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Final Environmental Impact Statement

Galton Vegetation Management Project

Fortine Ranger District, Kootenai National Forest
Lincoln County, Montana

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Galton Vegetation Management Project
Final
Environmental Impact Statement
Lincoln County, Montana

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Abstract: The Galton Vegetation Management Final Environmental Impact Statement (FEIS)is a site-specific environmental effects analysis of management activities proposed in the Galton Vegetation Management project area. The project area is located east of US Highway 93 from the US/Canada border to south of Dickey Lake and includes a small portion of National Forest System Lands west of US Highway 93 in the Dickey Lake and Ant Flat area. The boundary for this project covers approximately 170,300 acres of which about 127,380 acres is National Forest System (NFS) land. Activities are for NFS lands only.

This project includes proposals for vegetation management through prescribed burning and harvest and road maintenance associated with those activities.Two action alternatives were developed for this project. Alternative 1 is the proposed action and Alternative 3 is a modification of the proposed action, designed to respond to public concern regarding lynx habitat. Both action alternatives contain openings over 40 acres which require approval of the Regional Forester. Alternative 2 is the no action alternative which serves as a baseline to compare effects of the alternatives.

A summary of the changes between the Draft Environmenal Impact Statement (DEIS) and the FEIS is contained following the Summary section and prior to Chapter 1.

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Summary

This project includes proposals for vegetation management through prescribed burning and harvest and road maintenance associated with those activities. The Galton project as originally scoped also contained proposals for travel management, road management and recreation. The Forest Supervisor decided to remove those activities from consideration at this time and move forward with the vegetation management portion of this project. The Ten Lakes Travel Management project addresses travel management in the Ten Lakes area.

The project area is located east of US Highway 93 from the US/Canada border to south of Dickey Lake and includes a small portion of National Forest System (NFS) lands west of US Highway 93 in the Dickey Lake and Ant Flat area.Activities are proposed only for NFS lands. Please refer to the vicinity map (MAP 1).

This area includes the Ten Lakes Wilderness Study Area (WSA), the Ten Lakes Scenic Area, Grave Creek, Therriault Lakes, Dickey Lake, Marston, and Ant Flat. The boundary for this project covers approximately 170,300 acres of which about 127,380 acres is NFS lands.Proposed activities are located on NFS lands only.

The Galton project was developed to respond to the goals and objectives of the 2015 Kootenai National Forest Land Management Plan (Forest Plan), to be in compliance with numerous laws, regulations, and

policies regarding management of National Forest System lands, and to move towardthe desired conditions, described below. The Forest Plan provides the overarching direction for management activities on the Kootenai National Forest. Forest wide management goals, as well as specific management area direction represent the desired future condition that management actions are designed to achieve.

The Proposed Action for the Galton project was scoped in June of 2009. As a result of scoping comments, and the implementation of the Forest Plan, one more action alternative was developed. Please see Chapter 2 of this document for detailed alternative information.

Alternative 1 (Proposed Action) includes:

Vegetation Management
- 359 acres of Regeneration Harvest
- 46 acres of Commercial Thinning
- 1023 acres of Intermediate Harvest
- 307 acres of Intermediate Variable Density Harvest
- 43 acres of Vista Enhancements

Fuel Treatment
- 193 acres of Understory Thinning
- 7929 acres of Ecosystem Burning
- 109 acres of Prescribed Burning with Mechanical Pre-treatment

Road Management:
- 50.4 miles of Road Maintenance to meet Best Management Practices
- 1.36miles of Temporary Road Construction

Alternative 2 (No Action) proposes No Action in the project area. It serves as a baseline for comparing the effects of implementing management actions that are proposed in the Action Alternatives. Under this alternative, management actions in the project area would be limited to the current and reasonably foreseeable actions that are included in Chapter 3.

Alternative 3 includes:

Vegetation Management
- 334 acres of Regeneration Harvest
- 97 acres of Commercial Thinning
- 1112 acres of Intermediate Harvest
- 307 acres of Intermediate Variable Density Harvest
- 835 acres of whitebark pine planting

Fuel Treatment
- 204 acres of Understory Thinning
- 1682 acres of Ecosystem Burning
- 109 acres of Prescribed Burning with Mechanical Pre-treatment

Road Management:
- 44.8miles of Road Maintenance to meet Best Management Practices
- 2.0miles of Temporary Road Construction

The Responsible Official (Decision Maker) is the Forest Supervisor of the KNF, who will decide the following:

1. Whether to harvest timber, and if so, the selection and site-specific location of appropriate timber management practices (silvicultural prescriptions, logging methods, riparian buffers, fuels treatment, reforestation and appropriate mitigation measures).
2. Whether to implement prescribed burning, and if so, where and when.
3. What, if any, project-specific monitoring requirements are needed to assure design criteria are implemented and are effective.

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 four 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 Fortine Ranger District Office in Eureka, 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 – Purpose and Need:

Chapter 2– Alternatives:

Included a Key Issues Used for Alternative Development Section

Included a Range of Alternatives section

Supplemented information regarding the reason for the development of Alternative 3

Chapter 3 – Affected Environment and Environmental Consequences:

Added theForestwideYoung Growth Vegetation Management project to Table 8 - Current and Reasonably Foreseeable Actions. This project is a forest wide effort to treat second growth stands with either precommercial or commercial thinning treatments. Stand specific treatments are not known at this time and would be developed through criteria contained in the ForestwideYoung Growth Vegetation Management. It is assumed that stands identified in the Galton project area would be treated over a 10 to 15 year period which would average 400 to 600 acres annually.

Effects disclosures regarding climate change were added to each resource area.

Change in wording for coarse woody debris in Vegetation section for clarification

Change in wording for Forest Vegetation for FW-DC-VEG-08

The status of wolverine was changed from a sensitive species to a federally proposed species between the release of the DEIS and the FEIS. This change is reflected in the Wildlife section.Wolverine now appears in the Threatened, Endangered, and Proposed Species section of Chapter 3.

Added effects disclosures for Forestwide Young Growth Vegetation Management Project

Enhanced Map 15 – Fire History to reflect a greater range of known information for past decades fire activity

Corrected title on Map 16- Landtypes. Map 16 in the DEIS was incorrectly labeled as VRU

Literature Cited Changes:

Added several references that were used during the analysis process or presented in comments and utilized in the analysis.

Chapter 1. Purpose of and Need for Action

Introduction

The Forest Service has prepared this environmental impact statement in compliance with the National Environmental Policy Act (NEPA) and other relevant Federal and State laws and regulations. This environmental impact statement discloses the direct, indirect, and cumulative environmental impacts that would result from the proposed action and alternatives.

Additional documentation, including more detailed analyses of project area resources, may be found in the project planning record located at the Eureka Ranger Station, 949 Highway 93N, Eureka, MT 59917.

The Galton Final Environmental Impact Statement (FEIS) is a site-specific environmental effects analysis of management activities proposed on National Forest System lands within the Galton project area (project area).

Timber harvest and associated activities have occurred for many decades and continue to be an important tool for forest management. The actions contained in the FEIS reflect the need to manage a safe, efficient, and environmentally compatible road system, ensure sustainability of the land for use by present and future generations, and provide economic benefits.

Background

The Galton project was developed to respond to the goals and objectives of the Forest Plan, to comply with numerous laws, regulations, and policies regarding management of National Forest System lands, and to move towards the desired conditions, described below. The Forest Plan provides the overarching direction for management activities on the Kootenai National Forest. Forest wide management goals, as well as specific management area (MA) direction represent the desired condition that management actions are designed to achieve. Please see Chapter 3 for MA descriptions.

The Galton Interdisciplinary Team (ID Team) conducted initialreconnaissance of the project area in 2008. The ID Team utilized an ecosystem approach where physical, biological, and social factors were considered, both on a landscape and stand-level basis. Those resources were: Human Uses (transportation system, recreation, public access, scenic resources, cultural resources, range, minerals, and economics); Aquatic Resources (hydrology and fisheries); and Terrestrial Resources (geology and soils, vegetation, fire and fuels management, air quality, and wildlife). Since 2008, specialists have returned to further assess conditionsin the project area. They have found no significant changes in the project area.

In 2015, the Forest Supervisor decided to separate the vegetation management portions of the Galton project from other proposals in the Proposed Action. The Ten Lakes Travel Management project was re-scoped in April 2015 to address the travel management aspects of the original Galton Project.

The factors were addressed in terms of the existing condition, reference condition, and desired condition. The existing condition describes the current condition of the resources in the project area, and was drawn from database information and field reviews. The reference condition is the range of conditions that would be expected to occur in a particular forest type when ecological processes are functioning properly. They are expressed as a range because of the dynamic nature of ecological systems. Reference conditions are assumed to be ecologically sustainable.

Reference conditions for social factors were addressed in terms of identified public needs/desires and opportunities within the project area.

The desired condition considers ecological processes, as well as social needs and desires. Included in this determination was the identification of opportunities for moving resources toward their desired conditions, as identified in the Forest Plan and other documents, including the Lincoln County Montana – Community Wildfire Protection Plan (2005); The Northern Region Overview (USDA Forest Service 1998); and the National Fire Plan (2001). These opportunities formed the basis for the Proposed Action and its alternatives, which are analyzed in this FEIS.

During the summer of 2015, a portion of the project area experienced a wildfire. Map 2 shows the Marston Fire area. Several units (20, 85, 86, 87, 89, 90, 91) that were located within the fire area were removed from consideration from all alternatives.

Purpose and Need for Action

Some resources in the project areaare exhibiting conditions and trends that deviate from the reference conditions identified during the ecosystem assessment. In some cases, these are affecting forest health (diversity and productivity), and are having social consequences. These conditions and consequences will be addressed in detail in Chapter 3.

Desired Condition for the Galton Vegetation project area

The desired condition for vegetation throughout the project areais to have forests in a condition that have the capacity for renewal and recovery from disturbance. Forests in this condition are healthy, diverse and productive. This includes healthy stand conditions, adequate seed sources and productive soils. There is a desire for a variety of forest types in various age classes. This means there would be both an adequate percentage of young stands as well as some old growth habitats and a mixture of intermediate and mature forest types. The majority of stands would have healthy, vigorously growing trees, but some areas would still provide dense hiding cover and security habitat for a variety of wildlife species. The presence of endemic insect and disease levels would be part of the environment. The desired arrangement of these stands would modify wildland fire behavior by keeping fire on the ground, allowing for direct-attack fire suppression on a typical burn day, especially in the wildland urban interface. Forests in this condition provide recreational opportunities, attract visitors and tourists, and help provide an economic benefit to local communities.

The ID Team identified specific actions that could be taken in those situations where existing conditions either are not meeting desired conditions or are not moving toward desired conditions. Collectively these items form the Purpose and Need for Action, which would help move the area toward the desired conditions described in the Northern Region Overview and the Forest Plan.

Healthy, Diverse, and Productive Ecosystems

Existing Condition

Forests in the Galton project area are very diverse. Elevations range from less than 2700 feet to over 7800 feet. Much of this elevation change occurs quickly as the forests transition from valley bottom to mountain summit in a relatively short distance. Vegetation ranges from dry Douglas-fir/ponderosa pine forests to high elevation whitebark pine.

The Galton project area is a fire dependent ecosystem. Fire is needed to maintain many of the natural and ecological processes in the area. History records in similar vegetation types show that fire probably returned to the area every 5-50 years in the lower elevations and on the south

and west slopes and every 50-350 years in the higher elevations and the north and east facing slopes. Fire allows certain tree and browse species to regenerate as well as reducing surface and ladder fuels and reducing stand stocking, usually leaving the larger diameter trees and more fire resistant species. Frequent low intensity fires can increase the resilience of forests to severe fires by reducing continuous fuel beds and be instrumental in keeping wildland fires smaller and less intense. Insects, disease, windthrow and human activities such as timber harvest have also played a substantial role in shaping the forested environment.

Catastrophic fires in the early 1900s resulted in the public and land management agencies embracing total fire suppression policies. As a result, for the last 100 years we have been very successful at suppressing most fires in the Galton project area. The implication of these suppression actions on the vegetation resource include: increased competition between trees, reduction in overall stand vigor, increased susceptibility to stress-induced mortality from insect and disease infestation, an increased risk for stand replacement fire, and an overall decrease in the levels of desired seral species such as ponderosa pine, western larch, western white pine, and whitebark pine.

Fire suppression efforts have reduced the creation of openings that can provide forage for wildlife including deer, elk, moose and bears. This is especially evident in the higher elevations that provide summer range for these species. Less than 5% of the current mule deer habitat is in openings. In addition, existing openings on south and west facing slopes that provide winter forage, are in need of fire to rejuvenate the brush species that provide browse for big game and to decrease the encroaching trees.

Whitebark pine cones can provide an important food source for red squirrels, Clark's nutcrackers and bears where available. Promoting the regeneration of this tree would benefit these wildlife species. Reproduction of whitebark pine is typically poor, due to harsh site conditions, sporadic seed production, low germination rates, and consumption of viable seed by wildlife. Fire appears to increase reproductive success.

Decades of effective fire suppression have decreased the role that fire plays in the forest and increased the role of insects and diseases. Recent aerial forest health surveys conducted in the area show that Douglas-fir beetle has been active in the lower elevation, Douglas-fir dominated portions of the area. Douglas-fir beetle populations appear to be trending downward at this time but still play a role in the lower elevations, normally attacking the oldest, largest Douglas-fir trees in a stand.

Western balsam bark beetles have been active in the mid to upper elevation areas. This insect tends to kill subalpine fir in groups or pockets. Evidence of this insect's activity can be seen from higher elevation roads and lookout points in the area.

Mountain pine beetles were very active in the lodgepole pine stands through the last couple of decades. Heavy infestations in the 1980s and 1990s dramatically changed stands that were dominated by lodgepole pine. Examples of this activity are very evident in the Gibralter Ridge area and the Ksanka face area, visible from Eureka. This mortality has led to very heavy fuel loading due to downed trees. Mountain pine beetle activity is currently limited in the lodgepole pine stands but the whitebark pine stands have seen more activity in recent years.

Root diseases are present in the forests of the Galton project area. These diseases tend to change forests slowly as they typically have a slow rate of spread. Over time, diseases can have substantial effects on forested stands by changing the species composition, size classes, and overall vigor of the area.

White pine blister rust is anexotic disease in the area. This disease attacks and kills western white pine as well as whitebark pine. Whitebark pine is the most susceptible species to white

pine blister rust. This disease, along with the mountain pine beetle, has caused dramatic changes in the upper elevation whitebark pine stands.

The Northern Region Overview identified the whitebark pine forest type as “at risk” due to the effects of mountain pine beetle activity, white pine blister rust, and successional replacement by spruce-fir. Currently, many of the stands in the cool/dry forest types are older aged and in late seral stage conditions. In areas where whitebark pine mortality is high, a shift toward early seral stage with primarily subalpine fir has occurred.

RelevantGoals, Desired Conditions, and Objectives from the Forest Plan

The Forest Plan includes a goal for vegetation (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.” That goal is applicable to this project, along with the following Forest Plan desired conditions and objectives.

Drier Vegetative Response Units have stands with reduced tree densities to increase stand vigor, make forests more resilient to disturbance, and to reduce the risk of stand replacement fires, especially within the WUI. (FW-DC-VEG-04 and FW-DC-VEG-11)

Wildlife habitat components, such as browse, have been improved. (FW-DC-VEG-01, FW-DC-VEG-02, FW-DC-VEG-04, FW-DC-VEG-05and FW-DC-VEG-11)

Fire is being used to emulate its natural ecological role. (FW-DC-FIRE-02 and FW-DC-FIRE-03)

Forests are in a condition that they have the capacity for renewal and recovery (resilience) from disturbances (e.g. healthy stand conditions, adequate seed sources, and productive soils) (FW-OBJ-VEG-01)

A variety of successional stages are spread across the landscape to provide a range of habitats as well as increasing the potential to influence fire behavior. (FW-DC-VEG-02, FW-DC-VEG-03, FW-DC-VEG-04, FW-DC-VEG-05)

Purpose and Need for Action:

- *Fuels within the WUI need to be managed to reduce the risk of stand-replacement fires and the associated risk to private property values. Reducing those current risks through prescribed fire and other vegetation treatments may facilitate future use of unplanned ignitions for resource benefits.(FW-DC-FIRE-01, FW-DC-FIRE-02, and FW-DC-FIRE-03)*

- *There is a need to create openings to provide browse for big game, especially in mule deer habitat.(FW-DC-VEG-05 and FW-DC-WL-16)*

- *There is a need to reduce sub-alpine fir encroachment within whitebark pine stands and also create areas of early successional forest.(FW-DC-VEG-02, FW-DC-WL-19)The regeneration of whitebark pine needs to be encouraged through the creation of seed cache sites using harvesting or prescribed fire.Whitebark pine provides a valuable food source for grizzly bear. (FW-DC-VEG-09, and GA-DC-VEG-TOB-01)*

- *The role of fire within forest ecosystems needs to be re-established, especially on south and west aspects. The re-introduction of fire would reduce fuel buildup, stimulate the growth of browse and other native fire-dependent plant species, and help restore the overall health of the forest. There is also a need to provide openings and areas of*

young aged trees and shrubs for wildlife species.(FW-VEG-OBJ-01, FW-DC-FIRE-03, and FW-DC-WL-18)

Economic Benefits

Existing Condition

The Galton project area has been used for decades by humans for a variety of reasons including recreation, solitude, forest product production/gathering, hunting, etc. It is expected that these uses will continue into the future.

Goals, Desired Conditions, and Guidelines for Social and Economic Benefits

The Forest Plan includes 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 products and other economic opportunities related to the Forest are made available to provide desired goods and services for the nation and to contribute to the local timber and recreation related economy. (FW-DC-SES-01 and FW-DC-SES-02)

Purpose and Need for Action:

- *A portion of the forest is managed to provide a stable product flow for the local and regional economy. (FW-DC-TBR-01,FW-DC-SES-01 and FW-DC-SES-02)*

Proposed Action

The Proposed Action (Alternative 1) is described in detail in Chapter 2. It was designed by the ID Team to respond specifically to the Purpose and Need for Action. It would implement activities that would contribute to moving the resources in the project area toward their desired conditions.

Summary of the Proposed Action

The purpose of the Proposed Action is to restore and maintain sustainable ecological processes and improve forest health; reduce the risk of wildfires escaping initial attack and developing into large, stand-replacing fires; reduce impacts to water resources; and provide a sustained yield of timber volume responsive to local, regional, and national needs.

The Proposed Action would utilize vegetation management (timber harvest, prescribed burning, and reforestation) to respond to the Purpose and Need for Action.

The Proposed Action also plans to create scenic vistas along Road #319.

The Proposed Action is designed to help achieve the goals and desired conditions of the Forest Plan, and to meet all applicable laws and regulations including the National Environmental Policy Act, the National Forest Management Act, the Clean Water Act, the Endangered Species Act, the Clean Air Act and the National Historic Preservation Act, among others.

Scope of the Proposed Action

The Proposed Action would be implemented in the summer of 2016. Timber harvest activities would generally be expected to be completed by 2026. Prescribed burning would begin following the end of harvest activities. Management activities that would not involve timber harvest, such as prescribed burning with no timber harvest would likely begin in 2016 and be completed by 2031.These dates are tentative, based upon anticipated budgets, work force, weather, and other considerations. Actual dates of implementation and accomplishment could vary.

Decision Framework

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

The Responsible Official (Decision Maker) is the Forest Supervisor of the KNF, who will decide the following:

- Whether to harvest timber, and if so, the selection and site-specific location of appropriate timber management practices (silvicultural prescriptions, logging methods, riparian buffers, fuel treatments, reforestation and appropriate mitigation measures).
- Whether to implement prescribed burning, and if so, where and when.
- What, if any, project-specific monitoring requirements are needed to assure design criteria are implemented and are effective.

Public Involvement

The Notice of Intent (NOI) to prepare an Environmental Impact Statement was published in the Federal Register on March 8, 2010. Additional public comment periods occurred with the January 2008 pre-scoping package, open houses and community meetings held in February 2008, and the June 2009 Proposed Action. The Forest also hosted a stakeholder group beginning in the Fall of 2012. Recommendations from that group are incorporated into this document.

Using the comments from the public, various interested groups, and other agencies, the interdisciplinary team developed a range of alternatives described in Chapter 2.

Chapter 2. Alternatives, Including the Proposed Action

Introduction

This chapter describes and compares the alternatives considered for the Galton Vegetation Management Project. It includes a description and map of each alternative considered. This section also presents the alternatives in comparative form, sharply defining the differences between each alternative and providing a clear basis for choice among options by the decision maker and the public.The information is based upon the environmental, social and economic effects of implementing each alternative.

Key Issues Used for Alternative Development

Issues for the Galton Vegetation Project were identified from public comments received, field reviews conducted by specialists, information about historic and current conditions in the project area, review of the Forest Plan and other planning and scientific documents. Based on this information, the planning team and I identified three "key" issues, for which action alternatives were developed.

- **Treatment of fuels within the wildland urban interface**

  Most commenters were supportive of treatments within the wildland urban interface and in some cases, suggested additional areas to be considered. The ID team reviewed the areas suggested and modified proposed unit boundaries or added units where appropriate to accommodate these suggestions.

- **Lynx habitat**

  Comments received regarding lynx were primarily concerned with the motorized access portion of the original scoping package for the Galton project. The motorized access portion of the project has been separated into a unique project dealing with access, known as the Ten Lakes Travel Management project. The original proposal for the Galton project contained a considerable amount of prescribed fire that would be implemented across the landscape in an effort to restore fire onto the landscape. Nearly all of this proposed prescribed fire occurred within lynx habitat.

- **Compliance with the Forest Plan**

  The proposed action for the Galton project was developed using the guidance contained in the 1987 Kootenai Forest Plan. The Kootenai National Forest was in the process of developing a revised Forest Plan from 2000 until 2015. The revised Kootenai Forest Plan was released in January, 2015. The Galton project was revised to reflect the guidance contained in the Forest Plan.

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 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, one other alternatives were examined during the analysis process. Although this alternative contributed to the reasonable range, it was eliminated from further consideration for the reasons listed below.

Alternatives Considered but Eliminated from Detailed Study

The ID Team considered the following alternative that was eliminated from further study:

1. Increase the amount of harvest and fuel treatment in the project area: During scoping, a comment was received that identified major areas and drainages where harvest and fuels treatment may be needed. All Action Alternatives include a variety of fuel treatments and harvest activities throughout the project area. The harvest and fuel treatments included in the alternatives were designed to meet Management Area requirements, timber suitability requirements, threatened and endangered species management direction, inventoried roadless area direction as well as minimize impacts to resourcesanalyzed in Chapter 3 of this document.

Alternatives Considered in Detail

Threealternatives were considered in detail by the ID Team: Alternative 1 is the “Proposed Action” alternative, Alternative 2 is the "No Action" alternative, and Alternative 3 is an “action” alternative that was developed to respond to public comments.

Actions Common to all Alternatives

This project areais adjacent to the US/Canada Border and receives a great deal of use year round by the Department of Homeland Security and Forest Service Law Enforcement. This use is expected to continue in the area.

Alternative Descriptions

The following section describes the activities associated with each alternative. The alternatives differ in their emphasis and approach to managing resources within the project area. Resource outputs resulting from implementation of the alternatives are listed. Summary table numbers are rounded; please refer to the Alternative Unit Tables for more precise figures.

Alternative 1 – The Proposed Action

The Proposed Action was developed to specifically respond to the social and ecological factors identified in the Purpose and Need for Action. It utilizes active management to move existing conditions toward desired conditions in the Forest Plan. This alternative addresses the ecological and social factors identified in Chapter 1, providing forest products, while maintaining a sustainable environment for the long-term.This alternative would require Regional Forester approval to create regeneration harvest openings over 40 acres in size.

Forest Plan Amendments Required To Implement This Alternative

- This alternative does not comply with Forest Plan Standard (FW-STD-WL-01). Specifically, this alternative does not meet Standard Vegetation S6 of the Northern Rockies lynx management direction, which prohibits vegetation management activities that reduce winter snowshoe hare habitat in multistory forests. This would require a Forest Plan amendment.

Table 1. Summary of Alternative 1

Road Management	
Road Maintenance to Meet Current BMPs	50.4 miles
Temporary Roads to be Constructed	1.36 miles
Vegetation Management	**1778 acres**
Regeneration Harvest	359 acres
Commercial Thin	46 acres
Intermediate Harvest	1023 acres
Intermediate Variable Density Harvest	307 acres
Whitebark Pine Planting	0 acres
Vista Enhancement	43 acres
Fuel Treatment	**8231 acres**
Understory Thinning/Fuel Reduction	193 acres
Ecosystem Burn	7929 acres
Prescribed Burn with Mechanical Pre-Treatment	109 acres

Features of Alternative 1

Road Maintenance

This is the ongoing upkeep of eachroad necessary to meet the approved Road Management Objectives. The present focus of Road Management Objectives is to meet the current Best Management Practices (BMPs) for each road. The BMP objectives for road maintenance are to: reduce the concentration of sub-surface and surface water runoff; minimize road surface erosion; filter ditch water before entering streams; and decrease the risk of culvert failures during peak runoff events. Maintenance work could include, but would not be limited to: culvert installation, replacement of existing culverts with larger diameter culverts, installation of drainage dips or surface water deflectors, placement of riprap to armor drainage structures, replacement of aggregate surfaces, placement of aggregate to reinforce wet surface areas, ditch construction and cleaning, and surface grading to restore the drainage efficiency of road surfaces. These actions would bring the roads up to current BMP standards and provide benefits to the streams in the project area. The proposed work would not only reduce the effects of non-point source sediment to streams, but would also help reduce the risk of effects due to peak flow runoff events.

- Approximately 50.4 miles of existing road surface would be maintained in the project area by these methods.

A map displaying the roads identified for BMP maintenance is shown in Map 3. Tables listing the roads, their mileage, and their funding source for treatment are located in the Transportation section of the project File.

Vegetation Management

Harvest

Detailed information on the proposed units is contained in Table 2. Alternative 1 is shown on Map 4. The shapes of the proposed harvest units are for representation purposes only; actual unit boundaries may be modified during sale layout to conform to natural patterns or identifiable landmarks on the landscape.

Each type of timber harvest proposed in Alternative 1 is designed to address one or more of the Purpose and Need for Action statements.

Regeneration Harvest: Regeneration harvest is proposed for those stands where the objectives are to initiate a new stand that is more resistant to insect and disease attack, to reduce fuel accumulations, and to capture the economic value of dead and dying trees. Four products of this treatment include 1) the restoration of landscapes composed of long-lived, seral species and fire adapted forest structures; 2) a change in the arrangement and continuity of fuels on a large scale, reducing the risk of wildfires escaping initial attack; 3) the development of effective fuel breaks through the strategic use of large openings; 4) reduced fragmentation, an increase in forage, and the development of blocks of wildlife habitat in a mosaic of successional stages and structures. These treatments respond to the Purpose and Need statements in Chapter 1. Stands have been identified for regeneration harvest for the following reasons:

- Stands have sustained moderate to heavy mortality and are too under-stocked to implement intermediate harvest methods. This mortality is due to Douglas-fir bark beetle in Douglas-fir; mountain pine beetle in lodgepole pine; a variety of endemic sources, such as stem breakage due to stem decay in dense, older stands composed primarily of Douglas-fir, subalpine fir, spruce, and lodgepole pine that are declining in vigor; or a combination of these factors.

