1969	401
A530400169	2	34	Stand Clearcut (EA/RH/FH)	Noseeum	8/1/1989	401
A530400169	2	1	Stand Clearcut (EA/RH/FH)	Noseeum	8/1/1989	401
A530400173	10	44	Stand Clearcut (EA/RH/FH)	Noseeum	9/1/1987	401
A530400177		61	Stand Clearcut (EA/RH/FH)		10/1/1969	401
A530400178		71	Stand Clearcut (EA/RH/FH)		10/1/1969	401
A530400179		19	Stand Clearcut (EA/RH/FH)		10/1/1963	401
A530400182		19	Stand Clearcut (EA/RH/FH)		10/1/1963	401
A530400186		7	Stand Clearcut (EA/RH/FH)		10/1/1969	401
A530400195		61	Salvage Cut (intermediate treatment, not regeneration)		9/1/1985	401
A530400199	1	23	Stand Clearcut (EA/RH/FH)	Noseeum	7/1/1988	401
A530400208		28	Liberation Cut		10/1/1971	401
A530400212		19	Liberation Cut		10/1/1971	401
A530400218		24	Stand Clearcut (EA/RH/FH)		6/1/1970	401
A530400220		21	Stand Clearcut (EA/RH/FH)		10/1/1957	401
A530400223		24	Salvage Cut (intermediate treatment, not regeneration)	Oberhoffers Sanit.	10/1/1984	401
A530400223		24	Liberation Cut		6/1/1969	401
A530400226		29	Stand Clearcut (EA/RH/FH)		6/1/1969	401

FACTS ID	Unit ID	Unit Acres	Type of Harvest Activity	Timber Sale Name	Completion Date	Equipment Type Code
A530400227		34	Liberation Cut		6/1/1969	401
A530400228		38	Salvage Cut (intermediate treatment, not regeneration)	Oberhoffers Sanit.	10/1/1984	401
A530400228		38	Stand Clearcut (EA/RH/FH)		6/1/1969	401
A530400230		2	Stand Clearcut (EA/RH/FH)	Oberhoffers Sanit.	10/1/1984	401
A530400234		29	Salvage Cut (intermediate treatment, not regeneration)	Oberhoffers Sanit.	10/1/1984	401
A530400241	1	21	Two-aged Seed-tree Seed and Removal Cut (w/ reserves) (2A/RH/FH)	Skinner Salvage	11/1/1996	494
A530400241	1	0	Two-aged Seed-tree Seed and Removal Cut (w/ reserves) (2A/RH/FH)	Skinner Salvage	11/1/1996	494
A530400252		5	Permanent Land Clearing		5/1/1975	205
A530400259	2	11	Stand Clearcut (EA/RH/FH)	Noseeum Longline	7/1/1983	401
A530400701		0	Stand Clearcut (EA/RH/FH)		6/1/1987	000
A530400701		91	Stand Clearcut (EA/RH/FH)		6/1/1987	000
A530400701		0	Stand Clearcut (EA/RH/FH)		6/1/1987	000
A530400701		3	Stand Clearcut (EA/RH/FH)		6/1/1987	000
A530400702		0	Two-aged Seed-tree Seed and Removal Cut (w/ reserves) (2A/RH/FH)		6/1/1988	000
A530400702		226	Two-aged Seed-tree Seed and Removal Cut (w/ reserves) (2A/RH/FH)		6/1/1988	000
A530400702		6	Two-aged Seed-tree Seed and Removal Cut (w/ reserves) (2A/RH/FH)		6/1/1988	000
A530400705		0	Seed-tree Seed Cut (with and without leave trees) (EA/RH/NFH)		6/1/1988	000
A530400705		63	Seed-tree Seed Cut (with and without leave trees) (EA/RH/NFH)		6/1/1988	000
A530400706		0	Two-aged Seed-tree Seed and Removal Cut (w/ reserves) (2A/RH/FH)		6/1/1989	000
A530400706		0	Two-aged Seed-tree Seed and Removal Cut (w/ reserves) (2A/RH/FH)		6/1/1989	000
A530400706		186	Two-aged Seed-tree Seed and Removal Cut (w/ reserves) (2A/RH/FH)		6/1/1989	000
A530400706		2	Two-aged Seed-tree Seed and Removal Cut (w/ reserves) (2A/RH/FH)		6/1/1989	000
A530400708		0	Salvage Cut (intermediate treatment, not regeneration)		6/1/1988	000
A530400708		19	Salvage Cut (intermediate treatment, not regeneration)		6/1/1988	000
A530400708		0	Salvage Cut (intermediate treatment, not regeneration)		6/1/1988	000
A530400709		0	Two-aged Seed-tree Seed and Removal Cut (w/ reserves) (2A/RH/FH)		6/1/1960	000

FACTS ID	Unit ID	Unit Acres	Type of Harvest Activity	Timber Sale Name	Completion Date	Equipment Type Code
A530400709		35	Two-aged Seed-tree Seed and Removal Cut (w/ reserves) (2A/RH/FH)		6/1/1960	000
A530400709		0	Two-aged Seed-tree Seed and Removal Cut (w/ reserves) (2A/RH/FH)		6/1/1960	000
A530400710		0	Salvage Cut (intermediate treatment, not regeneration)		6/1/1980	000
A530400710		18	Salvage Cut (intermediate treatment, not regeneration)		6/1/1980	000
A530400710		0	Salvage Cut (intermediate treatment, not regeneration)		6/1/1980	000
A530400711		0	Salvage Cut (intermediate treatment, not regeneration)		6/1/1985	000
A530400711		104	Salvage Cut (intermediate treatment, not regeneration)		6/1/1985	000
A530400712		19	Stand Clearcut (EA/RH/FH)		6/1/1980	000
A530400713		0	Salvage Cut (intermediate treatment, not regeneration)		6/1/1980	000
A530400713		61	Salvage Cut (intermediate treatment, not regeneration)		6/1/1980	000
A530400715		0	Permanent Land Clearing		6/1/1970	000
A530400715		14	Permanent Land Clearing		6/1/1970	000
A530400716		0	Permanent Land Clearing		6/1/1970	000
A530400716		5	Permanent Land Clearing		6/1/1970	000
A540100104		75	Single-tree Selection Cut (UA/RH/FH)		10/1/1979	401
A540100104		0	Single-tree Selection Cut (UA/RH/FH)		10/1/1979	401
A540100105	6	6	Liberation Cut	Obrien Cleanup	9/1/1986	401
A540100108	6	11	Liberation Cut	Obrien Cleanup	10/1/1985	401
A540100109	8	1	Stand Clearcut (EA/RH/FH)	Obrien Cleanup	6/1/1986	401
A540100110	9	7	Liberation Cut	Obrien Cleanup	9/1/1986	401
A540100111		18	Group Selection Cut (UA/RH/FH)		10/1/1979	401
A540100111		0	Group Selection Cut (UA/RH/FH)		10/1/1979	401
A540100112	7	5	Stand Clearcut (EA/RH/FH)	Obrien Cleanup	6/1/1986	401
A540100113	3	19	Stand Clearcut (EA/RH/FH)	Obrien Cleanup	9/1/1986	401
A540100113	3	0	Stand Clearcut (EA/RH/FH)	Obrien Cleanup	9/1/1986	401
A540100114	4	14	Stand Clearcut (EA/RH/FH)	Obrien Cleanup	6/1/1986	401

FACTS ID	Unit ID	Unit Acres	Type of Harvest Activity	Timber Sale Name	Completion Date	Equipment Type Code
A540100114	4	0	Stand Clearcut (EA/RH/FH)	Obrien Cleanup	6/1/1986	401
A540100115		46	Group Selection Cut (UA/RH/FH)		10/1/1979	401
A540100115		0	Group Selection Cut (UA/RH/FH)		10/1/1979	401
A540100115		0	Group Selection Cut (UA/RH/FH)		10/1/1979	401
A540100116	1	5	Stand Clearcut (EA/RH/FH)	Obrien Cleanup	6/1/1986	401
A540100116	1	0	Stand Clearcut (EA/RH/FH)	Obrien Cleanup	6/1/1986	401
A540100117	5	10	Single-tree Selection Cut (UA/RH/FH)	Obrien Cleanup	9/1/1986	401
A540100117	5	0	Single-tree Selection Cut (UA/RH/FH)	Obrien Cleanup	9/1/1986	401
A540100117	5	0	Single-tree Selection Cut (UA/RH/FH)	Obrien Cleanup	9/1/1986	401
A540100118	2	6	Stand Clearcut (EA/RH/FH)	Obrien Cleanup	6/1/1986	401
A540100118	2	0	Stand Clearcut (EA/RH/FH)	Obrien Cleanup	6/1/1986	401
A540100121	11	28	Salvage Cut (intermediate treatment, not regeneration)	Short Curtain Salvage	1/1/2005	401
A540100122	11	82	Salvage Cut (intermediate treatment, not regeneration)	Short Curtain Salvage	1/1/2005	401
A540100123	11	37	Salvage Cut (intermediate treatment, not regeneration)	Short Curtain Salvage	1/1/2005	401
A540100125	11A	18	Salvage Cut (intermediate treatment, not regeneration)	Short Curtain Salvage	6/1/2005	401
A540100127	11A	59	Salvage Cut (intermediate treatment, not regeneration)	Short Curtain Salvage	6/1/2005	401
A540100128	11A	15	Salvage Cut (intermediate treatment, not regeneration)	Short Curtain Salvage	6/1/2005	401
A540100129	11	62	Salvage Cut (intermediate treatment, not regeneration)	Short Curtain Salvage	1/1/2005	401
A540100130	11	44	Salvage Cut (intermediate treatment, not regeneration)	Short Curtain Salvage	1/1/2005	401
A540100132	11	31	Salvage Cut (intermediate treatment, not regeneration)	Short Curtain Salvage	1/1/2005	401
A540100142	11	23	Salvage Cut (intermediate treatment, not regeneration)	Short Curtain Salvage	1/1/2005	401
A540100146		20	Salvage Cut (intermediate treatment, not regeneration)		10/1/1979	401
A540100150	3	3	Stand Clearcut (EA/RH/FH)	Noseeum	9/1/1986	401
A540100151	8	1	Stand Clearcut (EA/RH/FH)	King Ranch	12/1/1988	401
A540100152		5	Salvage Cut (intermediate treatment, not regeneration)		10/1/1979	401
A540100152		0	Salvage Cut (intermediate treatment, not regeneration)		10/1/1979	401

FACTS ID	Unit ID	Unit Acres	Type of Harvest Activity	Timber Sale Name	Completion Date	Equipment Type Code
A540100702		0	Seed-tree Seed Cut (with and without leave trees) (EA/RH/NFH)		6/1/1985	000
A540100702		0	Seed-tree Final Cut (EA/NRH/FH)		6/1/1992	000
A540100702		30	Seed-tree Seed Cut (with and without leave trees) (EA/RH/NFH)		6/1/1985	000
A540100702		30	Seed-tree Final Cut (EA/NRH/FH)		6/1/1992	000
A540100705		0	Liberation Cut		6/1/1988	000
A540100705		0	Liberation Cut		6/1/1988	000
A540100705		81	Liberation Cut		6/1/1988	000
A540100706		0	Liberation Cut		6/1/1988	000
A540100706		7	Liberation Cut		6/1/1988	000
A540100707		54	Stand Clearcut (EA/RH/FH)		6/1/1988	000
A540100708		33	Liberation Cut		6/1/2000	000
A540100710		0	Seed-tree Seed Cut (with and without leave trees) (EA/RH/NFH)		6/1/1985	000
A540100710		0	Seed-tree Final Cut (EA/NRH/FH)		6/1/2000	000
A540100710		107	Seed-tree Seed Cut (with and without leave trees) (EA/RH/NFH)		6/1/1985	000
A540100710		107	Seed-tree Final Cut (EA/NRH/FH)		6/1/2000	000
A540200103		18	Stand Clearcut (EA/RH/FH)		10/1/1959	401
A540200105		31	Stand Clearcut (EA/RH/FH)		10/1/1959	401
A540200106		10	Stand Clearcut (EA/RH/FH)		10/1/1959	401
A540200107		14	Stand Clearcut (EA/RH/FH)		10/1/1959	401
A540200109		15	Stand Clearcut (EA/RH/FH)		10/1/1960	401
A540200118		26	Stand Clearcut (EA/RH/FH)		10/1/1960	401
A540200121		17	Stand Clearcut (EA/RH/FH)		10/1/1959	401
A540200123		16	Stand Clearcut (EA/RH/FH)		10/1/1959	401
A540200125		9	Stand Clearcut (EA/RH/FH)		10/1/1960	401
A540200127		11	Stand Clearcut (EA/RH/FH)		10/1/1959	401
A540200129		17	Stand Clearcut (EA/RH/FH)		10/1/1959	401

FACTS ID	Unit ID	Unit Acres	Type of Harvest Activity	Timber Sale Name	Completion Date	Equipment Type Code
A540200131		8	Stand Clearcut (EA/RH/FH)		10/1/1959	401
A540200133		21	Stand Clearcut (EA/RH/FH)		10/1/1959	401
A540200135		12	Stand Clearcut (EA/RH/FH)		10/1/1960	401
A540200137		4	Stand Clearcut (EA/RH/FH)		10/1/1960	401
A540200143		99	Stand Clearcut (EA/RH/FH)		6/1/1965	401
A540200143		0	Stand Clearcut (EA/RH/FH)		6/1/1965	401
A540200143		0	Stand Clearcut (EA/RH/FH)		6/1/1965	401
A540200144	4	9	Two-aged Shelterwood Establishment and Removal Cut (w/ reserves) (2A/RH/FH)	Flying Fur	6/1/1989	401
A540200146		10	Salvage Cut (intermediate treatment, not regeneration)		10/1/1977	401
A540200148		9	Salvage Cut (intermediate treatment, not regeneration)		10/1/1977	401
A540200149		10	Salvage Cut (intermediate treatment, not regeneration)		10/1/1977	401
A540200150		20	Harvest Without Restocking		10/1/1977	401
A540200151		32	Liberation Cut		10/1/1977	401
A540200152		14	Liberation Cut		10/1/1977	401
A540200154		4	Stand Clearcut (EA/RH/FH)		6/1/1960	401
A540200155		14	Stand Clearcut (EA/RH/FH)		10/1/1960	401
A540200156		8	Stand Clearcut (EA/RH/FH)		10/1/1960	401
A540200158		10	Stand Clearcut (EA/RH/FH)		10/1/1960	401
A540200160		10	Stand Clearcut (EA/RH/FH)		10/1/1960	401
A540200163		12	Stand Clearcut (EA/RH/FH)		10/1/1959	401
A540200164		8	Stand Clearcut (EA/RH/FH)		10/1/1960	401
A540200167		10	Stand Clearcut (EA/RH/FH)		10/1/1960	401
A540200168		30	Stand Clearcut (EA/RH/FH)		10/1/1959	401
A540200171		21	Stand Clearcut (EA/RH/FH)		10/1/1959	401
A540200173		12	Stand Clearcut (EA/RH/FH)		10/1/1960	401

FACTS ID	Unit ID	Unit Acres	Type of Harvest Activity	Timber Sale Name	Completion Date	Equipment Type Code
A540200175		17	Stand Clearcut (EA/RH/FH)		10/1/1960	401
A540200176	2	3	Stand Clearcut (w/ leave trees) (EA/RH/FH)	Pew Fire Salvage	10/1/1996	401
A540200178	2A	12	Stand Clearcut (w/ leave trees) (EA/RH/FH)	Pew Fire Salvage	10/1/1996	401
A540200180		28	Stand Clearcut (EA/RH/FH)		10/1/1959	401
A540200182		14	Stand Clearcut (EA/RH/FH)		10/1/1960	401
A540200184		16	Stand Clearcut (EA/RH/FH)		10/1/1960	401
A540200701		91	Stand Clearcut (EA/RH/FH)		6/1/1985	000
A540200701		0	Stand Clearcut (EA/RH/FH)		6/1/1985	000
A540200702		5	Salvage Cut (intermediate treatment, not regeneration)		6/1/1988	000
A540200702		6	Salvage Cut (intermediate treatment, not regeneration)		6/1/1988	000
A540200703		15	Stand Clearcut (EA/RH/FH)		6/1/1977	000
A540200704		155	Liberation Cut		6/1/1992	000
A540200704		155	Commercial Thin		6/1/2000	000
A540200704		3	Liberation Cut		6/1/1992	000
A540200704		3	Commercial Thin		6/1/2000	000
A540200704		0	Liberation Cut		6/1/1992	000
A540200704		0	Commercial Thin		6/1/2000	000
A540200706		0	Seed-tree Seed Cut (with and without leave trees) (EA/RH/NFH)		6/1/1995	000
A540200706		78	Seed-tree Seed Cut (with and without leave trees) (EA/RH/NFH)		6/1/1995	000
A540200708		0	Seed-tree Seed Cut (with and without leave trees) (EA/RH/NFH)		6/1/1985	000
A540200708		0	Seed-tree Final Cut (EA/NRH/FH)		6/1/2000	000
A540200708		119	Seed-tree Seed Cut (with and without leave trees) (EA/RH/NFH)		6/1/1985	000
A540200708		119	Seed-tree Final Cut (EA/NRH/FH)		6/1/2000	000
A540200709		58	Two-aged Seed-tree Seed and Removal Cut (w/ reserves) (2A/RH/FH)		6/1/1989	000
A540200709		58	Two-aged Shelterwood Final Removal Cut (w/ reserves) (2A/NRH/FH)		6/1/2002	000
A540200709		0	Two-aged Seed-tree Seed and Removal Cut (w/ reserves) (2A/RH/FH)		6/1/1989	000

FACTS ID	Unit ID	Unit Acres	Type of Harvest Activity	Timber Sale Name	Completion Date	Equipment Type Code
A540200709		0	Two-aged Shelterwood Final Removal Cut (w/ reserves) (2A/NRH/FH)		6/1/2002	000
A540200712		0	Salvage Cut (intermediate treatment, not regeneration)		6/1/1988	000
A540200712		22	Salvage Cut (intermediate treatment, not regeneration)		6/1/1988	000
A540300701		8	Shelterwood Establishment Cut (with or without leave trees) (EA/RH/NFH)		6/1/1996	000
A540300701		1	Shelterwood Establishment Cut (with or without leave trees) (EA/RH/NFH)		6/1/1996	000
A540300702		115	Seed-tree Seed Cut (with and without leave trees) (EA/RH/NFH)		6/1/1986	000
A540300702		115	Seed-tree Final Cut (EA/NRH/FH)		6/1/2002	000
A540300702		0	Seed-tree Seed Cut (with and without leave trees) (EA/RH/NFH)		6/1/1986	000
A540300702		0	Seed-tree Final Cut (EA/NRH/FH)		6/1/2002	000
A540300703		69	Shelterwood Removal Cut (EA/NRH/FH)		6/1/1996	000
A540300703		69	Two-aged Seed-tree Seed and Removal Cut (w/ reserves) (2A/RH/FH)		6/1/1996	000
A540300703		0	Shelterwood Removal Cut (EA/NRH/FH)		6/1/1996	000
A540300703		0	Two-aged Seed-tree Seed and Removal Cut (w/ reserves) (2A/RH/FH)		6/1/1996	000
A540300704		31	Stand Clearcut (EA/RH/FH)		6/1/1986	000
A540300705		0	Commercial Thin		6/1/1998	000
A540300705		125	Commercial Thin		6/1/1998	000
A540300705		0	Commercial Thin		6/1/1998	000
A540300706		403	Commercial Thin		6/1/1997	000
A540300706		0	Commercial Thin		6/1/1997	000
A540300707		16	Commercial Thin		6/1/1990	000
A540300710		49	Stand Clearcut (EA/RH/FH)		6/1/1985	000
A540300711		0	Salvage Cut (intermediate treatment, not regeneration)		6/1/1988	000
A540300711		70	Salvage Cut (intermediate treatment, not regeneration)		6/1/1988	000
A540300712		0	Liberation Cut		6/1/1993	000

FACTS ID	Unit ID	Unit Acres	Type of Harvest Activity	Timber Sale Name	Completion Date	Equipment Type Code
A540300712		0	Commercial Thin		6/1/2002	000
A540300712		0	Liberation Cut		6/1/1993	000
A540300712		0	Commercial Thin		6/1/2002	000
A540300712		134	Liberation Cut		6/1/1993	000
A540300712		134	Commercial Thin		6/1/2002	000
A540300716		0	Salvage Cut (intermediate treatment, not regeneration)		6/1/1980	000
A540300716		15	Salvage Cut (intermediate treatment, not regeneration)		6/1/1980	000
A540300717		0	Salvage Cut (intermediate treatment, not regeneration)		6/1/1988	000
A540300717		14	Salvage Cut (intermediate treatment, not regeneration)		6/1/1988	000
A540400108		2	Stand Clearcut (EA/RH/FH)		10/1/1960	401
A540400113		33	Stand Clearcut (EA/RH/FH)		10/1/1959	401
A540400115		27	Stand Clearcut (EA/RH/FH)		10/1/1959	401
A540400118		9	Stand Clearcut (EA/RH/FH)		10/1/1959	401
A540400120		43	Stand Clearcut (EA/RH/FH)		10/1/1959	401
A540400122		9	Stand Clearcut (EA/RH/FH)		10/1/1959	401
A540400123		31	Stand Clearcut (EA/RH/FH)		10/1/1960	401
A540400128	12	49	Stand Clearcut (w/ leave trees) (EA/RH/FH)	Pulpit Fire Salvage	10/1/1996	401
A540400129	6	54	Stand Clearcut (w/ leave trees) (EA/RH/FH)	Pulpit Fire Salvage	10/1/1997	430
A540400141	15	51	Stand Clearcut (w/ leave trees) (EA/RH/FH)	Pulpit Fire Salvage	10/1/1996	401
A540400142		11	Stand Clearcut (EA/RH/FH)		10/1/1960	401
A540400145		13	Stand Clearcut (EA/RH/FH)		10/1/1960	401
A540400146		21	Stand Clearcut (EA/RH/FH)		10/1/1961	401
A540400152	6C	12	Stand Clearcut (w/ leave trees) (EA/RH/FH)	Pulpit Fire Salvage	10/1/1996	401
A540400153	6A	26	Stand Clearcut (w/ leave trees) (EA/RH/FH)	Pulpit Fire Salvage	10/1/1996	401
A540400154		18	Single-tree Selection Cut (UA/RH/FH)		7/1/1960	401
A540400156		10	Single-tree Selection Cut (UA/RH/FH)		7/1/1960	401

FACTS ID	Unit ID	Unit Acres	Type of Harvest Activity	Timber Sale Name	Completion Date	Equipment Type Code
A540400157		22	Single-tree Selection Cut (UA/RH/FH)		7/1/1960	401
A540400159		23	Liberation Cut		9/1/1977	401
A540400159		23	Stand Clearcut (EA/RH/FH)	Rabbit Creek Osr	11/1/1981	454
A540400160		23	Liberation Cut	Rabbit Creek Osr	11/1/1981	454
A540400165		19	Stand Clearcut (EA/RH/FH)		10/1/1959	401
A540400166		7	Stand Clearcut (EA/RH/FH)		10/1/1960	401
A540400169		21	Stand Clearcut (EA/RH/FH)		10/1/1959	401
A540400171		59	Salvage Cut (intermediate treatment, not regeneration)		10/1/1977	401
A540400172		5	Salvage Cut (intermediate treatment, not regeneration)		10/1/1977	401
A540400174		19	Single-tree Selection Cut (UA/RH/FH)		10/1/1977	401
A540400175		38	Salvage Cut (intermediate treatment, not regeneration)		10/1/1977	401
A540400177		177	Group Selection Cut (UA/RH/FH)		10/1/1977	401
A540400178		63	Single-tree Selection Cut (UA/RH/FH)		10/1/1977	401
A540400179		12	Group Selection Cut (UA/RH/FH)		10/1/1976	401
A540400180		16	Group Selection Cut (UA/RH/FH)		10/1/1977	401
A540400183		20	Salvage Cut (intermediate treatment, not regeneration)		10/1/1977	401
A540400184		12	Single-tree Selection Cut (UA/RH/FH)		10/1/1977	401
A540400186		22	Commercial Thin	Rabbit Run	9/1/1982	401
A540400189		38	Group Selection Cut (UA/RH/FH)		10/1/1977	401
A540400196	9	13	Two-aged Seed-tree Seed and Removal Cut (w/ reserves) (2A/RH/FH)	Lynx Creek ii	2/1/1986	401
A540400197		35	Improvement Cut	Lynx Plant 1st Xmas	6/1/1982	401
A540400197		0	Improvement Cut	Lynx Plant 1st Xmas	6/1/1982	401
A540400197		35	Improvement Cut	Lynx Plant 2nd Xmas	10/1/1986	401
A540400197		0	Improvement Cut	Lynx Plant 2nd Xmas	10/1/1986	401
A540400197		35	Stand Clearcut (EA/RH/FH)		6/1/1968	401
A540400197		0	Stand Clearcut (EA/RH/FH)		6/1/1968	401