- Stands that are largely composed of thin-barked, shallow-rooted species such as subalpine fir, spruce, and lodgepole pine are not conducive to intermediate harvest methods. These species are easily damaged during harvest operations, and are not wind-firm or fire-resistant.

- Root disease is prevalent and the stand has a significant percentage of susceptible species.

While regeneration harvest would retain overstory trees, the number of trees remaining would vary, largely dependent on their number and condition (vigor/fire hardiness) prior to harvest. Patches developed by regeneration harvest would move toward naturally occurring opening size and patterns. Patch sizes of 50-5000+ acres, with most in the 400-600 acre range, are characteristic of the disturbance patterns in the project area (USDA Forest Service 2002b). Regeneration harvest varies by prescription and contains the following:

Shelterwood with reserves (variable density, dispersed moderate retention[1]): An even-age silvicultural system where a new age class develops from seeds that germinate in a moderated micro-environment provided by 10-40 residual trees per acre. Seed trees would be designated by species/diameter designation, so their dispersal would be variable and would mirror the existing distribution. Coarse woody debris would be left on-site to attain the levels indicated in the Soils section of Chapter 3. All snags not posing a hazard during harvest operations would be left on-site. All seed trees would be retained indefinitely. Hand planting may be used to supplement tree numbers or increase the component of western larch, ponderosa pine, or western white pine.

[1] Retention terminology analogous to that found in Franklin et al 1997.

The objective of this treatment is to produce an even-age stand with two canopy levels, and to provide snag replacements. Leave trees would generally be thick-barked, fire-resistant species such as ponderosa pine, Douglas-fir and western larch.

Shelterwood harvest would result in removal of 60- 75% of the canopy of the stand.

Seed Tree with Reserves: An even-age silvicultural system where a new age class develops from seeds that germinate in a fully-exposed micro-environment after removal of nearly all of the previous stand, except for 5-20 trees per acre left to provide seed. Some or all of the seed trees would be retained indefinitely after regeneration is established. Coarse woody debris would be left on-site to attain the levels indicated in the Soils section of Chapter 3. In some cases, hand planting may be used to supplement tree numbers or to provide for species diversity.

The objectives of this treatment are to produce an even-age stand with two canopy levels, and to provide snag replacements. Leave trees would generally be thick-barked, fire-resistant species such as, western larch, and Douglas-fir 14 inches or greater diameter at breast height (DBH).

Seed tree harvest would result in approximately 80% canopy removal.

Units 110, 111, 112, and 114, totaling 226 acres, would be harvested using either a shelterwood or seed tree with reserves harvest method. Please see Table 2 for unit information and Map 4 for the location of the units.

Clear Cut with Reserves: An even-age silvicultural system where nearly all trees are harvested in one entry and a new stand is developed in a fully-exposed micro-environment through natural seeding, hand planting, or a combination of the two. Some trees per acre would be left to meet reserve tree standards for snags or snag replacement.

Clear cut harvest would result in removal of approximately 95% of the canopy of the stand.

Coarse woody debris would be left on-site to attain the levels indicated in the Soils section of Chapter 3. All snags not posing a hazard during harvest operation would be left on site. All mistletoe free seed trees would be retained indefinitely. Hand planting may be used to supplement tree numbers or increase the component of western larch, and western white pine. Reforestation would be designed to reforest the units within a five year time period using a mixture of native tree species appropriate to the specific site.

Unit 97, totaling 133 acres would be implemented using this type of regeneration harvest. Please see Table 2 for unit information and Map 4 for the location of thisunit.

Tree Planting Post Treatment: Tree planting would occur in areas where it is deemed necessary by site specific silvicultural prescriptions. Planting is used for a variety of reasons. Some of these include: Ensure adequate numbers of trees on a site for desired tree stocking levels following harvesting or fires; increase species diversity on a site; restore tree species largely lost due to insects and diseases (such as white pine or whitebark pine). Species to be planted may include ponderosa pine, western larch, Douglas-fir, lodgepole pine, Engelmann spruce, whitebark pine, and western white pine. Site specific determinations of the number of trees to be planted and the distribution of species wouldbe made by a certified silviculturist.

Planting occurring in western white pine areas wouldutilize seedlings that have been bred with resistance to white pine blister rust. These seedlings have been grown in nurseries from stockthat have shown resistance to white pine blister rust. White pine blister rust has caused a dramatic loss of five-needled pines across North America.

Planting of whitebark pine is essential due to the high percentage of mortality in whitebark pine in the Galton area. White pine blister rust and bark beetles have dramatically reduced the number of live cone-bearing whitebark pine, thus reducing potential seed sources for natural regeneration. Lack of disturbance has allowed subalpine fir encroachment on whitebark pine sites, effectively creating a closed canopy forest where whitebark pine has no reproductive advantage. Proposed prescribed burning and timber harvest in this project wouldmimic disturbance processes and create site conditions for successful regeneration of whitebark pine.

Intermediate Harvest: Intermediate harvest would be used to modify stand structure, density, or species composition to improve vigor and stand resistance to insect and disease occurrence. It would also be used to reduce fuels prior to prescribed burning, and to recover the economic value of dead and diseased trees. These treatments respond to the Purpose and Need statements in Chapter 1.

Intermediate harvest is proposed for stands: 1) where fuel reduction and density control are desirable; 2) that have no known root disease occurrence that can be worsened by intermediate harvest; 3) that have stand compositions that would allow partial harvest and fuels reduction activities without excessive damage to the residual stand; and 4) where objectives can be achieved while leaving a fully stocked stand that is windfirm and expected to remain intact. Stands proposed for intermediate harvest generally contain a high proportion of Douglas-fir, ponderosa pine, and western larch. These species are windfirm and have thick bark that protects them during prescribed burning operations. Underburning would be used to further reduce fuels.

There are three types of proposed intermediate harvest: commercial thin, improvement cutting, and salvage of incidental mortality from underburning.

Commercial Thin:A silvicultural treatment where subordinate trees from all crown classes are harvested to reduce stand density.

The primary objectives of this treatment are to improve stand vigor, enhance forest health, and recover the economic value of mortality. The residual stand would be considered adequately stocked to meet most management objectives. In some situations, regeneration may be initiated, but the new cohort wouldnot be managed; total emphasis would be on the residual stand.

Commercial thinning would result in approximately 50% canopy removal.

Unit 107, totaling 46 acres would be implemented.See Map 4.

Improvement cutting:This action is a cutting made in a stand past the sapling stage primarily to improve composition and quality by removing less desirable trees of any species. In practice, this method improves the overall vigor of a stand by removing trees with short crowns with low vigor, those with poor form, those trees competing with more vigorous or more desired species, or those trees in excess of desired density levels. The residual stand would be considered adequately stocked to meet most management objectives. In some situations,

regeneration may be initiated, but the new cohort would not be actively managed; the major emphasis would be on the residual stand.

Fuels resulting from all types of harvest would be treated through entire tree yarding, excavator piling, pile burning, and/or underburning.

Units 5, 6, 7, 8, 10, 106, 108, 113, 115, 116, 201, 202, 204, 210, 304, 305, 306, totaling 1328 acres would be treated with improvement cutting. Please see Table 2 for unit information and MAP2-5 for the location of the units.

Salvage of Incidental Mortality from Underburning: While prescribed burning is designed to minimize the risk of mortality in leave trees or adjacent stands, incidental mortality to individual trees and small patches of trees within, or adjacent to, prescribed burns, could occur. Mortality could be salvaged from either units that were harvested and underburned, or from units that were underburned without harvest. Salvage would likely occur 1-2 years following burning to reduce merchantability loss.

Salvage of trees dying or killed by prescribed burning could occur within the project area, subject to the following conditions: 1) leave islands designed to provide cover would be left; 2) adequate levels and distribution of coarse woody debris would be retained after salvage; 3) Fortine Ranger District snag level guidelines would be met; 4) no salvage would occur in areas of known nest trees, den sites, or other specialized habitats as determined by the project's Wildlife Biologist; 5) no salvage would occur within Riparian Habitat Conservation Areas; 6) existing skid trails and roads would be utilized to the extent possible. If additional skid trails are necessary, they would be designated to minimize soil disturbance; 7) harvest would occur only within Forest Plan MAs that allow salvage; 8) no new road construction would occur; 9) Forest Plan open road densities would be met as amended; 10) cultural resource and sensitive plant surveys would be completed, and salvage would not impact known cultural sites or sensitive plant populations; 11) no salvage would occur within identified wetlands; 12) all other design criteria specified in the decision would be met; 13) salvage is limited to areas within or adjacent to treatment units; 14) salvage activities would only occur in Lynx Analysis Units if they were in compliance with the Northern Rockies Lynx Management Direction (USDA 2007) standards for salvaging fire-killed trees; and maintaining critical lynx habitat 15) post-salvage activity fuels would be treated through excavator piling, jackpot burning, or other accepted methods of fuel treatment; and 16) cumulatively, no more than 200 acres of fuel reduction-related salvage could occur during the planning period; approximately 20 acres/year. Salvage of incidental mortality from burning would appear similar to the treatment in the unit where the salvage occurs. Salvage of incidental mortality from underburning would not occur in the Wilderness Study Area or any Inventoried Roadless Area.

Scenic Vista Enhancement: Remove conifer trees to provide scenic vistas for forest users. This treatment provides for an enhanced recreation experience as forest users travel along these roads by allowing opportunities to view the landscape. Trees would be removed using hand felling and tractor skidding methods. The areas where tree removal would occur is typically 6 acres or less per site and would result in about 43 total acres being treated. Please see Table 2 for unit information and Map 4 for the location of the units.

Fuel Treatment Following Harvest

Underburning Following Harvest: The objective is to reduce fuel loads, both natural and those resulting from harvest, and to prepare sites for regeneration. This type of burning occurs under

leave trees. These treatments respond to thePurpose and Need statements in Chapter 1. Not all acres in these units would be underburned. Underburning of these units may occur following excavator piling and burning to achieve other objectives in the stand such as treating fine fuels and stimulating browse.

Portions of 23 units (5, 6, 7,8,10, 97, 106, 107, 108, 110, 111, 112, 113, 114, 115, 116, 201, 202, 204, 210, 304, 305, 306) with a maximum total of 1735 acres would be implemented. Please see Table 2-3 for unit information and Map 4for the location of the units.

In addition to underburning, the following types of prescribed burning would be used to reduce fuel loads resulting from timber harvest:

Excavator Piling and Burning: This would be done where fuel concentrations are high and resources, such as snags or leave trees, need to be protected in the harvest units. With this type of fuel treatment, logging slash is concentrated in piles using an excavator. The piles are generally burned in the fall when the chance of fire spreading is minimal. These units may be underburned following pile burning to achieve other objectives for the stand (e.g. treating fine fuels, stimulating browse). Not all acres within a treatment unit may be excavator piled and burned.

Portions of 23 units (5, 6, 7,8,10, 97, 106, 107, 108, 110, 111, 112, 113, 114, 115, 116, 201, 202, 204, 210, 304, 305, 306) with a maximum total of 1735 acres would be implemented. Please see Table 2 for unit information andMap 4for the location of the units.

Entire Tree Yarding/Spot Excavator Pile: These are mechanical methods that change the fuel profile during harvest or thinning activities. The entire tree including the top and limbs are removed from the harvest site and processed in a designated landing area. The activity fuels created from the processing is typically piled and burned in the landing area. This type of treatment is used reduce the fuel profile and minimize scorch heights and tree mortality within some stands during prescribed burning activities. In areas of heavier fuel loads or where activity fuels create a substantially heavier fuel load, spot excavator piling is utilized to reduce the overall fuel load on site. Excavator piles are subsequently burned under favorable conditions. In some cases this may be the only fuel treatment to occur in a unit.

Vista units with a maximum total of 43acres would be implemented using entire tree yarding. Entire tree yarding may not completely address the fuels profile within the treatment units and some additional manipulation of fuels (spot excavator piling or lop and scatter) would occur to ensure proper fuels treatment.Please see Table 2for unit information and Map 4for the location of the units.

Fuel Treatment - Ecosystem Burning and Fuel Reduction

Objectives for this method of prescribed burning may include returning fire to the landscapes, maintaining a range of variability in forest conditions, creating openings, rejuvenation of whitebark pine, reducing ground and ladder fuels, changing stand density and composition, and rejuvenating shrubs and brush. This treatment may occur in a variety of stand compositions with varying objectives. Prescribed burns in ponderosa pine and western larch dominated stands would typically underburn at low intensities, thereby reducing ground and ladder fuels. However in areas dominated by dense subalpine fir, Douglas-fir or decadent lodgepole pine, prescribed burning may occur at a higher intensity, killing portions of the overstory. This would create pockets of mortality and visible openings on the landscape (generally less than 100 acres). These treatments typically occur over large areas. In addition to burning, some units may require a limited amount of slashing of small trees and brush around the perimeter, typically adjacent to

private land. Other units may include slashing around whitebark pine trees to limit mortality, while creating a viable seed bed for new seedlings. These ecosystem burns would be helicopter ignited.

Ecosystem Burning within the Inventoried Roadless Area and the Ten Lakes Wilderness Study Area: Ecosystem burning would occur in the Wilderness Study Area and within Inventoried Roadless Area boundaries in this alternative. Some slashing could occur around the perimeter of units to prevent the prescribed fire from spreading outside of unit boundaries, and to create fire control lines near private property and the U.S./Canada border. Slashing would also occur in some units to create a fuel bed for prescribed burning. In units with a whitebark pine component, slashing would occur to benefit the whitebark pine and minimize cone-bearing whitebark pine mortality from the prescribed burn. None of the slash produced would be removed from the burn area. No roads would be constructed within the Inventoried Roadless Area Boundary or Ten Lakes Wilderness Study Area. Please see Map 5for a representation of treatment units within the Inventoried Roadless Area.

All or portions of the following units are in the Ten Lakes Wilderness Study Area/Ten Lakes Inventoried Roadless Area and are proposed for an ecosystem burn only treatment: 13, 14, 15, 16, 21, 22, 23, 24, 64, 65, 66, 67, 68, 69, 70, 71, 72, 73, 74, 81, 92, 93. These units total 5432 acres.Please see Table 2for unit information and Maps 4 and5for the location of the units.

All or portions of the following units are located in an Inventoried Roadless Area: 19, 47, 50, 53, 54, 56, 57, 58, 59, 63, and 84. *These units total 2155 acres. Please see Table 2 for unit information and Maps 4 and5 for the location of the units.*

The following units are NOT located in an Inventoried Roadless Area or the Ten Lakes Wilderness Study Area. The units are proposed for an ecosystem burn. This includes Units 52, 79, 94, 95,and 96 for a total of 342 acres. Please Table 2 for unit information and Map4for the location of the units.

Prescribed Burn with Mechanical Pre-treatment: This treatment would be used to accomplish a variety of resource objectives where the stand densities, topography, proximity to private land, or visual concerns preclude the use of prescribed burning without mechanical treatment. Mechanical pre-treatment would slash small diameter trees using chainsaws. Underburning could occur within 1-5 years after initial treatment. Again prescribed burning would typically occur at large scales and depending on resource objectives may create pockets of mortality and visible openings. No product would be removed with this treatment.

Unit 88, totaling 109 acres would be implemented.Please see Table 2 for unit information and Map 4for the location of this unit.

Understory Thinning/Fuel Reduction: This treatment would be implemented in units where there is a need to reduce understory fuels. This generally occurs on a small scale and in close proximity to private land. Treatment generally would consist of thinning understory trees and hand or machine piling natural and activity fuels. Piles would subsequently be burned under favorable conditions. In most cases this would be the only fuel treatment to occur in a unit.

Units 12, 104,105, 301, 302, 303 are proposed for an understory thinning/fuel reduction treatment for a total of 193 acres.Please see Table 2 for unit information and Map 4for the location of the units.

Temporary Roads for Vegetation Management Activities: Units 106 (0.38 miles), 113 (0.15 miles), 114 (0.44 miles), 115 (0.31 miles), and 210 (0.08 miles) would require the implementation of a temporary road to complete harvest activities. A total of 1.36miles of temporary road would be utilized in Alternative 1. Temporary roads are obliterated and re-contoured immediately after cessation of use. Roads are scarified to reduce compaction, and care is taken to make the road template less visible. The work is generally accomplished within the timber sale, and completed before the sale is finalized.

Table 2. Alternative 1 Proposed Vegetation Treatment Units

* denotes units within an IRA

Unit	Acres	Silvicultural Treatment	Fuels Treatment	Harvest System
5	161	Improvement Cutting	Excavator Pile/ Underburn	Tractor
6	43	Improvement Cutting	Excavator Pile/ Underburn	Tractor
7	27	Improvement Cutting	Excavator Pile/ Underburn	Tractor
8	307	Improvement Cutting (Intermediate Variable Density)	Excavator Pile/ Underburn	Tractor
10	88	Improvement Cutting	Excavator Pile/ Underburn	Tractor
12	101	Understory Thinning/ Fuel Reduction	Hand Pile/ Underburn	N/A
13*	1035	Ecosystem Burn	Underburn	N/A
14*	213	Ecosystem Burn	Underburn	N/A
15*	348	Ecosystem Burn	Underburn	N/A
16*	778	Ecosystem Burn	Underburn	N/A
19*	244	Ecosystem Burn	Slash/ Underburn	N/A
21*	334	Ecosystem Burn	Underburn	N/A
22*	300	Ecosystem Burn	Underburn	N/A
23*	546	Ecosystem Burn	Underburn	N/A
24*	191	Ecosystem Burn	Underburn	N/A
47*	258	Ecosystem Burn	Underburn	N/A
50*	530	Ecosystem Burn	Slash/Underburn	N/A
52	108	Ecosystem Burn	Underburn	N/A
53*	304	Ecosystem Burn	Underburn	N/A
54*	205	Ecosystem Burn	Underburn	N/A
56*	112	Ecosystem Burn	Underburn	N/A
57*	133	Ecosystem Burn	Underburn	N/A
58*	201	Ecosystem Burn	Underburn	N/A
59*	68	Ecosystem Burn	Underburn	N/A
63*	13	Ecosystem Burn	Underburn	N/A
64*	86	Ecosystem Burn	Underburn	N/A
65*	118	Ecosystem Burn	Underburn	N/A
66*	95	Ecosystem Burn	Underburn	N/A
67*	103	Ecosystem Burn	Underburn	N/A
68*	74	Ecosystem Burn	Underburn	N/A
69*	59	Ecosystem Burn	Underburn	N/A
70*	113	Ecosystem Burn	Underburn	N/A
71*	77	Ecosystem Burn	Underburn	N/A
72*	139	Ecosystem Burn	Underburn	N/A

Unit	Acres	Silvicultural Treatment	Fuels Treatment	Harvest System
73*	312	Ecosystem Burn	Underburn	N/A
74*	9	Ecosystem Burn	Underburn	N/A
79	65	Ecosystem Burn	Slash/Underburn	N/A
81*	255	Ecosystem Burn	Underburn	N/A
84*	87	Ecosystem Burn	Underburn	N/A
88*	109	Prescribed Burn with Mechanical Pre-treatment	Slash/Underburn	N/A
92*	87	Ecosystem Burn	Underburn	N/A
93*	162	Ecosystem Burn	Underburn	N/A
94	36	Ecosystem Burn	Slash/Underburn	N/A
95	76	Ecosystem Burn	Slash/Underburn	N/A
96	57	Ecosystem Burn	Slash/Underburn	N/A
97	133	Clearcut with Reserves	Excavator Pile/Underburn	N/A
104	18	Understory Thinning/ Fuel Reduction	Slash/Hand pile	N/A
105	3	Understory Thinning/ Fuel Reduction	Slash/Hand pile	N/A
106	89	Improvement Cutting	Excavator Pile/ Underburn	Tractor
107	46	Commercial Thinning	Excavator Pile/ Underburn	Tractor
108	23	Improvement Cutting	Excavator Pile/ Underburn	Tractor
110	80	Shelterwood or Seedtree with Reserves	Excavator Pile/ Underburn	Tractor
111	45	Shelterwood or Seedtree with Reserves	Excavator Pile/ Underburn	Tractor
112	33	Shelterwood or Seedtree with Reserves	Excavator Pile/ Underburn	Tractor
113	110	Improvement Cutting	Excavator Pile/ Underburn	Tractor
114	68	Shelterwood or Seedtree with Reserves	Excavator Pile/ Underburn	Tractor
115	55	Improvement Cutting	Excavator Pile/ Underburn	Tractor
116	80	Improvement Cutting	Excavator Pile/ Underburn	Tractor
201	65	Improvement Cutting	Excavator Pile/ Underburn	Tractor
202	43	Improvement Cutting	Excavator Pile/ Underburn	Tractor
204	26	Improvement Cutting	Excavator Pile/ Underburn	Tractor
210	93	Improvement Cutting	Excavator Pile/ Underburn	Tractor
301	19	Understory Thinning/ Fuel Reduction	Slash/Excavator Pile	N/A
302	36	Understory Thinning/ Fuel Reduction	Slash/Excavator Pile	N/A
303	14	Understory Thinning/ Fuel Reduction	Slash/Excavator Pile	N/A
304	11	Improvement Cutting	Excavator Pile/	Tractor

Unit	Acres	Silvicultural Treatment	Fuels Treatment	Harvest System
			Underburn	
305	76	Improvement Cutting	Excavator Pile/ Underburn	Tractor
306	32	Improvement Cutting	Excavator Pile/ Underburn	Tractor
	43	Vista Enhancement	ETY/Lop & Scatter/Excavator Pile	Tractor

Alternative 2 – No Action

Alternative 2displays the course of change in the project area that would be expected if no proposed management activities were to occur. It serves as a baseline for comparing the effects of implementing management actions contained in the action alternatives. The course of change on the landscape may include the potential for naturally-occurring events such as blowdown, wildfire, or insect and disease infestation. The No Action alternative is required by the National Environmental Policy Act (40 CFR 1502.14).

Under this alternative, management actions in the project area would be limited to the current and reasonably foreseeable actions listed in Chapter 3. These include vegetation management and fuel reduction, cattle grazing, noxious weed treatment, wildfire suppression, road management, recreation maintenance, special uses, public use on NFS land, private land activities, and activities from other agencies.

This alternative represents the existing condition. Since there are no further planned activities associated with this alternative, Map 10, containing the Past Actions, represents Alternative 2.

Road Management

Road management would remain as represented on Map 6.

Alternative 3 – Action Alternative

This alternative also identifies new opportunities for vegetation management that were requested in public comment and complies with the Forest Plan.There were also concerns raised regarding the effect of prescribed fire on suitable lynx habitat. Alternative 3 greatly reduces the amount of prescribed fire that would occur, primarily in the Inventoried Roadless Areas in lynx habitat. Alternative 3 would not reduce multistoried or stem exclusion lynx habitat.Alternative 3 would also require Regional Forester approval to harvest units over 40 acres in size. This alternative would not require Forest Plan Amendment.

Table 3. Summary of Alternative 3

Road Management	
Road Maintenance to Meet Current BMPs	44.8 miles
Temporary Roads to be Constructed	2.0 miles
Vegetation Management	**2685 acres**
Regeneration Harvest	334 acres
Commercial Thin	97 acres
Intermediate Harvest	1112 acres
Intermediate Variable Density Harvest	307 acres
Whitebark Pine Planting	835 acres
Vista Enhancement	0 acres
Fuel Treatment	**1996 acres**
Understory Thinning/Fuel Reduction	204 acres
Ecosystem Burn	1682 acres
Prescribed Burn with Mechanical Pre-Treatment	109 acres

Features of Alternative 3

Please reference the activity descriptions located in Alternative 1.

Road Management

Approximately 44.8 miles of existing road surface would be maintained in the project area by these methods.

Map 7displays the roads identified for BMP maintenance. Tables listing the roads, their mileage, and their funding source for treatment are located in the Transportation section of the project File.

Vegetation Management

Harvest

Detailed information on the proposed units is contained in Table 4. A map of Alternative 3 is shown on Map 8. The shapes of the proposed harvest units are for representation purposes only; actual unit boundaries may be modified during sale layout to conform to natural patterns or identifiable landmarks on the landscape.

Each type of timber harvest proposed in Alternative3 is designed to address one or more of the Purpose and Need for Action statements.

Regeneration Harvest: The objectives for regeneration harvest are the same as described for Alternative 1. Reforestation would also occur as described for Alternative 1.

- *Units110, 111, 112, 114, 127, and 133 totaling 310 acres would be harvested using either a shelterwood or seed tree with reserves harvest method. Please see Table 4 for unit information and Map 8for unit locations.*
- *A portion of unit 119, totaling 24 acres would be implemented using a clearcut with reserves harvest. Please see Table 4 for unit information and Map 8for unit location.*

Intermediate Harvest: Intermediate harvest methods and objectives are the same as Alternative 1.

Commercial Thinning*:* U*nits107 and 118, totaling 97 acres would be implemented.*

Improvement Cutting:*Units 5, 6, 7, 8, 10, 106, 108, 113, 115, 116, 117, a portion of 119, 201, 202, 204, 210, 304, 305, and 306 totaling 1,420 acres would be treated with improvement cutting.*

Salvage of Incidental Mortality from Underburning: While prescribed burning is designed to minimize the risk of mortality in leave trees or adjacent stands, incidental mortality to individual trees and small patches of trees within, or adjacent to, prescribed burns, could occur. Mortality could be salvaged from either units that were harvested and underburned, or from units that were underburned without harvest. Salvage would likely occur 1-2 years following burning to reduce merchantability loss.

Cumulatively, no more than 200 acres of fuel reduction-related salvage could occur during the planning period; approximately 20 acres/year. Salvage of incidental mortality from burning would appear similar to the treatment in the unit where the salvage occurs. Salvage

of incidental mortality from underburning would not occur in the Wilderness Study Area or any Inventoried Roadless Area.

Whitebark Pine Planting: Hand planting of whitebark pine may occur in areas burned by the 2015 Marston fire. High elevation stands that were burned with greater than 70% mortality and on operable slopes have been included. Surveys would be done prior to planting to determine need and stocking levels. In some cases, designated areas may regenerate with whitebark pine naturally and not need additional stocking. Please see Map 8 for potential planting locations.