FACTS ID	Unit ID	Unit Acres	Type of Harvest Activity	Timber Sale Name	Completion Date	Equipment Type Code
A540400199	6B	14	Stand Clearcut (w/ leave trees) (EA/RH/FH)	Pulpit Fire Salvage	10/1/1996	401
A540400200	1	25	Liberation Cut	Flying Fur	7/1/1989	401
A540400200	1	0	Liberation Cut	Flying Fur	7/1/1989	401
A540400203	2	5	Two-aged Shelterwood Establishment and Removal Cut (w/ reserves) (2A/RH/FH)	Flying Fur	7/1/1989	401
A540400205	3	7	Liberation Cut	Flying Fur	6/1/1989	401
A540400206	4	9	Two-aged Shelterwood Establishment and Removal Cut (w/ reserves) (2A/RH/FH)	Flying Fur	6/1/1989	401
A540400207		10	Group Selection Cut (UA/RH/FH)		10/1/1977	401
A540400213		13	Single-tree Selection Cut (UA/RH/FH)		7/1/1960	401
A540400215		14	Single-tree Selection Cut (UA/RH/FH)		7/1/1960	401
A540400216		46	Single-tree Selection Cut (UA/RH/FH)		7/1/1960	401
A540400218		13	Single-tree Selection Cut (UA/RH/FH)		7/1/1960	401
A540400219		18	Single-tree Selection Cut (UA/RH/FH)		7/1/1960	401
A540400220		91	Single-tree Selection Cut (UA/RH/FH)		7/1/1960	401
A540400225		27	Stand Clearcut (EA/RH/FH)		10/1/1960	401
A540400226		23	Stand Clearcut (EA/RH/FH)		10/1/1960	401
A540400230	13	15	Stand Clearcut (w/ leave trees) (EA/RH/FH)	Pulpit Fire Salvage	10/1/1996	401
A540400231	14	47	Stand Clearcut (w/ leave trees) (EA/RH/FH)	Pulpit Fire Salvage	10/1/1997	430
A540400232	14A	5	Stand Clearcut (w/ leave trees) (EA/RH/FH)	Pulpit Fire Salvage	6/1/1997	480
A540400233	8	20	Stand Clearcut (w/ leave trees) (EA/RH/FH)	Pulpit Fire Salvage	8/1/1998	480
A540400234	8A	7	Stand Clearcut (w/ leave trees) (EA/RH/FH)	Pulpit Fire Salvage	8/1/1998	480
A540400235	15A	10	Stand Clearcut (w/ leave trees) (EA/RH/FH)	Pulpit Fire Salvage	10/1/1996	401
A540400236	7B	5	Stand Clearcut (w/ leave trees) (EA/RH/FH)	Pulpit Fire Salvage	8/1/1998	480
A540400237	7	84	Stand Clearcut (w/ leave trees) (EA/RH/FH)	Pulpit Fire Salvage	8/1/1998	480
A540400238	7A	2	Stand Clearcut (w/ leave trees) (EA/RH/FH)	Pulpit Fire Salvage	8/1/1998	480

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A540400239	16	69	Stand Clearcut (w/ leave trees) (EA/RH/FH)	Pulpit Fire Salvage	10/1/1996	401
A540400242		6	Group Selection Cut (UA/RH/FH)		10/1/1977	401
A540400243		5	Single-tree Selection Cut (UA/RH/FH)		10/1/1977	401
A540400701		0	Salvage Cut (intermediate treatment, not regeneration)		6/1/1985	000
A540400701		0	Salvage Cut (intermediate treatment, not regeneration)		6/1/1985	000
A540400701		54	Salvage Cut (intermediate treatment, not regeneration)		6/1/1985	000
A540400703		0	Liberation Cut		6/1/1997	000
A540400703		0	Commercial Thin		6/1/2000	000
A540400703		41	Liberation Cut		6/1/1997	000
A540400703		41	Commercial Thin		6/1/2000	000
A540400703		0	Liberation Cut		6/1/1997	000
A540400703		0	Commercial Thin		6/1/2000	000
A540500114		19	Stand Clearcut (EA/RH/FH)		10/1/1960	401
A540500115	23	30	Stand Clearcut (EA/RH/FH)	Lynx Creek ii	7/1/1986	401
A540500116	23A	7	Stand Clearcut (EA/RH/FH)	Lynx Creek (Original	6/1/1984	401
A540500119	24	11	Stand Clearcut (EA/RH/FH)	Lynx Creek ii	9/1/1986	454
A540500131	17	10	Stand Clearcut (EA/RH/FH)	Lynx Creek ii	9/1/1985	401
A540500134	25	18	Harvest Without Restocking	Lynx Creek ii	10/1/1987	401
A540500138	22	12	Stand Clearcut (EA/RH/FH)	Lynx Creek ii	10/1/1987	401
A540500139	20	20	Stand Clearcut (EA/RH/FH)	Lynx Creek ii	8/1/1987	401
A540500142	21	11	Stand Clearcut (EA/RH/FH)	Lynx Creek ii	9/1/1987	401
A540500143	21A	9	Stand Clearcut (EA/RH/FH)	Lynx Creek ii	9/1/1987	401
A540500144	19	5	Stand Clearcut (EA/RH/FH)	Lynx Creek ii	10/1/1987	401
A540500147	12	7	Stand Clearcut (EA/RH/FH)	Lynx Creek ii	10/1/1986	401
A540500148	12A	9	Stand Clearcut (EA/RH/FH)	Lynx Creek ii	6/1/1987	401
A540500150	12	10	Stand Clearcut (EA/RH/FH)	Lynx Creek ii	10/1/1986	401

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A540500152	16	6	Stand Clearcut (EA/RH/FH)	Lynx Creek ii	9/1/1986	401
A540500161	14	23	Harvest Without Restocking	Lynx Creek ii	8/1/1987	401
A540500169	26	27	Stand Clearcut (EA/RH/FH)	Lynx Creek (Original	5/1/1984	401
A540500171	26A	16	Salvage Cut (intermediate treatment, not regeneration)	Lynx Creek (Original	5/1/1983	401
A540500174		48	Liberation Cut	King China	10/1/1979	401
A540500177		28	Liberation Cut	King China	10/1/1979	401
A540500179		11	Liberation Cut	King China	6/1/1979	401
A540500182		237	Group Selection Cut (UA/RH/FH)		10/1/1957	401
A540500191	22	2	Stand Clearcut (EA/RH/FH)	Lynx Creek ii	10/1/1987	401
A540600105	8	15	Stand Clearcut (EA/RH/FH)	Lynx Creek (Original	5/1/1984	401
A540600110		12	Stand Clearcut (EA/RH/FH)		10/1/1978	401
A540600115	7	24	Two-aged Shelterwood Establishment and Removal Cut (w/ reserves) (2A/RH/FH)	Lynx Creek (Original	6/1/1983	401
A540600116	8A	9	Two-aged Shelterwood Establishment and Removal Cut (w/ reserves) (2A/RH/FH)	Lynx Creek (Original	6/1/1983	401
A540600120		7	Salvage Cut (intermediate treatment, not regeneration)		5/1/1983	401
A540600126		53	Liberation Cut	King China	6/1/1979	401
A540600127		35	Liberation Cut	King China	10/1/1979	401
A540600128		73	Liberation Cut	King China	10/1/1979	401
A540600132	11	39	Stand Clearcut (EA/RH/FH)	Lynx Creek ii	8/1/1987	401
A540600139	10	30	Harvest Without Restocking	Lynx Creek ii	8/1/1987	401
A540600160		5	Stand Clearcut (EA/RH/FH)		10/1/1954	401
A540600160		1	Stand Clearcut (EA/RH/FH)		10/1/1954	401
A540600160		36	Stand Clearcut (EA/RH/FH)		10/1/1954	401
A540600160		0	Stand Clearcut (EA/RH/FH)		10/1/1954	401
A540600161		92	Liberation Cut		6/1/1973	401

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A540600161		0	Liberation Cut		6/1/1973	401
A540600161		0	Liberation Cut		6/1/1973	401
A540600161		0	Liberation Cut		6/1/1973	401
A540600161		3	Liberation Cut		6/1/1973	401
A540600161		1	Liberation Cut		6/1/1973	401
A540600161		0	Liberation Cut		6/1/1973	401
A540600162		29	Stand Clearcut (EA/RH/FH)		10/1/1974	401
A540600162		0	Stand Clearcut (EA/RH/FH)		10/1/1974	401
A540600162		0	Stand Clearcut (EA/RH/FH)		10/1/1974	401
A540600167		6	Stand Clearcut (EA/RH/FH)		6/1/1973	401
A540600701		0	Commercial Thin		6/1/1997	000
A540600701		98	Commercial Thin		6/1/1997	000
A540600702		9	Stand Clearcut (EA/RH/FH)		6/1/1978	000
A540600703		0	Commercial Thin		6/1/1997	000
A540600703		127	Commercial Thin		6/1/1997	000
A540600704		73	Salvage Cut (intermediate treatment, not regeneration)		6/1/1988	000
A540600704		0	Salvage Cut (intermediate treatment, not regeneration)		6/1/1988	000
A540600705		0	Stand Clearcut (EA/RH/FH)		6/1/1978	000
A540600705		41	Stand Clearcut (EA/RH/FH)		6/1/1978	000
A540600706		0	Commercial Thin		6/1/1995	000
A540600706		85	Commercial Thin		6/1/1995	000
A540600707		0	Stand Clearcut (EA/RH/FH)		6/1/1978	000
A540600707		8	Stand Clearcut (EA/RH/FH)		6/1/1978	000
A550100102		19	Commercial Thin		6/1/1973	401
A550100129		39	Shelterwood Preparatory Cut (EA/NRH/NFH)	Surprise Gulch	8/1/1983	401
A550100130		15	Liberation Cut	Horsh Show	10/1/1983	401

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A550100130		15	Liberation Cut	Surprise Gulch	7/1/1983	401
A550100131		50	Liberation Cut	Surprise Gulch	9/1/1982	401
A550100131		50	Salvage Cut (intermediate treatment, not regeneration)	Surprise Gulch	7/1/1962	401
A550100131		50	Liberation Cut		10/1/1971	401
A550100132		21	Liberation Cut		10/1/1971	401
A550100132		21	Liberation Cut		10/1/1974	401
A550100134		49	Liberation Cut		6/1/1974	401
A550100134		49	Commercial Thin		6/1/1974	401
A550100136		30	Liberation Cut		6/1/1974	401
A550100146		3	Stand Clearcut (EA/RH/FH)	Surprise Gulch	7/1/1982	401
A550100147		2	Stand Clearcut (EA/RH/FH)	Surprise Gulch	9/1/1982	401
A550100162		13	Liberation Cut		6/1/1973	401
A550100162		0	Liberation Cut		6/1/1973	401
A550100163		31	Liberation Cut		6/1/1974	401
A550100164		14	Liberation Cut		6/1/1973	401
A550100164		0	Liberation Cut		6/1/1973	401
A550100165		26	Liberation Cut		6/1/1973	401
A550100165		0	Liberation Cut		6/1/1973	401
A550100166		42	Liberation Cut		6/1/1974	401
A550100166		2	Liberation Cut		6/1/1974	401
A550100166		2	Liberation Cut		6/1/1974	401
A550100167		7	Liberation Cut		6/1/1973	401
A550100167		0	Liberation Cut		6/1/1973	401
A550100168		12	Liberation Cut		6/1/1973	401
A550100168		3	Liberation Cut		6/1/1973	401
A550100168		2	Liberation Cut		6/1/1973	401

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A550100169		17	Commercial Thin		6/1/1973	401
A550100171		7	Stand Clearcut (EA/RH/FH)		6/1/1973	401
A550100171		0	Stand Clearcut (EA/RH/FH)		6/1/1973	401
A550100172		1	Liberation Cut		6/1/1973	401
A550100172		0	Liberation Cut		6/1/1973	401
A550100173	1	3	Permanent Land Clearing	Shoot Out	10/15/2006	421
A550100173	1	2	Permanent Land Clearing	Shoot Out	10/15/2006	421
A550100173	1	3	Permanent Land Clearing	Shoot Out	10/15/2006	421
A550100173	1	1	Permanent Land Clearing	Shoot Out	10/15/2006	421
A550100173	1	0	Permanent Land Clearing	Shoot Out	10/15/2006	421
A550100701		0	Liberation Cut		6/1/2001	000
A550100701		0	Liberation Cut		6/1/2001	000
A550100701		679	Liberation Cut		6/1/2001	000
A550100701		0	Liberation Cut		6/1/2001	000
A550100701		0	Liberation Cut		6/1/2001	000
A550100701		63	Liberation Cut		6/1/2001	000
A550100701		0	Liberation Cut		6/1/2001	000
A550100702		0	Commercial Thin		6/1/2000	000
A550100702		105	Commercial Thin		6/1/2000	000
A550100704		0	Salvage Cut (intermediate treatment, not regeneration)		6/1/1990	000
A550100704		0	Salvage Cut (intermediate treatment, not regeneration)		6/1/1990	000
A550100704		0	Salvage Cut (intermediate treatment, not regeneration)		6/1/1990	000
A550100704		58	Salvage Cut (intermediate treatment, not regeneration)		6/1/1990	000
A550100704		0	Salvage Cut (intermediate treatment, not regeneration)		6/1/1990	000
A550100705		0	Salvage Cut (intermediate treatment, not regeneration)		6/1/1980	000
A550100705		35	Salvage Cut (intermediate treatment, not regeneration)		6/1/1980	000

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A550100705		0	Salvage Cut (intermediate treatment, not regeneration)		6/1/1980	000
A550100708		0	Seed-tree Seed Cut (with and without leave trees) (EA/RH/NFH)		6/1/1992	000
A550100708		29	Seed-tree Seed Cut (with and without leave trees) (EA/RH/NFH)		6/1/1992	000
A550100709		0	Seed-tree Seed Cut (with and without leave trees) (EA/RH/NFH)		6/1/1992	000
A550100709		13	Seed-tree Seed Cut (with and without leave trees) (EA/RH/NFH)		6/1/1992	000
A550100710		0	Salvage Cut (intermediate treatment, not regeneration)		6/1/1975	000
A550100710		0	Salvage Cut (intermediate treatment, not regeneration)		6/1/1975	000
A550100710		17	Salvage Cut (intermediate treatment, not regeneration)		6/1/1975	000
A550100710		0	Salvage Cut (intermediate treatment, not regeneration)		6/1/1975	000
A550100714		0	Salvage Cut (intermediate treatment, not regeneration)		6/1/1980	000
A550100714		24	Salvage Cut (intermediate treatment, not regeneration)		6/1/1980	000
A550200110	5	18	Harvest Without Restocking	China Sheep	4/1/1989	401
A550200113	2	13	Harvest Without Restocking	China Sheep	4/1/1989	401
A550200133	6	3	Harvest Without Restocking	China Sheep	4/1/1989	401
A550300101		26	Liberation Cut		10/1/1969	401
A550300108		15	Liberation Cut	King China	6/1/1979	401
A550300111		2	Stand Clearcut (EA/RH/FH)	King China	9/1/1980	401
A550300112		67	Stand Clearcut (EA/RH/FH)		10/1/1970	401
A550300113		7	Stand Clearcut (EA/RH/FH)		10/1/1969	401
A550300114		11	Stand Clearcut (EA/RH/FH)	Broken Koot	9/1/1983	401
A550300114		11	Liberation Cut		6/1/1978	401
A550300117	4	17	Two-aged Seed-tree Seed and Removal Cut (w/ reserves) (2A/RH/FH)	Kootchikoo Bugs	6/1/1988	401
A550300118		35	Stand Clearcut (EA/RH/FH)		10/1/1969	401
A550300119	8	34	Salvage Cut (intermediate treatment, not regeneration)	Far East Sanitation	9/1/1984	401
A550300123		34	Liberation Cut		10/1/1969	401
A550300124		13	Stand Clearcut (EA/RH/FH)		10/1/1969	401

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A550300125	9	13	Harvest Without Restocking	Kootchikoo Bugs	5/1/1988	401
A550300125		13	Harvest Without Restocking		10/1/1969	401
A550300126	7	6	Harvest Without Restocking	Kootchikoo Bugs	5/1/1988	401
A550300128	7	7	Two-aged Shelterwood Establishment and Removal Cut (w/ reserves) (2A/RH/FH)	China Sheep	5/1/1990	430
A550300133	3	20	Harvest Without Restocking	China Sheep	10/1/1989	430
A550300134		57	Stand Clearcut (EA/RH/FH)		10/1/1969	401
A550300135	1	21	Harvest Without Restocking	China Sheep	5/1/1990	430
A550300145	11	61	Salvage Cut (intermediate treatment, not regeneration)	Far East Sanitation	8/1/1984	401
A550300146	8	10	Two-aged Seed-tree Seed and Removal Cut (w/ reserves) (2A/RH/FH)	Kootchikoo Bugs	7/1/1988	401
A550300148	12	13	Harvest Without Restocking	China Sheep	5/1/1989	401
A550300148	3	13	Salvage Cut (intermediate treatment, not regeneration)	Kootchikoo Bugs	5/1/1988	401
A550300148	2	13	Harvest Without Restocking	Kootchikoo Bugs	6/1/1988	401
A550300150		41	Commercial Thin	Broken Koot	8/1/1984	401
A550300160		36	Liberation Cut		9/1/1980	401
A550300161	7	26	Harvest Without Restocking	China Sheep	5/1/1990	430
A550400101		5	Stand Clearcut (EA/RH/FH)	King China	9/1/1980	401
A550400102		45	Liberation Cut	King China	10/1/1978	401
A550400102		45	Liberation Cut		6/1/1957	401
A550400104	13	1	Stand Clearcut (EA/RH/FH)	Kootchikoo Bugs	5/1/1988	401
A550400105	22	21	Two-aged Seed-tree Seed and Removal Cut (w/ reserves) (2A/RH/FH)	China Sheep	10/1/1989	424
A550400106	3	45	Salvage Cut (intermediate treatment, not regeneration)	Far East Sanitation	6/1/1985	401
A550400106	4	45	Salvage Cut (intermediate treatment, not regeneration)	Far East Sanitation	6/1/1985	401
A550400107		42	Stand Clearcut (EA/RH/FH)		10/1/1969	401
A550400109		23	Stand Clearcut (EA/RH/FH)	Broken Koot	8/1/1983	401
A550400109		23	Seed-tree Seed Cut (with and without leave trees) (EA/RH/NFH)	Broken Koot	7/1/1983	401

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A550400109		23	Single-tree Selection Cut (UA/RH/FH)	King China	10/1/1978	401
A550400110		26	Liberation Cut	King China	10/1/1978	401
A550400111		52	Stand Clearcut (EA/RH/FH)		10/1/1969	401
A550400112	18	2	Stand Clearcut (w/ leave trees) (EA/RH/FH)	China Basin Salvage	10/1/1997	401
A550400114	21	18	Stand Clearcut (EA/RH/FH)	China Sheep	11/1/1989	424
A550400117	15	17	Two-aged Seed-tree Seed and Removal Cut (w/ reserves) (2A/RH/FH)	China Basin Salvage	7/1/1997	401
A550400120	6	87	Salvage Cut (intermediate treatment, not regeneration)	Far East Sanitation	11/1/1983	401
A550400121	17	10	Stand Clearcut (w/ leave trees) (EA/RH/FH)	China Basin Salvage	12/1/1996	401
A550400128	16	5	Stand Clearcut (w/ leave trees) (EA/RH/FH)	China Basin Salvage	12/1/1996	401
A550400130	23	46	Harvest Without Restocking	China Sheep	6/1/1990	430
A550400133	16	15	Stand Clearcut (EA/RH/FH)	China Sheep	10/1/1989	424
A550400134	7	29	Salvage Cut (intermediate treatment, not regeneration)	Far East Sanitation	9/1/1984	401
A550400135	12	10	Seed-tree Seed Cut (with and without leave trees) (EA/RH/NFH)	China Sheep	5/1/1989	401
A550400135	1	10	Salvage Cut (intermediate treatment, not regeneration)	Far East Sanitation	9/1/1984	401
A550400135		10	Stand Clearcut (EA/RH/FH)		10/1/1969	401
A550400136		43	Stand Clearcut (EA/RH/FH)		10/1/1969	401
A550400137	13	8	Harvest Without Restocking	China Sheep	5/1/1989	401
A550400137	2	8	Salvage Cut (intermediate treatment, not regeneration)	Far East Sanitation	9/1/1984	401
A550400138	10	24	Harvest Without Restocking	China Sheep	12/1/1989	430
A550400140	14	29	Stand Clearcut (EA/RH/FH)	China Sheep	12/1/1989	424
A550400141		6	Group Selection Cut (UA/RH/FH)		9/1/1970	401
A550500101		11	Stand Clearcut (EA/RH/FH)	King China	9/1/1980	401
A550500103	28	10	Stand Clearcut (EA/RH/FH)	China Sheep	10/1/1990	430
A550500105	2	21	Stand Clearcut (w/ leave trees) (EA/RH/FH)	China Basin Salvage	11/1/1996	401
A550500107	2A	36	Stand Clearcut (w/ leave trees) (EA/RH/FH)	China Basin Salvage	11/1/1996	401
A550500109	1	114	Harvest Without Restocking	China Basin Salvage	11/1/1996	401

FACTS ID	Unit ID	Unit Acres	Type of Harvest Activity	Timber Sale Name	Completion Date	Equipment Type Code
A550500110		15	Liberation Cut	King China	10/1/1978	401
A550500110		15	Liberation Cut		6/1/1957	401
A550500111		156	Group Selection Cut (UA/RH/FH)		10/1/1956	401
A550500114		12	Liberation Cut	King China	10/1/1978	401
A550500114		12	Liberation Cut		6/1/1957	401
A550500116		37	Stand Clearcut (EA/RH/FH)		10/1/1969	401
A550500117	9	25	Salvage Cut (intermediate treatment, not regeneration)	Far East Sanitation	6/1/1985	401
A550500118	30	16	Stand Clearcut (EA/RH/FH)	China Sheep	8/1/1990	430
A550500120	8	6	Harvest Without Restocking	China Basin Salvage	11/1/1996	401
A550500120		6	Group Selection Cut (UA/RH/FH)		10/1/1956	401
A550500121		100	Liberation Cut	King China	10/1/1978	401
A550500121		100	Liberation Cut		6/1/1957	401
A550500122	22	7	Two-aged Seed-tree Seed and Removal Cut (w/ reserves) (2A/RH/FH)	China Sheep	10/1/1989	424
A550500125	21	8	Stand Clearcut (EA/RH/FH)	China Sheep	5/1/1990	424
A550500127	24	13	Two-aged Seed-tree Seed and Removal Cut (w/ reserves) (2A/RH/FH)	Kootchikoo Bugs	3/1/1988	401
A550500129	20	15	Two-aged Seed-tree Seed and Removal Cut (w/ reserves) (2A/RH/FH)	Kootchikoo Bugs	5/1/1988	401
A550500130	19	25	Two-aged Seed-tree Seed and Removal Cut (w/ reserves) (2A/RH/FH)	Kootchikoo Bugs	6/1/1988	401
A550500131	4	10	Stand Clearcut (w/ leave trees) (EA/RH/FH)	China Basin Salvage	11/1/1996	401
A550500133	5A	27	Salvage Cut (intermediate treatment, not regeneration)	Far East Sanitation	11/1/1983	401
A550500134		36	Stand Clearcut (EA/RH/FH)		10/1/1969	401
A550500135	5	13	Salvage Cut (intermediate treatment, not regeneration)	Far East Sanitation	9/1/1984	401
A550500137	5	23	Stand Clearcut (w/ leave trees) (EA/RH/FH)	China Basin Salvage	11/1/1996	401
A550500138	6	24	Stand Clearcut (w/ leave trees) (EA/RH/FH)	China Basin Salvage	10/1/1997	401
A550500141	11	11	Stand Clearcut (EA/RH/FH)	China Sheep	12/1/1989	430
A550500142		8	Group Selection Cut (UA/RH/FH)		10/1/1956	401
A550500143	32	14	Stand Clearcut (EA/RH/FH)	China Sheep	11/1/1989	430