Fuel Treatment Following Harvest

Underburning Following Harvest: The methods and objectives remain the same as Alternative 1. *Portions of Units5, 6, 7, 8, 10, 106, 107, 108, 110, 111, 112, 113, 114, 115, 116, 117, 118, 119, 127, 133, 201, 202, 204, 210, 304, 305,and 306 with a maximum total of 1852 acres would be implemented.*

In addition to underburning, the following types of prescribed burning would be used to reduce fuel loads resulting from timber harvest:

Excavator Piling and Burning:*Portions of Units5, 6, 7, 8, 10, 106, 107, 108, 110, 111, 112, 113, 114, 115, 116, 117, 118, 119, 201, 202, 204, 210, 304, 305,and 306 with a maximum total of 1767 acres would be implemented.*

Fuel Treatment -Ecosystem Burning and Fuel Reduction

The methods and objectives for ecosystem burning remain the same as Alternative 1**.**

Ecosystem Burning within the Inventoried Roadless Area: Ecosystem burning would occur within Inventoried Roadless Area boundaries in this alternative. Some slashing could occur around the perimeter of units to prevent the prescribed fire from spreading outside of unit boundaries, and to create fire control lines near private property and the U.S./Canada border. Slashing would also occur in some units to create a fuel bed for prescribed burning. In units with a whitebark pine component, slashing would occur to benefit the whitebark pine and minimize whitebark pine mortality from the prescribed burn. None of the slash produced would be removed from the burn area. No roads would be constructed within the Inventoried Roadless Area Boundary.

All or portions of the following units are located in an Inventoried Roadless Area: 16, 19, 21, 22, 50, 56, 59, *and* 84. *These units total 1,427 acres. Please see Table 4 for unit information and Map 9for unit locations.*

The following units are NOT located in an Inventoried Roadless Area. The units are proposed for an ecosystem burn. This includes Units 79, 94, 95, 96 and 310 for a total of 255 acres. Please see Table 4 for unit information and Map 9for unit locations.

Prescribed Burn with Mechanical Pre-treatment: The methods and objectives for this treatment remain the same asAlternative 1**.**There would be no product removal.

Unit 88 totaling 109 acres would be implemented.

Understory Thinning/Fuel Reduction: The methods and objectives for this treatment remain the same asAlternative 1**.**

Units 12, 104, 301, 302, 303 totaling 204 acres would be implemented.

Temporary Roads for Vegetation Management Activities: Units 106 (0.38 miles), 113 (0.15 miles), 114 (0.44 miles), 115 (0.31 miles), 131 (0.41 miles), 132 (0.19 miles) and 210 (0.08 miles) would require the implementation of a temporary road to complete harvest activities. A total of 2.0 miles of temporary road would be utilized in Alternative 3.Temporary roads are obliterated and re-contoured immediately after cessation of use. Roads are scarified to reduce compaction, and care is taken to make the road template invisible. The work is generally accomplished within the timber sale, and completed before the sale is finalized.

Table 4. Alternative 3 Vegetation Units

*denotes units within an IRA

Unit	Acres	Silvicultural Treatment	Fuels Treatment	Harvest System
5	161	Improvement Cutting	Excavator Pile/ Underburn	Tractor
6	43	Improvement Cutting	Excavator Pile/ Underburn	Tractor
7	27	Improvement Cutting	Excavator Pile/ Underburn	Tractor
8	307	Improvement Cutting (Intermediate Variable Density)	Excavator Pile/ Underburn	Tractor
10	88	Improvement Cutting	Excavator Pile/ Underburn	Tractor
12	101	Understory Thinning/ Fuel Reduction	Hand Pile/ Underburn	N/A
16*	400	Ecosystem Burn	Underburn	N/A
19*	232	Ecosystem Burn	Slash/ Underburn	N/A
20*	40	Ecosystem Burn	Spotpile/Underburn	N/A
21*	120	Ecosystem Burn	Underburn	N/A
22*	48	Ecosystem Burn	Underburn	N/A
50*	421	Ecosystem Burn	Slash/Underburn	N/A
56*	73	Ecosystem Burn	Underburn	N/A
59*	57	Ecosystem Burn	Underburn	N/A
79	78	Ecosystem Burn	Underburn	N/A
84*	76	Ecosystem Burn	Underburn	N/A
85*	52	Prescribed Burn with Mechanical Pre-Treatment	Slash/Underburn	N/A
86*	50	Prescribed Burn with Mechanical Pre-Treatment	Slash/Underburn	N/A
88*	109	Prescribed Burn with Mechanical Pre-treatment	Slash/Underburn	N/A
90*	119	Prescribed Burn with Mechanical Pre-Treatment	Slash/Underburn	N/A
91*	167	Prescribed Burn with Mechanical Pre-Treatment	Slash/Underburn	N/A
94	36	Ecosystem Burn	Underburn	N/A
95	76	Ecosystem Burn	Underburn	N/A
96	57	Ecosystem Burn	Underburn	N/A
104	18	Understory Thinning/ Fuel Reduction	Slash/Handpile	N/A
106	89	Improvement Cutting	Excavator Pile/ Underburn	Tractor
107	46	Commercial Thinning	Excavator Pile/ Underburn	Tractor
108	23	Improvement Cutting	Excavator Pile/ Underburn	Tractor
110	80	Shelterwood or Seedtree with Reserves	Excavator Pile/ Underburn	Tractor
111	45	Shelterwood or Seedtree with Reserves	Excavator Pile/ Underburn	Tractor

Unit	Acres	Silvicultural Treatment	Fuels Treatment	Harvest System
112	32	Shelterwood or Seedtree with Reserves	Excavator Pile/ Underburn	Tractor
113	111	Improvement Cutting	Excavator Pile/ Underburn	Tractor
114	68	Shelterwood or Seedtree with Reserves	Excavator Pile/ Underburn	Tractor
115	55	Improvement Cutting	Excavator Pile/ Underburn	Tractor
116	80	Improvement Cutting	Excavator Pile/ Underburn	Tractor
117	47	Improvement Cutting	Excavator Pile/ Underburn	Tractor
118	51	Commercial Thinning	Excavator Pile/ Underburn	Tractor
119	43	Improvement Cutting	Excavator Pile/ Underburn	Tractor
	24	Regeneration	Excavator Pile/ Underburn	Tractor
127	29	Shelterwood or Seedtree with Reserves	Underburn	Skyline
133	56	Shelterwood or Seedtree with Reserves	Underburn	Tractor
201	65	Improvement Cutting	Excavator Pile/ Underburn	Tractor
202	43	Improvement Cutting	Excavator Pile/ Underburn	Tractor
204	26	Improvement Cutting	Excavator Pile/ Underburn	Tractor
210	93	Improvement Cutting	Excavator Pile/ Underburn	Tractor
301	34	Understory Thinning/ Fuel Reduction	Slash/Excavator Pile	N/A
302	36	Understory Thinning/ Fuel Reduction	Slash/Excavator Pile	N/A
303	14	Understory Thinning/ Fuel Reduction	Slash/Excavator Pile	N/A
304	11	Improvement Cutting	Excavator Pile/ Underburn	Tractor
305	76	Improvement Cutting	Excavator Pile/ Underburn	Tractor
306	33	Improvement Cutting	Excavator Pile/ Underburn	Tractor
310	8	Ecosystem Burn	Underburn	N/A

Project Design Criteria Common to All Action Alternatives

The Forest Service also developed the following project design criteria to be used as part of all of the action alternatives. The measures identified in the following table serve to further reduce impacts to the specific resources identified.

Several abbreviations are used in the responsibility section of Table 5. The following explains those abbreviations

DR	District Ranger	NWM	Noxious Weed Manager
BT	Botanist	WB	Wildlife Biologist
SA	Sale Administrator	FB	Fisheries Biologist
TMC	Timber Marking Crew	LEO	Law Enforcement Officer
SP	Sale Preparation	FMO	Fire Management Officer

IDT	Interdisciplinary Team members
ENG	Engineer
ARCH	Archaeologist
SILV	Silviculturist
HYD	Hydrologist
DRC	District Road Coordinator
TP	Timber Sale Purchaser
RF	Resource Forester
RA	Range Administrator

Table 5. Design Features

Objective	Task	Responsibility	Due Date	Action Alts Affected
Preserve sensitive plant populations and their habitats	Protect sensitive plant populations, if found. Modifications to fuels management and/or timber sale, if necessary, will occur. Special Treatment Areas will be created or unit boundaries will be relocated to avoid negative impacts. Avoid disturbance of sensitive plant populations observed during sale activity through cooperation between sale administrators and contractors. Any sensitive plant species observed during sale activity will be given protective measures as afforded by standard contract clause B(T)6.24.	SP, SA, SILV, FMO	Prior to Implement ation	All
Preserve sensitive plant populations and their habitats	Bedrock meadows, rock outcrops and seepages included or adjacent to treatment areas will be reviewed on a site-by-site basis before any actions proceed on the ground.	SA, WB, BT, FMO	Prior to Implement ation	All
Soil Productivity	Maintain soil productivity through retention of Coarse Woody Debris (CWD) at levels recommended in the Forest Plan. Only material greater than 3" would count towards the required tons per acre of CWD. Provide adequate CWD to meet the requirements by biophysical settings/VRU in FW-GDL-VEG-08.	SILV, SP, SA, FMO, HYD	During Harvest, Post Harvest	All
Soil Productivity	Where possible, allow for one winter season between harvest and under-burning to maximize leaching of nutrients from logging slash into the soil.	SA, FMO, HYD	Post Harvest	All
Soil Protection	Use an excavator for mechanized slash piling to minimize the amount of soil disturbance. Use excavator or hand line to construct all fire lines.	SP, SA, FMO, HYD	During Harvest, Post Harvest	All
Soil Protection	Ground-based operations would occur during dry, frozen, or snow-covered conditions. Snow-covered conditions consist of two or more feet of snow or frozen ground at any soil moisture level except over wetlands.	HYD, SP, SA	Pre Harvest, During Harvest	All
Soil Protection	Utilize existing skid trails and landings in all units where they exist and where feasible; specifically in Units 5, 6, 7, 12, 106, 107, 110, 111, 113, 114, 115, 116, 119, 202, 204, 210, 305, 306, and the Vista Units.	SP, SA, HYD	Pre Harvest, During Harvest	All
Soil Protection	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 and also in accordance with State of Montana BMPs Section IV.B.	SP, SA, HYD	Pre Harvest, During Harvest	All

Objective	Task	Responsibility	Due Date	Action Alts Affected
Soil Protection	Tractor skid roads shall be no less than 75- 100 feet apart except where converging.	SP, SA, HYD	Pre Harvest, During Harvest	All
Soil and Water Quality	Soil and Water Conservation Practices, or Best Management Practices (BMPs), would be applied to all proposed harvest activities. A list of BMPs that would be applied for this project is contained in the Soil and Water Section of the Project File. Application of BMPs would follow the guidance in the Soil and Water Conservation Practices Handbook (Forest Service Handbook 2509.22)	SA, ENG, HYD	Pre Harvest, During Harvest, and Post Harvest	All
Reduce erosion on system roads and protect road surfaces	Restrict traffic as necessary on roads during spring breakup to prevent rutting and accelerated erosion.	SA, ENG, HYD	Pre-harvest, during hauling, Post harvest	All
Control erosion and sedimentation	Scarify heavily disturbed landings, main skid trails, and temporary spur roads. Incorporate slash into erosion control on skid trails, when possible.	SP, SA, HYD	Pre-harvest, During harvest & Post-harvest	All
Control erosion, reduce hydrologic effects of temporary roads	Decommission temporary roads using drain dips, out-sloping road, scarifying, seeding, and re-contouring	SA, SP	Post-harvest	All
Minimize erosion, encourage native plants, and prevent noxious weed infestations	On closed roads, skid trails, landings, fire lines, and decommissioned roads, use the required seed mixture listed in the timber sale contract. Use all state, blue tag, certified weed seed-free mixes.	NWM, SP, SA	Post activity	All
Minimize erosion and road damage	Leave stumps and roots in Vista Cuts, especially those on fill slopes to prevent erosion and road damage.	SA, ENG	Pre and Post Activity	All
Protect range improvements in place within the Project Area	Assure that range improvement structures are identified and protected during and after harvest activity. Units 5, 305, and 306 have fencing in harvest areas. Unit 301 contains a water trough. Contact range manager prior to harvest in these areas.	SA, TMC, IF, FMO, SP	Pre and Post sale	All
Protection of special use structures	Assure that utility lines and roads under special use are protected during and after harvest activity.	SA, TMC, IF, FMO, SP, RF	Pre and post sale	All

Objective	Task	Responsibility	Due Date	Action Alts Affected
Management Requirements and Design Criteria Identify American Indian concerns relating to project activities	Executive Orders 13084 and 13175 provides direction for consultation with tribal governments for formulating or implementing projects.	ARCH	Pre-Sale, Contract prep, during harvest, and site prep.	All
Protect known archaeological sites	Either hand pile and underburn or machine pile and monitor for disturbance prior to and during implementation.	ARCH, FMO	Pre-Sale, Contract Prep, during harvest and site prep	As Recommended
Meet Montana Air Quality Standards	Favor spring and early summer underburning to maximize favorable atmospheric conditions for smoke dispersal.	FMO	Post-sale	All
Meet Montana Air Quality Standards	Construct machine piles to minimize the incorporation of dirt into the piles. Allow piles to cure for a minimum of 30 days to minimize emissions from burning green material.	FMO,SA	Post-sale	All
Control the spread of noxious weeds	Monitor roads along haul route and within sale area prior to starting sale activity. Treat infested roads as necessary.	SP, NWM, SA	Prior to activity	All
Control the spread of noxious weeds	Clean off-road equipment of soil and loose debris (CT6.351#) prior to moving to Sale Area.	SA, NWM	Prior to activity	All
Control the spread of noxious weeds	When using gravel from borrow pits, adhere to MOU with Lincoln County.	ENG, NWM	Prior to activity	All
Control the spread of noxious weeds	Locate/design skid and decking and landing sites in areas not infested with noxious weeds (where possible). Spray known infested sites prior to ground-disturbing activity, where possible.	SA, NWM	Prior to activity	All
Minimize sediment introduction into streams	Minimize road and landing locations in RHCAs.	SP, HYD, ENG, SA	Sale prep, pre- sale and during harvest	All
Minimize sediment introduction into streams	Avoid sidecasting of soils or snow. Sidecasting of road material is prohibited on road segments within or abutting RCHAs in priority watersheds.	HYD, ENG, SA	Sale prep, pre- sale and during harvest	All
RMO attainment	Design prescribed burn projects and prescriptions to contribute to the attainment of Riparian Management Objectives.	HYD, FMO	During burn plan development	All
Improve road/stream crossings	Improve existing culverts, bridges, and other stream crossings to accommodate 100-year flood. Base priority for upgrading on risks in priority watersheds and the ecological value of the riparian resources affected.	HYD, ENG	Ongoing	All
Provide aquatic organism passage	Provide and maintain fish passage at all road crossings of existing and potential fish-bearing streams.	HYD, FB, ENG	Ongoing	All

Objective	Task	Responsibility	Due Date	Action Alts Affected
Minimize disturbance to native salmonids	Management activities that may disturb native salmonids, or have the potential to directly deliver sediment to their habitats, should be conducted between July 15 and August 31.	FB,	Ongoing	All
Minimize impacts to trails	Implement contract provision B(T)6.22, Protection of Improvements, on all trails in or adjacent to any harvest units. If crossings are necessary, these will be perpendicular to the trail at predetermined locations agreed upon with Resource Forester. The only exception to this is in unit 110 and 210 where the trail is on an old roadbed. The trail tread will need to be reestablished where skidding or hauling has impacted the trail. Blazed trees along the trail will be identified and marked with ribbon to save prior to implementation. Those species of trees with a greater potential to blow down post-harvest will be high-stumped above the blaze.	SP, SA, RF	Pre-sale and harvest	All
Minimize impacts to trails	During burn plan development, the FMO or Fire Official will contact the Resource Forester for any underburn units that are in or adjacent to any units and that have Protection of Improvements on the trails (some units are 16, 19, 21, 22, 23, 50, 54, 65, 67, 69, 70, 73, 81 & 93). The post treatment situation will be evaluated and the best method to minimize the impacts to the trail can be designed into the burn plan.	RF, FMO	During burn plan developme nt	All
Protect camper's experience and campground aesthetics	Leave a strip of trees along the south side of Road 114 along unit 204 to serve as a screen to buffer the campers from the sights and sounds of traffic. Coordinate with Resource Forester to work with Marking Crew regarding selection of trees to be harvested near established camp sites as well as potential sites.	SP, SA, TMC, RF,	Pre-sale, during harvest & post sale	All
Protect campground improvements	For the portion of unit 204 that lies on the south side of Road 114 implement contract provision B(T)6.22, Protection of Improvements in the timber sale contract to protect campground improvements. Improvements include signs, picnic tables, fire rings, sweet smelling toilet, and spur roads to sites.	SP, SA, RF	Pre-sale, during harvest & Post-sale	All

Objective	Task	Responsibility	Due Date	Action Alts Affected
Minimize impact to campers, ground disturbance, and risk of unplanned ignition.	For unit 202 and the portion of unit 204 that lies on the south side of Road 114 limit harvest to winter only to reduce conflicts with campers and to minimize visible ground disturbance. Treat slash for the portion of unit 204 that lies on the south side of Road 114 by entire tree yarding to the old gravel pit, at east end of unit, making only one pile. This will limit ground disturbance that would have occurred if slash was piled throughout the unit and burned. This also reduces the chance of unauthorized ignitions during the summer before pile burning in the fall.	SP, SA, RF, FMO	Pre-sale, during harvest, & post sale	All
Protect young tree plantations within the Analysis Area	1. Mineral blocks and herding will be used to discourage cattle access. Mineral blocks will be placed at least ¼ mile away from plantations. 2. Range Administrator will provide permittee with annual updates of plantation grazing changes for when trees in units reach three feet in average height and no longer need monitoring. 3. Slash placement or fencing will be used if cattle encroachment causes >20% damage to seedlings. 4. Harvest units will be monitored by the District 3 or more times a year for 10 years following harvest so any noxious weed populations could be identified and targeted for control.	SILV, WB, RA	Post-sale	All
Protect sensitive whitebark pine species and habitat.	Any projects located in whitebark pine habitat will include a) pre-survey for whitebark pine; (b) protection of existing cone-bearing whitebark pine during treatment, and, (c) planting after treatment will be considered during development of the site specific treatment prescription.	SILV, FMO	Prior to Implement ation	All
Meet ESA requirements	If critical habitat is identified during implementation of the proposed activities, special protection measures will be implemented by including provision CT6.251 in all applicable timber sale contract packages. This provision is mandatory.	SP, SA, WB, TP	Contract prep and logging	All

Objective	Task	Responsibility	Due Date	Action Alts Affected
Maintain cavity-nesting habitat	Where snag numbers are insufficient to meet snag levels by BpS (identified in the Forest Plan, FW-GDL-VEG-04) existing WL and PP or DF (in that order) snags greater than 10" dbh and 10 feet in height will be marked or by using (C(T)2.303) and protected during timber harvest and site preparation as long as safety requirements are met. Merchantable trees (live) will be reserved through marking if snag levels are still not met. If felled for safety, they will be left on site. Maintain the largest snags first. Favor trees further than one tree length from the road prism or any external boundary.	WB, SP, TMC, SA, FMO	Pre-sale and harvest	All
Maintain cavity-nesting habitat within intermediate harvest units	Within intermediate harvest units, maintain existing snags greater than 10” dbh and 10 feet in height as long as safety requirements are met. Retention snag numbers are designated by BpS (identified in the Forest Plan, FW-GDL-VEG-04). Maintain the largest snags first. Where desirable snags are insufficient to meet these numbers, use snags down to 8” dbh. Where a unit falls into two or more BpSs, use the BpS that makes up the majority of the stand.	WB, SP, TMC, SA, FMO	Pre-sale and harvest	All
Leave tree protection	Pull back and scatter slash away from leave trees in units that will be underburned.	SP, SA, SILV, FMO	Pre-sale	All
Provide large woody material for wildlife	To provide feeding, nesting, and cavity habitat, leave existing large down woody material,leave large un-merchantable logs/acre (> 14" diameter. and 20' length) when available. Sale administrator will work with logger to minimize disturbance to large woody material through skid trail design and encourage avoidance when possible and will work with contractor to leave all existing large down woody material on site and out of the piles.	SP, SA, WB	Post-sale; harvest	All
Provide hiding and denning habitat	Where hand or machine piling is required, leave at least one small unburned pile per three acres. Landing piles are excluded and piles will be located in areas to avoid loss due to unauthorized burning. This is typically away from open roads or hidden from view.	WB, SA, FMO	Post-sale	All
Reduce affects to Core Habitat through scheduling of sale area activities.	Winter logging will be required for units 10, 112, 110, 108, and 210 (Dec.1 thru March 30). One week (outside winter time frame stated above) will be allowed for pre harvest road work and 1 week for post harvest road rehab for units 10 and 210; one week (outside winter time frame stated above) for preharvest road work and 1 week for post harvest road rehab for units 112, 110 and 108; All other mechanized activities utilizing roads 7006 (behind berm), 7065(behind berm), 7066E, 7066J or 7067A (will be conducted during the winter period stated above.	SP, WB, SILV, SA	Pre-sale	All

Objective	Task	Responsibility	Due Date	Action Alts Affected
Maintain areas of undisturbed spring grizzly bear habitat	Ecosystem burn units within the BMU will be burned in the summer/fall except for units 50, 79, and 16, which will be hand ignition only and could be burned in the spring. These units will be scheduled so that they are not all burned in one year, but over a 10 year period.	WB, FMO SILV, SA	Pre-sale	All
Reduce effects in core habitat by scheduling helicopter burns in the BMU to spatially limit areas of disturbance on a year to year basis. See project file for example map	Prescribed burn areas within the Therriault sub-BMUs would generally be limited to approximately 400-500 acres per year over a 10 year period and approximately 200 acres/year in the Krinklehorn sub-BMU and would follow the "Guide to Effects Analysis of Helicopter Use in Grizzly Bear habitat".	SP, WB, FMO, SILV, ENG	Pre- sale	Alt. 1
Reduce effects in core habitat by scheduling helicopter burns in the BMU to spatially limit areas of disturbance on a year to year basis. See project file for example map	Prescribed Burns would occur over a ten year period and follow the "Guide to Effects Analysis of Helicopter Use in Grizzly Bear habitat". Burn areas would be scheduled on a yearly basis in an interdisciplinary manner to include grizzly habitat considerations.	WB, FMO, SILV	Pre- sale	Alt. 3
Provide for wildlife security by deterring illegal off-road vehicle use	In harvest that are adjacent to open or seasonally open roads, leave a vegetative strip of trees, brush (where applicable) to act as a visual barrier between road-side and harvested portion of unit to deter illegal use. Take measures to avoid killing vegetation in this strip when site prep burning. Berm or block firelines where they access open or seasonally open roads.	SP, FMO, AFMO, WB	Pre-sale	All
Management activities should avoid/minimize disturbance at known active nesting or denning sites for sensitive, threatened or endangered species.	If denning or known nesting sites for these species are found during the course of layout or other management activities, best available information should be used to set a timeframe and distance buffer around active nests or dens.	WB, SA, SP, SILV,FMO	Pre-sale, harvest, and site prep	All

Objective	Task	Responsibility	Due Date	Action Alts Affected
Management activities should avoid/minimize disturbance at known active raptor nests, including owls.	If raptor nests are found during the course of layout, or other management activities, timing restrictions and distance buffers should be based on best available information, as well as site-specific factors.	WB, SA, SP, SILV, FMO	Pre-sale, harvest, and site prep	All
Provide for wildlife security and protection of road surfaces	Determine the time of road restrictions involved with timber sales in the pre-sale round table discussion. Maintain existing restrictions as directed by the Sale Administrator.	SA, WB, TP, SP, ENG	Pre-sale & Post-sale	All
Maintain movement corridors in larger units for large ungulate and carnivore movements.	Maintain islands of vegetation within large units to break up the distance of non cover and to provide horizontal diversity within the larger units. The following units will leave cover corridors between units, or cover blocks where necessary within these units: 8, 117, 118, 201, 210, 301, 302, & 305.	WL, SILV, SP, SA, FMO	Pre sale & during harvest	All
Maintain flammulated owl rearing habitat	Maintain 1- 5 acre patches of understory/midstory trees where they exist, for owl rearing habitat in units: 12, 16, 50, 79, & 93.	WL, FMO	Pre sale, pre burn	All
Avoid disturbance during the nesting and fledging period around bald eagle nests	Timing restrictions may be required on harvest activity or burning for units 12, 95, and 107. Activity restrictions would occur between February 15 and August 15 based on occupancy of nest(s). No restrictions are necessary if nests are unoccupied.	WB, SILV, FMO	Harvest Prescriptio n, Sale Prep	All
Minimize impacts in big horn sheep lambing habitat	Restrict prescribed burn Unit 71 to a summer/fall burn.	WL, FMO	Pre sale, pre burn	Alt. 1

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.

- Soil Productivity Monitoring – Monitor the effects from KV-funded activities;
- Watershed Resource Non-Structural Improvements Erosion Control – Erosion control on landing piles, fire lines, and skid trails post fuels activities;
- Watershed Resource Monitoring – Monitoring of post fuels activity erosion control;
- Post old growth stands to retain snags within;
- Monitor posted old growth stands;
- Re-berming of roads for wildlife security;
- Road barriers for wildlife security;
- Road restriction effectiveness monitoring;
- Spraying and monitoring of invasive plants in areas where their concentrations occur within timber sale areas;
- 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.);
- Trail signing to distinguish trail and trailhead area post-harvest;
- Detailed ground work on trailhead area and trail post-harvest to restore area for those recreating;
- Safety signs near administrative area (campground) post-harvest to ensure awareness of the proximity of people near the area to deter folks from target shooting in the area;
- Jackpot Burn - Burning of pockets of residual slash accumulated from thinning activities;
- Thinning – Understory thinning of non-merchantable, undesirable trees for stand improvement purposes after harvest activities are complete. Thinning would result in limited site resources being distributed to fewer individual trees;
- Underburn - Burning of residual slash, duff and natural fuels to rejuvenate shrubs and reduce fuel accumulations;
- Rearrangement of Fuels - Slashing of non-merchantable, undesirable trees for stand improvement purposes such as distributing limited site resources to fewer individual trees, and to help facilitate underburning activities after harvest activities are complete;
- Inter-plant rust resistant western white pine.

Comparison of Alternatives

Table 6. Comparison of Alternatives

	Alternative 1 – Proposed Action	Alternative 2 – No Action	Alternative 3 – Action Alternative

	Alternative 1 – Proposed Action	**Alternative 2 – No Action**	**Alternative 3 – Action Alternative**
Road Management			
Road Maintenance to meet Best Management Practices	50.4 miles	0 miles	44.8 miles
Temporary Road Construction	1.36 miles	0 miles	2.0 miles
Vegetation Management			
Regeneration Harvest	359 acres	0 acres	334 acres
Commercial Thinning	46 acres	0 acres	97 acres
Intermediate Harvest	1023 acres	0 acres	1112 acres
Intermediate Variable Density Harvest	307 acres	0 acres	307 acres
Whitebark Pine Planting	0 acres	0 acres	835 acres
Vista Enhancements	43 acres	0 acres	0 acres
Fuel Treatment			
Understory Thinning	193 acres	0 acres	204 acres
Ecosystem Burning	7929 acres	0 acres	1682 acres
Prescribed Burning with Mechanical Pre-treatment	109 acres	0 acres	109 acres
Forest Plan Amendments and other Framework			
Meets Lynx Veg S6	No	No	Yes
Requires Regional Forester approval of harvest units over 40 acres	Yes	No	Yes

Chapter 3. Affected Environment and Environmental Consequences

Introduction

Chapter 3 describes the physical, biological, and social conditions in the project area, and the environmental consequences of implementing the alternatives presented in Chapter 2. As directed by the Council on Environmental Quality's implementing regulations for the National Environmental Policy Act (NEPA), the discussion evaluates the effects of the project to forest resources. Only those descriptions necessary to understand the effects of the alternatives on resources are provided (40 CFR 1502.15); supporting data and analysis are located in the resource sections of the project File.

The discussion of environmental consequences forms the basis for comparing the alternatives under consideration. Environmental consequences are discussed in terms of the direct, indirect, reasonably foreseeable, and cumulative effects (40 CFR 1502.16). Direct effects are caused by the proposed activities and occur at the same time and place (40 CFR 1508.8). Indirect effects are caused by proposed activities, and occur later in time or are further removed in distance, but are still reasonably foreseeable (40 CFR 1508.8). Cumulative effects result from incremental impacts of proposed activities when added to other past, present, and reasonably foreseeable actions regardless of what agency or person undertakes such other actions (40 CFR 1508.7). Some resource conditions consider a larger area if predicted effects extend beyond the project area. Information concerning the spatial and temporal bounds for each resource analysis is located in the respective sections of analysis and in the project File.

The following describes other actions (past, present, reasonably foreseeable) that have the potential to contribute to cumulative effects for the resources in the area. Each resource area considers the relevant past, present and reasonably foreseeable actions as they affect their resource.

Past Actions

Past actions are management activities (timber harvest, pre-commercial and commercial thinning, prescribed burning, road construction and maintenance) and events (wildfires) that have occurred in the project area. The effects of these activities and events were considered in the analysis of the existing conditions of the resources in the project area, which are described in Chapter 3 of this document. A map of past actions is shown inMap 10.

Additional information is contained in the project Files for each of the resources.

The past activities and events for the project area are those that occurred during the past and were documented in the computer database. These are summarized in Table 7.

Table 7.Past Actions

Activity	Description	Acres/Miles	% of the project area
Vegetation Management	Intermediate Harvest (sanitation/salvage, improvement cutting, commercial thinning)	1959	1
	Pre-Commercial Thinning	31,999	19
	Regeneration Harvest (clearcut, seed tree, and shelterwood)	13,683	8
	Private land regeneration harvest	1,354	< 1
	Private land intermediate harvest	n/a	
	State land intermediate harvest	n/a	
Prescribed Burning	Natural fuels treatments (ecosystem burning, non-timber harvest fuel treatments)	6,972	4
Wildfire		8,705	<1
Road Construction	Total Miles of All Roads In The Galton Decision Area	690.7 miles	N/A
	National Forest System Roads (NFSR)	263.23 miles	
	County Roads	53.91 miles	
	Highway 93	28.06 miles	
	State Roads	18.21 miles	
	Private Roads	325.93 miles	
	Undetermined Roads	1.31 miles	
Cattle Grazing	100 cow/calf pairs are currently permitted to graze on the Grave Creek Allotment from May 15 to September 30.	5584	3

Current and Reasonably Foreseeable Actions

Current and reasonably foreseeable actions are those management activities planned by the Forest Service, State of Montana, and the public that the members of the ID Team determined were appropriate to consider in the cumulative effects analyses for their resources. Current and reasonably foreseeable actions would occur regardless of which alternative is selected for implementation.

Current actions are activities or projects that are ongoing; reasonably foreseeable actions are those that will be implemented within the next 10 years, including those that would occur on an annual basis.

Current and reasonably foreseeable actions that could be mapped are shown in Map 11.

Table 8. Current and Reasonably Foreseeable Actions

Activity	Description	C	F
Vegetation Management and Fuels Reduction Activities	ForestwideYoung Growth Vegetation Management - Within the Galton Vegetation project area, approximately 6,000 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.	X	X
	Little Feet Harvest associated pile burning – Harvest complete – approximately 90 acres of pile burning remains	X	X
	Ant Flat Maintenance Prescribed Burn 40 acres	X	X
	Pre-Commercial Thinning 200 acres/year	X	X
	Tree Planting 50 acres/year	X	X
	Blowdown Salvage (as needed after appropriate analysis) Estimate 20 acres /year		
Cattle Grazing	100 cow/calf pairs are currently permitted to graze on the Grave Creek Allotment from May 15 to September 30. This level of use is not expected to increase within the next ten years.	X	X
Noxious Weed Treatment	Efforts to treat present infestations of noxious weeds and to eradicate infestations of new invaders are ongoing. Most herbicide treatments are conducted along existing roads; a few treatments occur in timber harvest units. All activities will comply with the Kootenai National Forest Invasive Plant Management ROD (2007).	X	X
Fire Suppression	Control of wildfires will follow Forest Plan standards for the affected Management Areas. Activities may include construction of fire lines, safety zones and helispots by hand and equipment.	X	X
Road Management	Routine road maintenance will continue to occur in the project area.	X	X
	Administrative use in the project area will be ongoing. Use is associated with road maintenance, permit administration, noxious weed control, data collection, monitoring, and general administration of public lands. Road use will follow Forest and/or District policies.	X	X
Recreation Maintenance	Approximately 159 miles of trail are maintained each year within the project area. Routine trail maintenance activities may include brushing; removing blowdown, debris, and hazard trees; repairing or adding waterbars, repairing treads; repairing or replacing signs; and improving vistas.	X	X
Travel Management	The Ten Lakes Travel Management project is currently under analysis. This project includes summer and winter travel management proposals on 64,177 acres, the majority of which is the Ten Lakes Wilderness Study Area.	X	X
Special Uses	There are 26 special use permits including road access to private property.	X	X
Public Use	Recreational use of the project area is expected to include but is not limited to hiking, camping, fishing, hunting, photography, berry picking, other forest product gathering, Christmas tree cutting, firewood gathering, driving for pleasure, mountain biking, sightseeing, wildlife viewing, cross country skiing, snowshoeing, trapping and snowmobiling.	X	X

	Christmas tree cutting and Bough gathering 20 acres/year	X	X
Private Property	Assume two new residences built per year per planning area. No subdivisions formally proposed at this time.	X	X
Other Agency	**State of Montana Trust Lands** T37N R27W Sec 36 SW ¼ has a grazing lease that is expected to continue T37N R27W Sec36 NE 40 acres is under land use license to the Indian Springs Golf Course T36N R26W Sec 16 and 36 – no treatments planned for next 5 years T35N R26W Sec 36 – This section has been previously harvested, some planting may occur as needed	X	X
	Fish Wildlife and Parks Woods Ranch – no actions planned at this time	X	X
	Department of Homeland Security This project is adjacent to the US/Canada Border and receives a great deal of use year round by the Department of Homeland Security and Forest Service Law Enforcement. This use is expected to continue in the area.	X	X

Relationship to the Forest Plan

The Forest Plan, and its accompanying Environmental Impact Statement and Record of Decision, specify the overall direction by which the resources of the Forest are managed. The Forest Plan consists of forest-wide and area-specific goals, objectives, guidelines, and standards that provide for land uses with anticipated resource outputs. Forest-wide Goals and Objectives pertinent to the Proposed Action were discussed in the Purpose and Need for Action in Chapter 1. A description of area-specific goals, standards, and guidelines follow.

The Galton FEIS is tiered to the Environmental Impact Statement for the Forest Plan, and incorporates the management direction found in the Forest Plan. This FEIS is not a general management plan for the project area, nor is it a programmatic document. It is a site-specific link between the Forest Plan and the requirements established by NEPA, which involves the analysis and implementation of management practices designed to achieve the goals and objectives specified in the Forest Plan. This FEIS will discuss the Proposed Action and its alternatives in a site-specific manner as required by NEPA.

Forest Plan Management Area Direction

The Forest Plan divided the Forest into management areas (MA), each of which has goals, standards, and schedule of management practices (USDA Forest Service 2015). Theproject area contains MAs 1b, 1c, 3,5a, 5b, and 6.

Table 9 displays the MAs, their management emphasis, and the number of acres and percentages in the project area. Please see Map 12 for a visual representation of the MAs within the project area.

Table 9. Management Areas within the Galton Vegetation Project Area

MA	Management Emphasis	Acres within project area	% of project area
1b	Recommended Wilderness – Ten Lakes. This MA overlaps with MA1c (Ten Lakes Wilderness Study Area). MA1c management area direction takes precedent.	26,000	15%
1c	Wilderness Study Area – Ten Lakes. This MA is administered to maintain the wilderness character and the potential for inclusion in the National Wilderness Preservation System that existed in 1977 when the act was passed. These acres overlap with MA1b. MA1c management area direction takes precedent.	34,100	20%
3	Special Areas – places that have unique, unusual, or important characteristics. Management activities may vary where there are multiple classifications, in which case the most restrictive guidance applies.	15,388	9%
5a	Backcountry – Non-motorized year round.	41,666	24%
5b	Backcountry – Motorized year round	24,549	14%
6	General Forest – Most of this MA consists of relatively large areas with roads, trails, and structures, as well as sign of past and ongoing activities designed to actively manage the forest vegetation.	26,962	16%

*numbers do not add up to 100% due to overlap of MA designations. This also does not include private lands.

Forest Vegetation

Introduction

The forests in the Galton project area are composed of a variety of vegetation. This vegetation occurs in diverse combinations and patterns of species, ages, sizes, shapes, and structure. These diverse forests provide a multitude of social, biological, and ecological benefits, such as wildlife habitat, livestock forage, timber products, firewood, berries, clean air and water, and a pleasant setting for human enjoyment. Disturbance processes play a major role in shaping forest vegetative conditions. In the Galton Vegetation Analysis Area insects and disease are the major disturbance processes that have shaped vegetative patterns and diversity, especially in the last century. Large wildfires in 1994, 1998, and 2016 created patches of 1,300 acres;1,060 acres;7,300 acres respectively within the project area. Prior to effective fire suppression efforts in the early twentieth century, fire was also a major influence.

As stated above, forest insects and disease have played a major role in shaping vegetative patterns and diversity. When occurring at endemic levels, insects and disease can increase diversity and create important structural attributes. Examples of these attributes include snags and coarse woody debris for wildlife habitat and openings in the canopy that allow regeneration of seral and non-seral species and increase browse species. When insects or disease increase above endemic levels, they can create heavy accumulations of fuels and increase fire hazard, provide breeding sites that serve to further increase insect populations, and eventually cause tree mortality. Under historic endemic and epidemic conditions, insects and disease help set the stage for wildfires to renew forest vegetation.

Forests in the Northern Rockies have developed in a close relationship with wildfire. Many of the plants and animals found here rely on fire to change the structure, composition, and pattern of vegetation. Fire provides for regeneration of tree species such as lodgepole pine, creation of forest openings, and the recycling of nutrients to the soil. The size and intensity of the fires, and the ensuing vegetative patterns, are determined by a combination of soils,vegetative fuel topography, stand structure, and climate. The suppression of wildfires during the past 100 years has had a strong influence on these fire-dependent ecosystems. The natural fire regimes are altered by human intervention on low-to-moderate intensity fires and by creation of an environment conducive to high-intensity stand-replacement fires.

Regulatory Framework

The following Forest Plan desired conditions, objectives, guidelines, and standards apply to the vegetative condition of the Galton Vegetation area.

State and Federal Law, Regulation, and Policy

- **The Forest and Rangeland Renewable Resources Planning Act of 1974:** Provides for maintenance of land productivity and the need to protect and improve the soil and water resources.
- **The National Forest Management Act (NFMA) of 1976:** "It is the policy of the Congress that all forested lands in the NFS shall be maintained in appropriate forest cover with species of trees, degree of stocking, rate of growth, and conditions of stand designed to secure the maximum benefits of multiple use sustained yields. Plans developed shall provide for the diversity of plant and animal communities based on the suitability and capability of the

specific land area in order to meet the overall multiple-use objectives, and within the multiple-use objectives."

- **The Endangered Species Act (ESA) of 1973:** Requires federal agencies to conserve threatened and endangered species.
- **Executive Order 13112:** Directs federal agencies whose actions may affect the status of invasive species to (1) prevent the introduction of invasive species, (2) detect and respond rapidly to and control populations of such species in a cost effective and environmentally sound manner, as appropriations allow.
- **FSM 2670.22:** (1) Develop and implement management practices to ensure that species do not become threatened or endangered because of Forest Service actions; (2) maintain viable populations of all native and desired non-native wildlife, fish, and plant species in habitats distributed throughout their geographic range on NFS lands; (3) Develop and implement management objectives for populations and/or habitats of sensitive species.

Kootenai National Forest Plan

FW-DC-VEG-01. The composition of the forest is within the desired ranges for the dominance groups illustrated in the Forest Plan. 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 the Forest Plan, more hardwood trees occur in the Forest such as quaking aspen, black cottonwood, and paper birch.

FW-DC-VEG-02. The structure of the forest is within the desire ranges for each size class illustrated in the Forest Plan. 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.

FW-DC-VEG-04. Tree densities and the number of canopy layers within stands are generally decreased.

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.

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 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.

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. Over time, the number of large-diameter snags (20 inch in DBH or greater) increases in all biophysical settings.

FW-DC-VEG-08. Down wood occurs throughout the forest in various amounts, size, 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.

FW-DC-VEG-09. Habitat for plant species listed under the 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.

FW-DC-VEG-11. The desired forest compositions are described in the Forest Plan (Figures 4, 5, 6, 7, 8, 9 and Table 12). These compositions are based on biophysical setting and are described by size class and composition.

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 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, mechanical fuel treatments, re-vegetation 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-GDL-VEG-03. Vegetation management activities should retain the amounts of coarse woody debris that are displayed in Table 3 of the Forest Plan. 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.

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 that are displayed in Table 4 of the Forest Plan. Where snag numbers do not exist to meet the recommended snag 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.

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;
- Emphasize the retention of the largest snags and live trees as well as those species that tend to be the most persistent;
- Favor snags or live trees with existing cavities or evidence of use by woodpeckers or other wildlife.

FW-GDL-VEG-06. During vegetation management activities, and in the event that retained snags fall over or are felled, they should be left on site to provide coarse woody debris.

FW-GDL-VEG-07. Evaluate proposed management activities and project areas for the presence of occupied or suitable habitat for any plant species listed under the Endangered Species Act or on the regional sensitive species list.

FW-GDL-VEG-08. All silvicultural practices may be used to manage forest vegetation. This includes silvicultural systems, regeneration methods, 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 as 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.

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 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 function.

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 morality and fuel loading. Lands are adequately restocked within 5 years of final regeneration harvest, following a site-specific silvicultural prescription.

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.

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).

FW-OBJ-TBR-01. Annually offer timber for sale at the estimated predicted volume sold of 47.5 MMBF.

FW-STD-TBR-01. Regulated timber harvest activities shall occur only on those lands classified as suitable for timber production.

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 windstorms.

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.

FW-STD-TBR-04. Even-aged stands shall generally have reached or surpassed culmination of mean annual increment 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.

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.

FW-STD-TBR-07. Even-aged prescriptions other than clearcutting (seed tree, shelterwood, etc.) shall be used when appropriate to meet Forest Plan direction.

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.

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.

MA6-DC-TBR-01. Timber production occurs on suitable lands within this MA.

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.

Analysis Area, Methods, and Reference Conditions

Analysis Area

The analysis area encompasses the entire Galton Vegetation analysis area, for a total of 127,380 acres of National Forest System Land. The effects analysis focuses on all the proposed activities that may have any measurable effects on vegetation structure, composition or distribution within Management Areas 1b, 1c, 3, 4, 5a, 5b, 6 and the Tobacco Geographic Area as described in the Forest Plan. The analysis area is the same as the project area boundary as direct, indirect and cumulative effects will be site specific to the area directly influenced from the vegetation treatment.

Analysis Method

Previous analyses, such as the Graves Creek Ecosystem Assessment at the Watershed Scale (EAWS) (2002), were used to provide background information for this analysis. Information collected for the EAWS as well as existing Forest Service databases provided the information used to characterize the affected environment for vegetation within the Galton analysis area. Ground reconnaissance and the FSVeg database were the primary sources of information used to describe existing vegetation conditions.

Reference Conditions

This analysis identifies specific disturbance processes, together with landform and other environmental elements, which have influenced the patterns of vegetation across the Decision Area. Vegetative Response Units (VRUs) were used to define and describe the components of ecosystems. VRUs are used to describe an aggregation of land having similar capabilities and potentials for management. These ecological units have similar properties in natural communities: soils, hydrologic function, landform and topography, lithology, climate, air quality, and natural processes (nutrient and biomass cycling, succession, productivity, and fire regimes).

Each VRU has a characteristic frequency and type of disturbance based on its climate, soils, vegetation, animals, and other factors. Populations of native plants and animals have responded and adapted to these characteristic disturbance regimes over time (~2500 years) and the resulting vegetation patterns, processes, and structure within a historical range of variability. These characteristic processes, patterns, and structure are termed “Reference Conditions”.

Many of these VRUs have similar environments. For example, VRUs 2 and 3 are relatively dry. To simplify analysis, VRUs found in the Galton Vegetation Analysis Area have been grouped into three forest types: warm–dry, cool–moist, and cold forest. Map 13 shows a visual display of the VRUs within the analysis area.

Following are summaries of the reference conditions for the biophysical settings and VRUs found in the analysis area.A crosswalk for VRU to biophysical setting is as follows: Warm/dry biophysical setting is equivalent to VRU 1, 2, and 3. Warm/moist biophysical setting is equivalent to VRU 4, 5, and 6. Subalpine biophysical setting is equivalent to VRU 7 through 11.

VRUs 2 and 3 (Dry Forest – Warm/Dry Biophysical Setting)– The dry forest types occur mainly on the lower elevations and consist of a mixture of ponderosa pine, Douglas-fir, western larch, and lodgepole pine. The species mix and stand density vary with aspect.

Typically, the southern aspects were predominantly ponderosa pine, with lesser amounts of Douglas-fir, western larch, and lodgepole pine. Some of the areas were characterized by open, park-like stands of ponderosa pine and Douglas-fir, with grass and brush understories. The conditions were maintained by low and moderate severity fires that typically occurred every 15-30 years. These fires removed smaller Douglas-fir trees and favored the more fire-resistant ponderosa pine. When these low-intensity fires burned into small areas with heavier fuel accumulations or high densities of understory trees, they burned with more intensity, sometimes killing small patches of overstory trees. These are referred to as “mixed-severity fires.” Stand-replacement fires were infrequent, occurring every 150-200 years or longer. Stand-replacing fires occur when a combination of high fuel loads, hot, dry, and windy weather and an ignition source occur at one location.

Patches are areas of uniform vegetation that differ in structure and composition from that which surrounds them. Patch size was somewhat larger on north aspects and moister sites than on drier southern aspects. Naturally occurring patch sizes are generally larger than those created by past timber harvest due to National Forest Management Act (NFMA) administrative limits on opening size. Triepke (2001) found that in the dry forest type the average historic patch size was 481 acres, with 12 percent of the patches between 100 and 300 acres, only three percent were less than 100 acres.

On north and east aspects at the lower elevations, Douglas-fir and western larch dominated the stands, along with ponderosa pine. Some stands had a substantial component of lodgepole pine.Low-intensity underburns and mixed-severity fires occurred at much the same frequency as on south exposures, however, due to higher moisture levels on north slopes, underburns were less extensive and stand densities were higher. Stand-replacement fires were more common on north aspects due to increased fuel accumulations and understory densities. In many cases these stand-replacing fires would burn the entire north aspect, changing to an underburn or mixed-severity fire when they spread into lower fuel conditions or other aspects.

On all aspects there were areas where understories developed into thickets of dense Douglas-fir. Mixed-severity fires created mosaics of uneven age stands and even-aged stands with individual and groups of surviving trees. This provided structural and habitat diversity within stands, and created conditions that were necessary for stands to regenerate.

Root disease (*Armillaria ostoyae*) and the Douglas-fir beetle were the major forest health disturbance factors. Root disease mortality occurred in small, discontinuous pockets, affecting mostly Douglas-fir. This discontinuous distribution of root disease was due to a combination of the relatively wide spacing of trees resulting from repeated low-intensity burns, and from a moderate-to-heavy component of western larch and ponderosa pine, which are relatively resistant to root disease. Mortality resulting from Douglas-fir beetle attack was generally scattered, affecting mostly the older, decadent Douglas-fir. Occasionally, high levels of mortality may have occurred in denser stands, which had a high component of mature Douglas-fir. Brown cubical root and butt rot (*Polyporous schweinitizii*) was scattered throughout the Dry Forest, acting mostly as a butt rot and weak root pathogen that rarely caused direct mortality, but often lessened the vigor of older Douglas-fir, predisposing them to a bark beetle attack that eventually killed the tree.

VRUs 5 and 7 (Moist Forest – Warm/Moist Biophysical Setting) – The Moist Forest type occurred along benches and stream bottoms (VRU 5) consisting of a variety of tree species including western larch, western white pine, Douglas fir, Engelmann spruce, western red cedar, lodgepole pine, and in lower, moist subalpine areas (VRU 7), and consisted mostly of various mixtures of western larch, lodgepole pine, Douglas-fir, subalpine fire, and Engelmann spruce, with western white pine, western red cedar, and western hemlock also occurring in a few areas. Stand densities range from park-like to densely stocked. The characteristic disturbance regime of these forest types is a mixed-severity fire every 40-90 years followed by stand-replacing fires every 100-200 years. Mixed-severity fires often maintained open stands of western larch for 200 or more years (USDA Forest Service 1998). Stand-replacing fires were the result of a combination of dry weather conditions and heavy fuel buildups that occurred from a mixture of normal tree mortality and disturbance-caused mortality (e.g. past fires, windthrow, insects, and disease). The fire pattern resulted in heavy tree mortality and the development of large, mostly even-age stands consisting of scattered, large diameter western larch and Douglas-fir that survived the fire.

Patch sizes ranged from 50 to 5000 acres or larger; generally larger than those created by past timber harvest due to administrative (NFMA) limits on opening size. Triepke (2001) found that in the moist forest type the average historic patch size was 632 acres, with eight percent of the patches between 100 and 300 acres. Only two percent were less than 100 acres.

Infrequent but extensive stand-replacing fire is the primary ecological process that drives patch size in the moist and cold VRUs. Mixed-severity fires are the primary process that developed the reference stand structure, particularly the structure of old growth stands dominated by western larch (USDA 1998).

Root disease occurrence and distribution in the Moist Forest type was dependent on the occurrence of susceptible species such as Douglas-fir, grand fir, and subalpine fir. If these species did not compose a substantial component of the site for a generation or two, then root disease would occur only in isolated patches. If these species were a major component for one or two generations, then large root disease centers would develop and in some cases the root disease colonies would merge. In the Decision Area, root disease levels in the Moist Forest type appear to be low, indicating that these sites have been largely dominated by the more root disease-resistant species such as western larch, western white pine, and Engelmann spruce. Brown cubical root and butt rot were scattered throughout the Moist Forest type, weakening trees, but rarely causing direct mortality. These pathogens often lessen the vigor of older Douglas-fir, predisposing them to bark-beetle attack.

A number of bark beetles played important roles in the Moist Forest type. Mountain pine beetle (*Dendroctonus ponderosae*), spruce beetle (*Dendroctunus rufipennis*), and western balsam bark beetle (*Dryocetes confusus*) were the most impactive over the Fortine Ranger District. Mountain pine beetles were the most aggressive of these, with periodic epidemics killing most of the lodgepole pine (8-inches diameter at breast height and larger or over 70-years old) in affected areas. Outbreaks of spruce beetle would cause moderate-to-high mortality in stands heavily stocked with larger diameter Engelmann spruce. These spruce beetle outbreaks were often precipitated by windthrow, which allowed the beetle populations to increase in the downed trees. Western balsam bark beetles were the major cause of mortality in subalpine fir, with infestations developing in trees weakened by drought, heavy tree competition or disease. Periodic outbreaks of all three bark beetles have occurred in the project area.

VRUs 9, 10, and 11 (Cold Forest – Subalpine Biophysical Setting) – The Cold Forest type occurred in the dry, cold, upper-elevations, and consisted mostly of various mixes of lodgepole pine, subalpine fir, and Engelmann spruce. Western larch and Douglas-fir were a minor component in some stands. In the project area, whitebark pine and subalpine larch occur at elevations typically above 6,200 feet. At higher elevations, areas of lighter and more open stocking occurred on rocky ridges. Mixed-severity fire was typical in these high-elevation stands with seral whitebark pine and subalpine larch as substantial components. Non-lethal underburns occurred at intervals of 50-70 years (Gautreaux 1999). Below 6,200 feet, stands were usually moderate-to-heavily stocked. Open forest conditions were uncommon due to the lack of frequent surface fires. The cool, dry conditions in this forest type favored stand-replacement fires at long return intervals of 120-500 years. These large-scale crown fires were a result of heavy fuel buildups that occurred from a mixture of normal tree mortality and disturbance-caused mortality (e.g. past fires, windthrow, insects, and disease). The fire pattern resulted in heavy tree mortality and the development of large, mostly even-age stands, usually single-storied but occasionally some larger-diameter western larch or Douglas-fir survived the fire and formed the upper story of a two-storied stand.

Patch size ranged from 100 to 5000 acres or larger, with most in the 1000-2000 acre size class (Gautreaux 1999). Naturally occurring patch sizes are generally larger than those created by past timber harvest due to administrative (NFMA) limits on opening size. Triepke (2001) found that in the cold forest type, dominated by lodgepole pine, the average historic patch size was 1255 acres, with three percent of the patches between 100 and 300 acres. Less than one percent of patches were less than 100 acres.

White pine blister rust has had a major impact on western white pine and whitebark pine. The effects of blister rust infection on whitebark pine seed production and establishment may be creating different patterns of succession than would historically occur. Bark beetles cause moderate-to-high mortality on lodgepole pine stands within these VRUs, which in turn impacts neighboring whitebark pine stands. This mortality causes higher fuel accumulations, thereby providing fuel for mixed-severity fires in these stands. Wildfire is generally low-to-moderate severity due to the lack of surface fuels in the highest elevation stands. In general, snow and wind damage and rockslides may be of more influence than fire in maintaining early stages of succession.

Affected Environment

This analysis has detailed how the diversity of forests can be described in the Northern Rockies and specifically in the Galton Vegetation Analysis Area. The diverse vegetative condition in these forests is a valuable resource in itself. It is also the habitat base for a variety of other species, a modulator of our hydrologic cycle, and a modifier of climate. (See other Chapter 3 analyses for information regarding these topics.)