FACTS ID	Unit ID	Unit Acres	Type of Harvest Activity	Timber Sale Name	Completion Date	Equipment Type Code
A550500147	24	5	Stand Clearcut (w/ leave trees) (EA/RH/FH)	China Basin Salvage	11/1/1997	401
A550500154		82	Stand Clearcut (EA/RH/FH)		10/1/1970	401
A550500156		98	Stand Clearcut (EA/RH/FH)		10/1/1970	401
A550500161	10	5	Stand Clearcut (w/ leave trees) (EA/RH/FH)	China Basin Salvage	11/1/1996	401
A550500162	7	9	Stand Clearcut (w/ leave trees) (EA/RH/FH)	China Basin Salvage	11/1/1996	401
A550500164	11	22	Stand Clearcut (w/ leave trees) (EA/RH/FH)	China Basin Salvage	10/1/1997	401
A550500165	11A	23	Stand Clearcut (w/ leave trees) (EA/RH/FH)	China Basin Salvage	10/1/1997	401
A550500166	12	8	Stand Clearcut (w/ leave trees) (EA/RH/FH)	China Basin Salvage	10/1/1997	401
A550500167	13	63	Stand Clearcut (w/ leave trees) (EA/RH/FH)	China Basin Salvage	10/1/1997	401
A550500170	14	12	Stand Clearcut (w/ leave trees) (EA/RH/FH)	China Basin Salvage	10/1/1997	401
A550500171	18	18	Stand Clearcut (w/ leave trees) (EA/RH/FH)	China Basin Salvage	10/1/1997	401
A550500172	21	12	Stand Clearcut (w/ leave trees) (EA/RH/FH)	China Basin Salvage	8/1/1997	401
A550500173	20	2	Two-aged Shelterwood Establishment and Removal Cut (w/ reserves) (2A/RH/FH)	China Basin Salvage	10/1/1997	401
A550500175	19	23	Stand Clearcut (w/ leave trees) (EA/RH/FH)	China Basin Salvage	7/1/1997	401
A550500177	23	38	Two-aged Seed-tree Seed and Removal Cut (w/ reserves) (2A/RH/FH)	China Basin Salvage	7/1/1997	401
A550500178	22	5	Two-aged Seed-tree Seed and Removal Cut (w/ reserves) (2A/RH/FH)	China Basin Salvage	10/1/1997	401
A550500179	15	2	Two-aged Seed-tree Seed and Removal Cut (w/ reserves) (2A/RH/FH)	China Basin Salvage	10/1/1997	401

EQUIPMENT CODES
000: Not Applicable
205: Plowing Machine
401: Manual (residential firewood)
420: Tractor (less than 2000 feet external skidding distance)
421: Tractor (greater than 2000 feet external skidding distance)
424: Ground Based Skidder*
430: Single Span Skyline (less than 2000 feet external yarding distance)
454: Other Logging
480: Helicopter Logging
491: Mechanized Systems (felling/bucking/delimbing)
494: Processor

Appendix G – OLY Monitoring Plan

Item #	Resource	Objective	Timing	Methodology	Responsible Official
1	Watershed	Monitor implementation and effectiveness of Best Management Practices (BMPs) used for project activities (includes monitoring RHCAs)	During and post project activities	Review a representative sample of timber sale units, road reconstruction, road storage and road decommissioning and complete BMP monitoring reports.	Sale Admin/ Engineering Representative/IDT/ District Staff
2	Watershed	Monitor the effectiveness of project specific design features	During and post timber sale activities		Sale Admin/ IDT/District Staff
3	Soils	Monitor detrimental soil disturbance	Post Treatment	Randomly sample timber sale units using approved methodology (walk through transects).	Soil Scientist
4	Soils	Monitor the effectiveness of project specific design features	Post Treatment		Soil Scientist
5	Soils/ Silviculture	Monitor coarse woody debris (CWD) to see if recommended amounts were retained	Post Treatment	Measure tons per acre of CWD within a representative sample of both burned and piled units.	Soil Scientist/ Silviculturist
6	Silviculture/ Fuels/ Wildlife	Determine whether fuels treatment objectives were accomplished	Post Treatment	Review selected treatment areas. Evaluate silvicultural objectives and prescribed burn objectives.	Fuels Specialist/ Silviculturist/IDT
7	Silviculture	Track insect and diseases	Post Treatment	Annual insect and disease mortality surveys; ongoing program accomplished by Forest Health Protection (FHP).	R-1 Forest Health Protection
8	Silviculture/ Botany	Monitor old growth characteristics and effectiveness of harvest and fuels treatments	Pre and Post Treatment	Walk through transects or old growth plots	Botany

Item #	Resource	Objective	Timing	Methodology	Responsible Official
9	Silviculture	Assure regeneration harvest units are stocked with trees in 5 years	Post Treatment	Reforestation surveys the 1st, 3rd and 5th year after planting.	Silviculture
10	Wildlife	Verify maintenance and retention of cavity habitat	Post Treatment	Representative sample of units taken to determine retention of cavity habitat.	Wildlife Biologist
11	Noxious Weeds	Monitor noxious weed infestations	Pre Treatment and following timber sale activities	Monitor project area to determine effectiveness of weed spraying.	District Weed Specialist
12	Wildlife	Determine effectiveness of burning to increase browse.	1-3 years after burning	Survey selected underburn treatments to determine the species of browse and to what extend burning has stimulated browse.	Wildlife Biologist/ Fuels Specialist
13	Wildlife	Monitor the status and effectiveness of closure devices – gates, earthen barriers, signing	1-2 times per year	District employees will monitor the status of closure devices and their effectiveness through their daily field work and once a year through the Adopt—Road program.	District Access Management Program/ Law Enforcement
14	Cultural Resources	Ensure effectiveness of historic properties protection measures and survey for newly exposed cultural resources	Pre and Post Fuels Treatment	Pedestrian survey will be conducted over newly disturbed or exposed surfaces within specified units. Fire line construction will be actively monitored in specified units.	Kootenai NF Heritage personnel and/or Tribal liaison (where applicable)

Appendix H: Past BMP Practices in the OLY Project Area

Year Implemented	Project Name	Type of Project	Watersheds	Reconstruction* (mile)	New Construction** (mile)	Active Stored Service (mile)	Active Road Decommission (mile)	Major Stream Crossing Structures Upgraded	Road Number	Comments
1993	Arbo Fire Salvage	Reconstruction/ Construction for Timber Harvest	Arbo, Seventeenmile	5.2	0.2		0.2		176, 2367H	Original CMP on Arbo Ck was not replaced; overflow CMP added.
1996	Arbo Fire Watershed Restoration	Decommission	Arbo				13.2		2366, 2366A, 2367,2367A, 2367B, 2367D, 2367G, 2367H, 2368	Rd 2367 (6.8 miles) should be stored service not decommissioning, but was entered in the database as decommissioning.
1996?	China Basin Fire Salvage	Reconstruction/ Construction for Timber Harvest	China, Koot, Surprise Gulch	11.1	1.1				4441, 4443, 4443A, 4444, 4445, 4445P, 14344A, 14357, 14357A	
1996-1997	Pulpit Fire Salvage	Reconstruction/ Construction for Timber Harvest	Upper O'Brien, Rabbit	9.6	~1.9				331, 752, 4419, 4419B, 4425, 4429	A portion of 4419B was renamed 14311. Was not constucted to end as shown in road package because of unstable soils.
1997	Lynx Creek Washout Repair	Culvert replacement	Lynx					1	4445	Lynx Ck - Installed 81"x59" CMPA

Year Implemented	Project Name	Type of Project	Watersheds	Reconstruction* (mile)	New Construction** (mile)	Active Stored Service (mile)	Active Road Decommission (mile)	Major Stream Crossing Structures Upgraded	Road Number	Comments
1997	Rabbit O'Brien Washout Repair	Repair road at washout locations (Toomey dam failure/debris torrent)	Kootenai						331	
1998	Pulpit ERFO	Slide stabilization/ decommission	Rabbit				1.9		4425	Several sites treated and road decommissioned
1998	China Basin Watershed Restoration	Storage and decommission	China			8.8	3.1		4441, 4441A, 4441B, 4443, 4443A, 4444, 4445P, 14344, 14344A, 14357, 14357A	
1998	Lynx Creek Road Reconditioning	Road drainage improve/culvert replacement	Lynx	5.3					4445	
1998?	Surprise Gulch Washout Repair	Road repair and three culverts replaced	Surprise Gulch					3	4445	Three washed out stream crossings on Surprise Gulch repaired (3 large culverts).

Year Implemented	Project Name	Type of Project	Watersheds	Reconstruction* (mile)	New Construction** (mile)	Active Stored Service (mile)	Active Road Decommission (mile)	Major Stream Crossing Structures Upgraded	Road Number	Comments
1999	Rabbit Creek	Road drainage improve/culvert replacement	Rabbit	7.5					331	
1996	Studebaker Draw Culvert Replacement	Fish Passage	Studebaker Draw					1	752	Buried 108" round CMP.
1996-1997	Studebaker Fire Salvage	Reconstruction/ Construction for Timber Harvest	Upper O'Brien, Studebaker, Kedzie	11.4	4.0				2391C, 2391D, 4651, 4651E, 4651F, 14355, 14355B, 14741	
1997	Studebaker ERFO	Slide repair	Studebaker						2391	Five sites treated and road reopened
2000	Noseeum Fire	Post-fire road closure activities	Upper O'Brien, Noseeum				0.9		2391A, 14319, 4416, 4416B, 14307	Mostly waterbarring, except 2391A was recontoured
2000	Feeder Mountain Fire	Post-fire road closure activities	NF O'Brien, Feeder						2376, 2376C, 2380, 14349	Waterbars, some recontouring on road 14349.
2000-2002	O'Brien Restoration Phase I	Decom and Road to Trail Conversion	Upper O'Brien, Kedzie				5.1		2391, 2391C, 2391D, 2391F, 2991, 14741	Removed all culverts except on Rd 2391.

Year Implemented	Project Name	Type of Project	Watersheds	Reconstruction* (mile)	New Construction** (mile)	Active Stored Service (mile)	Active Road Decommission (mile)	Major Stream Crossing Structures Upgraded	Road Number	Comments
2001	O'Brien Restoration Phase II	Decommission and storage	Upper O'Brien, Studebaker			9.4	3.8		4651, 4651E, 4651F, 14355, 14355A, 14355B	Removed all culverts except on Rd 4651.
2001	Kootenai Mountain 10%	Road drainage improve/culvert replacement	Lynx, China	3.3					4445	
2001	Road 4429 BMP	Road drainage improve/culvert replacement	O'Brien	0.5						Work was on first 1/2 mile of road.
2003	O'Brien Restoration Phase III & IV	Storage	Upper O'Brien				2.9		14307A, 4429E	
2003	O'Brien Restoration Phase III & IV	Decommission	Upper O'Brien, Noseeum, Rabbit				13.4		4416A, 4419, 4419A, 4419B, 4420, 14311, 14400, 1998, 1998A, 1998C, 1998D, 1998E, 1998JB, 331I	

Year Implemented	Project Name	Type of Project	Watersheds	Reconstruction* (mile)	New Construction** (mile)	Active Stored Service (mile)	Active Road Decommission (mile)	Major Stream Crossing Structures Upgraded	Road Number	Comments
2004	O'Brien Fire Restoration (2000 Fire)	Road drainage, minor and major culvert replacement	Upper O'Brien	11.6				2	331, 752, 2380, 4429	Kedzie Ck - Installed 112"x78" CMPAUnnamed O'Brien Trib (Rd 752-MP 5.49) Installed 73"x55" CMPA
2005	Yaak Mountain 10%	Road drainage improvement	O'Brien	2					4407	
2007	Yaak Mountain Washout Repair	Road repair and culvert replaced.	O'Brien						4407	Washed out stream crossing repaired on Rd 4407. Also one crossing repaired on County Road below and three crossings on Stimson roads above.
2009	NF O'Brien Fish Passage	Fish Passage	NF O'Brien					1	2380	NF O'Brien - Installed bridge. Provides fish passage.
	Total Treated			**67.5**	**5.3**	**18.2**	**44.5**	**8**		

* Some road segments were reconstructed more than once to repair storm damage or improve drainage.
** All new construction roads were decommissioned and are included in decommission total.

Appendix I – List of Preparers and Recipients

List of Preparers

The following interdisciplinary team members contributed to the development of the Buckhorn project and this Draft Environmental Impact Statement.

Preparer	Position	Experience	Contribution
Alberts, Sara	Supervisory Forester and Operations	15	Project team leading, advice on timber harvest design.
Anderson, Shelly	Transportation Planner	26	Prepared travel analysis report and access management plan.
Arvidson, Michael	Botanist/ GIS	30	Prepared reports for PTES plants, maintained GIS coverage, prepared project maps, and assisted in data queries and modeling.
Ferguson, Leslie	Weeds Specialist, District Resource Staff	31	Prepared the noxious weed analysis and provided NEPA advice.
Frament, Ellen	Forest Economist	30	Economic Analysis.
Friel, Breton	TEAMS -Archeologist		Cultural Resources analysis and American Indian Consultation.
Friend, Miles	NEPA IDT Leader	30	Project co-team leader, writer/editor, project documentation, public involvement and collaboration, and provided NEPA advice.
Gier, John	Soil Scientist	25	Prepared soil reports and analysis and contributed to project design.
Giesey, Mike	Silviculturist	29	Silvicultural prescriptions
Hill, Dustin	Archeologist	6	Cultural Resources analysis and American Indian Consultation.
Hubbell, Linda	District FMO	28	Advice on prescribed burning and fuels treatments.
Janke, Nicole	Silviculturist trainee	7	Diagnosis of stand treatment needs, vegetation effects, silvicultural prescriptions, and fire ecology.
Jeresek, Jacob	Fuels Planner	7	Prepared Fire/Fuels analysis.
Lundin, Allison	NEPA Assistant	24	Writer/editor, project file documentation, public notification and document preparation.
Moschelle, Justin	Forest Archeologist		Cultural Resources analysis and American Indian Consultation
Naples, Brendan	Fish Biologist	7	Prepared fisheries analysis.
Newgard, Kris	Hydrologist	31	Prepared water resources and analysis, and contributed to project design.
Osborn, Lisa	NEPA Assistant	20	Writer/editor, public notification, document preparation and project file documentation.
Pickar, Justin	Civil Engineer	7	Design of road reconstruction and maintenance activities.
Rockwell, Mandy	Wildlife Biologist	11	Wildlife habitat analysis and project design.
Sedler, Ed	Timber Sale Preparation	11	Timber Harvest design, project development.
Stephens, Vicki	Fuels Planner	14	Prepared Fire/Fuels and Air Quality analysis.
Thorstenson, Dave	Recreation Planner	15	Prepared recreation, scenery, and inventoried roadless area analysis.
Tisher, Connie	Timber Sale Administration	31	Logging systems and timber operations

List of Recipients

The following is a list of recipients to whom this Draft EIS or notice of availability has been sent. Additional copies of this Draft EIS are available upon request from the Three Rivers Ranger District in Troy, Montana.

Local Government and Elected Officials

Lincoln County Commissioners
Boundary County Commissioners

Federal Agencies

Advisory Council on Historic Preservation
Northwest Power Planning Council
Environmental Protection Agency - Region 8
Federal Aviation Administration
Federal Highway Administration
US Army Corps of Engineers - Northwest Division
US Coast Guard
US Department of Energy
US Department of Homeland Security - Border Patrol
USDA - Animal and Plant Health Inspection Service
USDA - Natural Resource Conservation Service
USDA-National Agricultural Library
USDI – Fish and Wildlife Service
USDI – Office of environmental policy & compliance

Organizations

Alliance for the Wild Rockies
Kootenai Forest Stakeholder Coalition
Kootenai Valley Resource Initiative
Idaho Forest Group
Idaho Conservation League
Montana Wilderness Association
The Lands Council
Stimson Lumber Company
Yaak Valley Forest Council
Vital Ground

State Agencies

Montana Department of Environmental Quality
Montana Department of Fish, Wildlife and Parks

Native American Tribes and Organizations

Confederated Salish and Kootenai Tribe
Kootenai Tribe of Idaho
Kootenai Salish Tribal Liaison

Individuals

Akin, Cliff
Akin, Jerry
Anderson, Ken
Artley, Richard
Bass, Rick
Benson, Joel & Debra
Blanchard, Nathan
Boltz, Jerry
Bowser, Matt
Britton, Gary
Buegge, Kip
Carlson, Ted
Chilton-Radantt, Tonya
Cleek, Ron & Audrey
Coldwell, Darren
Coryell, Larry
Curry, Brandy
Dougherty, Tim
Edwardson, Eric
Greenleaf, Kevin,
Grossman, Jesse
Hauke, Walt
Higgins, Ron
Hight, James
Hill, Donald
Janssen, Sue
Johnson, Tony
Juel, Jeff
Kargol, Barbara
Kasworm, Wayne
Kelsey, Rick
King, Robyn
Larson, Greg
Lawson, Brian
Levert, Ed
Lilly, Mike
Mayo, Jim
Merz, Norm

Individuals- continued

Miller, Doug
Mischenko, Donald
Moss, Judi
Noble, Robert
Orr, Dave & Glenda
Osterberg, Dale
Paulson, Tanna & Wes
Peck, Mark
Perry, Patty
Petersen, Mike
Postulka, Lon
Prieve, Steve
Rank, Jeremy
Reichert, Chris
Reno, Rex
Robertson, Merrilee
Robinson, Amy
Sanders, Mike
Sachau, Barbara
Schader, Max
Severy, Niles & Janet
Stevens, Loretta
Sullivan, Pat and Cindy
Taggart, Don
Tracy, Donn
Teats, Chadwick
Tucker, Mike
Vincent, Chas
Vranizan, Tom
Woelfel, Barry
Williams, Noel
Kuropat, Betty
Ruestow, Judith
Wandler, Jerry
Weatherbee, Fred
Wimer, Ken and Laurie
Wright, Nancy
Yelle, Julie
Zuelke, Russell

Map Index

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M-2	**Recreation Improvements**
M-3	**OLY Project Area Road Work**
M-4	**Analysis Watersheds**
M-5	**OLY Project Area Haul Roads**
M-6	**All Harvest and Fuels Units for Alternative 2**
M-6.1	Subset of M-6 (zoomed in to northern units)
M-6.2	Subset of M-6 (zoomed in to southern units)
M-6.3	Subset of M-6 (zoomed in to central units)
M-7	**All Harvest and Fuels Units for Alternative 3**
M-7.1	Subset of M-7 (zoomed in to northern units)
M-7.2	Subset of M-7 (zoomed in to southern units)
M-7.3	Subset of M-7 (zoomed in to central units)
M-8	**All Harvest and Fuels Units for Alternative 4**
M-8.1	Subset of M-8 (zoomed in to northern units)
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M-8.3	Subset of M-8 (zoomed in to central units)
M-9	**Fireline and Burn Area Map for Sears Flats**
M-10	**OLY Fire History**
M-11	**OLY Project Area Pre-Treatment Fuels Models**
M-12	**OLY Project Area Post-Treatment Fuels Models**
M-13	**Vegetation Age Class**
M-14	**Forest Cover Types**
M-15	**Vegetation Response Units**
M-16	**Biophysical Settings**
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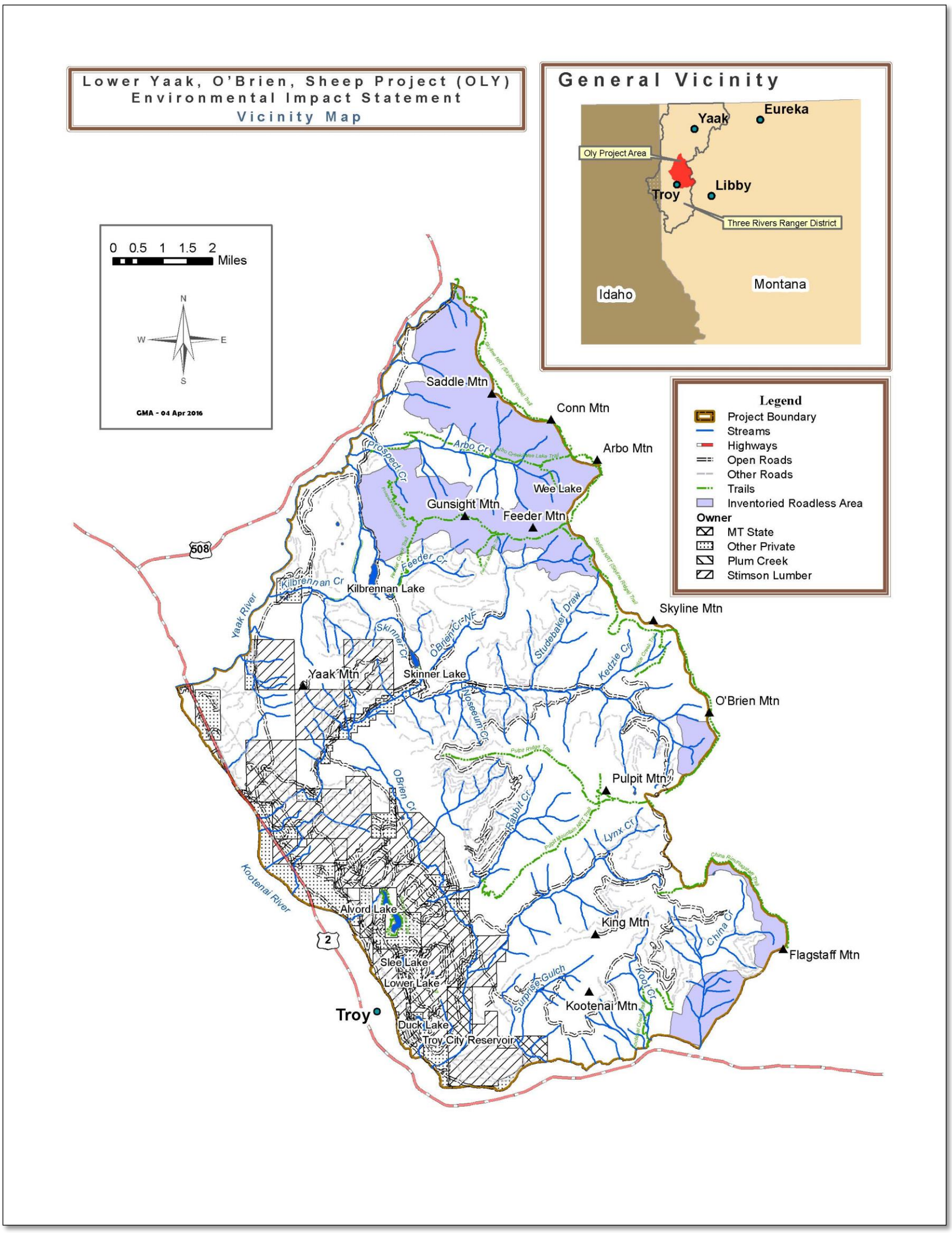
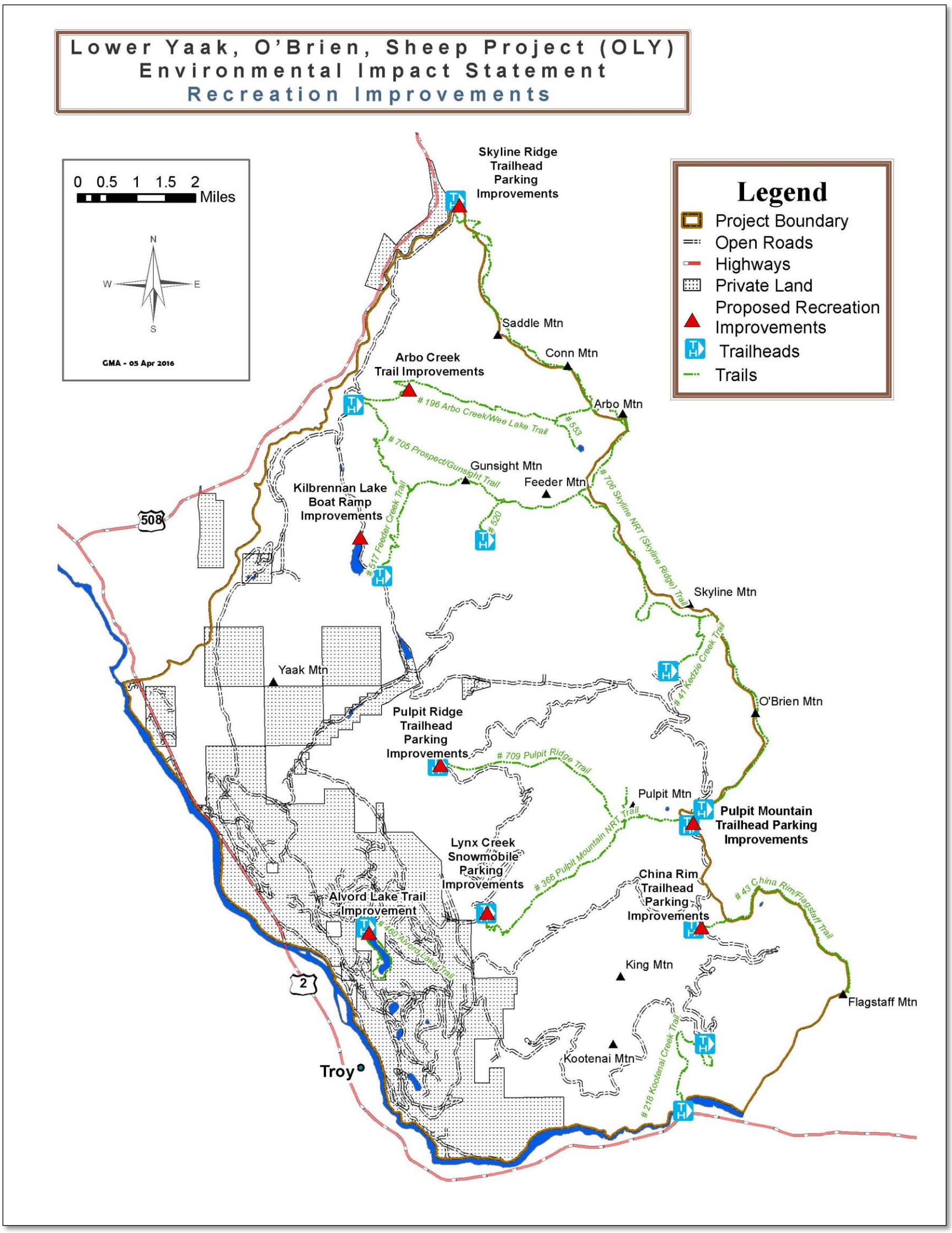
M-21	**Land Types**
M-22	**Management Areas**
M-23	**Core Swap**
M-24	**Stimson Lumber Company Potential Timber Harvest**
M-25	**Scenic and Recreational River Segments**