Forest Health

Forest health has many aspects to it and can have varying definitions. Forest health can be thought of as conditions that result in a healthy sustainable forest. The Forest Health Protection Branch of the Forest Service defines a healthy sustainable forest as “a condition wherein a forest has the capacity across the landscape for renewal, for recovery from a wide range of disturbances, and for retention of its ecological resiliency while meeting current and future needs of people for desired levels of values, use, products, and services” (USDA Forest Service, 2003c).

Forest change caused by insects and diseases can range from the subtle to the dramatic. Changes in the forests of the Galton range have been both. The Forest Service annually conducts aerial detection surveys to monitor insect and disease conditions across the region. Maps from these flights and statistics generated from them were used to get an overview of forest health conditions in the Galton area.

Aerial detection maps from 2010 to present (see project file) show the Galton area to have more insect and disease activity than the rest of the Fortine Ranger District. In the lower elevations Douglas-fir beetle has been the predominant pest, killing pockets of trees. These areas of mortality are obvious to forest visitors observing the lower foothills of the range. Mortality generally occurs from the Dickey Lake area to the British Columbia border. Groups of 5-80 dead trees were mapped. Regionally, Douglas-fir beetle attacks have trended downward in the last few years but are still locally active. Extended dry summers and mild winters contribute to the continued beetle activity and subsequent tree mortality.

Western balsam bark beetle has been active in the subalpine fir component of the project area. Subalpine fir tends to inhabit the mid to upper elevations of the area. Pockets of mortality range from 5 to 200 trees. The heaviest concentrations of mortality occur from Deep Creek north to the

British Columbia border. Much of this mortality appears to be related to the extended warm, dry summers.

Mountain pine beetles were active in the area in the lodgepole component in the late 1980s into the mid-1990s. Currently there is limited mountain pine beetle activity in the lodgepole component. Even though there is little lodgepole being affected at this time, the last infestation killed substantial amounts of trees, radically changing the down fuel components in many stands. Examples of this are evident in the Gibralter ridge area and the Ksanka face area visible from Eureka.

Current mountain pine beetle activity is occurring in whitebark pine. Whitebark pine inhabits the highest elevation portions of the project area. This increased beetle activity at the higher elevations has been attributed to mild winters and extended summer droughts. Current whitebark pine mortality is mapped in pockets ranging from 5 to 200 trees. Areas most heavily impacted are the upper elevation portions east and west of Therriault lakes, areas between Camp Creek and Wam Creek, upper portions of the area between Drip and Foundation Creeks and also the ridge between Stahl and Clarence drainages.

White pine blister rust, an exotic disease introduced to the west coast in the early 1900s, is also currently causing mortality in whitebark pine. The combinations of mountain pine beetle, white pine blister rust, and encroachment of subalpine fir have all contributed to a loss of the whitebark pine cover type.

For historical perspective, this disease heavily impacted the western white pine in the mid-elevation portions of the Galton area in the 1950s and 1960s. Today, less than 10% of the original western white pine component still exists.

Vegetation and Disturbance Processes

The forests in the analysis area are composed of vegetation that occurs in diverse combinations and patterns of species, ages, sizes, shapes, and structure. These forests provide a multitude of social, biological, and ecological benefits such as wildlife habitat, livestock forage, timber products, firewood, berries, clean air and water, and a pleasing setting for human enjoyment. Disturbance processes play a major role in shaping forest vegetative conditions. In the analysis area, fire is one of the disturbance processes that have shaped vegetative patterns and diversity.

The existing condition for the Vegetation Resource in the Galton Project Area is the result of disturbances that have occurred through time, primarily insects and disease infestation, wildfire, and timber harvest. Fire suppression has also had a large effect on vegetation in the analysis area. Fire atlas records for the Kootenai National Forest (KNF) for the years 1908-1992 show 155 lightning-caused fires and 234 human-caused fires in or near the analysis area. Since the turn of the last century, the KNF experienced numerous extreme fire seasons including, 1910, 1930, 1940, 1967, 1973, 1979, 1984, 1988, 1991, 1994, 1998, 2000, 2003, and 2015. There is a high probability that, had suppression not occurred during these years, wildfires would have burned through substantial areas of the landscape as stand-replacement or understory/low-intensity surface fires.

Exclusion of most surface fires during the last 90 years, has allowed accumulations of dead and down fuels and vigorous undergrowth of small tree thickets, which now provide ladder fuels that could accelerate initiation of major crown fires in forest stands. This combination of surface and aerial fuels could greatly increase the risk of stand-replacement fires in dry years. The Northern Region Overview identified this condition as resulting in a reduction in the “western larch cover

type and emergent structure due to the lack of low-intensity, periodic disturbance, and a shift toward stand-replacing fire, with associated loss of wildlife habitat for some species." Much of this cover type that still exists is "at risk" for loss by stand-replacing fire (USDA Forest Service 1998a). Additionally the Analysis of the Management Situation for the Revision of the Kootenai and Idaho Panhandle Forest Plans (USDA Forest Service, 2003b) states that strategies need to be developed to restore wildlife habitat provided by the western larch cover type. Although regionally this forest type is decreasing, much of this "at risk" emergent western larch still exists in the analysis area.

High stocking densities occur in a number of stands in the analysis area. These cause excessive inter-tree competition that result in stress-related mortality, which in turn increases fuel loads and the risk for stand-replacing fire. In addition, crown fires occurring in densely stocked stands spread faster than crown fires occurring in less dense stands (Graham, McCaffrey, and Jain, 2004; Scott and Reinhardt, 2001; Pollet and Omi, 2002).

In August of 2015, the lightning caused Marston fire burned on the face of Mount Marston between Deep Creek drainage and the Stillwater river drainage. The fire burned approximately 7,550 acres; 7,268 of which are forested acres on National Forest system lands. An estimated 3,470 acres (47%) are believed to have mortality that exceeded 70%. These high severity areas are primarily concentrated at the higher elevations, generally at the head ends of drainages, although some 5-50 acre pockets are located across the entire Marston face. Cones from western larch, true fir, and serotinous lodgepole have survived the fire. These are scattered across the entirety of the fire area and will provide a seed source for these openings. At the highest elevations within the whitebark pine habitat the fire burned at a high severity, but it created fingers of intermixed burned and unburned. There is a component of mature whitebark pine within the unburned stringers. An estimated 1,330 acres (18%) of the fire area burned in a mixed-severity, with an expected mortality of 50-70%. These areas are generally found at the mid-to-lower elevations. Seed by surviving adjacent ponderosa pine, Douglas-fir, western larch, Engelmann spruce, and lodgepole pine is expected to produce natural regeneration. The remainder, approximately 2,470 acres (33%), is expected to have less than 50% mortality. These are generally lower elevation areas that have fire regimes adapted to repetitive, low severity fire. Seasonality also affected the burn severity, as the season progressed, more low severity fire was noted across the landscape as temperatures were lower, moisture increased, and burn periods were shorter. Generally fire activity was surface fire with a short residence time that did not produce substantial stem or crown scorch.

During this same time period, the Barnaby fire was also ignited by lightning. This 56 acre fire was located in the Sinclair creek drainage. Fifty of those acres burned in a contiguous area, with an approximately 5 acre spot fire. All acres within the fire perimeter are thought to have mortality exceeding 50%, with 75% of acres exceeding 70% mortality. The fire backed down a steep slope, which is interspersed with avalanche chutes and scree. Surviving cones from serotinous lodgepole pine, true firs, and western larch are scattered throughout the fire area and will provide seed for natural regeneration. Though not as large as the Marston fire, the Barnaby fire provides important openings for wildlife and fuels reduction.

VRUs 2 and 3 (Dry Forest) - Four existing conditions differ from the reference conditions and prevent the attainment of Forest Plan desired conditions. These conditions are as follows:

1. Effective fire suppression has changed the species composition and stand structure in portions of the dry forest types. The stand structure has changed from an open park-like stand of large trees to a two or three-storied stand composed of a large widely

scattered overstory with a dense understory of smaller Douglas-fir. These high-density understories provide ladder fuels that increase the potential for wildfires to develop into stand-replacing crown fires rather than the low-intensity underburns that historically occurred on these sites. As overstory trees gradually die, the sites they occupy are being taken over by thickets of Douglas-fir. Large trees are unlikely to develop due to overstocked stand conditions. In addition, the dense understory competes with the larger overstory trees for nutrients and moisture, which stresses these larger older trees and predisposes them to insect and disease attack. These developing stands are substantially different from reference conditions where these sites were dominated by lower density large-diameter overstory trees, sustained through relatively frequent low-intensity fires.

2. A number of areas have experienced moderate-to-heavy Douglas-fir beetle mortality during the last 10 years. Fortine District aerial photos taken in 2005 and analysis of more recent Google Earth photography show Douglas-fir beetle mortality present in the lower elevation portions of the Galton Vegetation Analysis Area. This is largely due to high densities of mature Douglas-fir that predispose these stands to high levels of beetle attack coupled with extended drought. Bark beetle mortality is adding to fuels accumulations, which is contributing to fuels hazard.

3. High stocking densities occur in some stands. This condition is related to the above description of species composition, stand structure, and lack of mixed severity fire, but is more related to tree densities versus species and their arrangement. High stocking densities cause excessive inter-tree competition that result in stress-related mortality, which in turn increases fuel loads and the risk for stand-replacing fire. In addition, crown fires occurring in densely stocked stands spread faster than crown fires occurring in less dense stands.

4. Western larch was formerly a large component of the project area. A lack of disturbances, primarily from fire, is converting sites formerly dominated by western larch to sites dominated by Douglas-fir.

VRUs 5, 7, 9, 10, and 11 (Moist Forest and Cold Forest) – Four existing conditions in the Moist and Cold Forest types present forest protection and forest health concerns. As with the Dry Forest types, these existing conditions may differ from those found in the reference condition, and present forest health concerns preventing the attainment of Forest Plan desired conditions.

1. A buildup of surface and ladder fuels has occurred over most of the moist forest due to a combination of normal mortality, disturbance-induced mortality (e.g. windthrow, bark beetles, and root disease), and fire suppression. In a number of areas, this buildup could result in a large-scale stand-replacing fire if a fire start were to occur. Although large stand-replacement fires have historically occurred in this forest type, they are undesirable for a number of reasons: they destroy merchantable wood products and may result in substantial impacts to soils, aquatic resources, air quality, old growth, and other wildlife habitat. The mountain pine beetle epidemic in the late 1980s and early 1990s contributed substantially to these conditions by killing 30-60% of the lodgepole pine in many stands, resulting in extremely high surface fuel loads in some areas.

2. Fire suppression and exclusion combined with naturally occurring insect and disease cycles, and climate variations has resulted in a shift from mixed severity fires towards stand-replacing fires. Mixed severity fires developed and maintained a large

tree residual structure (emergent structure) where the overstory was dominated by large diameter seral species, particularly western larch (USDA Forest Service, 1998a). Much of this emergent structure still exists in the analysis area with many of these stands meeting the large tree criteria for old-growth as specified in Green and others 1992, errata corrected 12/2011. However this structure is at risk for a number of reasons: (a) a lack of mixed severity fires has resulted in a multi-layered structure with the understory composed of shade-tolerant species. These species compete with the large old overstory trees for moisture, nutrients, and crown space, lessening the vigor of the overstory trees: and (b) these shade-tolerant understory trees typically have full crowns that reach the surface. These full crowns serve as ladder fuels that enable surface fires to reach the crowns of the overstory trees. Fires that would normally be light surface fires or moderate mixed severity fires become stand-replacing fires that kill even the largest overstory tree; and (c) many of these emergent stands had a component of lodgepole pine that was killed in the mountain pine beetle epidemic in the late 1980s and early 1990s. This lodgepole pine mortality developed high fuel loads conducive to stand-replacing fires (USDA Forest Service, 1998a).

Suppression of surface fires has also resulted in a decrease of early-seral, fire-resilient tree species such as ponderosa pine, western larch, subalpine larch, and whitebark pine, and an increased amount of shade-tolerant, fire-intolerant and insect and disease-prone trees (USDA Forest Service, 2003a).

3. Douglas-fir beetle have been active on the Fortine Ranger District for many years. Populations of the beetles have been well above endemic levels for several years (see project file for Aerial Detection Survey Summaries for the Fortine Ranger District last five years). Much of this activity has been in the Galton Vegetation Analysis Area with specific locations in Indian and Grave Creek drainages. The occurrence of root disease-caused mortality has also increased. Long-term drought (prior to 2010 and 2011) in western Montana has added to the effects of root disease. In some cases, scattered root disease pockets are expanding. This is partly the result of increasing densities of root disease-susceptible Douglas-fir.

4. High stocking density of some stands is causing excessive inter-tree competition, which results in stress-related mortality. This high stocking density is due in part to lack of low-intensity, periodic disturbance. This increases fuel loads and the risk for stand-replacing fire (Graham et al, 1999; Scott and Reinhardt, 2001; and Pollet and Omi, 2002).

   High tree densities predispose stands to high levels of bark beetle attack and a number of areas have experienced moderate-to-heavy mortality during the last ten years as a result of Douglas-fir and western balsam bark beetle. A number of stands in the analysis area are at moderate-to-high risk of bark beetle attack because of high stand densities.

Vegetative Conditions Related to Past Harvest

Since the late 1950s, timber production has been a major land use activity on National Forest System Lands in the project area. Road building and salvage harvest continued into the 1990s in response to heavy mortality of lodgepole pine from the mountain pine beetle. State and private timber harvesting has also occurred throughout this period. These harvests were typically conducted in units that were forty acres or less in size, primarily to comply with the National

Forest Management Act. This resulted in a pattern across the landscape that does not represent the historic disturbance pattern where openings were typically larger in size (50-5000 acres).

The analysis area has received a low to moderate level of harvest over the last six decades (see Vegetation Table 1). These activities include a variety of management practices ranging from intermediate harvest (e.g. salvage, commercial thinning, etc.) to regeneration harvests (e.g. clearcuts, seedtree, shelterwood, etc.). Regeneration harvest has taken place across 9.8 percent of the analysis area. Intermediate harvest has taken place across 4.9 percent of the analysis area.

The harvest and conversion of mature mixed conifer stands has been the focus of silvicultural entries over the last thirty years.In areas where shade-tolerant species were the predominant type harvested, both artificial (planting) and natural reforestation has been used to increase the abundance of shade intolerant species (e.g. western larch), which have greater adaptability to fire. In some cases, mechanical scarification was used to reduce grass competition and create sites for newly planted seedlings.

Vegetation Table 1. Harvest History of the 127,380 Acre Galton Analysis Area

Decade	Acres of Regeneration Harvest	Acres of Intermediate Harvest
1940-1949	15	No records
1950-1959	3,938	450
1960-1969	4,484	609
1970-1979	1,514	2,208
1980-1989	1,845	736
1990-1999	746	557
2000-2010	17	1,741
Total Acres	12,559	6,301

Data source: FACTS database

Environmental Consequences

Direct and indirect effects on the vegetation resource are described below for proposed activities identified in Chapter 2. Cumulative effects were considered for all past, proposed, current, and reasonably foreseeable activities listed in Chapter 3 and are described at the end of this section.

Description of Measurement Indicators

Four indicators will be used to evaluate how the alternatives respond to vegetation areas of concern.

1. **Stocking Density** – The indicator used to measure the effects of different alternatives for this area of concern will be: **Acres of stands where stocking density is reduced, improving vigor of the stands and reducing surface and ladder fuels.**

   The need to address surface and ladder fuels and subsequent stand-replacement fires can be evaluated using this indicator.

   High stocking densities occur in a number of stands in the analysis area. These cause excessive inter-tree competition that result in stress-related mortality, which in turn increases fuel loads and the risk for stand-replacing fire. Indicators 1, 2 and 3 will

have some stands/acres that overlap. Stand densities would be reduced while favoring the larger structural component.

2. **Douglas-fir Beetle** – The indicator used to measure the effects of different alternatives for this area of concern will be: **the number of acres currently classified as having moderate-to-high Douglas-fir beetle hazard that would be manipulated to reduce this beetle hazard.**

Stand conditions have been identified that are most conducive to Douglas-fir beetle outbreaks (Gibson and Lockman, Fortine Insect and Disease Report, 2000). These conditions are:

a. Stands in which Douglas-fir is the predominant species and sites on which those stands are most commonly found (species composition). The higher the percentage of Douglas-fir in the stand, particularly in excess of 50-60 percent, the greater the susceptibility. Douglas-fir habitat types on south-facing slopes and drier ridges sustain more beetle-caused mortality than other types.

b. Age of Douglas-fir in the stand. As Douglas-fir reaches maturity, it slows in growth and is more susceptible to the beetle. Tree ages greater than 80 years are considered to be highly susceptible; beyond 120 years becomes extreme.

c. Size of Douglas-fir in the stand. Usually associated with age, stand susceptibility is also reflected in the size of host trees. Generally, the larger trees in the stand are the more susceptible. Trees less than 14 inches diameter breast height (DBH) are not as likely to be attacked and killed by Douglas-fir beetle.

d. Overall stand density.When stocking exceeds 80 percent of "normal" stocking for the site, susceptibility to attack increases substantially. The denser the stocking, which increases inter-tree competition and also provides cooler, more shaded environments, preferred by the beetle, the greater the probability of infestation. Typically, as stocking exceeds 150 square feet of basal area, susceptibility to the beetle increases as well.

Management activities that alter one or more of those stand conditions – species, size, composition, age or stocking – can reduce susceptibility to Douglas-fir beetle. All action alternatives contain different levels of intermediate harvesting. One of objectives with this type of harvest is to reduce Douglas-fir beetle risk.

Intermediate harvest would be used to affect a change in two of the four stand conditions mentioned above:

- The first and probably most important change would be an overall reduction in stand densities. Depending on the VRU and aspect, densities would be reduced to a target level of 60-120 square feet of basal area per acre. This would be accomplished by removing smaller diameter trees that generally occupy the lower portions of the tree canopies. Post harvest, the hottest, driest sites would represent the lower end of the basal area range, while the more moist sites would be near the higher end of the range.

- The second Douglas-fir beetle risk reduction method used would be lowering the overall species composition of Douglas-fir, leaving a higher composition of other species such as western larch.

- Overall stand ages would not be decreased by the proposed intermediate harvest. Actual average stand ages may increase slightly due to the proposed harvest targeting removal of the smaller/younger trees. The removal of trees in the smaller diameter classes would increase the average diameter of the stand.

3. **Sustainability of Shade Intolerant Species** – The indicator used to measure the effects of different alternatives for this area of concern are: **Number of acres treated with intermediate or regeneration harvests in stands where western larch, ponderosa pine, and/or western white pine is greater than 20% of the total stand basal area.**

   The Northern Region Overview identified the western larch cover type as "at risk" due to the lack of low-intensity, periodic disturbance and a shift toward stand-replacing fire, with associated loss of wildlife habitat for some species (USDA Forest Service, 1998a). Additionally, the Analysis of the Management Situation for the Revision of the Kootenai and Idaho Panhandle Forest Plans (USDA Forest Service, 2003b) states that strategies need to be developed to restore wildlife habitat provided by the western larch cover type. Arno et al. (1997) found that, prior to fire suppression, typical western larch old growth stands in Montana were open and park-like and were dominated by large diameter trees with a very light understory. Basal areas ranged from 60-160 ft2/acre, with most stands averaging 70-90 ft2/acre. Currently a majority of the stands in VRUs 2, 3, 5, and 7 that are dominated by an overstory of western larch and Douglas-fir contain an encroaching understory of subalpine fir, Engelmann spruce, and other shade-tolerant species. Basal areas in these stands currently range from 150-200+ ft2/acre. These conditions are considered to be moderate-to-high risk for stand-replacing crown fire. Western larch would be the preferred reserve tree species in all these treatments.

   The Northern Region Overview also identifies western white pine as "at risk" due to white pine blister rust, active bark beetle populations, root disease, and climate change. These agents are effectively eliminating most remaining western white pine. Planting blister rust resistant stock and pruning are essential to maintaining this productive tree. Historically western white pine depended on fire to create openings which stimulated western white pine regeneration. These sites would often be dominated by western white pine for 200+ years. Western white pine would be reserved on the site where appropriate and planting of rust resistant stock will occur.

4. **Sustainability of Whitebark Pine** – The indicator used to measure the effects of different alternatives for this area of concern will be: **Acres treated in stands with high whitebark pine component and reestablishment of whitebark pine post-treatment.** This measurement indicator will track the amount of area where whitebark pine has been treated through harvest and/or prescribed fire and the reforestation status to monitor and maintain this species into the future.

Direct and Indirect Effects Common to All Action Alternatives

Forest Health

Whether or not management actions are taken, insects and pathogens will continue to play their role in modifying forest vegetation. The overall number of acres affected by bark beetles is likely to begin a slow decline as populations begin to decrease. However, this is speculative and

somewhat tied to weather conditions (drought and mild winters) and stand disturbances such as fire or blowdown that can increase beetle populations. The Douglas-fir beetle is expected to continue to cause mortality in mature overstory trees in areas of higher densities and susceptible stand structure. It is anticipated that an increase in Douglas-fir beetle will occur in the three years following the Marston fire area. A portion of the area that burned in a low to mixed condition is within a Douglas-fir habitat type and are in a condition that is susceptible.

Forest health conditions are expected to be improved across the landscape through the implementation of any of the action alternatives. The treatments will result in stand conditions that are more resistant to insect and disease attacks due to reduced stand densities. Treated stands would be left in a conditions better able to withstand fire.

Vegetation and Disturbance Processes

The action alternatives have been developed to reduce existing fuel loadings present with in the treatment units, both through harvest methods and prescribed fire. These treatments would result in stands with reduced tree densities and reduced fuel loadings. The conditions within treated units would be less prone to stand-replacing events and more resilient to future insect and disease attacks. This assumes that fire suppression would continue and active forest management continues on its current trend.

Effects by Alternative – Direct and Indirect Effects

The proposed alternatives would manage forest ecosystems and improve forest health to varying degrees depending on the acres treated. Vegetation Table 2 provides a comparison of the acres of each proposed harvest treatment.

Vegetation Table 2. Harvest Summary by Alternative

Harvest Treatment	Regeneration Harvest Acres	Intermediate Harvest Acres (i.e. Improvement Cut/Commercial Thin)	Fuel Treatment (i.e. Mechanical Pretreatment/ Understory Thin) Acres	TOTAL ACRES
Alternative 1	359	1,419	302	2,080
Alternative 2 – No Action	0	0	0	0
Alternative 3	334	1,516	314	2,164

The alternatives differ in their response to the Purpose and Need for Action. Specifically, the alternatives differ quantitatively in the following aspects:

- Acres of stands where stocking density is reduced, improving vigor of the stands and reducing surface and ladder fuels. This would address the need for fuels management and creation of openings for browse development.
- Acres of Douglas-fir beetle hazard reduction. This would address the need for fuels management both inside and outside of the WUI.
- Acres of shade intolerant stands treated, increasing the sustainability of these stands. This would address the need to reintroduce fire onto the landscape as well as fuels management

- Acres of whitebark pine treated, increasing the sustainability of these stands. This would address the need to encourage the regeneration of whitebark pine.

Vegetation Table 3 displays the summary of vegetation objectives by alternative.

Vegetation Table 3. Summary of Vegetation Objectives by Alternative

Alternative	Acres of Stands Where Stocking Density Is Reduced	Acres of Douglas-Fir Beetle Hazard Reduction	Acres of Shade Intolerant Stands Treated	Acres of Whitebark Stands Treated
1	1,031	902	1,015	3,398
2	0	0	0	0
3	1,542	1,562	1,414	1,133

*Treatment objectives in some proposed units meet more than one of the measurement criteria that respond to the purpose and need. Therefore, total acres in the above table (Vegetation Table 3) exceeds total treatment acres listed in Vegetation Table 2.

Acres of stands where stocking density is reduced.

Intermediate harvesting would be the primary method of density reduction. In addition, fuel treatments (another form of intermediate harvesting) and occasionally regeneration harvesting would be used to reduce conifer densities. Intermediate harvesting would result in a fully stocked stand after harvesting. Depending on the VRU and aspect, densities would be reduced to target levels ranging from 60-120 square feet/acre. The hotter, drier sites would generally leave the lower end of the basal area range, while more moist sites would be left nearer the higher end of the range.

Planting blister rust resistant western white pine and pruning are essential to maintaining this productive tree.

Acres of Douglas-fir beetle hazard reduction.

Of the action alternatives, Alternative 3 proposes to treat the most acres of moderate to high Douglas-fir beetle hazard stands; Alternative 1 would treat the least.

Acres of shade intolerant stands treated.

The two action alternatives propose three different forms of treatment to help ensure the shade intolerant species are conserved and perpetuated. These treatments include intermediate and regeneration harvests. Intermediate harvest would be used to reduce high densities of trees and reduce ladder fuels. Shade tolerant conifers such as subalpine fir and Engelmann spruce would be targeted for removal. Regeneration harvest would be used to help create two-storied stands. Site preparation techniques that favor the natural and artificial regeneration of species such as western larch, western white pine, and ponderosa pine would be used (normally underburning, preferably in the fall if burning conditions allow). In addition to intermediate and regeneration harvests, Understory Thinning/Fuel Reduction and Prescribed Burn with Mechanical Pre-treatment would also be used to favor shade-intolerant species in those stands with a healthy component of western larch, western white pine, and ponderosa pine.

In regeneration harvests, 10-20 of the largest, healthiest western larch, Douglas-fir, and/or ponderosa pine trees per acre would be retained where available. These reserve trees would provide seed, shelter for regeneration, and wildlife benefits, in addition to leaving large diameter

trees on site for aesthetics. These reserve trees will become snags and down woody debris sometime in the future.

Comparing the action alternatives, as displayed in Vegetation Table 3, Alternative 3 treats the most shade intolerant stands, while Alternative 1 treats the least amount of western larch, ponderosa pine, and western white pine stands and conducts less intermediate harvesting. Alternative 2 proposes no harvesting. In the long-term, this would have a negative effect on western larch, ponderosa pine, and western white pine as the proportion of these species as cover types would slowly decline over many years as tolerant and mid-tolerant species take over the sites formerly dominated by these species.

Acres of Whitebark Pine Stands Treated

When comparing the action alternatives, Alternative 1 treats the most acres of historic and current whitebark pine habitat. Alternative 3 treats the least amount of acres. However, Alternative 3 includes planting of whitebark pine within areas burned in the 2015 Marston fire.

Opening Size Greater Than 40 Acres

The National Forest Management Act of 1976, Section 6 (g)(3)(F)(iv), establishes opening size limits according to geographic areas, forest types, or other suitable classifications. Regulations establish the size limit for harvest openings in the project area at 40 acres, with exceptions for larger openings when they will produce a more desirable combination of net public benefits (36 CFR 219.27 (d)(2)(i)). The action alternatives were designed to meet the purpose and need and trend toward Forest Plan Desired Conditions. The Northern Regional Guide (USDA Forest Service, 1983a, page 2-5A) provides for limitations on size and opening sizes for larger units created under Alternatives 1 and 3.