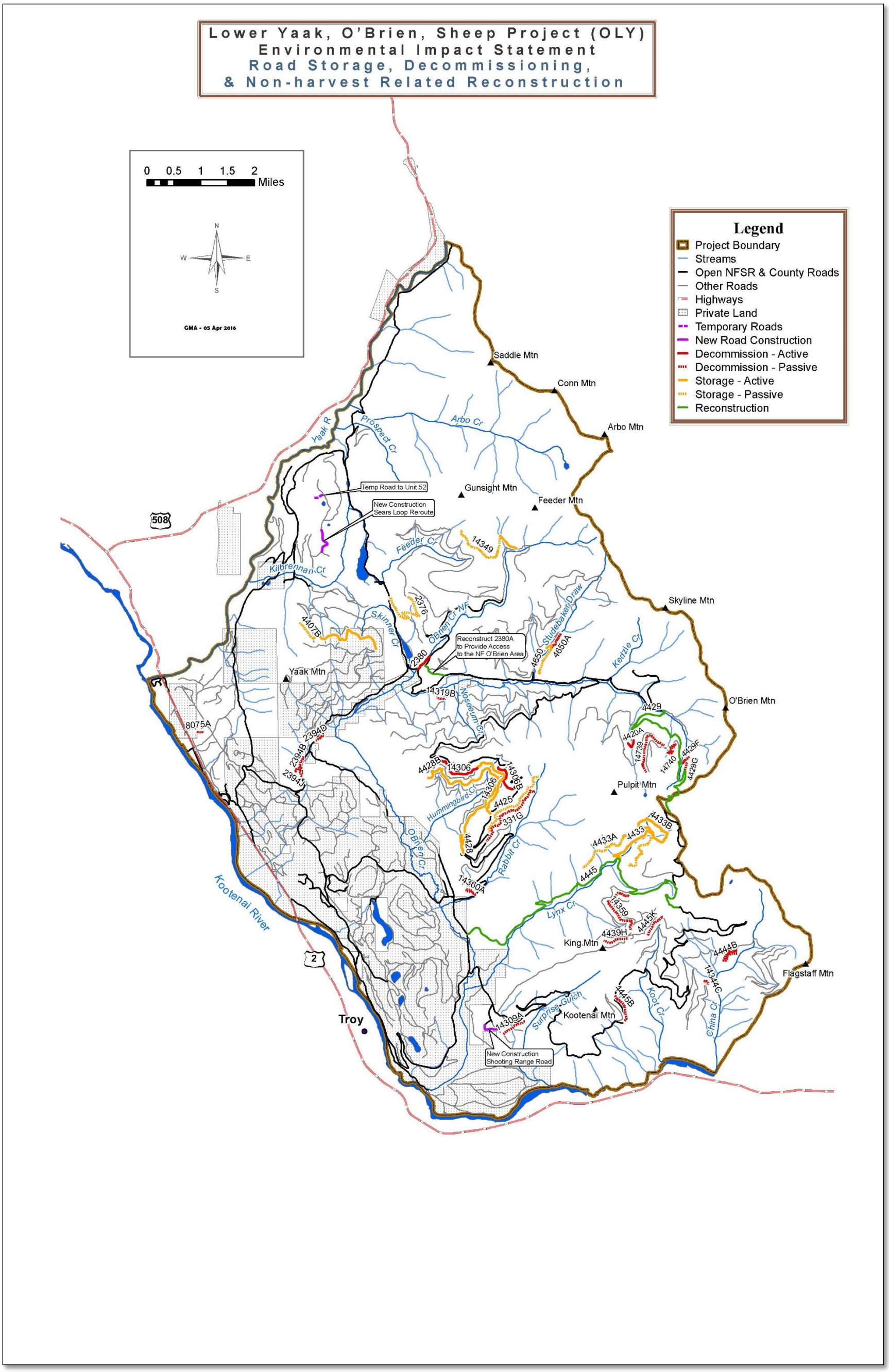
Map M-1: General Vicinity Map



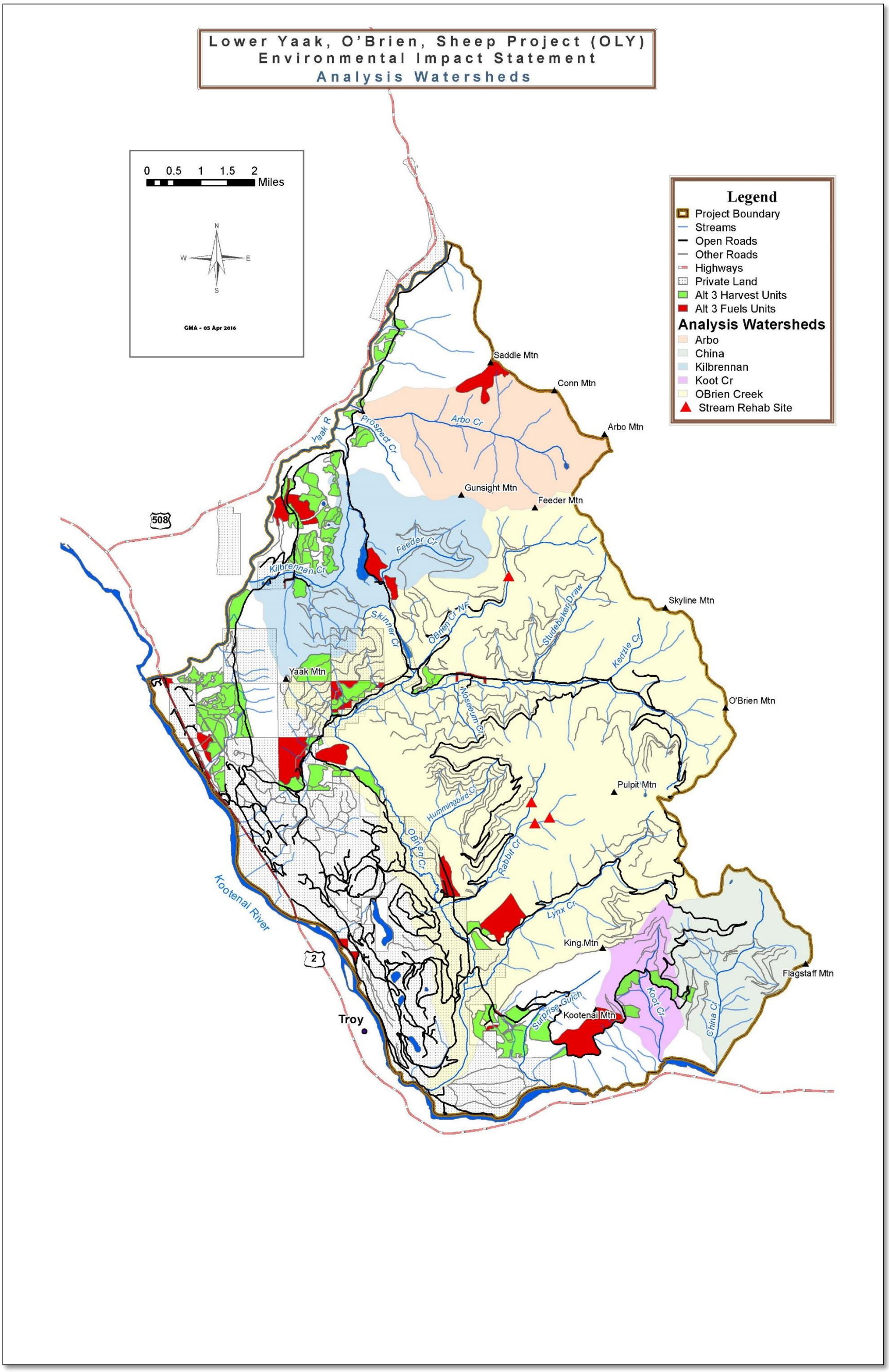
Map M-2: Recreation Improvements



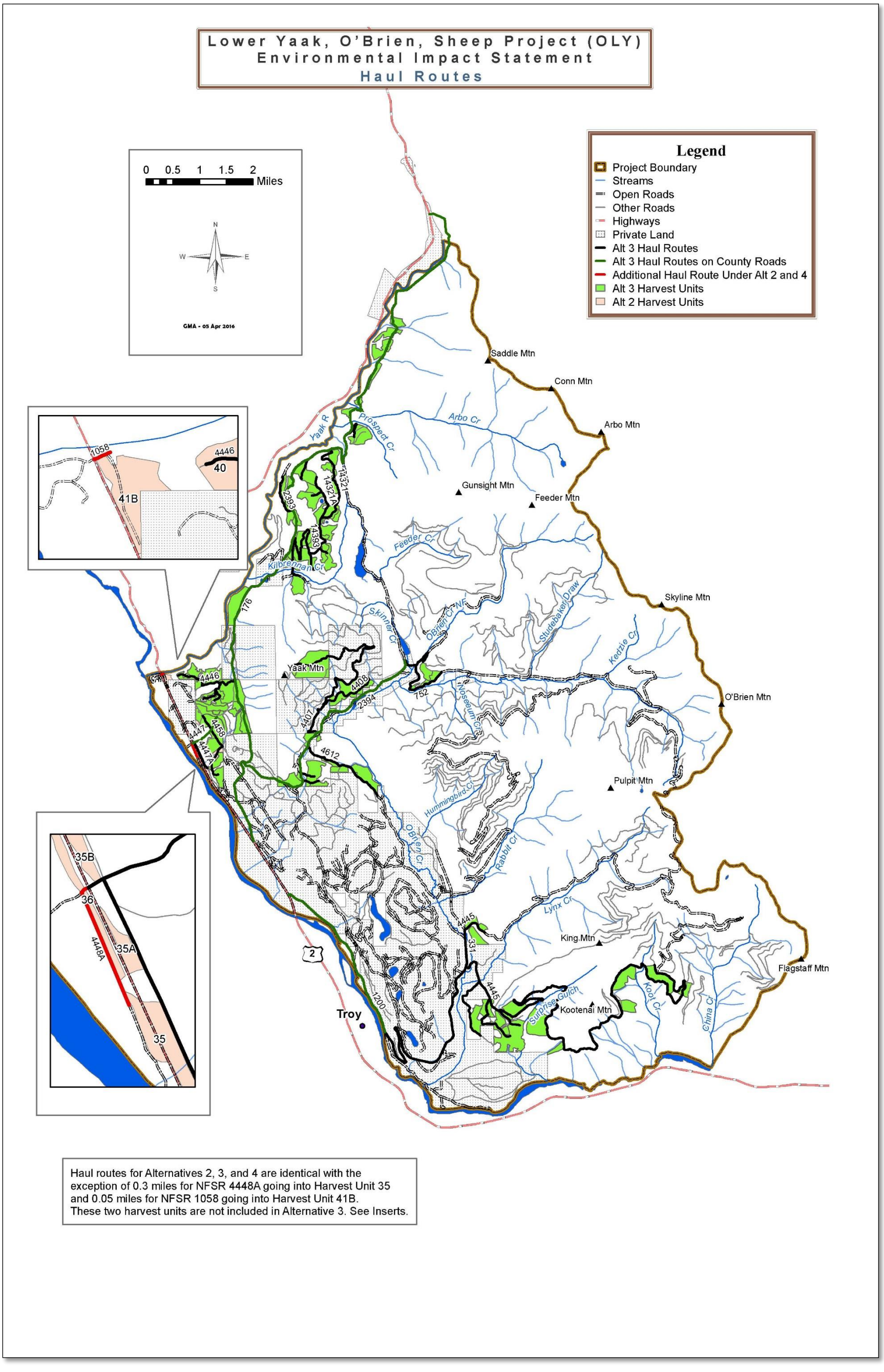
Map M-3: Road Storage, Decommissioning, and Non-harvest Related Reconstruction



Map M-4: Analysis Watersheds

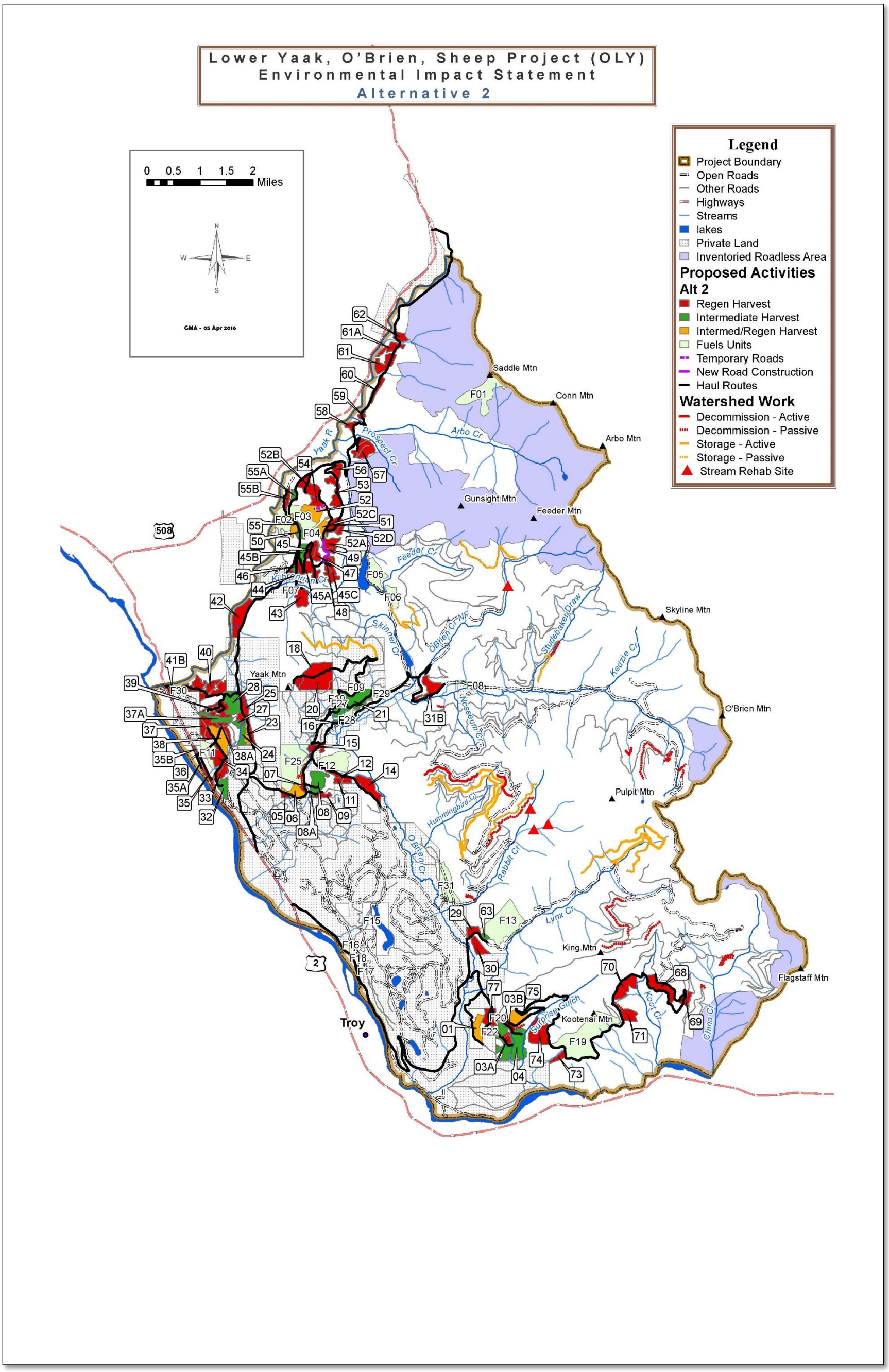


Map M-5: OLY Project Area Haul Roads

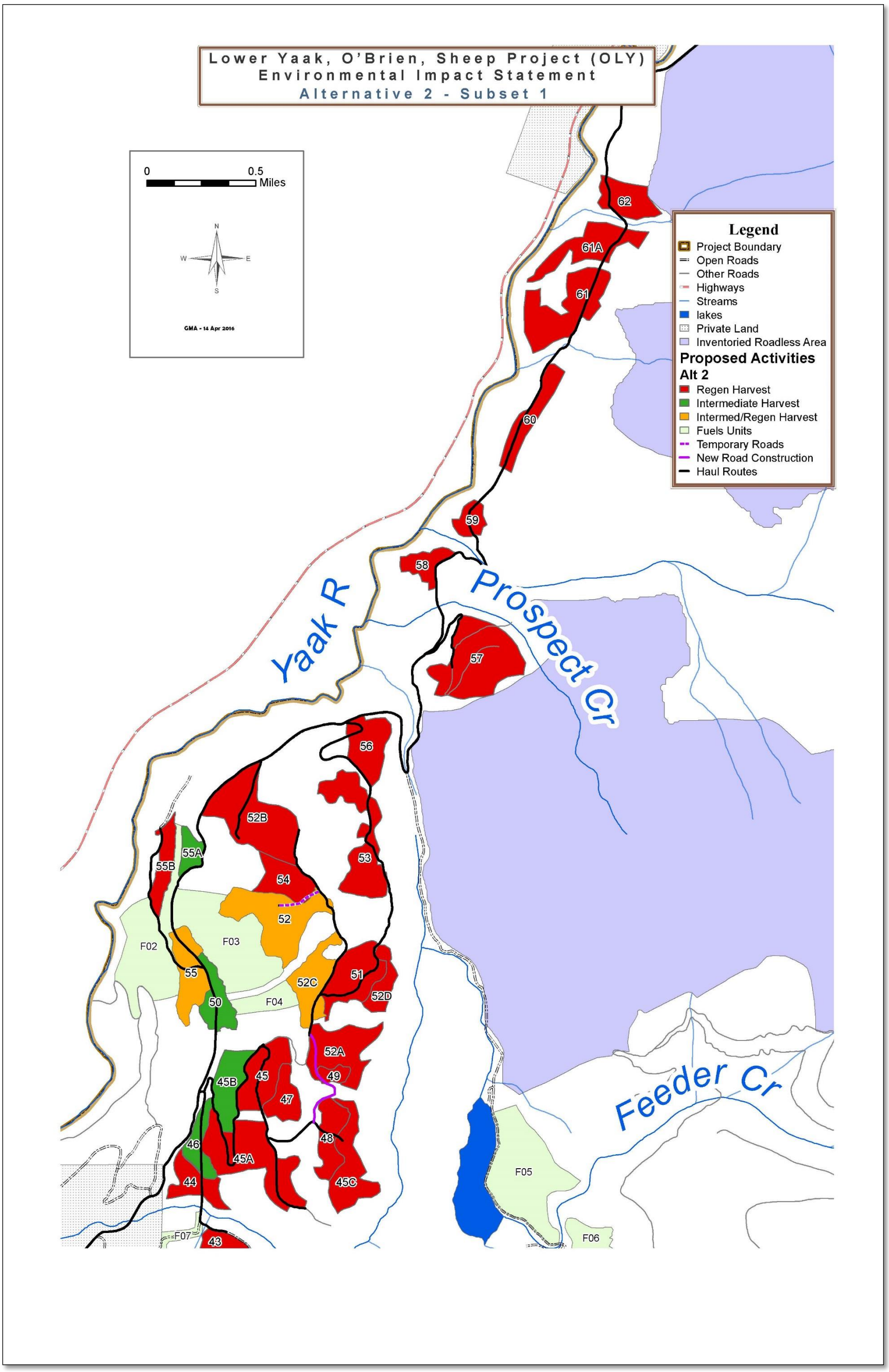


Haul routes for Alternatives 2, 3, and 4 are identical with the exception of 0.3 miles for NFSR 4448A going into Harvest Unit 35 and 0.05 miles for NFSR 1058 going into Harvest Unit 41B. These two harvest units are not included in Alternative 3. See Inserts.

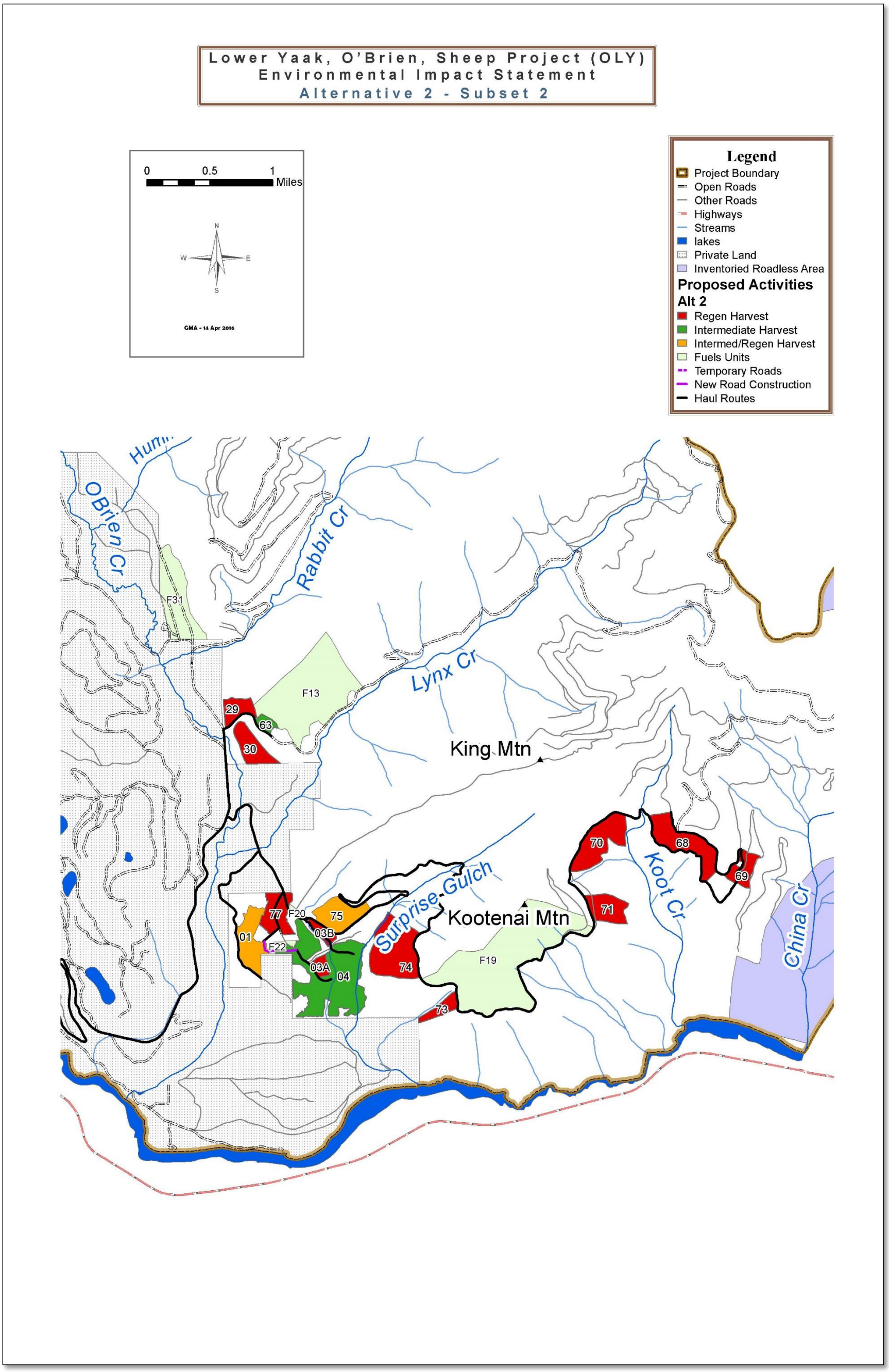
Map M-6: Harvest and Fuels Units in Alternative 2



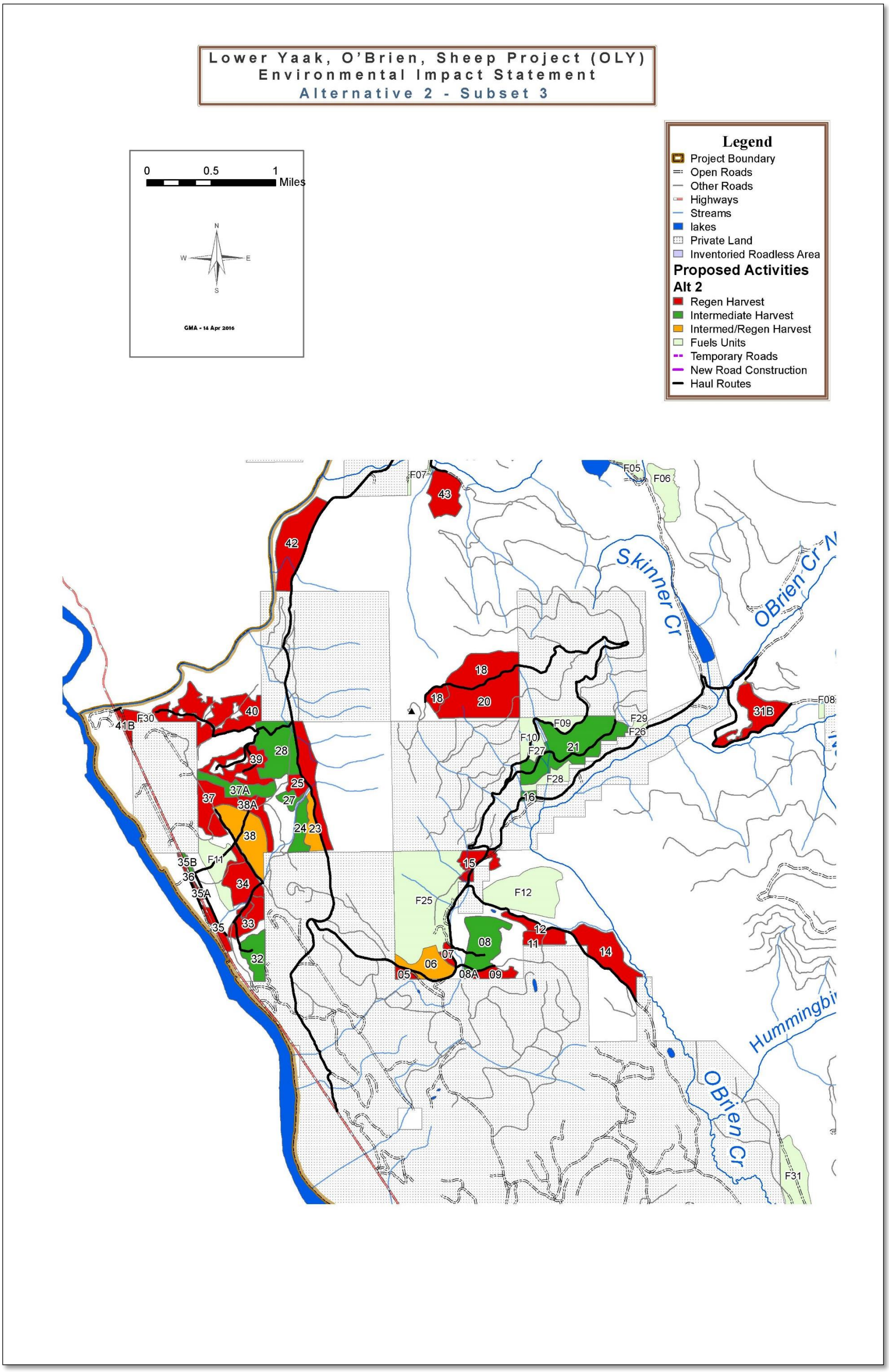
Map M-6.1 Subset of Map M-6 Zoomed into Northern Units



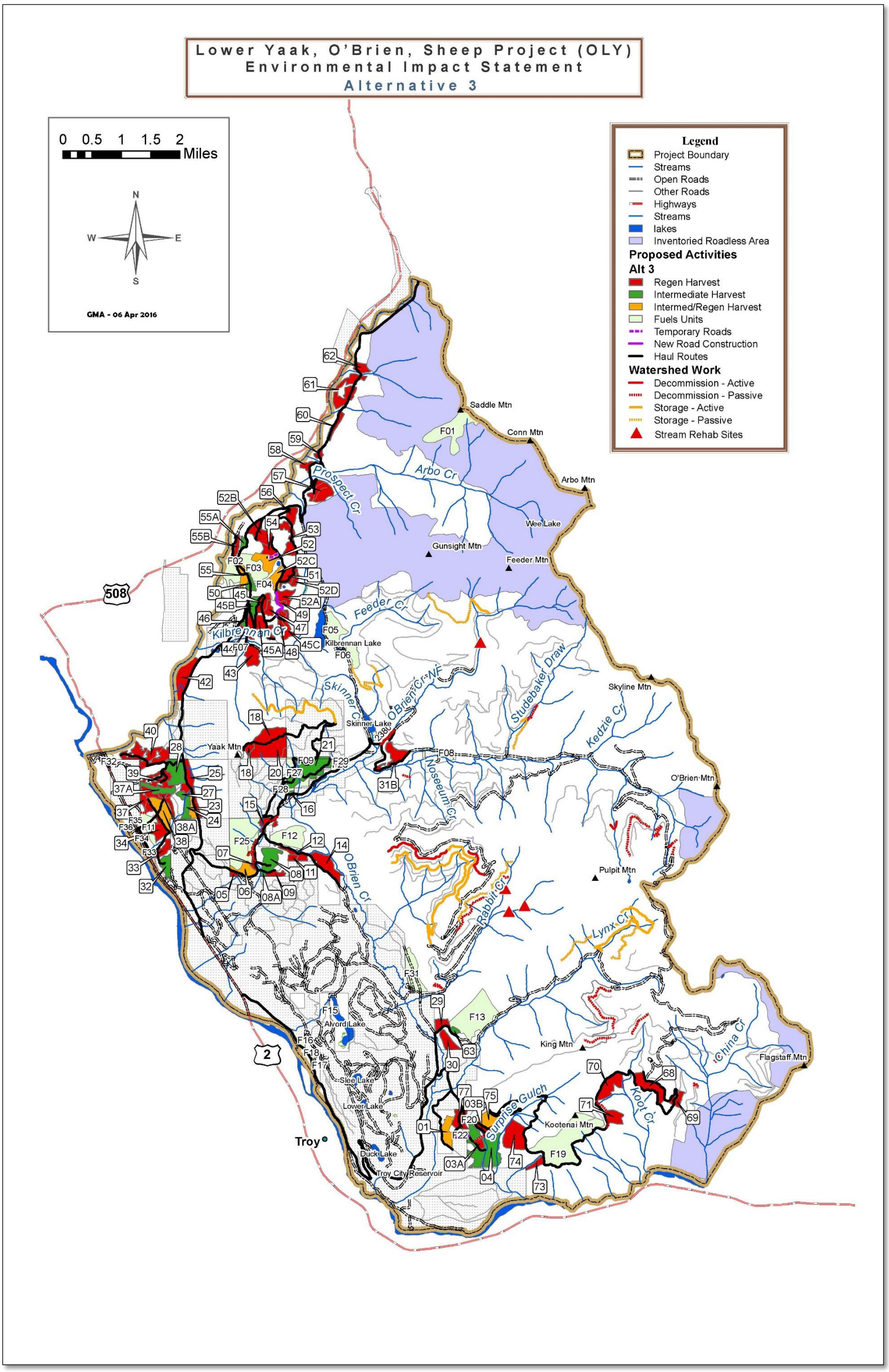
Map M-6.2 Subset of Map M-6 Zoomed into Southern Units



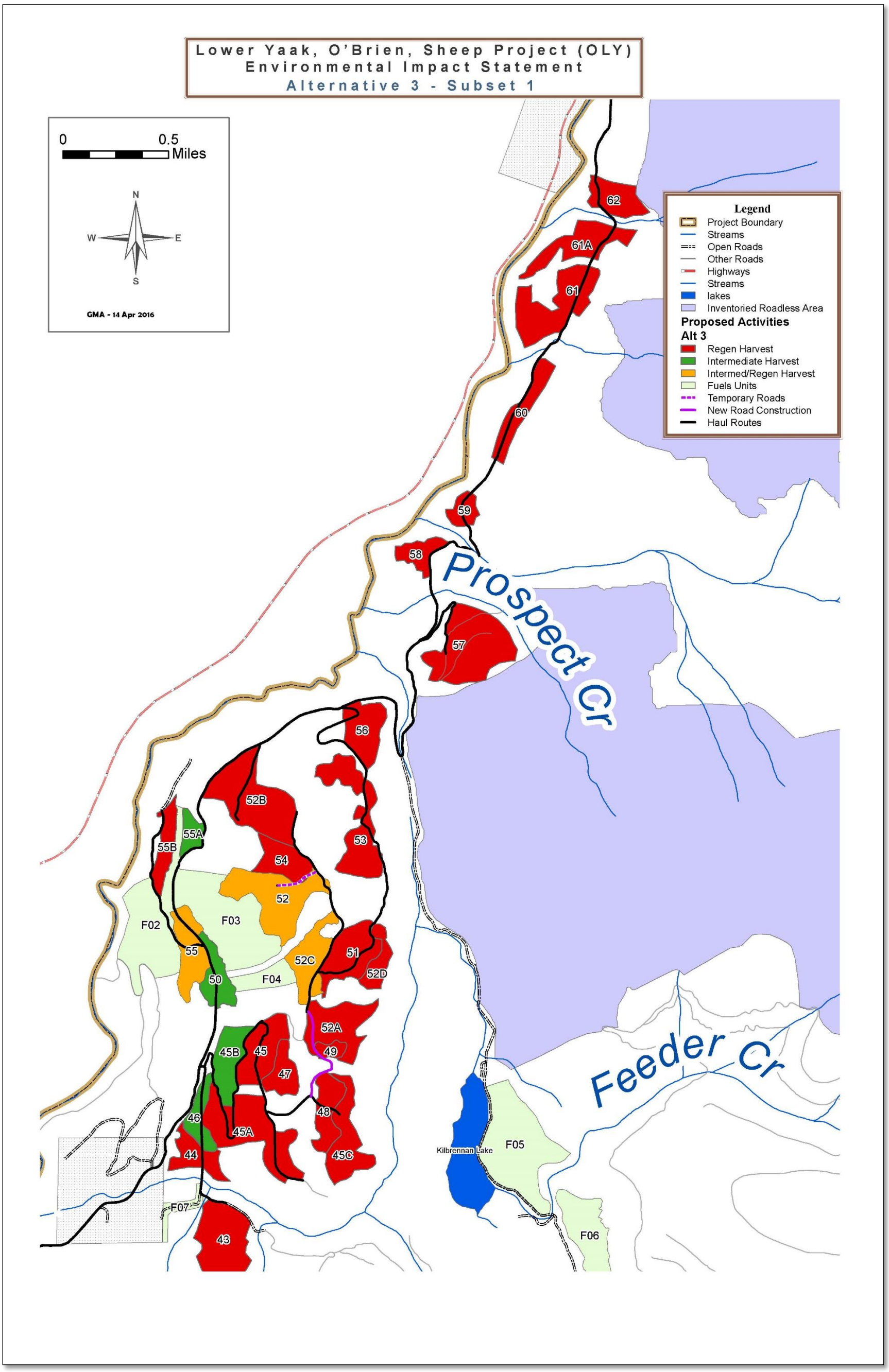
Map M-6.3 Subset of Map M-6 Zoomed into Central Units



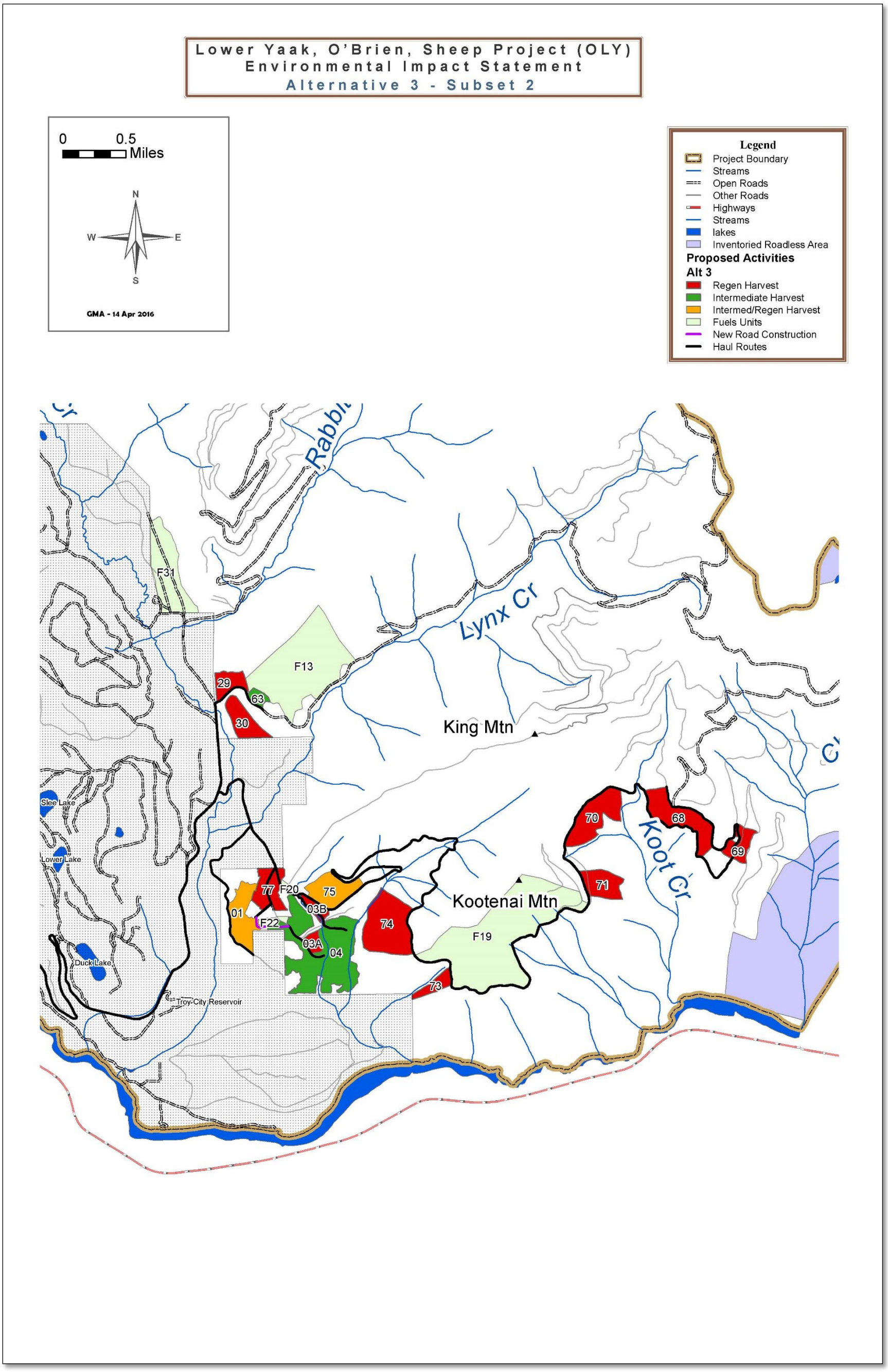
Map M-7: Harvest and Fuels Units in Alternative 3



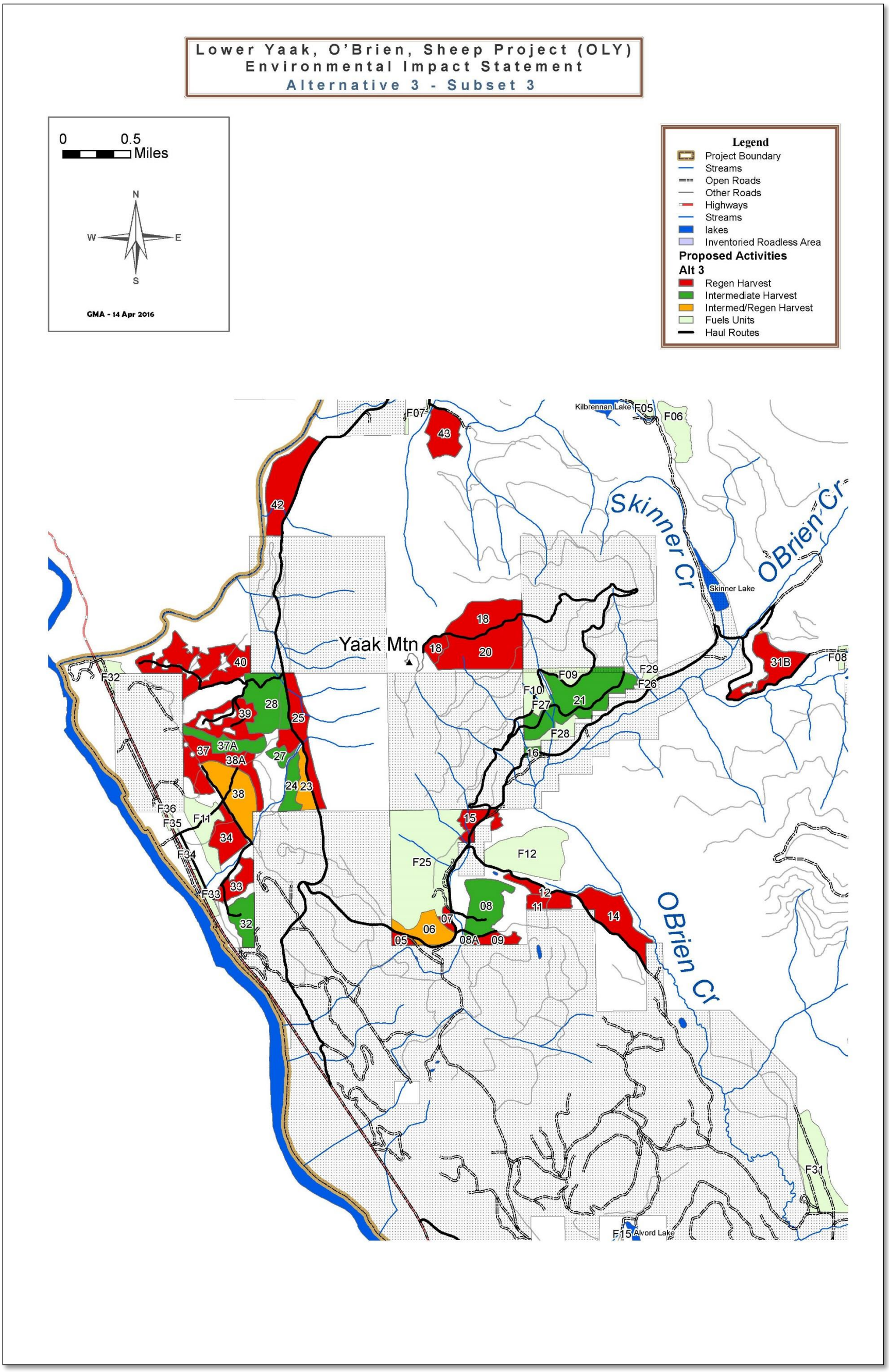
Map 7.1 Subset of Map M-7 Zoomed into Northern Units



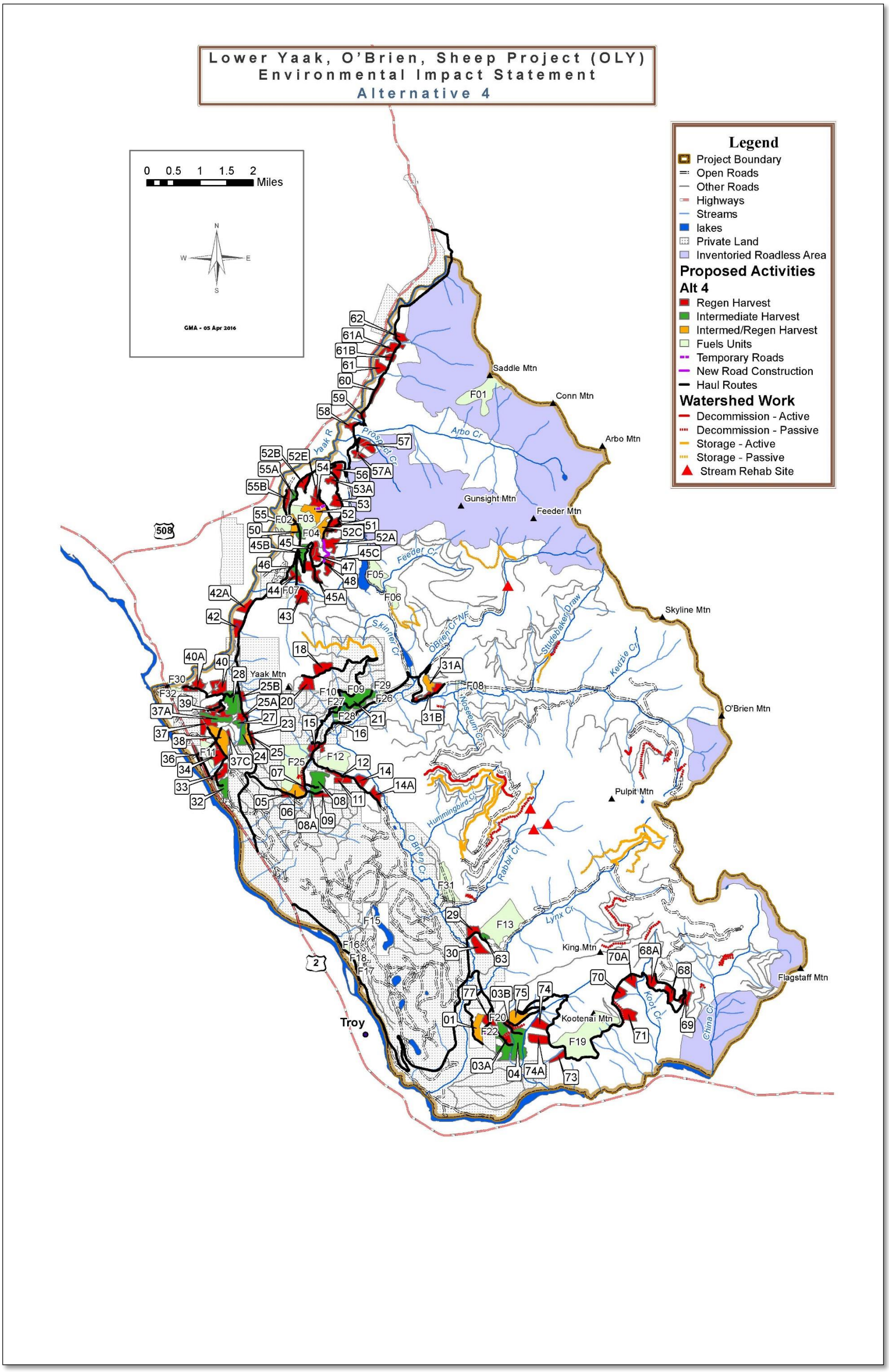
Map 7.2 Subset of Map M-7 Zoomed into Southern Units