Vegetation Table 4. Opening Sizes Greater Than 40 Acres

Alternative	Unit #	Acres	Total Acres
Alternative 1	97 110 111 114	133 80 45 68	326
Alternative 3	110 111 114 133	80 45 68 56	249

Multiple issues drive the reasoning behind the request to exceed the 40-acre limit. These include: 1) insect, disease, fuels, and stocking considerations;2) wildlife habitat; and 3) economic considerations. Following is a brief description of these issues.

1.) Insect, disease, fuels, and stocking – Unit 97 was affected by mountain pine beetle in the 1980's and early 1990's. Portions of these stands are understocked due to insects and disease as well as the general age and condition of the trees. Continuous large fuels are present in this area due to past mountain pine beetle infestation, breaking up large blocks of fuels is consistent with Forest Plan direction. Unit 110, 111, and 114 are located within the WUI. Reducing aerial fuels within this zone is essential to

changing predicted fire behavior, thus creating a larger zone of modified fire behavior is beneficial to the project success.

2.) Wildlife habitat – Units 110, 111, 114, and 133 address big game habitat concerns, this subunit is underrepresented in forage habitat. These units were developed to create early successional stages and break up the continuous nature of the forest. This strategy also sets the future condition of creating large blocks of security habitat, creating more desirable interior habitat, and ensuring more available browse in the short-term.

3.) Economic considerations- All units address economic considerations such as by having units greater than 40 acres, it necessitates fewer roads and less road building needed on the landscape, reduced number of entries to accomplish the same goals, and fewer landings.

These regeneration harvest openings are necessary to meet project goals and objectives. The larger-than-40-acre harvest openings would emulate natural processes associated with a mixed severity/stand-replacement fire occurrence and be closer to desired conditions in size and effects. Shade-intolerant species, primarily western larch, would have sufficient light and other resources to grow vigorously. This would lead to more resilient forest stands with a trend toward maintaining forest health.

Salvage of Incidental Mortality from Underburning

Alternatives 1 and 3 would authorize salvage of mortality that occurred during fuel treatments. There are 16 criteria listed on page 14 of the FEIS that would need to be complied with prior to any salvage occurring. These criteria provide for the protection of resources and compliance with Forest Plan direction; therefore, salvaging incidental mortality would have no further effects to the forest vegetation resource. This activity would not occur under Alternative 2, so no effects would occur if Alternative 2 is selected.

Alternative 2 (No Action) – Direct and Indirect Effects

No prescribed burning, harvest treatments, or fuels reduction would take place under this alternative. Only natural processes except fire would occur within these stands and continue to affect forest succession and health. The condition of forest areas would change over time, with continuing mortality, declining growth, and wood decay as a result of insect mortality, in high-risk stands. For some species, this will create available growing space and increased growth. In many areas, this change will continue a trend whereby shade-tolerant species that are more prone to insects and diseases and are less fire-adapted replace shade-intolerant species that have adapted to the influences of fire and are generally less susceptible to insects and diseases. The No Action Alternative would not enable management of forests that encourages more resilient and sustainable forest conditions. The No Action Alternative would also not contribute to the purpose and need of managing forests that have the capacity for renewal and recovery from disturbances.

Disturbance Processes and Forest Health

The analysis area was identified with moderate to high levels of forest health concerns. However, many of these acres had overlapping health concerns (i.e. one stand can have both root rot and high Douglas-fir beetle hazard). None of these moderate-to-high hazard areas would be treated with this alternative. Trees currently impacted by bark beetles would not be treated in this alternative, and numerous stands that contain western larch, ponderosa pine, whitebark pine, and western white pine that require some type of restoration treatment to be maintained on the landscape would not be initiated.

The following section details vegetation and forest health challenges that are expected to occur under the no action alternative.

Dry Forest Types (VRUs 2 and 3)

If vegetation development continues without a disturbance event (e.g. harvest, wildfire) these stands would continue their trend toward a higher representation of Douglas-fir at the expense of western larch and ponderosa pine, which require disturbance to maintain their presence. This trend would continue to reduce the forage potential for wildlife, would not promote the maintenance of ponderosa pine and western larch, and would not move toward a more open stand structure that is better suited to the re-introduction of fire as an ecosystem process.

Stands with a substantial Douglas-fir component would continue to increase in density and become older – two characteristics that increase their susceptibility to Douglas-fir beetles. Without fires or associated management actions that disturb portions of the landscape, the extent and intensity of insects and pathogens would increase and result in a community that is less resilient. These consequences may lead to a reduction in site quality and continued shift in species composition.

The no action alternative, coupled with continued fire exclusion, would increase the numbers of snags due to continued natural decadence.

Cool-Moist and Cold Forest Types (VRUs 5, 7, 9, 10, and 11)

In comparison with many of the other habitat settings, the influence of no action and continued fire exclusion on vegetation in many moist landscapes is less evident in the short term. This is because the fire-free intervals have historically been longer. Moist sites such as this are characterized as having mixed severity and infrequent stand-replacement fires within a range that is similar to recent historic levels. However based on fire history research and recent wildfire experiences on the Kootenai National Forest in 1994, 2000, and 2015 it is expected that no action and continued suppression of ecologically important mixed severity fire would eventually promote larger stand-replacing fires than typical, particularly as forest homogeneity increases and higher stand densities persist. The influence of no action on age class distribution is minimal in the short term.

No action and continued fire suppression would continue to move species diversity toward a greater proportion of mid-tolerant and shade-tolerant species, which are not as adapted to fire. Many of these sites with long interval fire cycles are becoming fairly decadent and overmature. Insect and disease problems can become more substantial as forest conditions age, particularly with mountain pine beetles and balsam bark beetles. No action in this area would not provide the opportunity to restore western larch, western white pine, and whitebark pine to characteristic levels that are considered more resilient, better adapted to fire, and with a greater degree of tolerance to root disease, bark beetles, and climate change.

In the near future, the stands at risk to insect and disease problems would likely be those currently in overstocked conditions where tree vigor is typically low. As a result, overall landscape diversity could be reduced for some time due to less age class diversity and more fuels continuity. Western larch, western white pine, and whitebark pine would be at risk of being killed in stand-replacement fires due to heavy beetle generated down fuel loads and fill-in of shade-tolerant species over the years. This would decrease the amount and distribution of these species on the landscape.

With no action and continued fire exclusion, snag habitat and downed woody debris would increase in most mature stands as decadence occurs and older age classes develop. Historically, multi-storied old growth forests were located in these moist settings and maintained by succession and disturbance regimes. No management in this forest type foregoes an opportunity to promote growth and provide a more suitable condition for providing future old growth replacement in site-specific areas. Without the thinning mechanism of fire or selective harvest, many stands would not achieve the structural attributes or trend towards old growth forest conditions.

Climate Change

Of all the ongoing and foreseeable future actions that have the potential to affect forest vegetation in the Galton Vegetation project area, climate change is likely to be the single most important factor. The effects of climate change will likely combine with some of the effects that result from implementing the alternatives to produce cumulative impacts.

The potential effects (and uncertainties) that climate change may have on forest vegetation on the KNF are summarized in the KIPZ Climate Change Report (USDA Forest Service 2010). In general, given the existing condition of the forest vegetation in the Galton Vegetation project area, the potential effects of climate change can be summarized as:

- Increased mountain pine beetle outbreaks in lodgepole pine and whitebark pine in relatively high elevation forests and a decrease a low-mid elevation;
- Increase in western pine beetle/mountain pine beetle mortality in ponderosa pine during droughts or otherwise under moisture stress;
- Increased root disease mortality and mortality from insects/disease during times of moisture stress;
- Longer fire seasons with more frequent large fires and more annual area burned; and
- Increase in water balance deficit.

The alternatives analyzed would generally add to the potential effects from climate change as noted above. For all alternatives, the effects from climate change would be offset in those areas where vegetative treatments occur.

Whether it is invasive species (i.e. white pine blister rust), drought, uncharacteristic wildfire, elevated insect and disease levels, unusually high forest densities, or some other agent or combination of agents that serves to stress trees and forest ecosystems; recent research suggests that climate change will likely exacerbate those stressors and “stress complexes” will continue to manifest themselves (Littell et al. 2010, McKenzie et al. 2009).

Cumulative Effects

The cumulative effects are a compilation of all past, current, and reasonably foreseeable actions that have the potential to affect the planning area and are listed in Chapter 3. The activities identified that have the potential to affect the Vegetation resource are discussed below. The results of past activities are described in the section titled “Summary of Existing Condition” below. The impacts of current and reasonably foreseeable actions are added to the effects described in the direct and indirect effects section below. The sum of all these effects is the cumulative effects.

Bounds of Analysis

The Galton Vegetation analysis area is the boundary for cumulative effects for the vegetation resource. This is because direct vegetation treatment effects occur only on the actual area treated. Effects of the vegetation treatment will cross the bounds of time into the future and is analyzed for future projects. However, the effects of the vegetation treatment on a specific treatment area will not be affected by those occurring on another.

Summary of the Effects of Past Actions on the Existing Condition

Past actions, along with wildfires have led to the current condition of vegetation. Past regeneration harvest, limited to openings of 40 acres or less, has led to patch sizes that are smaller than desired conditions. Fire suppression, in some portions of the project area, has led to increased stand density and an increase in percentage of shade tolerant trees. This increased stand density and increase in shade tolerant trees has lessened the vigor of the shade intolerant trees that tend to be fire-tolerant and disease/insect-resistant tree species. Young shade tolerant trees and increased stand density also put normally fire-tolerant trees at risk by increasing ladder fuels and canopy bulk density, two conditions that make it easier for a ground fire to become a stand-replacing crown fire. A shade intolerant tree at particular risk is western larch. The Northern Region Overview identified the western larch cover type as “at risk” due to the lack of low-intensity, periodic disturbance, and a shift toward stand-replacing fire, with associated loss of wildlife habitat for some species (USDA Forest Service 1998).

Summary of Direct and Indirect Effects of the Action Alternatives on the Existing Condition

Alternative 1 would increase the percentage of disease/insect-resistant tree species on 902 acres, reduce stocking density, improve tree vigor, and reduce ladder fuels on 1,031 acres, restore shade-intolerant species on 1,015 acres, and treat whitebark pine on 3,398 acres.

Alternative 3 would increase the percentage of disease/insect-resistant tree species on 1,562 acres, reduce stocking density, improve tree vigor, and reduce ladder fuels on 1,542 acres, restore shade-intolerant species on 1,414 acres, and treat whitebark pine on 1,133 acres.

Effects of Current and Reasonably Foreseeable Actions

Vegetation Management and Fuels Reduction Activities - These activities trend the site-specific portions of the Analysis Area toward an improved condition. The 40 acres of natural fuel underburning would increase the percentage of fire-tolerant trees on the underburned acres. The pile burning on 90 acres will reduce surface fuels and create a more sustainable condition as the stand develops. Any blowdown salvage conducted would be done under the appropriate analysis. The effects described above would be the same for Alternatives 1, 2, and 3.

Forestwide Young Growth Vegetation Management - The Forestwide Young Growth Vegetation Management project would treat approximately 400 to 600 acres annually, dependent on funding, using precommercial thinning or commercial thinning treatments. Stands proposed for treatment are second growth stands and would be subject to a number of criteria before they were determined eligible for treatment. The Forestwide Young Growth Vegetation Management project 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 Galton Vegetation project and help to maintain the trajectory of these forest conditions towards a desirable future condition.

Ten Lakes Travel Management - The Ten Lakes Travel Management Project will address over-snow and mechanized travel planning for the Ten Lakes area. The area affected by the proposal includes the Ten Lakes WSA and areas with common entrance points to the WSA. There are three main over-snow entrance points to the Ten Lakes WSA: the Grave Creek corridor; Clarence and Stahl Creek; and the Burma/Blacktail area. Over-snow travel is currently not limited. Mechanized use (primarily mountain bicycles) is also currently unrestricted. The alternatives contained in the Ten Lakes Travel Management Draft Environmental Impact Statement contain various amounts of over-snow and mechanized travel for the project area. A final decision has not been made for this project and the cumulative effects analysis utilizes the Proposed Action as the basis for the analysis in the Galton Vegetation Management Project. The cumulative effects of the Ten Lakes Travel Management Project in conjunction with past, present, reasonably foreseeable actions would result in no measurable effects for the forest vegetation resource due to no vegetation management activities being proposed with this project.

Cattle Grazing – For Alternatives 1, 2, and 3, the major effect of cattle grazing is soil compaction (see soils discussion) and the occasional browsing and trampling of seedlings. Damaging seedlings is a setback to reforestation. A small amount of browsing and trampling have minimal effect. Evaluation of damage must be done to determine if more substantial measures need to be in place, such as placing netting around seedlings to protect them.

Noxious Weed Treatment – For Alternatives 1, 2, and 3, the noxious weed treatment would reduce the amount of non-native invasive plants on the treated areas. This is beneficial to the vegetation resource as it frees resources for native vegetation to use.

Fire Suppression –For Alternatives 1, 2 and 3, fire suppression would continue the current trend away from Forest Plan desired conditions for vegetation. Control of wildfires is expected to contribute to accumulations of dead and down fuels, and the vigorous undergrowth of small tree thickets that could accelerate initiation of major crown fires in forest stands. This continued increase of live and dead fuels would greatly increase the risk of stand-replacement fires in dry years. This activity would not contribute to achieving desired stand conditions. Fire suppression would allow stand densities to increase in the areas affected by fire suppression. The implementation of Alternatives 1 or 3 would somewhat ameliorate the effects of future fire suppression. The implementation of Alternative 2 (No Action), and future fire suppression would cumulatively result in the accumulations of ground and ladder fuels, and an increase in fire-susceptible tree species. This increase in fuels and fire-susceptible trees would greatly increase the risk of stand-replacement fires in dry years. Western larch stands would remain at risk for stand-replacing crown fire.

Road Management - For Alternatives 1, 2, and 3, the major effect road management would have on vegetation is the clearing of vegetation along road right-of-ways. Considering the low frequency and small percentage of area that this activity occurs on the affected area would not have a substantial effect on the composition or structure of the vegetation in the analysis area.

Recreation Maintenance –For Alternatives 1, 2, and 3, developed recreation sites and trails make up a small percentage of the project area's acreage, maintenance activity on these sites would not have a substantial effect on the structure and composition of vegetation within the analysis area, because minimal hazard trees would be removed during these maintenance activities.

Special Uses – For Alternatives 1, 2, and 3, special uses in the analysis area affect less than one percent of the project area's land base. There are 26 special use permits within the Project Area.

The majority of these permits are for roaded access to private lands with the remainder of the permits allowing for water transmission lines, and outfitter and guide activities.Therefore, special uses would have no measurable effect on the structure and composition of vegetation in the analysis area.

Public Use – For Alternatives 1, 2, and 3, firewood and Christmas tree cutting and berry picking generally occur within 200 feet of open roads. Most firewood cutting occurs on the uphill side of the road. Because only dead trees would be cut for firewood, this activity would have little effect on the structure and composition of live vegetation within the Analysis Area (refer to wildlife analysis for effects to snags). Christmas tree cutting will have minor impacts on the resource as live trees are removed from the forest. These are generally along roadsides and will reduce aerial fuels on travel corridors. Non-commercial berry picking would not injure the berry producing vegetation and would have no effect on the structure and composition of vegetation in the project area.

Private Property – For Alternatives 1, 2, and 3, actions on private property would not have a direct effect on the structure and composition of vegetation on Forest Service lands in the analysis area. This is because direct vegetation treatment effects occur only on the actual area treated. Indirect effects may include windthrow due to edge effect if a property owner clears their land. At this time 2 residences per year and no subdivision development is estimated. This will have a minimal impact on the vegetation resource.

Other Agency – For Alternatives 1, 2, and 3, activities (grazing and golf course lease) occurring on State of Montana Trust Lands will not have an impact on the structure and composition of vegetation in the Analysis Area. Use (driving, parking, and hiking) by Department of Homeland Security would not negatively affect the resource.

Cumulative Effects Finding

There could be cumulative effects associated with past actions, as these have contributed to the existing distribution, structure, and species composition. Past regeneration harvest, limited to openings of 40 acres or less, has led to patch sizes that are smaller than reference condition. Fire suppression in some portions of the Analysis Area, has led to increased stand density and an increase in the percentage of shade tolerant trees. This increased stand density and increase in shade tolerant trees has lessened the vigor of shade intolerant trees that tend to be fire-tolerant and disease/insect-resistant tree species. Young shade tolerant trees and increased stand density also put normally fire-tolerant trees at risk by increasing ladder fuels and canopy bulk density, two conditions that make it easier for a surface fire to become a stand-replacing crown fire. Current and reasonably foreseeable vegetation management and fuel reduction activities are ameliorating these conditions. Thinning and underburning will reduce stand density and increase the percentage of fire-tolerant, disease/insect-resistant trees. The cumulative effect of the activities proposed by Alternatives 1 and 3, combined with the past, current and reasonably foreseeable actions would be a trend toward the desired condition expressed in Chapter 1. Alternative 2 would not contribute to a positive trend toward the desired condition.

Consistency with Regulatory Framework

State and Federal Laws, Regulations, and Policy

- **The Forest and Rangeland Renewable Resources Planning Act of 1974:** Action alternatives have been developed that maintain productivity and improve soil and water resources. Design criteria have been developed to ensure compliance with this law.

- **The National Forest Management Act (NFMA) of 1976**: See below:Consistency with National Forest Management Act for full discussion.
- **The Endangered Species Act (ESA) of 1973:** Requires federal agencies to conserve threatened and endangered species.
- **Executive Order 13112:** Design criteria have been developed to ensure that invasive species are not spread through management action. See the Weeds section for further discussion.
- **FSM 2670.22:** The preferred alternative will comply with USFWS regulations regarding species viability and habitat needs for threatened and endangered species. The proposed actions do not compromise habitat necessary to support these populations. Design criteria have been developed to ensure compliance.

Consistency with the National Forest Management Act

The National Forest Management Act and the implementing of regulations require specific findings to be made when implementing the Forest Plan. Those finding include the following:

A. Suitability for Timber Production – Harvest units proposed on suitable lands have been reviewed by a Certified Silviculturist and determined that they are located on suitable lands and capable of being regenerated within five years of timber harvest.

B. Clearcutting and Even-aged Management – Forest Plan direction favors use of even-aged silvicultural systems with the Management Areas proposed for harvest in this assessment. The ID team and the Silviculturist have determined that prescribing even-aged systems on specified units is appropriate. The decision path for this rationale is displayed in the project file. Most of the target stands for regeneration harvest units would result in two-storied stands, yet would be considered even-aged. Clearcutting is proposed under all action alternatives.

C. Vegetative Manipulation – The National Forest Management Act provides that timber harvest and other silvicultural practices shall be used to prevent damaging population increases of forest pest organisms and treatments shall not make stands susceptible to pest-caused damage levels inconsistent with management objectives. Harvest of trees provides social and economic benefit, reduces potential losses attributed to insects and diseases, and manipulates forest vegetation to enhance wildlife habitat or meet associate objectives. The silvicultural prescription that directs the vegetative management process is designed to meet Forest Plan goals, objectives, and guidelines for forest productivity and wildlife habitat improvement while achieving ecosystem-based management.

Improvement harvest and commercial thinning are proposed for some stands in order to improve tree vigor of the desired leave trees and maintain or enhance plant diversity. NFMA provides for these treatments where they increase the growth rate of residual trees, favor commercially valuable species, favor species valuable to wildlife, or achieve some other multiple use objectives.

D. Regeneration Potential – The National Forest Management Act specifies, “timber would be harvested from National Forest system lands only where there is assurance that such lands can be adequately stocked within five years after final harvest” (16 USC 1604). Determination of adequate stocking is based on reforestation surveys conducted within a five-year period following harvest or site preparation. Results of these stocking surveys are compared with the desired and minimum levels identified

in a site-specific silvicultural prescription written for each treatment area. Restocking is considered satisfactory when the harvest area contains the minimum number, distribution, and species composition of vegetation specified in the prescription.

The Kootenai National Forest and Fortine Ranger District regeneration data demonstrates that proposed harvest sites can be adequately restocked within five years from the time of harvest, and that proposed activities would be expected to comply with the Forest Plan (See Vegetation Table 5). Regeneration survey records on the KNF have been analyzed for each VRU affected by proposed units in this project. A regional report (Regeneration Time Frame Report) in the district's Field Sampled Vegetation (FSVeg) database was used to obtain reforestation success results. Numbers from this report were summarized below with the results displayed in the project file.

Vegetation Table 5. Regeneration Success – Percent of Stands Restocked within 5 Years

Vegetation Response Unit (VRU) Group	Kootenai National Forest		Fortine Ranger District	
	Artificial**	Natural**	Artificial	Natural
Dry Forest (VRUs 1, 2, 3)	89%	96%	79%	95%
Moist Forest (VRUs 5 and 7)	92%	97%	84%	97%
Cold Forest (VRUs 9, 10, 11)	92%	98%	89%	97%

**Natural regeneration is renewal by self-sown seed or by vegetative means. Artificial regeneration is renewal by sowing or planting, generally used when timely natural regeneration is not expected to occur or when it is desirable to change species.

The data shows that harvest sites are highly likely to be adequately restocked within five years of the proposed time of harvest.

Forest Plan Direction

Accordingly, the Kootenai Forest established vegetation management direction with the Forest Plan. The Forest Plan addresses this under the Forest-wide management direction and states in its goals 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."

"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."

Action Alternatives – Alternatives 1 and 3

All proposed treatments in all action alternatives are consistent with the Forest Plan standards for timber management and meet or exceed the standards and guidelines for vegetative management.

Forest Plan direction provides that timber management activities would be the primary process used to minimize the hazards of insects and disease and would be accomplished by maintaining stand vigor and diversity of plant communities and tree species.

All action alternatives were designed to meet all Forest Plan standards.

No Action – Alternative 2

A decision not to provide silvicultural treatment would not contribute to the sustainability of the forests within the analysis area nor would it meet the purpose and need of this project. High stand densities of fire-intolerant species and increasing ladder fuels have some potential negative considerations. Without fuel abatement through harvest, excessive natural fuels accumulate and would likely lead to higher long-term fire suppression costs. Without prescribed fire, the Forest Plan goal of simulating natural ecological processes, creating habitat diversity for wildlife, and maintaining ecosystems would not be realized. Additionally, the maintenance of diverse age classes would be limited to that which presently exists.

A loss in economic value would occur as dead, dying, or mature lodgepole pine is left. Without stand improvement activities or removal of high-risk host tree species, additional mortality from bark beetles is likely to occur. Alternative 2 is not consistent with the Forest Plan desired condition of reducing the impact of insects and disease such that they cause less tree mortality (USDA Forest Service, 2015). The No Action alternative would not move the existing forest conditions within insect-killed areas towards the desired conditions identified by the ID Team. Stand productivity would be below optimum following a natural succession pattern. Ingrowths of shade-tolerant species would continue to occur and reduce our ability to manage for seral fire-adapted species. Restoration of western white pine and western larch on moist cover types and of whitebark pine on cold cover types would not occur.

In summary, the proposed project is consistent with the goals, objectives, and standards and guidelines for all forested vegetation and timber guidance set forth in the Forest Plan. Refer to the following:

Forest Plan Forest Vegetation Desired Conditions, Objectives, and Guidelines

FW-DC-VEG-01. Many treatment areas were designed to increase early seral species, while reducing the presence of late seral species.

FW-DC-VEG-02. Movement of stands towards the larger size class occurs as a very slow process. Intermediate harvests are proposed by this project. These treatments are designed to reduce competition within stands, thus giving the remaining fully stocked stand additional resources to develop.

FW-DC-VEG-04. Intermediate harvests are part of all alternatives. These treatments are designed to reduce tree densities, generally retaining early seral species. Canopy layers are generally reduced by removing the lower layers to reduce likelihood of crown fire initiation.

FW-DC-VEG-05. All action alternatives include timber harvest and ecosystem burning as treatment opportunities. Treatment specifications are dependent upon the site-specific objectives of each treatment however one of the over-riding goals will be to increase diversity in the patch size, composition and structure across the Galton landscape.

FW-DC-VEG-06. All action alternatives have developed treatments that include site specific objectives of reducing Douglas-fir beetle risk, reducing susceptibility to root disease fungi, and

reducing impacts of white pine blister rust. Methods include reducing stocking, planting with resistant stock, and converting stands to less susceptible species.

FW-DC-VEG-07. Snags are recognized as a very important component of a healthy ecosystem. Snags are evaluated on a site specific basis in each treatment area, based on the factors listed in the Forest Plan. The action alternatives should increase the presence of snags across the landscape.

FW-DC-VEG-08. Down woody material is recognized for its important role in ecosystems. Down woody material is retained on site in all treatment areas as Forest Plan guidelines recommend.

FW-DC-VEG-09. Whitebark pine has been listed as a candidate species for listing under ESA. Action alternatives include treatments such as ecosystem burning, planting, precommercial thinning, and pruning to retain and restore whitebark pine within the Galton ecosystem.

FW-DC-VEG-11. All action alternatives include treatments which include site specific objectives that will move the biophysical groups toward desired conditions for composition and structure. Primarily treatments will occur in the Warm/Dry and Warm/Moist biophysical settings.

FW-OBJ-VEG-01. All action alternatives include treatments that will assist the Forest in meeting these targets. Different alternatives better meet this Objective than others.

FW-GDL-VEG-03. Down woody material is recognized for its important role in ecosystems. Down woody material is retained on site in all treatment areas as Forest Plan guidelines recommend.

FW-GDL-VEG-04. Snags are recognized as a very important component of a healthy ecosystem. Snags are evaluated on a site specific basis in each treatment area, based on the factors listed in the Forest Plan. The action alternatives should maintain or increase the presence of snags across the landscape. Harvest operations sometimes result in snags being felled to alleviate safety concerns or are lost to the post-harvest fuel treatments. Additional green trees are left during harvest operations to help replace those existing snags that may be lost as part of the harvest effort. Prescribed fire both creates and removes snags from the landscape.

FW-GDL-VEG-05. Snags are recognized as an important component of a healthy ecosystem. Snags are evaluated on a site specific basis in each treatment area, based on the factors listed in the Forest Plan. The action alternatives should increase the presence of snags across the landscape, because harvest units would retain snags or designate snag replacements and underburning and ecosystem burning would create snags.

FW-GDL-VEG-06. Individual snags that fall are generally retained on site as down woody debris. Site specific exceptions can occur, such as a blowdown event, these are evaluated on a case by case basis and recommended down woody debris will be retained on site.

FW-GDL-VEG-07. Whitebark pine has been listed as a candidate species for listing under ESA. Action alternatives include treatments such as ecosystem burning, planting, precommercial thinning, and pruning to retain and restore whitebark pine within the Galton ecosystem. Treatments will be evaluated on a site-specific basis by a certified Silviculturist.

FW-GDL-VEG-08. All action alternatives manage forest vegetation. Site specific methods and objectives are determined by the IDT during the NEPA process and then written into a silvicultural prescription by a certified Silviculturist.

FW-DC-TBR-01. Action alternatives include regeneration harvest, intermediate harvest, salvage of dead and dying trees, fuels reduction thinning and excavator piling. The intent is to offer these opportunities in a competitive market. All treatments have been designed with multiple resource objectives.

FW-DC-TBR-02. Timber harvest is part of all action alternatives and as such is scheduled as part of the ASQ. These treatments have been prescribed in a site-specific manner for reasons such as reducing stocking, increasing seral species, reducing insect and disease risk, reducing fuels in the WUI, and create a diversity of patch size, composition and structure across the landscape.

FW-DC-TBR-03. Timber harvest in allowable areas is part of all action alternatives. These treatments are designed to either, reduce insect and disease risk, increase seral species, or reduce stocking density. Additionally intent of the vista treatments is to increase the scenic integrity of the area.

FW-DC-TBR-04. The action alternatives included in this project will allow the district to offer some timber volume to be sold. This will assist the Forest in meeting this Objective.

FW-OBJ-TBR-01. The action alternatives included in this project will allow the district to offer some timber volume to be sold. This will assist the Forest in meeting this Objective.

FW-STD-TBR-01. All action alternatives include timber harvest on lands suitable for timber production.

FW-STD-TBR-02. This document discusses the alternatives that include over 40 acre harvest created openings. Additionally the Forest Service requires an approval process for over 40 acre openings. This will occur concurrently with the NEPA.

FW-STD-TBR-03. See analysis above regarding meeting NFMA. It is determined that following current Kootenai and Forest Service procedures that restocking within 5 years is reasonable.

FW-STD-TBR-04. CMAI was used as a determining factor when analyzing stands for regeneration harvest. There is potential that stands or portions of stands that do not meet CMAI are included as part of an alternative. These meet the additional criteria determined in the Forest Plan.

FW-STD-TBR-05. Treatments have been prescribed to meet objectives set forth in Chapter 1 of this document. Such objectives include reducing fuels within the WUI, reducing insect and disease risk, and creating a diversity of patch size, composition, and structure across the landscape. The appropriate harvest system to meet these objectives was selected after site-specific objectives were determined.

FW-STD-TBR-07. Even-aged treatments are included as part of all action alternatives. These treatments have been prescribed for reasons including insect and disease risk mitigation, increasing seral species, and reducing stocking density.

FW-GDL-TBR-01. Timber harvest in allowable areas is part of all action alternatives. These treatments are designed to either, reduce insect and disease risk, increase seral species, or reduce

stocking density. Additionally intent of the vista treatments is to increase the scenic integrity of the area.

MA6-DC-VEG-01. All action alternatives have human activity including timber harvest, fuels reduction thinning and excavator piling, underburning, and/or ecosystem burning. These treatments are intended to emulate an ecological process or function that is integral to that ecosystem, thus they should trend the site towards a desired condition.

MA6-DC-TBR-01. Timber harvest occurs on lands that have been designated as allowed or for production.

MA6-STD-TBR-01. Timber harvest is part of all action alternatives and as such is scheduled as part of the ASQ.

MA6-STD-TBR-02. Timber harvest in allowable areas is part of all action alternatives. These treatments are designed to either reduce insect and disease risk, increase seral species, or reduce stocking density. Additionally intent of the vista treatments is to increase the scenic integrity of the area.

Old Growth

Introduction

As illustrated in the 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. 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 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. Managing forestwide vegetation composition, structure, pattern, and process within HRV (GOAL-VEG-01), including managing to increase old growth habitat, is part of the 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 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.

Regulatory Framework

The regulatory framework pertaining to old growth is summarized below. For additional information, please refer to the Regulatory Framework in the Old Growth Project File.

State and Federal Law, Regulation, and Policy

- **USDA Forest Service Position Statement on National Forest Old-Growth Values 10/11/89** – Recognizes the many values associated with old growth forests, such as biological diversity, wildlife and fisheries habitat, recreation, aesthetics, soil productivity, water quality, and industrial raw material. Old growth on the national forests will be managed to provide the foregoing values for present and future generations. Decisions on managing existing old growth forest to provide these values will be made in the development and implementation of forest plans. These plans shall also provide for a succession of young forests into old growth forests in light of their depletion due to natural events or harvest.
- **The National Forest Management Act (NFMA) of 1976:** "It is the policy of the Congress that all forested lands in the NFS shall be maintained in appropriate forest cover with species of trees, degree of stocking, rate of growth, and conditions of stand designed to secure the maximum benefits of multiple use sustained yields. Plans developed shall provide for the diversity of plant and animal communities based on the suitability and capability of the specific land area in order to meet the overall multiple-use objectives, and within the multiple-use objectives."

Forest Plan

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 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 wildfire, drought, insects and disease, and potential climate change effects. The size of the old growth stands or patches 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.

Data Sources, Methods, Assumptions, Bounds of Analysis

Management of old growth on the KNF is based on direction in the Forest Plan. Additional management considerations and characteristics of old growth and stand attributes necessary for a stand to be considered old growth are also discussed and summarized Green et al (1992) and Pfister et al (2000). That information is incorporated by reference.

Data sources to identify old growth stands include District files and surveys, the KNF old growth GIS layer developed from stand-level old growth inventory that is aggregated and summarized at the Forest scale, and the Forest Inventory and Analysis (FIA) data that collects and reports data at the Forest scale. Field verification of old growth stands was completed using stand exams with snag plots.

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 and subalpine 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 and subalpine 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.

The analysis boundary for project impacts is the Galton analysis area. Cumulative effects to old growth are analyzed at the Forest level.

Affected Environment

Existing Condition

Existing conditions are a result of historic timber harvest and wildfires (Map 10). The effects of historic human and natural disturbances are discussed in the Vegetation section of this document. GIS and old growth surveys have inventoried approximately 19,065 acres of old growth and recruitment old growth within the Galton analysis area. See Map 14, for location of mapped old growth stands within the analysis area. Old Growth Table 1 and Table 2 summarize the mapped old growth and includes the acres being managed for recruitment old growth in Galton analysis area, the Tobacco Geographic area, and the Kootenai National Forest.

Old Growth Table 1. Mapped Old Growth Acres on NFS Lands in the Galton Analysis Area, Tobacco Geographic Area and Forestwide

	Galton	Tobacco GA	Kootenai NF
Total Area (Acres)	170,300	370,000	
NFS Administered Lands (Acres)	127,380	264,240	2,219,100
Old Growth (Acres)	17,419	42,405	217,278
Recruitment Old Growth (Acres)	122	1,247	104,927
Unknown (Acres)	1,557	1,557	14,703
Total OG (Acres)	**19,065**	**45,209**	**336,909**

Stand Structure and Composition

Effective old growth stands support the habitat conditions described in “Old Growth Forest Types of the Northern Region” (Green et al 1992). Eight old growth types are described for the Kootenai National Forest. These adopted old growth definitions are specific to forest type (dominant tree species) and habitat type group and are defined by a minimum number of trees, a minimum age and diameter, in stands with a minimum density.

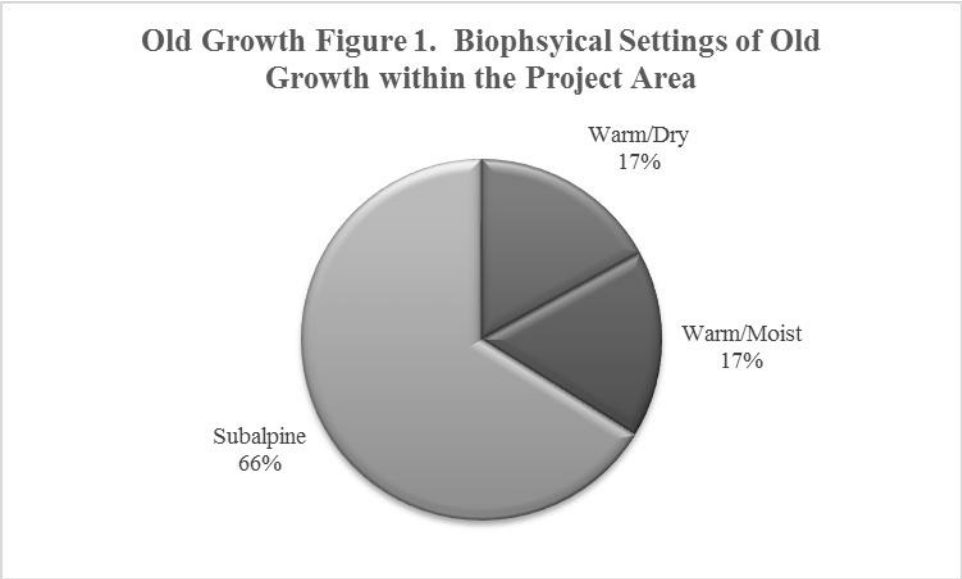
Old growth stands throughout the analysis area are composed primarily of old and large western larch, ponderosa pine, Douglas-fir, and spruce; though some other species do account for old growth in the higher elevations, such as lodgepole pine and subalpine fir.

Recruitment old growth stands have many old growth characteristics, but do not currently meet the definition of old growth as defined by Green et.al. These stands are being managed with the goal of meeting that definition in the future.

The Forest Plan directs old growth management to occur regardless of Management Area (MA) designation. The old growth information is managed and stored as a separate GIS layer and managed using the FSVeg and FSVeg Spatial databases.

Old Growth by Biophysical Setting

Old Growth Figure 1 shows the breakdown of the old growth stands within the project area by biophysical setting.



Old Growth Figure 1. Biophysical Settings

Old Growth Table 2 shows the distribution of old growth by biophysical setting and vegetation response unit. Old growth is well distributed across the vegetation types and by elevation. These mapped old growth stands represent ourcurrent knowledge of conditions in the analysis area, recognizing that these areas and their boundaries may change due to natural events such as windstorms, epidemic insect infestations, and stand replacement fires. Over time additional stands will contribute to the mapped old growth as they meet the old growth attributes that are described by Green et. al. (1992). Forest-wide projections for this are made in the Forest Plan FEIS.

Old Growth Table 2. Existing Old Growth Distribution by Biophysical Setting/VRU on NFS Lands in the Galton Analysis Area

Biophysical Setting	VRU	VRU (Acres) of all lands within Galton analysis area	Effective old growth (Acres)	Recruitment old growth (Acres)	Unknown old growth (Acres)	Total old growth (Acres) by VRU	Total old growth (Acres) by biophysical setting
Warm/Dry	**1**	235	0	0	0	0	3,334
	2	26,934	1,916	117	265	2,298	
	3	15,623	896	0	140	1,036	
Warm/Moist	**4**	172	86	0	0	86	3,052

Biophysical Setting	VRU	VRU (Acres) of all lands within Galton analysis area	Effective old growth (Acres)	Recruitment old growth (Acres)	Unknown old growth (Acres)	Total old growth (Acres) by VRU	Total old growth (Acres) by biophysical setting
	5	5,436	2,870	6	96	2,966	
	6	0	0	0	0	0	
Subalpine	**7**	56,206	10,731	0	949	11,680	12,708
	8	372	105	0	0	105	
	9	22,032	632	0	108	740	
	10	20,776	183	0	0	183	
	11	2,123	0	0	0	0	

Warm/Dry

In old growth within the warm/dry biophysical setting (VRUs 1-3), 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.

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 30-85 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 species on most sites and other species such as western white pine, lodgepole pine, Engelmann spruce, and western redcedar 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.

Subalpine

In old growth within the subalpine biophysical setting (VRUs 7-11) 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. Whitebark pine is found at the uppermost elevations within the project area. Fire exclusion has resulted in a loss of seral species due to high stand densities and lack of mixed severity fires.

Patch Size

Within the Galton Vegetation project area there are a total of 19,065 acres of mapped old growth and recruitment old growth in block sizes ranging from 4 to 6,435 acres in size. Of these 74 blocks, 60 (80%) are greater than 50 acres in size. These varying patch sizes provide a range of old growth habitat conditions supporting diverse species needs. Smaller patch sizes provide important habitat components for species requiring both old forest structure for roosting and/or nesting and early seral stages for foraging and "may act as stepping-stones for dispersal of many species associated with the specific environmental conditions throughout the landscape"(Morrison, et al. 1992 85).

Environmental Consequences

Old Growth Table 3 displays a comparison of effects to old growth habitat by alternative. These criteria are displayed under each alternative. The existing condition for the analysis area is shown under Alternative 2 (No Action).

Old Growth Table 3. Summary of Measurement Criteria to Evaluate Effects to Old Growth

Impacts	Indicator/Measure	Alternative 1 (Acres)*	Alternative 2 (Acres)	Alternative 3 (Acres) *
Old Growth Structure	Acres of surface/ladder fuels and canopy bulk density reduction in the warm/dry biophysical setting	754	0	476
	Acres of surface/ladder fuels and canopy bulk density reduction in the warm/moist and subalpine biophysical setting	289	0	28
	Acres no longer meeting minimum old growth criteria due to proposed treatments	0	0	0
Old Growth Species Composition	Acres treated to promote early seral species in the warm/dry biophysical setting	754	0	476
	Acres treated to promote early seral species in the warm/moist and subalpine biophysical setting.	289	0	28

Old Growth Resistance and Resilience	Acres of proposed harvest in old growth	0	0	12
	Acres of proposed fuels treatments in old growth	821	0	476
	Acres of proposed harvest in recruitment potential/unknown old growth	0	0	0
	Acres of proposed fuels treatments in recruitment potential/unknown old growth	224	0	17

(*) numbers in columns are not cumulative

Direct and Indirect Effects

Alternative 2 - No Action

This alternative would have no direct effect on old growth. The conditions for all measurement criteria (see Old Growth Table 3) 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 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 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 Galton Vegetation 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 Galton Vegetation project by not managing towards a characteristic forest structure, historic fuel loadings, and historic species composition.

Effects of Alternatives 1 and 3

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. (1992) old growth definitions. Based on 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, Fule et al. 2012). Additionally past projects on the Kootenai National Forest have been designed and implemented to maintain old growth attributes while treating excess fuel accumulations. In particular, on the Fortine Ranger District, the Fortine project had intermediate treatments in old growth that maintain the number of large trees and reduced the threat of potential wildfires reaching lethal intensities.

Management actions resulting from implementing Alternatives 1 or 3 would maintain the current levels of mapped old growth. Proposed treatments are designed to maintain desired old growth attributes described by Green et al. (1992). Management activities (removal of ladder fuels, prescribed fire) are proposed in multiple units (See Old Growth Table 4). The focus of old growth treatments is within the dry site cover types and south and west facing slopes. The purpose of these treatments is to lessen the threat of stand removal by wildfire and insects, maintain the integrity of the stand by lessening understory competition, and favor large diameter trees. The outcome would be the maintenance of all old growth tree structure, function and health in the treated areas. All other proposed treatments, not listed in Table 4, do not contain mapped old growth at this time. In addition as described under the No Action alternative above, many stands across the project area should continue the trajectory towards attaining old growth attributes, thus moving the project area towards FW-DC-VEG-03.

Alternatives 1 and 3 would authorize salvage of mortality that occurred during fuel treatments. There are 16 criteria listed on page 14 of the FEIS that would need to be complied with prior to any salvage occurring. These criteria provide for the protection of resources and compliance with

Forest Plan direction; therefore, salvaging incidental mortality would have no further effects to the old growth resource. This activity would not occur under Alternative 2, so no effects would occur if Alternative 2 is selected.

Old Growth Table 4. Proposed Old Growth Treatment by Unit and Alternative

Unit	Treatment Type	Alt 1 OG Acres/ Total Acres	Alt 3 OG Acres/ Total Acres	VRU of OG	Biophysical Setting of OG	Dominant Cover Type	Would Condition Improve?
12	Understory Thin	69/101	69/101	2S	Warm/Dry	PP/DF	Yes
13	Underburn	50/1035	0/0	7S	Subalpine	DF/WL	Yes
14	Underburn	75/213	0/0	7S/5S	Warm/Moist	DF/WL	Yes
16	Underburn	352/778	133/400	3	Warm/Dry	PP/DF/WL	Yes
19	Underburn	2/244	4/232	7S	Subalpine	DF/WL	Yes
22	Underburn	31/300	0/0	7S	Subalpine	DF/WL	Yes
24	Underburn	21/191	0/0	7S	Subalpine	DF/WL	Yes
50	Underburn	274/530	274/421	2S	Warm/Dry	PP/DF/WL	Yes
52	Underburn	104/108	0/0	7S	Subalpine	DF/WL	Yes
59	Underburn	4/68	3/57	7S	Subalpine	DF/WL	Yes
81	Underburn	14/255	0/0	3S/7S	Warm/Dry	PP/DF	Yes
93	Underburn	42/162	0/0	2S	Warm/Dry	PP/DF	Yes
104	Understory Thin	2/18	2/18	7S	Subalpine	DF/WL	Yes
105	Understory Thin	3/3	0/0	3	Warm/Dry	DF/WL	Yes
118	Commercial Thin	0/0	11/51	7N	Subalpine	DF/WL/LP	No
310	Underburn	0/0	8/8	7N	Subalpine	DF/WL	Yes

Alternative 3 proposes 11 acres of commercial thinning (unit 118) within a subalpine biophysical setting that after ground review would not enhance the old growth characteristics. These 11 acres could be removed from the proposed treatment in the Selected Alternative, leaving the remainder of the treatment unit intact.

Anticipated effects of prescribed fire within old growth include a temporary reduction in vertical structure including shrubs, reduction in down woody debris, snag loss and snag creation, and slight alteration of microclimate (e.g. soil moisture, penetration of sunlight, change in herbaceous layer, etc.). Silvicultural prescriptions and prescribed burning plans will be designed not to

modify the characteristics beyond meeting the appropriate Green et al. (1992) definition of old growth.

No new roads or temporary roads would be constructed through old growth stands in any action alternative. Access to most proposed treatment units is already in place for all action alternatives and only a few temporary roads and skid trails within the proposed units would be necessary to implement vegetation treatments. During project implementation, access to treatment areas would be restricted to the general public. No additional effects to old growth are anticipated other than those previously disclosed in the Alternative 2 discussion and within the discussion of Snag Resources.

Ground disturbing activities in or adjacent to old growth may result in noxious weed invasion. The project design includes measures to reduce this potential risk (e.g. washing equipment, weed spraying).

Salvage of Incidental Mortality from Underburning
Alternatives 1 and 3 would authorize salvage of mortality that occurred during fuel treatments. There are 16 criteria listed on page 14 of the FEIS that would need to be complied with prior to any salvage occurring. These criteria provide for the protection of resources and compliance with Forest Plan direction; therefore, salvaging incidental mortality would have no further effects to theold growth resource. This activity would not occur under Alternative 2, so no effects would occur if Alternative 2 is selected.

Climate Change - Climate change scenarios vary, but under simulations of warmer and drier, the Forest Plan FEIS (2013) displays the results of two methods that were analyzed and both showed increases in predicted old growth, even with management action, wildland fire, and insects and disease.

Cumulative Effects

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, western white pine and whitebark 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 and subalpine fir regeneration. This condition applies to many of the treatment units proposed in the Galton Vegetation 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. Old stands were likely harvested on private lands in the valley bottoms as well.

The road system on the Forest and District expanded from the 1950s to the 1980s. This impacted old growth stands by harvest or loss of snags within 200 feet of open roads from firewood cutting. Management for grizzly bear has restricted vehicle traffic on many roads since the 1990s. The

reduction in motorized access has reduced the impacts on snags within old growth stands adjacent to open roads.

Contrasting Effects of Proposed Actions with Past Actions

As contrasted with past timber harvest (pre 1980's), where large old growth trees and other old growth attributes were lost, the Galton Vegetation project does not propose any treatments that would modify the characteristics of the stand to the extent the stand would no longer meet the Green et al. (1992) definition of old growth. The objectives of the proposed activities within old growth is to increase the resistance and resiliency of the stands to disturbances and stressors.

Summary of Direct / Indirect Effects of Action Alternatives on Existing Condition

Alternatives 1 and 3 propose treatments in old growth. Briefly these include slashing to remove ladder fuels or growth site competition, and prescribed burning to reduce fuel loadings. No road building through old growth is proposed.

Effects of Current and Reasonably Foreseeable Actions

Following is a brief analysis of all current and reasonably foreseeable activities listed in Chapter 3.

Vegetation Management - Foreseeable Little Feet Harvest, Little Feet Fuels, and Ant Flat Maintenance Burn will not contribute to the cumulative effects on old growth because they are outside of any areas. Private lands in the Galton Vegetation analysis area were assumed to not provide any old growth based on past harvest practices. Pre-commercial thinning, tree planting, and blowdown harvest are activities that by their very nature do not take place within old growth.

The action alternatives, in combination with other current and reasonably foreseeable actions Chapter 3 should increase the level of old growth across the project area over time, thus meeting FW-DC-VEG-03.

The Forestwide Young Growth Vegetation Management project would treat approximately 400 to 600 acres annually, dependent on funding, using precommercial thinning or commercial thinning treatments. Stands proposed for treatment are second growth stands and would be subject to a number of criteria before they were determined eligible for treatment. The Forestwide Young Growth Vegetation Management project would not have negative impacts for existing old growth as all proposed future treatments are in second growth stands.

Ten Lakes Travel Management - The Ten Lakes Travel Management Project will address over-snow and mechanized travel planning for the Ten Lakes area. The area affected by the proposal includes the Ten Lakes WSA and areas with common entrance points to the WSA. There are three main over-snow entrance points to the Ten Lakes WSA: the Grave Creek corridor; Clarence and Stahl Creek; and the Burma/Blacktail area. Over-snow travel is currently not limited. Mechanized use (primarily mountain bicycles) is also currently unrestricted. The alternatives contained in the Ten Lakes Travel Management Draft Environmental Impact Statement contain various amounts of over-snow and mechanized travel for the project area. A final decision has not been made for this project and the cumulative effects analysis utilizes the Proposed Action as the basis for the analysis in the Galton Vegetation Management Project. The cumulative effects of the Ten Lakes Travel Management Project in conjunction with past, present, reasonably foreseeable actions would result in no measurable effects for the old growth resource due to no proposed changes to the old growth resource.

Cattle Grazing - Grazing cattle may find thermal (cooling) shelter within any available (non-fenced) old growth stands, there is usually little forage value for cattle to be found in old growth so impacts are expected to be minimal.

Noxious Weed Treatment - In general, noxious weed treatments have beneficial impacts on old growth by removing or at least controlling weed invasion, thus favoring native plant species associated with various old growth types. On occasion, individual native plants and shrubs may be accidentally treated with herbicides. However, this impact is typically minimal due to application methods (hand spraying and or pulling). There will be continued efforts to control the spread and/or introduction of noxious weeds and all control efforts will comply with the KNF Invasive Plant Management ROD (2007).

Fire Suppression - In the event of a wildfire, construction of fire lines, helispots, and safety zones could potentially result in impacts to old growth habitats. Suppression activities are typically subject to input from District Resource Advisors, and protection of special habitats, including old growth, is considered. However, if cumulative effects to old growth habitat result in the habitat no longer functioning as old growth, then old growth habitat would be sought according to Forest policies.

Road Management - Road management actions such as road maintenance and administrative use associated with permit administration, data collection, and monitoring of NFS lands are not likely to impact old growth or because they generally do not result in vegetation removal. The standing tree and snag component would only be affected if considered a hazard to road users.

Recreation Maintenance - Routine maintenance of trails and developed and dispersed recreation sites could involve the harvest of snags or blowdown that pose a hazard to users when adjacent to old growth stands. However, the scale of the impact would be small and not measurable as a cumulative effect to this element of old growth or associated species.

Special Uses - Most special use permits issued by the Forest Service involve property right-of-ways whether for access or utilities. These right-of-ways do not typically occur through established old growth and they generally follow existing road prisms or ditches, therefore, the continuance of these special use permits would have no additional measurable impact on old growth or associated species.

Public Use - Of the types of public uses listed in Chapter 3, the removal of forest products is the most likely use that could add to the cumulative impact on old growth or associated elements. Forest product removal can include Christmas tree cutting, bough and cone collecting, and firewood gathering. Of these, firewood gathering has the greatest potential to impact old growth through the removal and damage of snags, which many old growth cavity associated species make their homes. The anticipated impact on this component of old growth is disclosed under the snag resource section.

Private Property - There are several areas and types of old growth immediately adjacent to private lands within the Galton Vegetation analysis area. Although most activities on private lands can only be surmised, any regeneration timber harvesting that may occur on private lands adjacent to old growth can be expected to have similar effects as those described previously under vegetation management. Likewise, any prescribed burning occurring on private lands adjacent to old growth that escape control can be expected to impact old growth stands or at least associated elements of old growth such as understory removal or snag loss/creation.

Other Agency - State of Montana Trust Lands: The allowance of continued grazing in Section 36 is expected to have similar impacts on old growth as those described above if old growth is present. The land use license granted to Indian Springs Golf Course would not contribute to cumulative effects on old growth due to its physical separation from any old growth stands. No other known actions within state lands will contribute to the cumulative effect on old growth due to the types of actions (e.g. tree planting).

The Department of Homeland Security (Border Patrol) and Forest Service Law Enforcement routinely utilize the road and trail infrastructure available on Forest lands. This use is typically passive and therefore not altering forest vegetation. On occasion, down or hazardous trees may be removed by law enforcement personnel but these actions would not have measurable impacts to any species or their habitats.

Consistency with Regulatory Framework

State and Federal Laws, Regulations, and Policy

USDA Forest Service Position Statement on National Forest Old-Growth Values 10/11/89: Biological diversity, wildlife/fisheries habitat, recreation, aesthetics, soil productivity, water quality and raw materials are qualities of old growth that are considered under this analysis. The objectives of the proposed activities within old growth are to increase the resistance and resiliency of the stands to disturbances and stressors. In addition areas of recruitment old growth have been determined and are developing into future old growth opportunities. This project follows current Forest Plan direction for old growth on the Kootenai NF.

- **The National Forest Management Act (NFMA) of 1976:** Alternatives are consistent with the Forest Plan.

Forest Plan Direction

Kootenai National Forest Old Growth Goals, Desired Conditions, Guidelines, and Objectives

FW-DC-VEG-03: This project maintains the current levels of old growth found within the analysis area. . Alternatives 1 and 3 are designed to increase the resiliency of stands to disturbance and stressors through mechanical and prescribed burning methods. Mapped old growth is distributed across the analysis area.

FW-DC-WL-11: Treatments in Alternatives 1 and 3 have been designed not to modify the old growth characteristics beyond meeting the Green et al. (1992) definition of old growth. Therefore the Galton Vegetation project was designed in accordance with this desired condition.