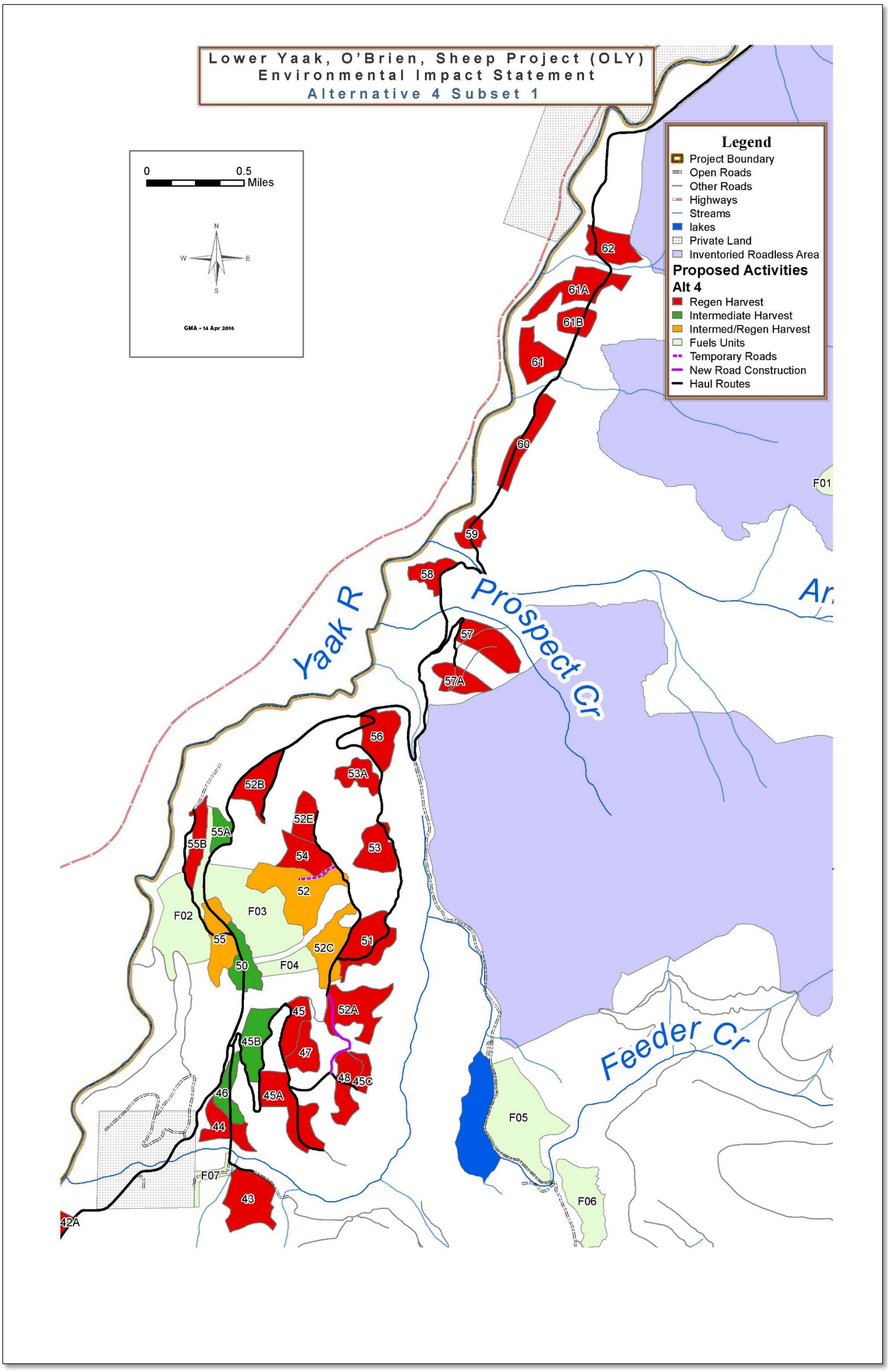
Map 7.3 Subset of Map M-7 Zoomed into Central Units



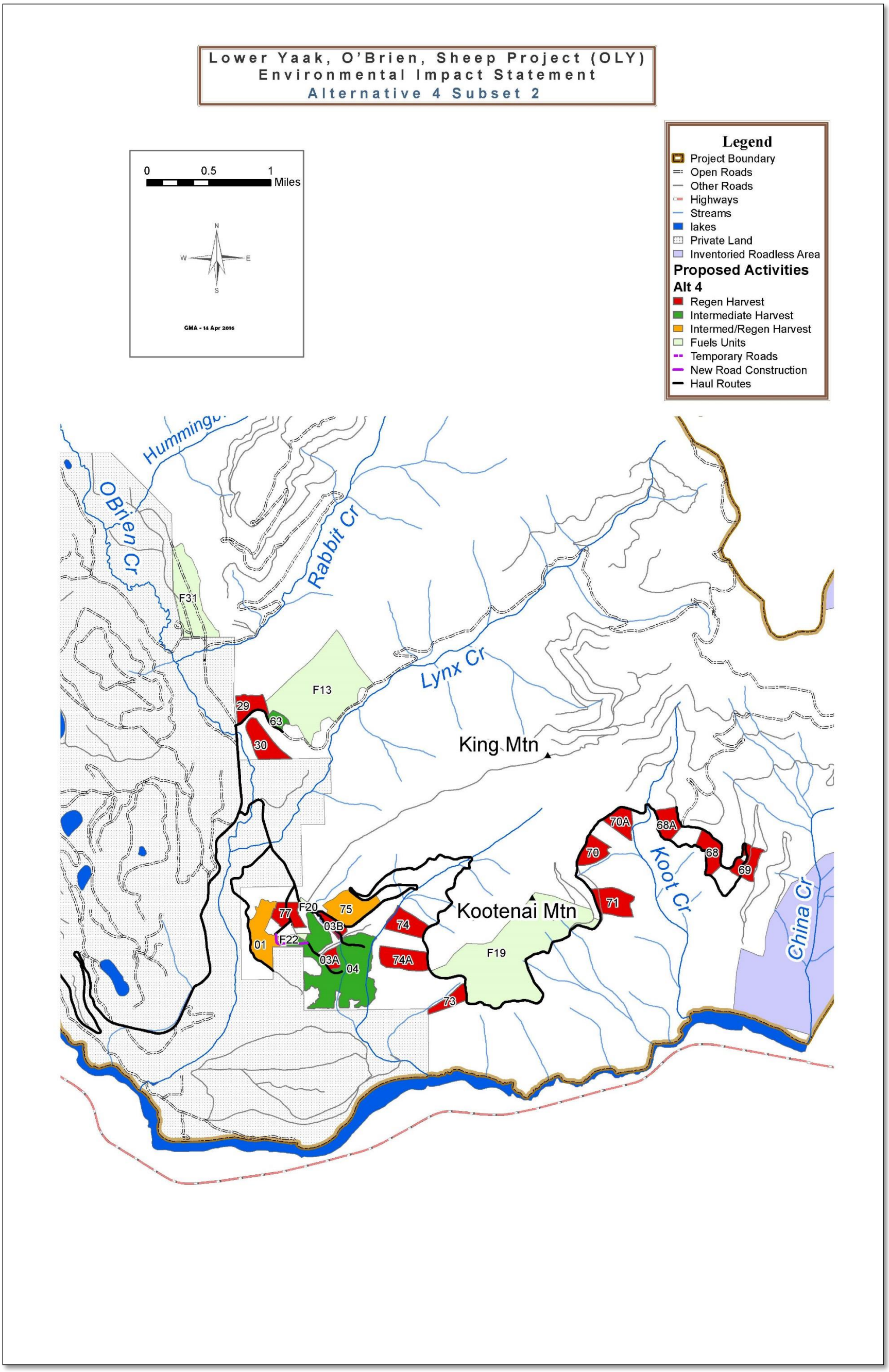
Map M-8: Harvest and Fuels Units in Alternative 4



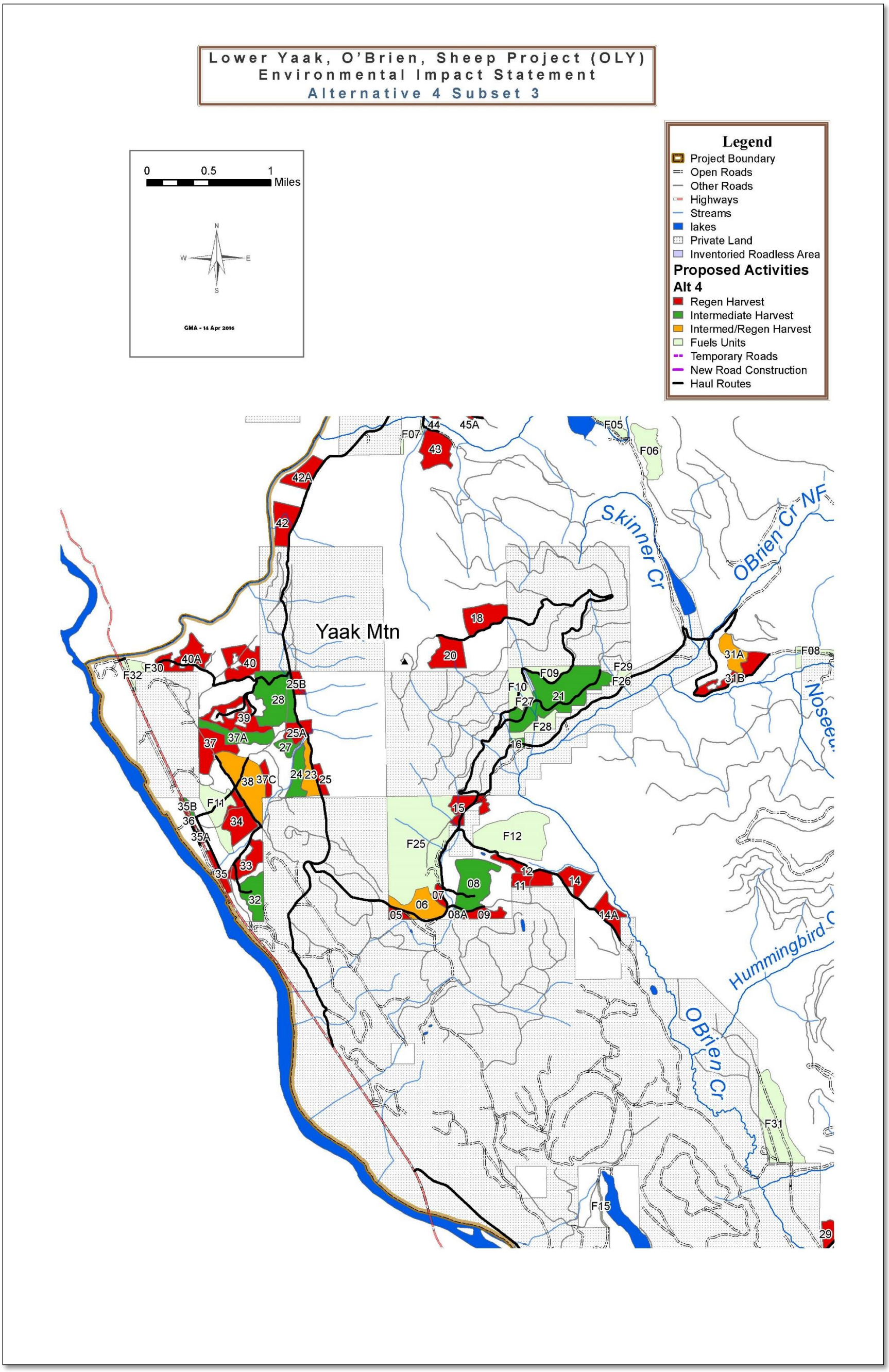
Map 8.1 Subset of Map M-8 Zoomed into Northern Units



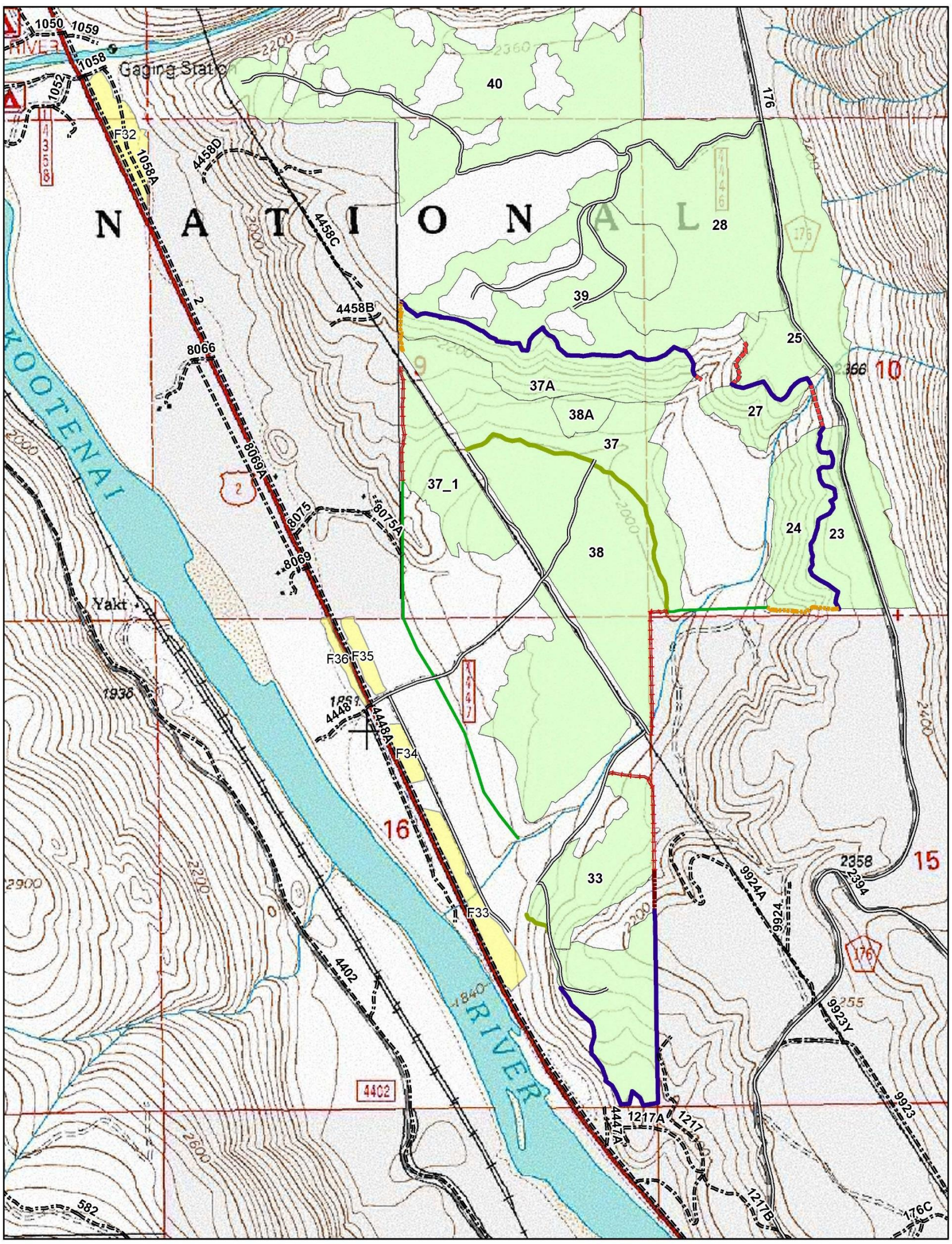
Map 8.2 Subset of Map M-8 Zoomed into Southern Units



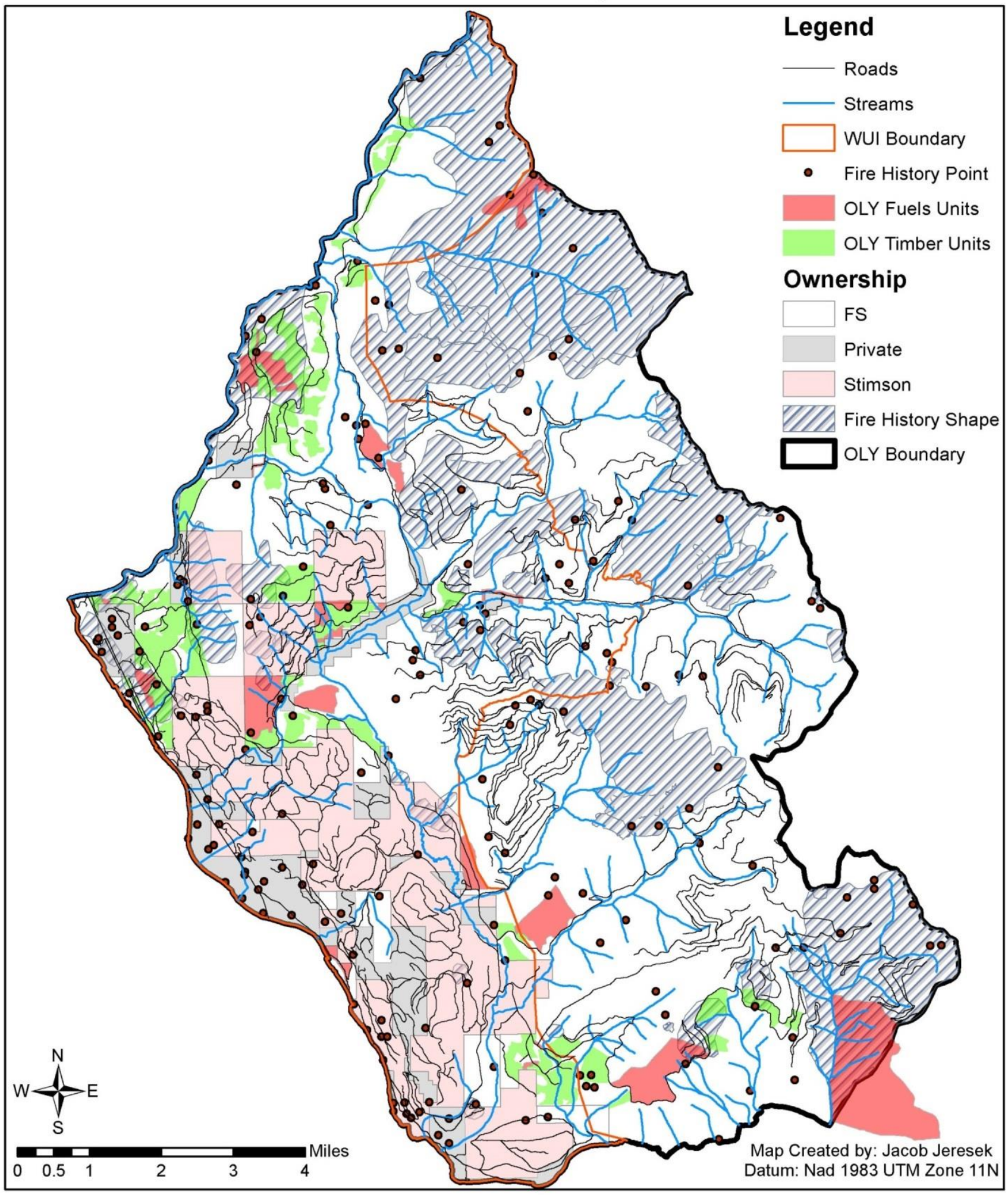
Map 8.3 Subset of Map M-8 Zoomed into Central Units



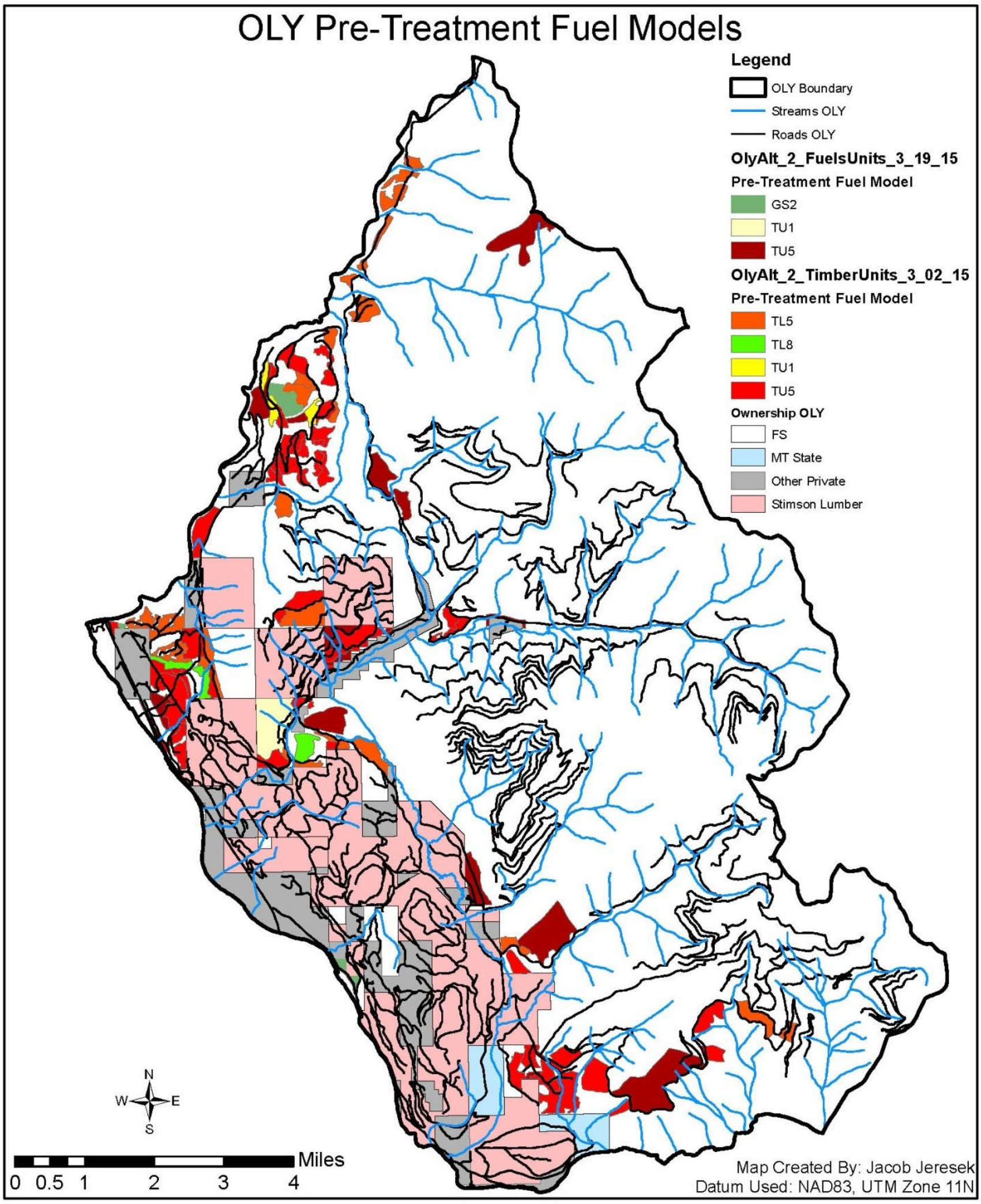
Map M-9: Fireline and Burn Area Map for Sears Flats



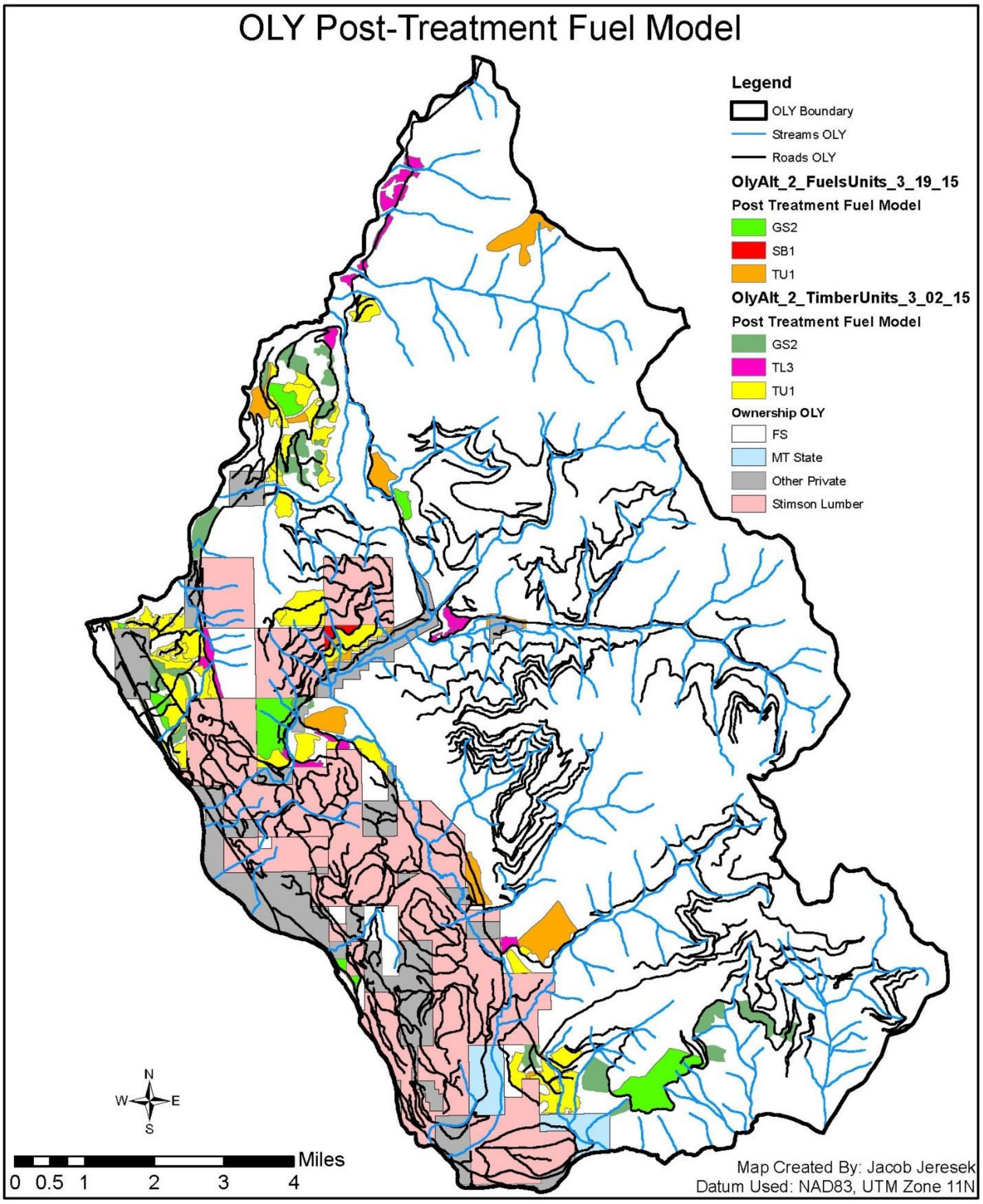
Map M-10: OLY Project Area Fire History



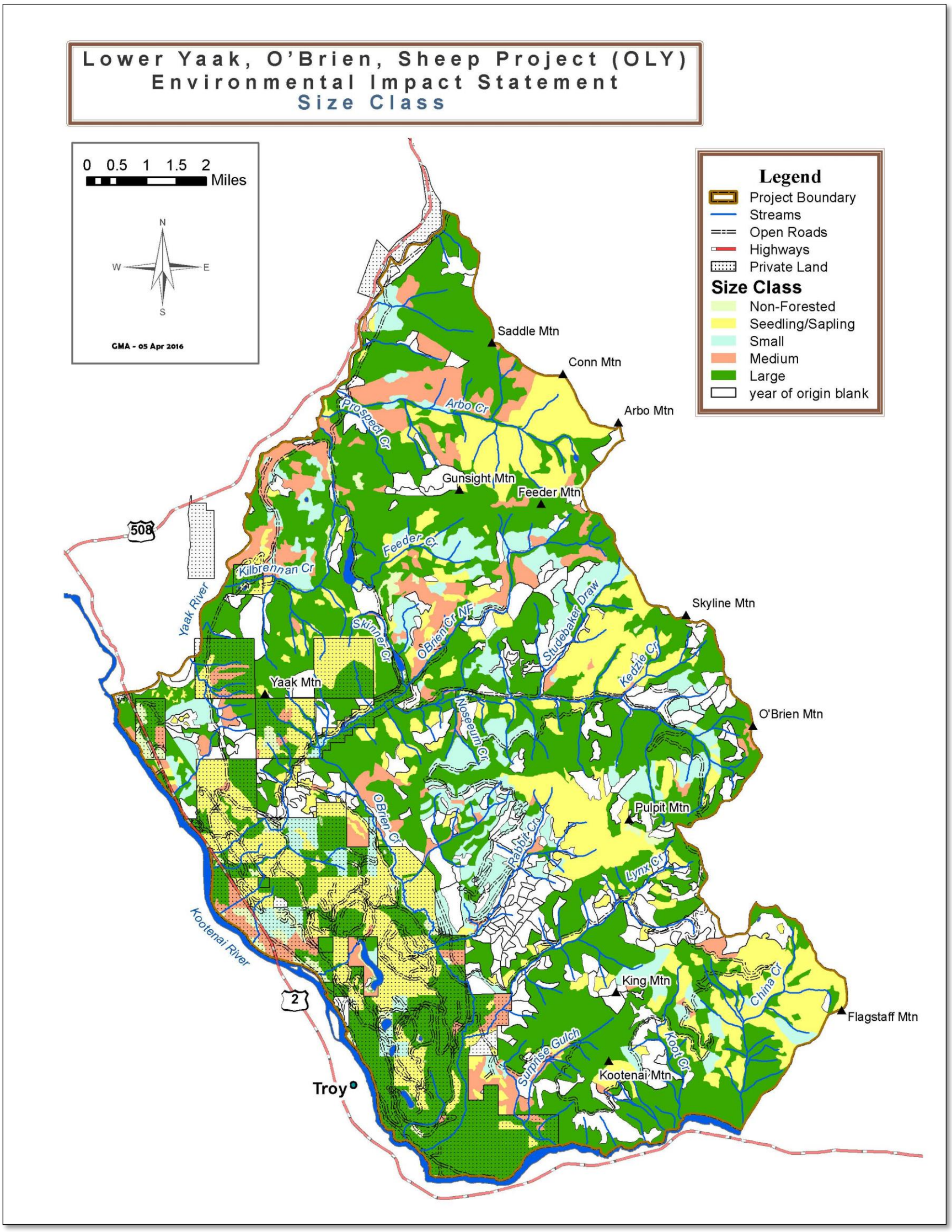
Map M-11: OLY Pre-Treatment Fuels Model Map



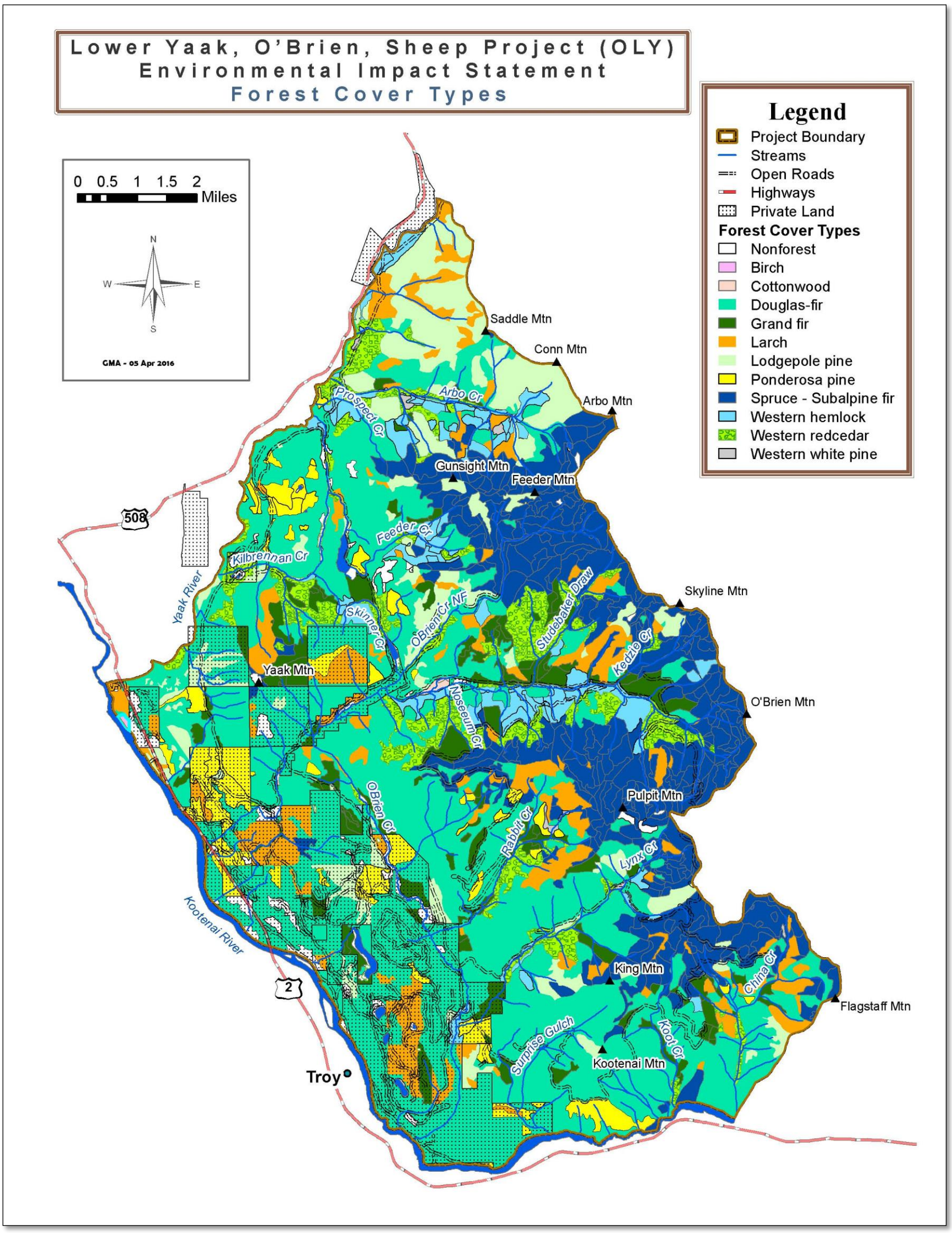
Map M-12: OLY Post-Treatment Fuels Model Map



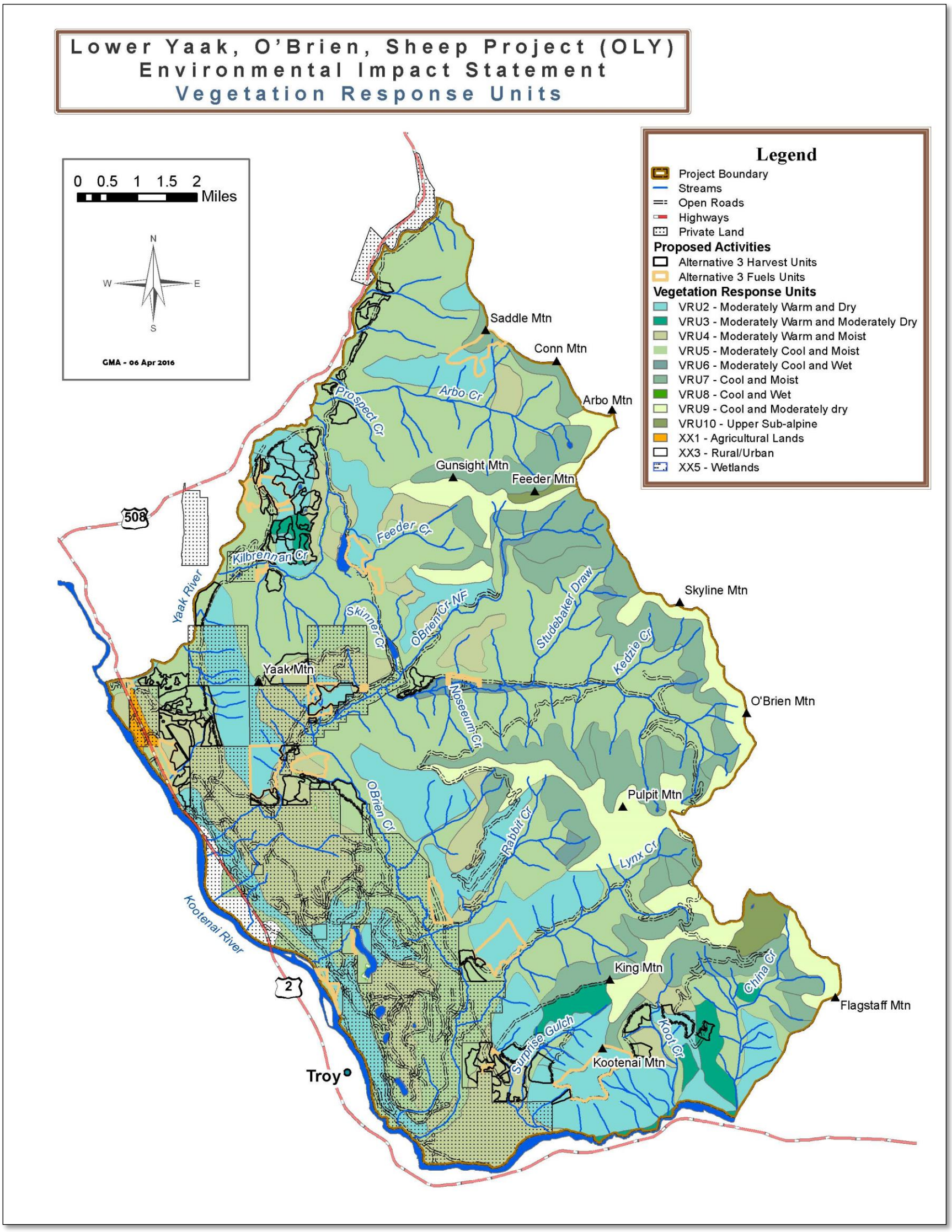
Map M-13: Vegetation Size Class



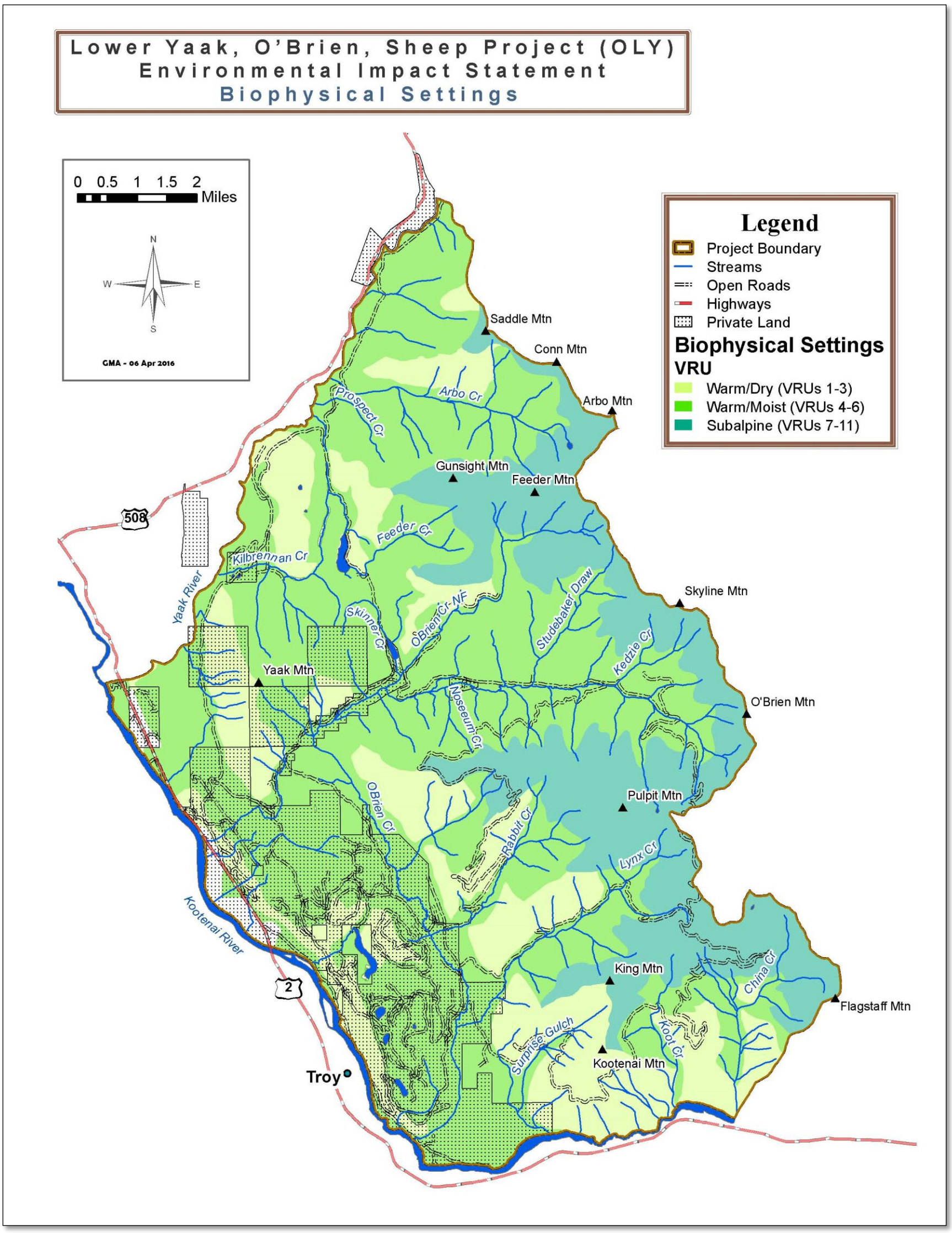
Map M-14: Forest Cover Types



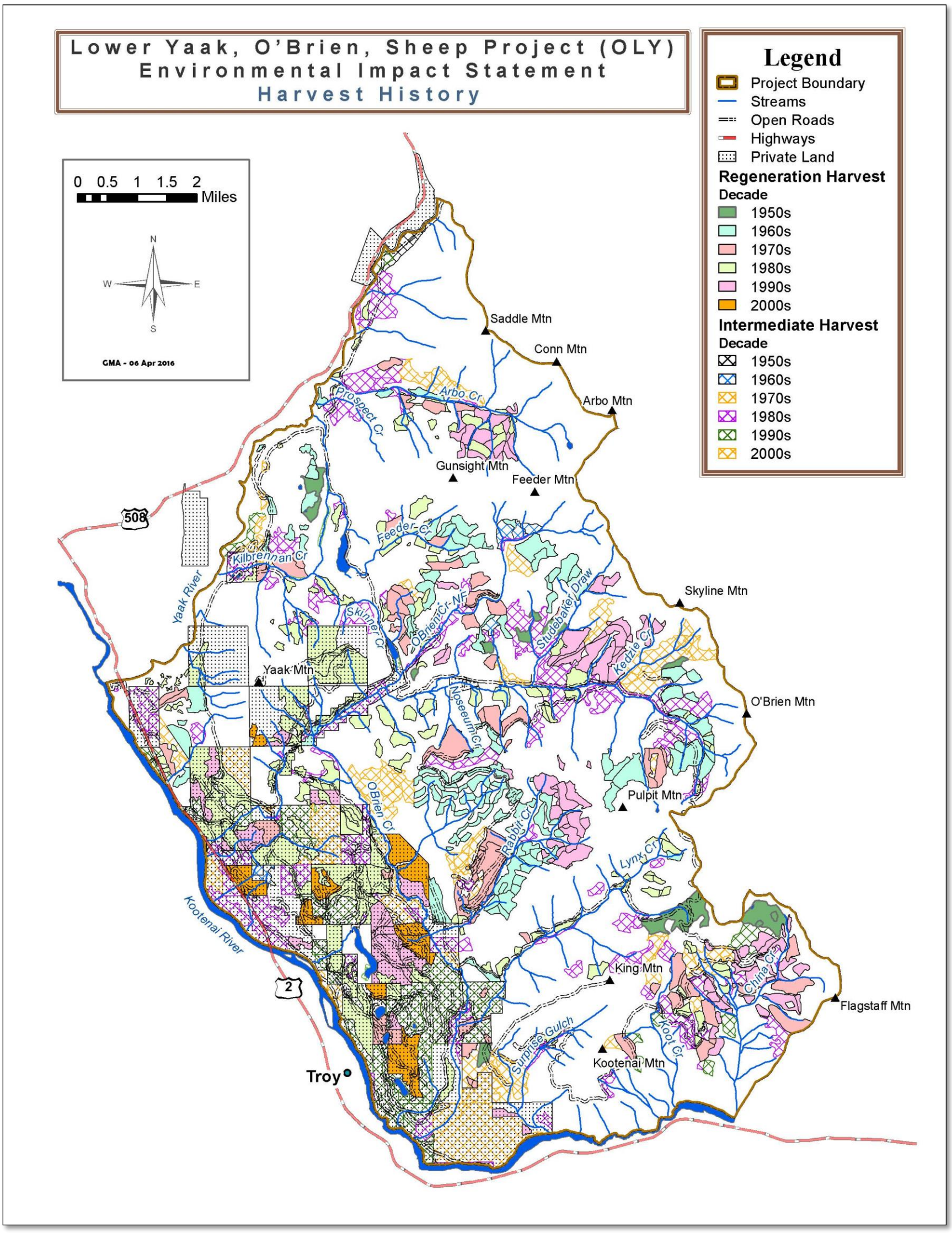
Map M-15: Vegetation Response Units



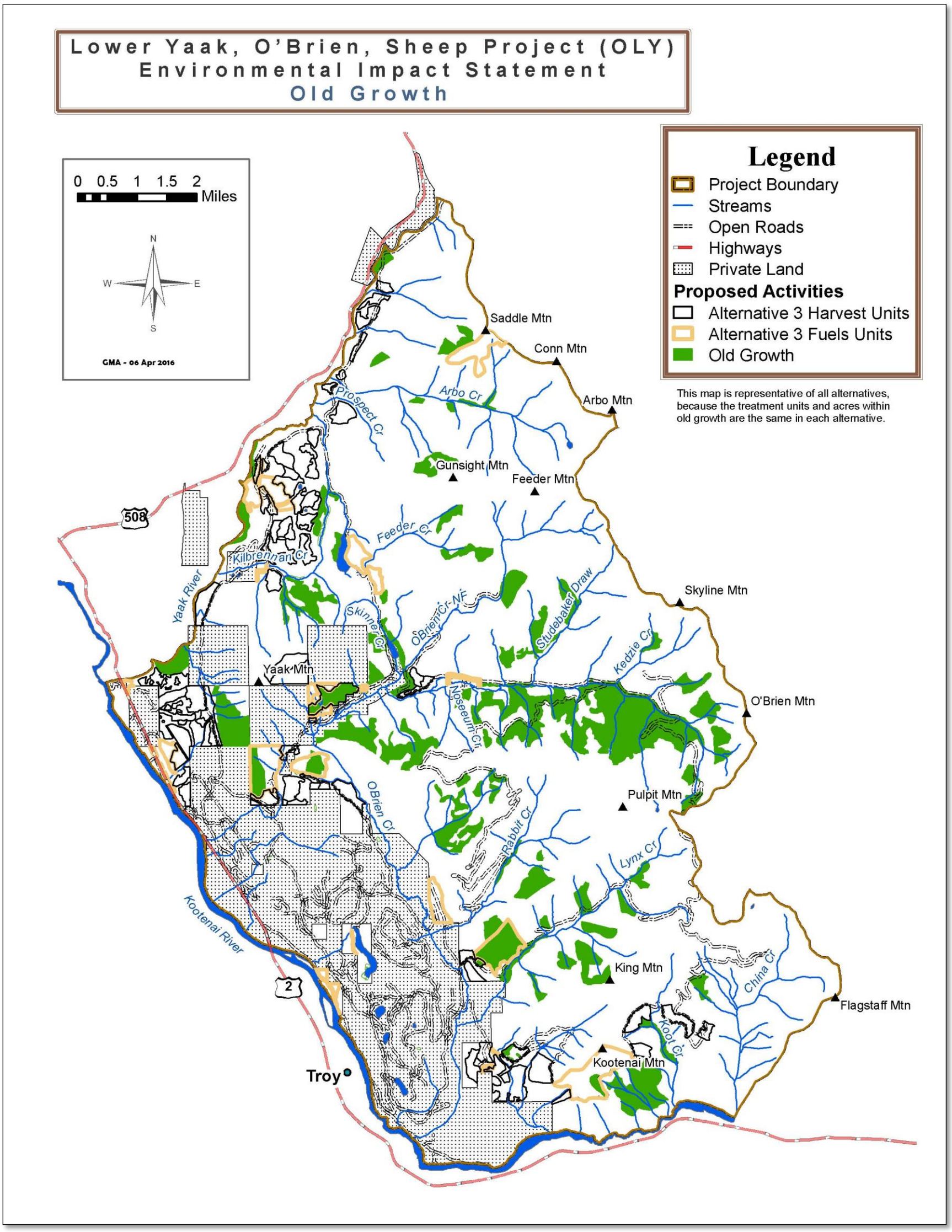
Map M-16: Biophysical Settings



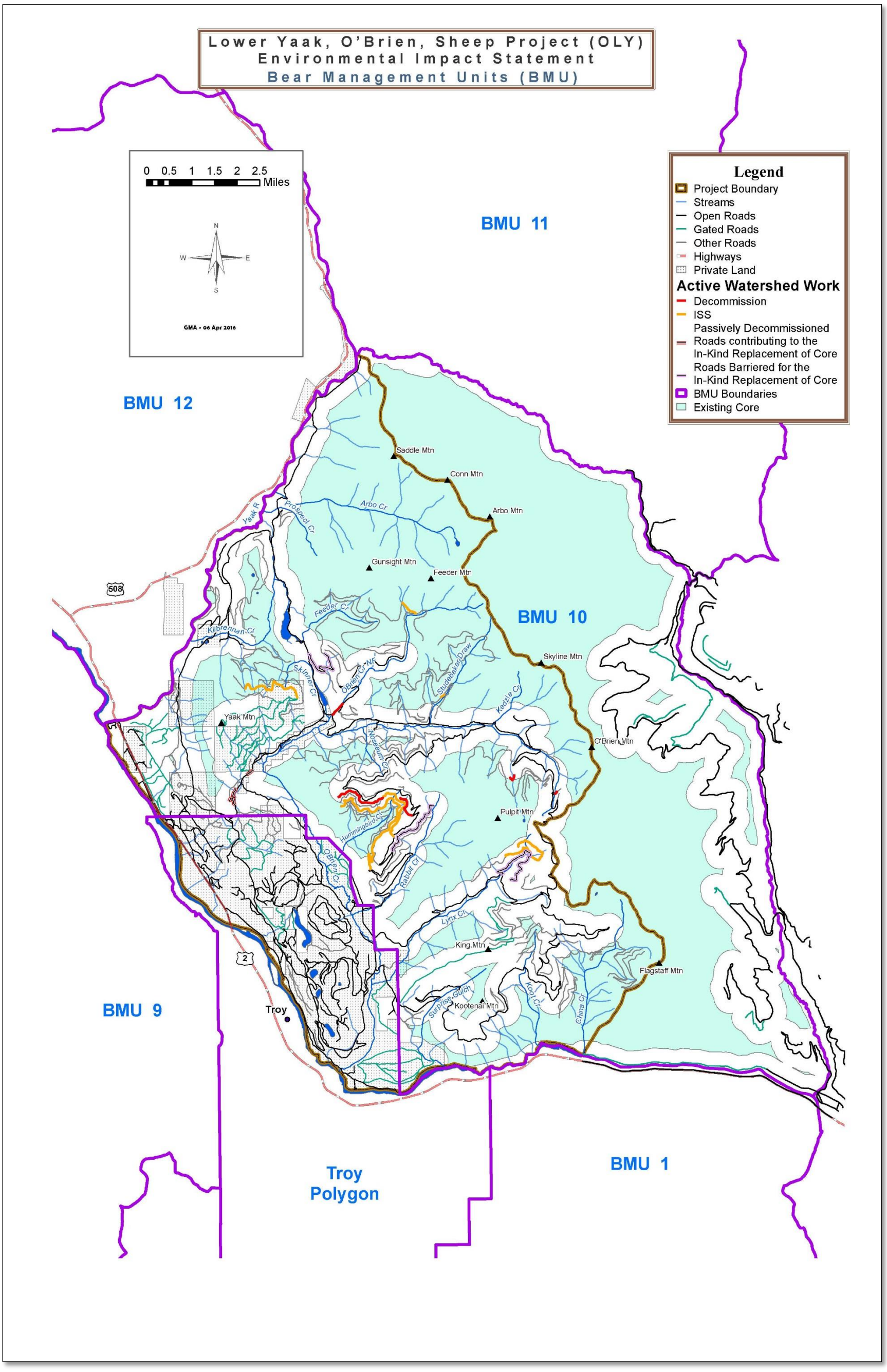
Map M-17: Harvest History



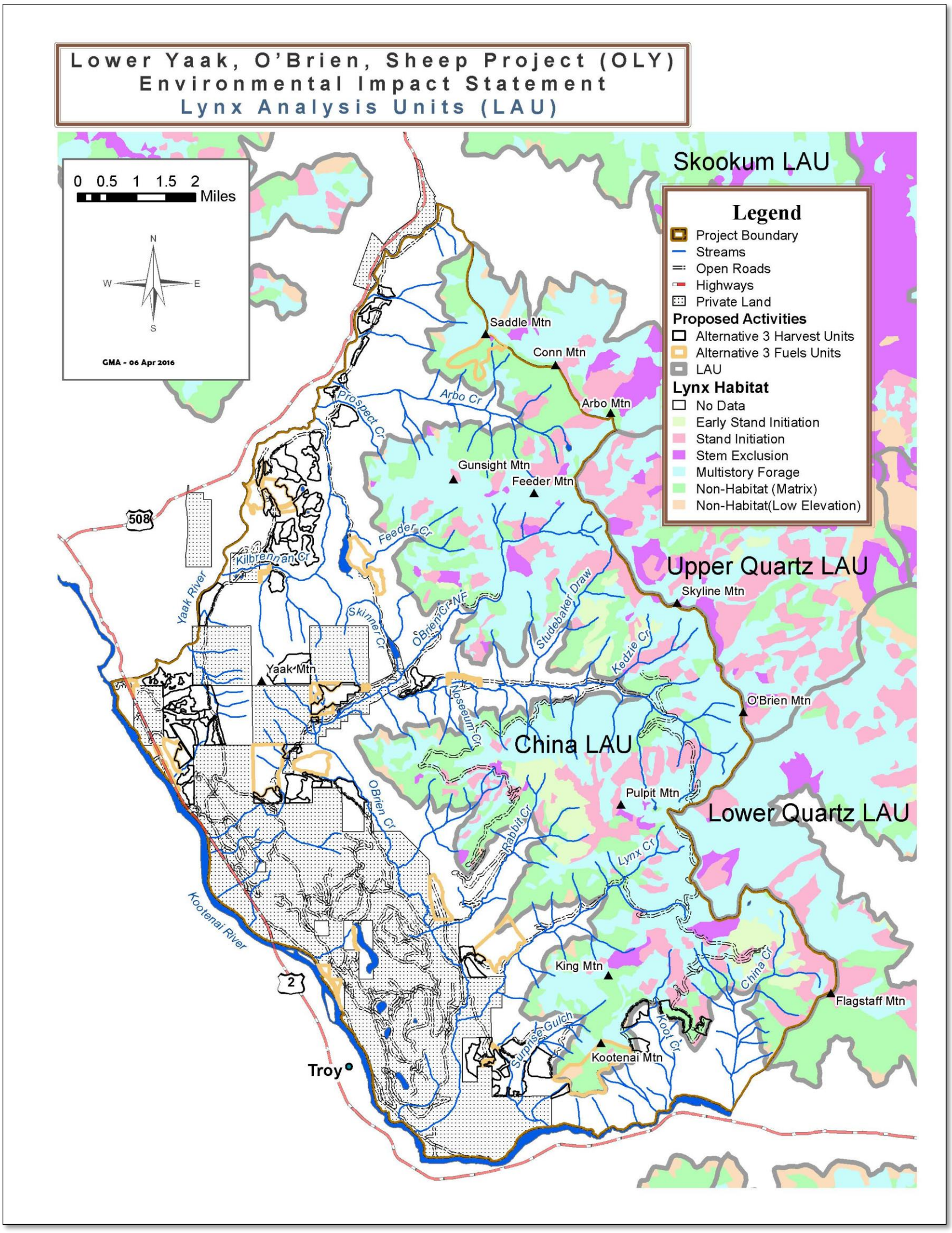
Map M-18: Old Growth



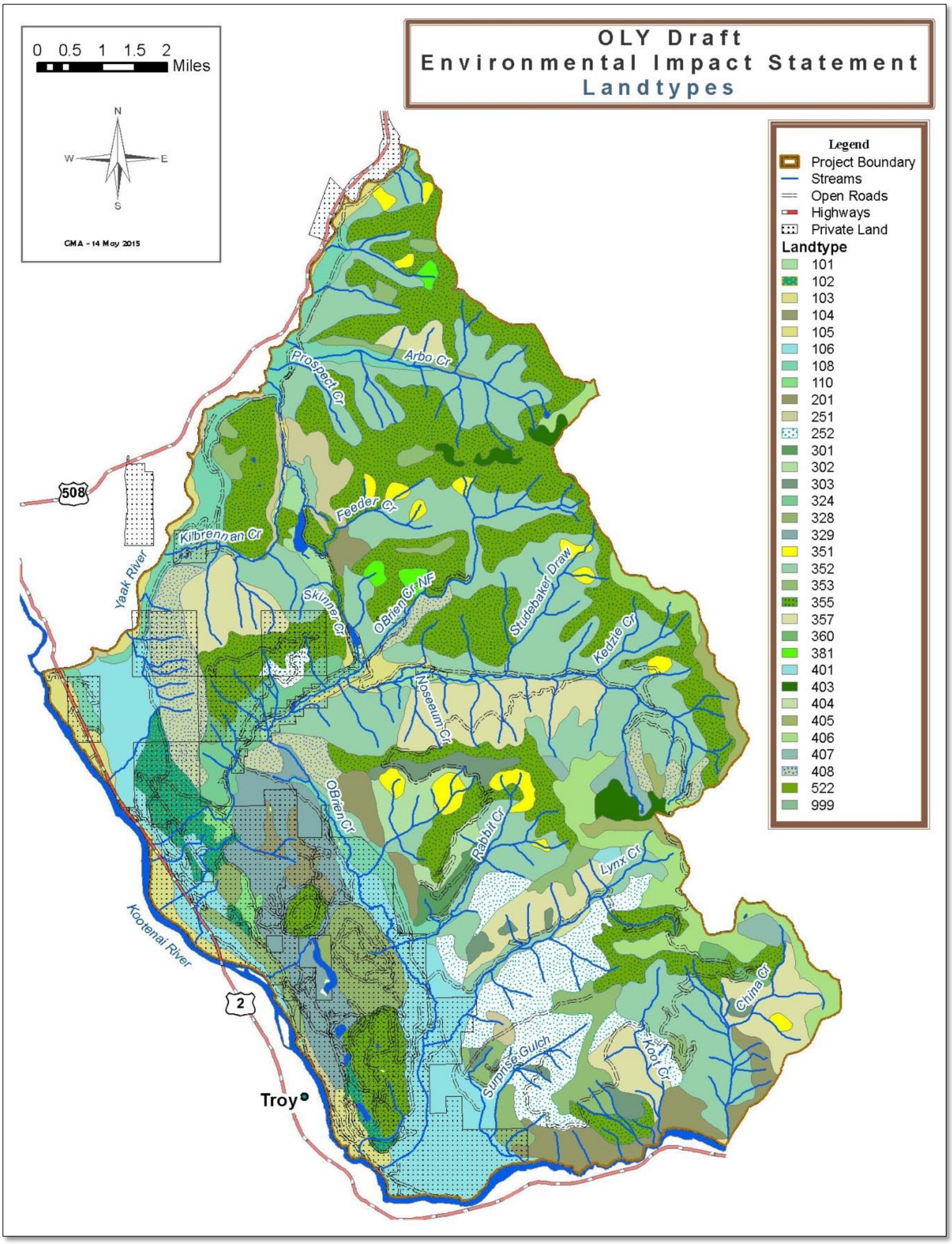
Map M-19: Bear Management Units



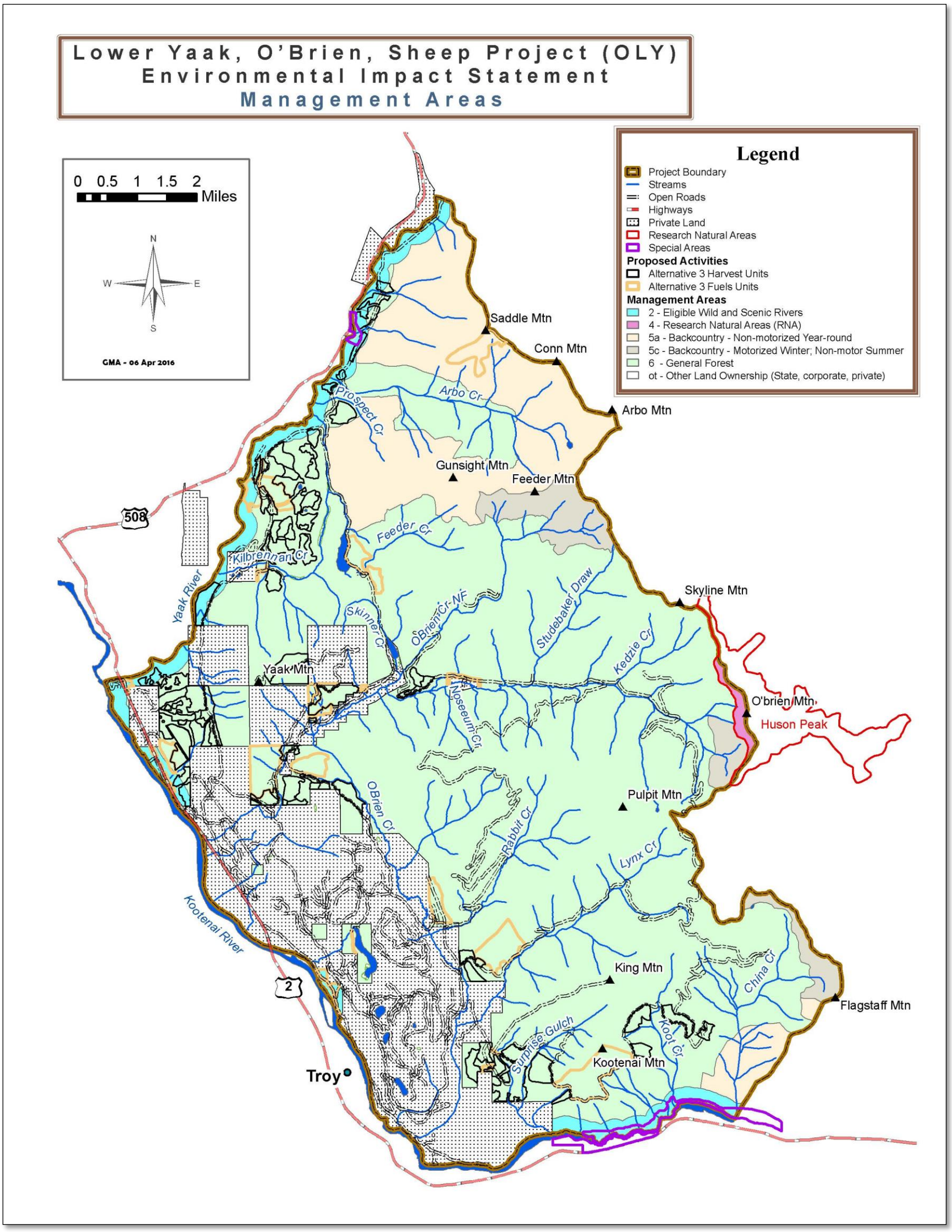
Map M-20 Lynx Analysis Units



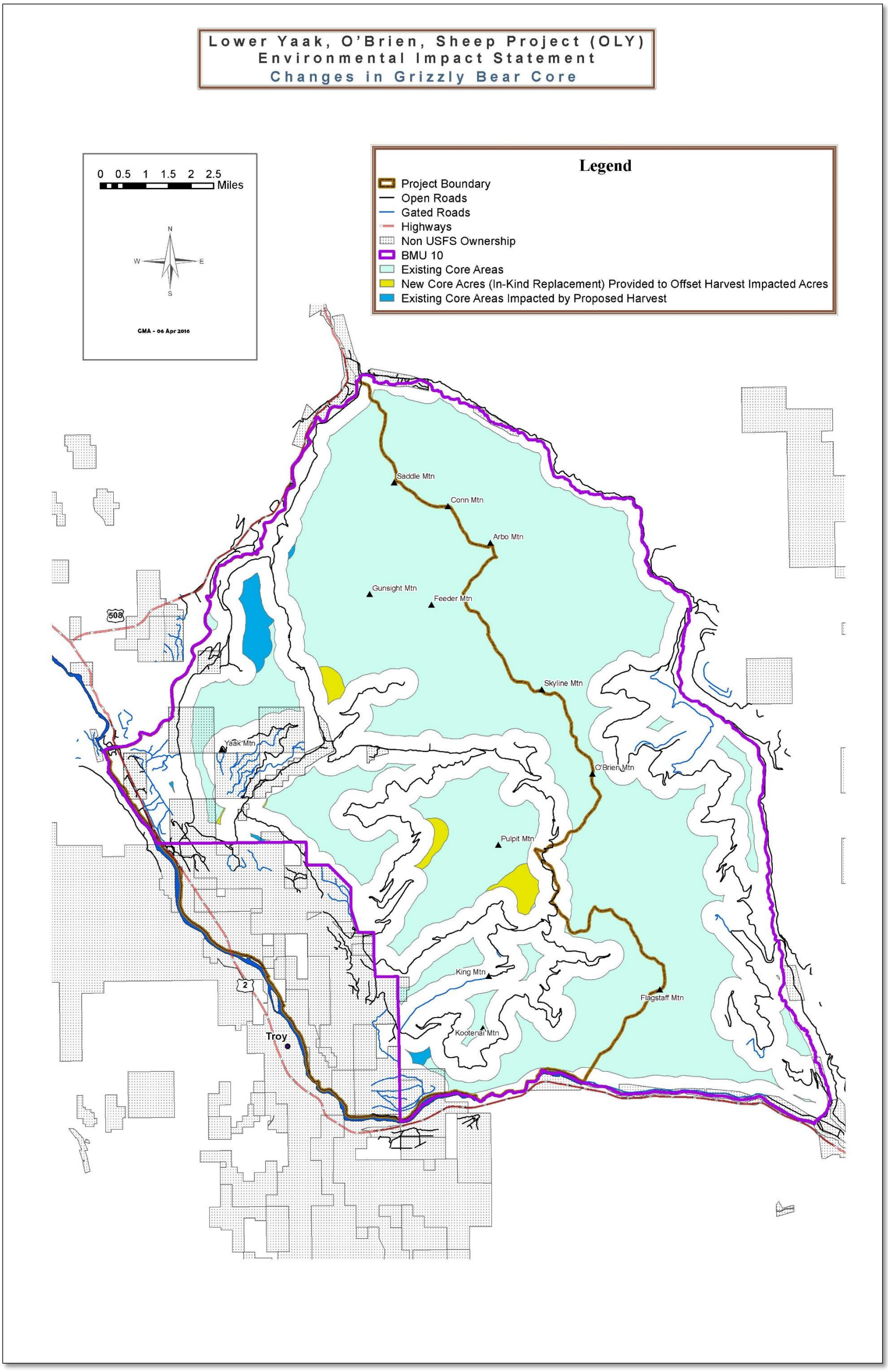
Map M-21: Landtypes in OLY Project Area



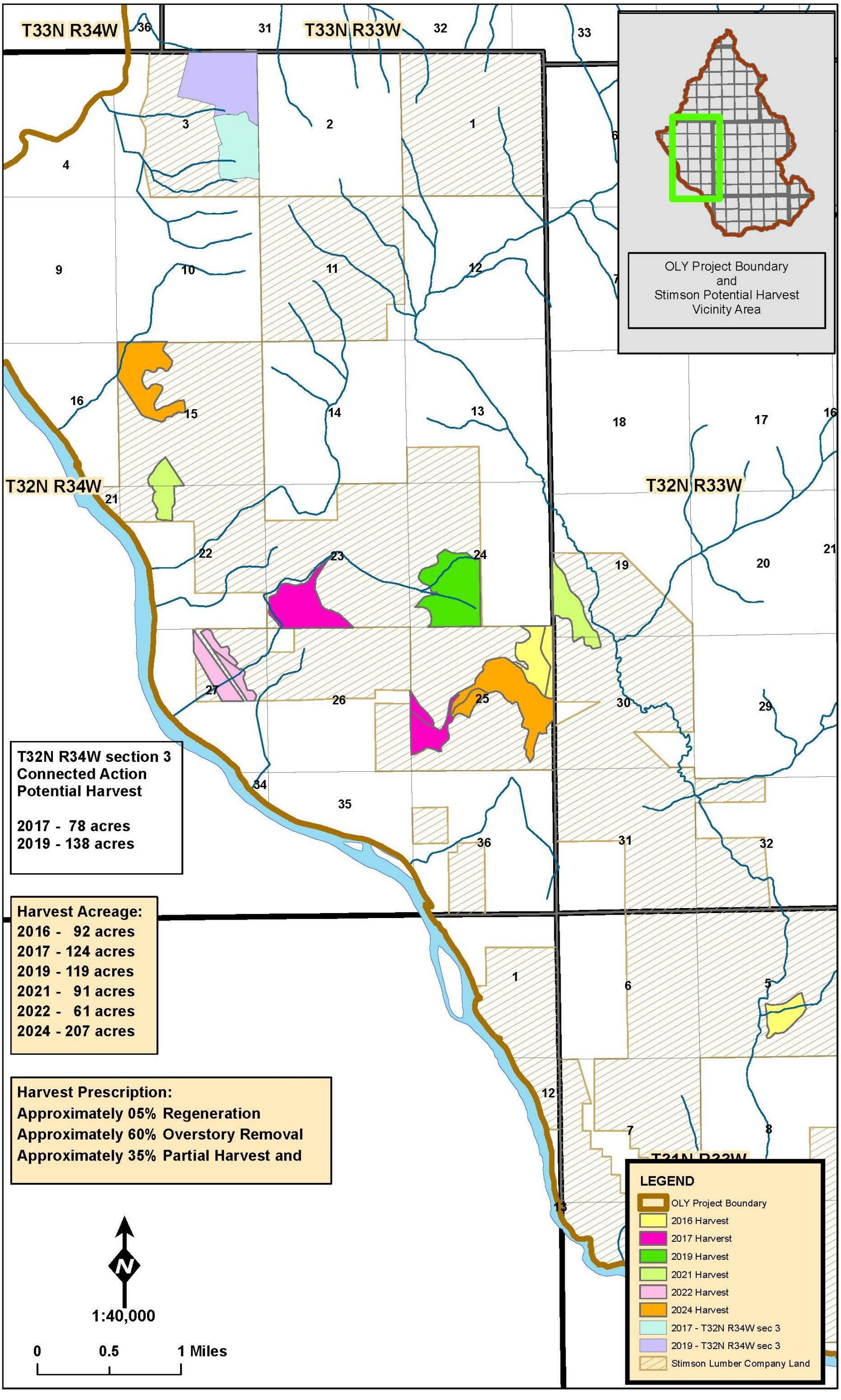
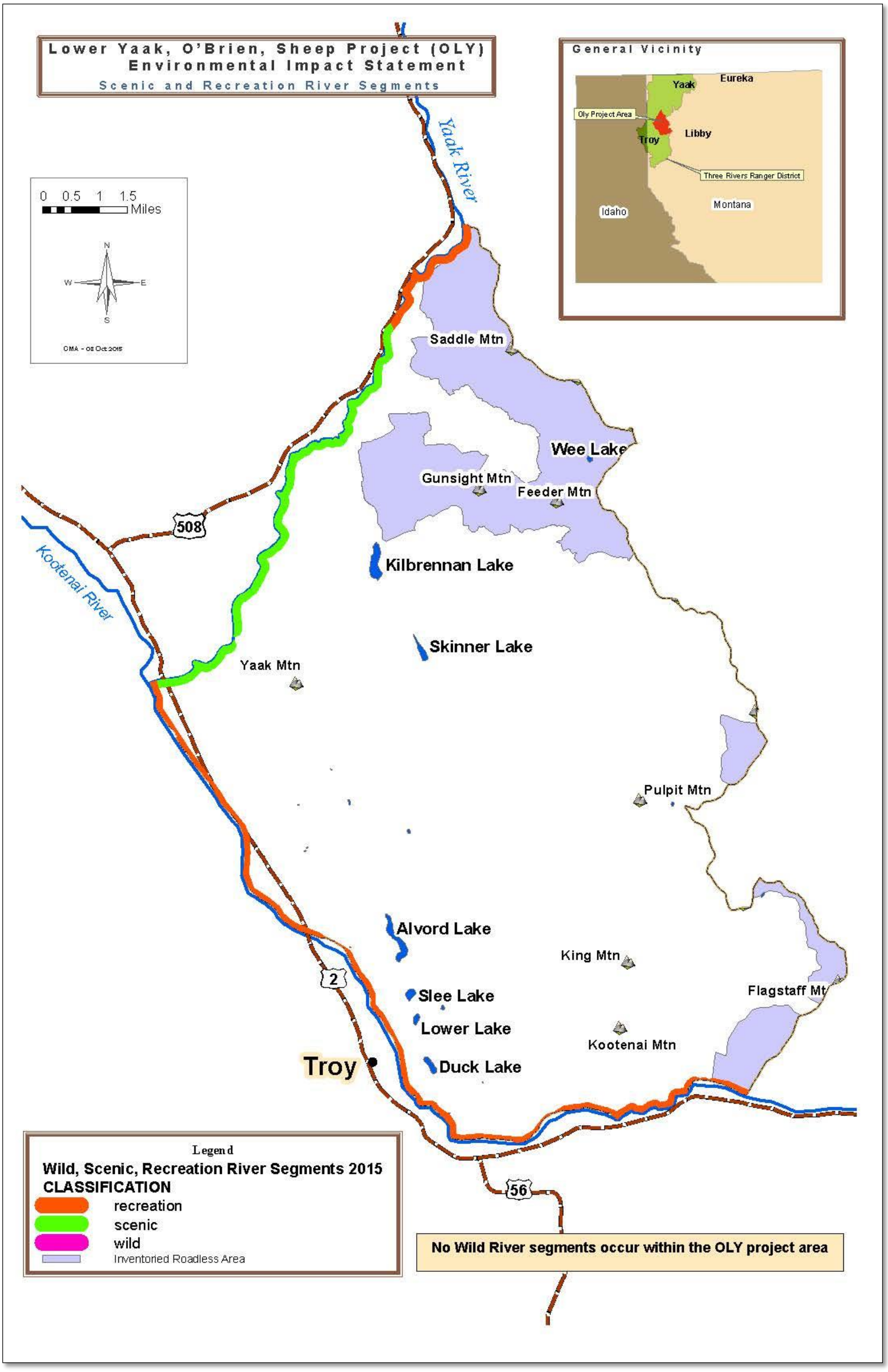
Map M-22: Management Areas



Map M-23: Core Swap



Map M-24: Stimson Lumber Company Potential Harvest



Map M-25 Scenic and Recreation River Segments