FW-STD-VEG-01: Treatments in Alternatives 1 and 3 have been designed not to modify the old growth characteristics beyond meeting the Green et al. (1992) definition of old growth. Therefore the Galton Vegetation project was designed in accordance with this standard.

FW-GDL-VEG-01: Treatments in Alternatives 1 and 3 have been designed not to modify the old growth characteristics beyond meeting the Green et al. (1992) definition of old growth. Therefore the Galton Vegetation project was designed in accordance with this guideline.

FW-GDL-VEG-02: No permanent or temporary roads are being constructed within old growth in this project.Therefore the Galton Vegetation project was designed in accordance with this guideline.

Snags and Coarse Woody Debris

Introduction

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 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.

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), and performs many physical, biological, and chemical functions in forest ecosystems. 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.

Regulatory Framework

The regulatory framework pertaining to snags and coarse woody debris is summarized below.

Forest Plan

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, on page 13 of the Forest Plan, displays a desired range of snag densities. Over time, the number of large-diameter snags (20 inches in DBH or greater) increases in all biophysical settings.

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.

FW-DC-WL-12: Trees and snags greater than 20-inch DBH are available throughout the Forest.

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.

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.

FW-GDL-VEG-03: Vegetation management activities should retain the amounts of coarse woody debris (including logs) that are displayed in Table 3 of the Forest Plan (page 19). 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.

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 (Forest Plan, page 20). 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.

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, western larch, and western red cedar; and
- Favor snags or live trees with existing cavities or evidence of use by woodpeckers or other wild life.

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.

FW-GDL-SOIL-02: Coarse woody debris is retained following vegetation management activities per FW-GDL-VEG-03.

Affected Environment

Snags

In order to quantify and describe the existing snags in the Galton Vegetation 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 (Forest Plan p. 80-83). The KNF and the project area are represented by three Biophysical Settings (warm/dry, warm/moist, and subalpine). For biophysical settings and how they correlate to VRU's see the Vegetation section. 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, VRU 1-3) 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, VRU 4-7) 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 and due to the high productivity of these sites also have large tree growth, which become snags when killed by stand replacing fires. Finally the subalpine habitat type (subalpine biophysical setting, VRU 8-11) 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 areas contains a lot of area without road access, particularly in the warm/moist and subalpine biophysical settings, that is further away from town, and therefore likely to have medium to high snag densities. Also the 2015 Marston fire area will have very high snag densities.

Coarse Woody Debris

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 application of the 1987 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.

Environmental Consequences

Direct and Indirect Effects

Alternative 2 - No Action

Alternative 2 is the No Action alternative – under which no prescribed burns, tree harvest, fuels reduction, or other management related activities would take place. Only natural processes and fire suppression would occur within these stands. This alternative does not contribute to the purpose and need for the project.

The effects of Alternative 2 – No Action provide a baseline from which to compare the action alternatives. The following trends were discussed in detail in the existing condition and are summarized below. These trends would continue under a no action scenario.

- Snags and coarse woody debris would continue at current levels in the short term.
- With continued fire suppression and lack of active management, the indirect effects of this alternative would include the loss of preferred snag species, such as western larch.
- 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 the reduction of dense understory, through natural or human caused disturbance such as fuels reduction, tree thinning, and/or fire, the development of large diameter trees would continue to decline.
- If high severity fire occurs due to the uncharacteristic fuels conditions then much of the existing CWD would either be consumed by fire or would be altered to a condition much less usable by wildlife.

Effects of Alternatives 1 and 3

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 or 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 fuel 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 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. 2005). Snag/CWD Table 1 shows the recommended number of snags by biophysical setting. These recommendations will be incorporated into the site specific silvicultural prescriptions. Design criteria have been developed specifying 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. See Chapter 2 for design criteria.

Alternatives 1 and 3 would authorize salvage of mortality that occurred during fuel treatments. There are 16 criteria listed on page 14 of the FEIS that would need to be complied with prior to any salvage occurring. These criteria provide for the protection of resources and compliance with Forest Plan direction; therefore, salvaging incidental mortality would have no further effects to the snag and coarse woody debris resource. This activity would not occur under Alternative 2, so no effects would occur if Alternative 2 is selected.

Snags/CWD Table 1. Snag and Snag Recruitment Levels to retain (where they exist) after Vegetation Management Activities (including Post-harvest activities), by Harvest Type

Dominance Group	Biophysical Setting	Snags >15"+ DBH	Live Trees >15.0" DBH
Ranges per Acre where Treatments result in a Seed/Sap Size Class (e.g. 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	1.5-2.2
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. Snags/CWD Table 2 displays the Forest Plan desired levels of CWD which will be incorporated into the silvicultural prescriptions.

Salvage of Incidental Mortality from Underburning

Alternatives 1 and 3 would authorize salvage of mortality that occurred during fuel treatments. There are 16 criteria listed on page 14 of the FEIS that would need to be complied with prior to any salvage occurring. These criteria provide for the protection of resources and compliance with Forest Plan direction; therefore, salvaging incidental mortality would have no further effects to thesnag and coarse woody debris resource. This activity would not occur under Alternative 2, so no effects would occur if Alternative 2 is selected.

Climate Change - Under the influence of climate change it is predicted that wildland fires are likely to increase in frequency and area burned. In addition, the mortality from insects and disease is likely to increase. Due to these stressors it is anticipated that mortality of forest vegetation will increase across the landscape. This will increase the presence of snags and CWD over time. Alternatives 1 and 3 will have slightly less acres affected by this as vegetation treatments are designed to reduce the impacts of climate change, whereas Alternative 2 does not have vegetation treatments.

Snags/CWD Table 2. Levels of Coarse Woody Debris to Retain after Vegetation Management Activities for each Biophysical Setting

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” with at least 2 pieces >20” Length: >12’
	Moister Sites: 10-20		
Warm/Moist	12-33	20-30	Diameter: >12” with at least 10 pieces >20” Length: >12’
Subalpine	Moister Sites: 12-25	Moister Sites: 20-30	Diameter: >10” (8” for lodgepole pine) Length: >12’
	Drier Sites: 7-15	Drier Sites: 15-20	

Cumulative Effects

Summary of the Existing Condition

The cumulative effects area for this resource is the same as the project area and the temporal analysis includes all known activities and events that have affected or will affect the snags and coarse woody debris. These analysis boundaries are appropriate in order to disclose the conditions and trends of the vegetation and the effects to the resource 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 of vegetation to treatments.

Past Actions and their Effects on the Current Condition

As described previously in the effects section, wildfire, timber harvest, prescribed burning, pre-commercial thinning, and other management activities have had a direct influent on the existing species composition, age class distribution, and patch size of the current vegetation. Natural disturbances such as fire have been greatly reduced by fire suppression while other management driven activities have been more prevalent. For example, 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.

Contrasting Past Actions with the Proposed Activities

Implementation of harvest activities would affect the distribution and composition of vegetation in the project area to varying degrees (see Vegetation section). The distant past harvest activities did not leave snags or current recommendation for down woody debris or riparian area management. It also did not implement current BMP standards in part because these standards had not been developed yet. Some of these past actions resulted in negative consequences 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, coarse woody debris has become standard practices as our knowledge of the importance to maintain these features has increased with experience and research.

Effects of Current and Reasonably Foreseeable Actions

Following is a brief analysis of all current and reasonably foreseeable activities listed in Chapter 3.

Vegetation Management – Listed management activities comply with the Snag, CWD, and BMP standards that were present at the time the NEPA was signed. In the case of snags, this may be more stringent in some biophysical settings than the current Forest Plan requirements.

Forestwide Young Growth Vegetation Management - The Forestwide Young Growth Vegetation Management project would treat approximately 400 to 600 acres annually, dependent on funding, using precommercial thinning or commercial thinning treatments. Stands proposed for treatment are second growth stands and would be subject to a number of criteria before they were determined eligible for treatment. The Forestwide Young Growth Vegetation Management project would follow all Forest Plan guidelines and standards for meeting CWD and snags during the site specific analysis.

Ten Lakes Travel Management - The Ten Lakes Travel Management Project will address over-snow and mechanized travel planning for the Ten Lakes area. The area affected by the proposal includes the Ten Lakes WSA and areas with common entrance points to the WSA. There are three main over-snow entrance points to the Ten Lakes WSA: the Grave Creek corridor; Clarence and Stahl Creek; and the Burma/Blacktail area. Over-snow travel is currently not limited. Mechanized use (primarily mountain bicycles) is also currently unrestricted. The alternatives contained in the Ten Lakes Travel Management Draft Environmental Impact Statement contain various amounts of over-snow and mechanized travel for the project area. A final decision has not been made for this project and the cumulative effects analysis utilizes the Proposed Action as the basis for the analysis in the Galton Vegetation Management Project. The cumulative effects of the Ten Lakes Travel Management Project in conjunction with past, present, reasonably foreseeable actions would result in no measurable effects for the snags and CWD resource due to no vegetation management activities proposed in the project.

Cattle Grazing – Snags can be knocked over by cattle if they are decayed to a certain degree. Generally cattle stay out of areas that have high amounts of coarse woody debris. In some cases, if CWD is highly decayed, cattle foot action may degrade it to a point that it no longer qualifies.

Fire Suppression – Fire suppression has generally reduced the number of snags across the landscape, due to the fact that fires are not creating snags. Fire suppression also mechanically removes snags in areas to prevent injury. Fire suppression can increase the coarse woody debris, in that it does not burn up in wildfires. It can reduce coarse woody debris in the long term in that, snags created by fires do not fall down as CWD.

Recreation Maintenance – Snags are removed in developed recreation areas and along trails. Within developed recreation sites these are often removed by visitors for firewood. Along trails they generally remain and increase the coarse woody debris on the site.

Special Uses – Snags and coarse woody debris may be reduced depending upon the special use permit. These are site specific.

Public Use – Firewood gathering is a large impact on the snag and CWD resource. Generally few snags remain along open roads and seasonally open roads. This reduces future CWD.

Private Property – Snags and CWD are generally reduced as private property is developed within forested lands.

Other Agency - Other government entities must comply with their own standards for snag and CWD retention as well as Montana BMP regulations.

Consistency with Regulatory Framework

Forest Plan Direction

Kootenai National Forest Snags and Coarse Woody Debris Goals, Desired Conditions, Guidelines, and Objectives

FW-DC-VEG-07: Snags are recognized as a very important component of a healthy ecosystem. Snags are evaluated on a site specific basis in each treatment area, they are based on and comply with the factors listed in the Forest Plan. The action alternatives should increase the presence of snags across the landscape.

FW-DC-VEG-08: Down woody material is recognized for its important role in ecosystems. Down woody material is retained on site in all treatment areas as Forest Plan guidelines recommend.

FW-GDL-VEG-03: Down woody material is recognized for its important role in ecosystems. Down woody material is retained on site in all treatment areas as Forest Plan guidelines recommend.

FW-GDL-VEG-04: Snags are recognized as a very important component of a healthy ecosystem. This project was designed in accordance with this guideline.

FW-GDL-VEG-05: Snags are recognized as an important component of a healthy ecosystem. This project was designed in accordance with this guideline.

FW-GDL-VEG-06: Individual snags that fall are generally retained on site as down woody debris. This project was designed in accordance with this guideline.

FW-GDL-SOIL-02: Coarse woody debris will be retained on site after management activities as directed in FW-GDL-VEG-03.

Proposed, Threatened, Endangered, and Sensitive Plants

Whitebark Pine

Introduction

Whitebark pine was designated as a sensitive species in the Northern Region in 2011 (Weldon, 2011). Whitebark pine is an important conifer species and serves many vital functions, including snow pack retention, visual aesthetics and forage and habitat values for wildlife. Whitebark pine ecosystems have been declining across much of the historic range due to combined effects of mountain pine beetle epidemics, fire exclusion and exotic blister rust invasion. Because of this decline, the U.S. Fish and Wildlife Service determined listing *Pinus albicaulis* as threatened or endangered is warranted.

Regulatory Framework

The regulatory framework pertaining to whitebark pine and threatened and sensitive plants is summarized below. For additional information, please refer to the Regulatory Framework in the Project File.

State and Federal Laws and Regulations

- **The Forest and Rangelands Renewable Resources Planning Act of 1976** – Provides for maintenance of land productivity and the need to protect and improve the soil and water resources.
- **The National Forest Management Act (NFMA) of 1976** – It is the policy of the Congress that all forested lands in the NFS shall be maintained in appropriate forest cover with species of trees, degree of stocking, rate of growth, and conditions of stand designed to secure the maximum benefits of multiple use sustained yield. Plans developed shall provide for the diversity of plant and animal communities based on the suitability and capability of the specific land area in order to meet the overall multiple-use objectives, and within the multiple-use objectives.
- **The Endangered Species Act (ESA) of 1973** – Requires federal agencies to conserve threatened and endangered species. USFWS has identified Whitebark pine as a candidate species for listing.
- **FSM 2670.22 -** (1) Develop and implement management practices to ensure that species do not become threatened or endangered species because of Forest Service actions; (2) maintain viable populations of all native and desired non-native wildlife, fish, and plant species in habitats distributed throughout their geographic range on NFS lands; (3) Develop and implement management objectives for populations and or habitats of sensitive species.

Forest Plan

The Forest Plan (USDA Forest Service, 2015) addresses Threatened and Sensitive plant species under its Forest--wide and geographic area management direction. In its goals it states that "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 are maintained." The plan also supports the protection and maintenance of important riparian

zone features, marshes and water bodies, where sensitive plants often occur (USDA Forest Service, 2015, p. 24-25). In terms of sensitive plants, all alternatives are consistent with the Forest Plan.

There is no significant physical or biological connection between the analysis area and known populations or critical habitat of Endangered, Threatened or Proposed plant species. As such, all alternatives comply with the Endangered Species Act, National Forest Management Act and the Forest and Rangelands Renewable Resources Planning Act.

FW-DC-VEG-01: The composition of the forest is within the desired ranges for the dominance groups illustrated in figure 2 of the Forest Plan. 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.

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.

FW-OBJ-VEG-01. 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.

FW-GDL-VEG-07. Evaluate proposed management activities and project areas for the presence of occupied or suitable habitat for any plant species listed under the ESA or on the regional sensitive species list. If needed, based on pre-field reviews, conduct field surveys and provide mitigation or protection to maintain occurrences or habitats that are important for species sustainability.

GA-DC-VEG-TOB-01. Whitebark pine structure, composition, and function trend toward a desired vegetation condition within appropriate high-elevation areas.

GA-DC-VEG-TOB-03. Management of vegetation towards the desired vegetation condition improves or possibly increases Spalding's catchfly. Calcareous soils and wetlands provide habitat for species such as lady's-slipper and cottongrass.

Analysis Area and Methods

Analysis Area

The analysis area for whitebark pine consists of the Galton Vegetation Analysis Area. This area is bounded on the north by British Columbia, Canada, on the west Hwy. 93 and on the east by the Flathead National Forest. Whitebark pine in the analysis area is generally found above 6000 feet elevation. The analysis area was set as the proper scale to mesh exactly with the Vegetation portion of the Galton project (stand boundaries and database information will be common). An additional reason for the bounds of this analysis are administrative boundaries; British Columbia, Canada to the north and the Flathead National Forest on the east.

Analysis Method

The assessment for whitebark pine and whitebark pine habitat followed the methods outlined for the Kootenai NF by Leavell and Triepke (1995). Suitable habitats have been identified by published literature and through field surveys. Probability of occurrence was estimated, including both historic and existing conditions. The probability analysis took into consideration; past disturbance, locations of known populations, and ecological requirements of the species.

The upper elevation areas within the Galton Analysis area were identified as suitable whitebark pine habitat and have high potential for providing restoration opportunities for whitebark pine. Action alternatives are proposed to address the downward trends that have led to proposed listing of the whitebark pine.

Affected Environment

The recent Region One Whitebark Pine Strategy (2011) – is range wide and references Keane et al 2011 as the primary source documentation for guiding principles and central tenets for the strategy.

Habitat Requirements and Ecology

The following description was adapted from Silvics of North America (1990). Whitebark pine is a slow growing, long-lived tree of the high mountains of southwestern Canada and the western United States. It is of limited commercial use, but it is valued for watershed protection and aesthetics. Its seeds are an important food source for grizzly bears and other wildlife of the high mountains. Whitebark pine grows in the highest elevation forest and at timberline. It grows in a cold, windy, snowy, and generally moist climatic zone. On the Kootenai NF it can also be found on drier southerly exposures at these high elevations.

Whitebark pine cone crops are produced at irregular intervals, with smaller crops and crop failures in between. Clark's nutcracker and red squirrels utilize the ripening cone crop during August and September. Clark's nutcrackers have an essential role in caching these seeds in the soil. While these seeds help to sustain the Clark's nutcracker, a large proportion of the seed caches go unrecovered and provide the essential means for the tree to regenerate.

Wildfire is an important vegetation recycling force in whitebark pine stands, with historical fire frequencies ranging from 35 to 300 years (Fischer and Bradley, 1987). These fires are often fueled by trees killed by the mountain pine beetle. Following disturbances like wildfires that expose mineral soil, the seed can more easily germinate. Prescribed fire is often identified as a restoration treatment. It is also important to address non-burn treatments such as planting of rust resistant seedlings following prescribed burns or wildfires.

Status of Whitebark Pine

It has been estimated that the entire Kootenai Forest has about 6,000 acres in the whitebark pine forest type (AMS, 2003). As compared with areas like the Flathead NF or the Gallatin NF, whitebark pine presence on the Kootenai NF 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, and replacement by shade tolerant species such as subalpine fir, and wildfires. These threats also operate together, increasing the mortality rates in whitebark pine. Competition for light and moisture by encroaching 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 wildfires.

Mature stands of whitebark pine are highly susceptible to mountain pine beetle infestation as evidenced by high mortality in the northern Rockies between 1909 and 1940 (Arno, 1989). Since 2000 there has been a substantial increase in mountain pine beetle activity in whitebark pine. (Bentz, 2011)

The principal disease affecting this tree is the introduced blister rust fungus (Cronartium ribicola). Blister rust is having a substantial effect on populations within northwest Montana as evidenced by survey estimates in Glacier National Park in 1995 and 1996 showing mortality as high as 44%; infestation rates at 70%; and an average of 25% crown kill at that time. (Keane, 2001). To address the impacts from white pine blister rust a genetic improvement program aimed at increasing blister rust resistance was established in 2000. The Inland West Whitebark Pine Genetic Restoration Program is modeled after the Northern Region's Western White Pine Program. Some of the highest resistance is found in Northwest Montana with an estimated 56% resistance to blister rust. Research through the program has shown that whitebark pine is genetically diverse with no marked inbreeding, that genetic variation in adaptive traits show moderate to high heritability that can respond to selection, that germination in older seedlots are good, and that there is an excellent probability that cost effective rust-resistant seedlings can be produced. (Mahalovich, 2004, 2006, 2011)

The effects from fire suppression - the high levels of fuel accumulation and successional replacement - cannot be understated. A brief listing of the current and potential losses include (1) loss of potential seed trees, (2) loss of disease resistant trees, (3) loss of whitebark pine regeneration, and (4) losses in proximity to seed sources following extreme wildfire. Fire exclusion has been a major factor in the downward trend of whitebark pine on the landscape.

In August of 2015, the Marston fire burned on the face of Mount Marston between Deep Creek drainage and the Stillwater river drainage. The fire burned approximately 7,550 acres. Much of the high severity fire occurred within the historic whitebark pine habitat. Much of the whitebark pine within the fire area had been killed due to the previously mentioned factors. However, along the ridges a portion of young and mature whitebark pine are present. During reconnaissance it was noted that there are a portion of whitebark pine that survived the Marston fire in unburned stringers.

Having adequate seed for the Clark's nutcrackers to cache at distances within nine mile proximity is viewed as an alternative to or in conjunction with planting for whitebark pine regeneration. Whitebark pine stands in later structural stages can be a source for cone-producing trees across the landscape. Historically Clark's nutcrackers were a major vector for whitebark pine seed dispersal. Understanding the effectiveness of Clark's Nutcracker seed dispersal is as important as having an adequate seed source for determining whether natural regeneration is a viable restoration strategy for whitebark pine. Current research indicates that while Clark's Nutcracker cached 58% of the collected whitebark pine seeds in whitebark pine habitat; only 16% of those seeds were cached in soil. Of those cached in the soil, most were cached in full sun or in forest litter, where germination success is low. (USDA FS 2011) This low seed dispersal effectiveness, combined with reduced seed production from white pine blister rust and mountain pine beetle stress and mortality suggest that relying on natural regeneration for whitebark pine restoration may not be a viable restoration strategy. It is concluded that the past management of fire suppression has been a factor in the downward trend of whitebark pine on the landscape.

Description of the Suitable Habitat and Population within the Project Area

Whitebark pine is within the Cold Forest and Subalpine Plant Species Guild. The term "guild" is used to describe a group of species that use similar resources in a similar way. Refer to status of whitebark pine above for a description of the potential threats. There is suitable whitebark pine habitat in the highest elevation portions of the analysis area. Foresters use the term "plus tree" to designate individual members of a species that have good form, good overall health, and may show resistance to various diseases such as blister rust. Plus trees serve as cone collection locations where seed can be collected and grown in forest nurseries for future planting stock. The Fortine Ranger District has identified whitebark pine plus trees in the Galton area. Two whitebark pine plus trees were killed during the Marston fire. Design criteria for any projects located in whitebark pine habitat will include a) pre-survey for whitebark pine; (b) protection of existing whitebark pine during treatment, and, (c) planting after treatment will be considered during development of the site specific treatment prescription. Given the decline of cone producing whitebark pine and the Clark's nutcracker caching behavior, this project will not rely on Clark's nutcracker caching for whitebark pine restoration.

Environmental Consequences

Direct and indirect effects on whitebark pine are described below for proposed activities identified in Chapter 2. Cumulative effects were considered for all past, proposed, current and reasonably foreseeable actions listed and described in Chapter 3 and are described at the end of this section.

Direct and Indirect Effects

Alternative 2 (No Action)

This alternative proposes no management activity. The no action alternative would have no direct effects to whitebark pine, because no activities would occur.

The no action alternative may have indirect effects as it would allow subalpine fir to continue successional development and expand its occupancy of the habitat, which combined with mountain pine beetle and blister rust may directly impact whitebark pine sustainability.

Action Alternatives - Alternatives 1 and 3

Alternative 1 proposes prescribed fire (Ecosystem Burning) on approximately 3,398 acres where whitebark pine may occur. Alternative 3 proposes prescribed fire (Ecosystem Burning) on approximately 298 acres where whitebark pine may occur. The objective is to return fire to stands where it historically maintained more open forest conditions. It would be used to reduce ground and ladder fuels and encroaching understory growth by burning at low-to-moderate fire intensities, similar to those that likely occurred naturally.

This treatment could occur in several different fire regimes. It is used to achieve multiple objectives including, but not limited to, shrub and browse rejuvenation, fuels reduction, and changes in stand density and composition. This treatment typically occurs over large areas.

Alternative 3 includes 835 acres of proposed whitebark pine planting. This would occur in areas that were burned at a high severity in the 2015 Marston fire. The identified areas are those that occur above 6000 feet where whitebark pine were historically found. Treatments would occur over the next ten years depending on available stock and funding. Additional surveys would occur

prior to planting activities to determine site specific needs. It may be determined that not all acres would need artificial regeneration.

The treatment in the action alternatives will disrupt the successional development of subalpine fir, reduce its occupancy of the habitat, which combined with protecting cone producing whitebark pine and potentially planting blister rust resistant seedlings, may directly positively impact whitebark pine sustainability.

Restoring ecosystem health may not directly reduce mountain pine beetle caused tree mortality, particularly while outbreaks are in progress.

Alternatives 1 and 3 would authorize salvage of mortality that occurred during fuel treatments. There are 16 criteria listed on page 14 of the FEIS that would need to be complied with prior to any salvage occurring. These criteria provide for the protection of resources and compliance with Forest Plan direction; therefore, salvaging incidental mortality would have no further effects to the proposed, threatened, endangered, and sensitive plants resource. This activity would not occur under Alternative 2, so no effects would occur if Alternative 2 is selected.

Restoration of the natural role of fire may indirectly result in five needle pine ecosystems that are less susceptible to MPB and promote selection resistance to blister rust infections (Schoettle and Sniezko 2007). Management efforts to reduce the effects of MPB, blister rust, and fire exclusion should result in more resilient stands less sensitive to future climate trends...” Restoring ecosystem health may not directly reduce mountain pine beetle caused tree mortality, particularly while outbreaks are in progress. Any surviving cone producing whitebark pine may need additional protection from mountain pine beetle infestation through application of an anti-aggregation pheromone.

Salvage of Incidental Mortality from Underburning

Alternatives 1 and 3 would authorize salvage of mortality that occurred during fuel treatments. There are 16 criteria listed on page 14 of the FEIS that would need to be complied with prior to any salvage occurring. These criteria provide for the protection of resources and compliance with Forest Plan direction; therefore, salvaging incidental mortality would have no further effects to theproposed, threatened, endangered, and sensitive plants resource. This activity would not occur under Alternative 2, so no effects would occur if Alternative 2 is selected.

Climate Change

Under the influence of change climate, if droughts and warmer winters continue, agents such as mountain pine beetle, Douglas-fir beetle, western balsam bark beetle, and spruce beetle will likely show increased levels of activity. Fires are likely to increase in intensity and severity under current climate change scenarios which forecast longer fire seasons with more annual area burned. Difficulties establishing sensitive species (i.e. whitebark pine) at high elevations will increase.

Cumulative Effects

Effects of Current and Reasonably Foreseeable Actions

The Cumulative Effects Worksheet, located in the Vegetation section of the Project File, contains the detailed analysis of all past, current, and reasonable foreseeable activities. All activities identified to occur within the analysis area that have the potential to affect whitebark pine are discussed below.

Vegetation Management and Fuels Reduction Activities - No commercial or precommercial mechanical treatments are planned in whitebark pine habitat in the Analysis Area.

Forestwide Young Growth Vegetation Management - The Forestwide Young Growth Vegetation Management project would treat approximately 400 to 600 acres annually, dependent on funding, using precommercial thinning or commercial thinning treatments. Stands proposed for treatment are second growth stands and would be subject to a number of criteria before they were determined eligible for treatment. All proposed future ground-disturbing activities would be evaluated through surveys and biological assessments/evaluations as to their impact on PTES plant species.

Ten Lakes Travel Management - The Ten Lakes Travel Management Project will address over-snow and mechanized travel planning for the Ten Lakes area. The area affected by the proposal includes the Ten Lakes WSA and areas with common entrance points to the WSA. There are three main over-snow entrance points to the Ten Lakes WSA: the Grave Creek corridor; Clarence and Stahl Creek; and the Burma/Blacktail area. Over-snow travel is currently not limited. Mechanized use (primarily mountain bicycles) is also currently unrestricted. The alternatives contained in the Ten Lakes Travel Management Draft Environmental Impact Statement contain various amounts of over-snow and mechanized travel for the project area. A final decision has not been made for this project and the cumulative effects analysis utilizes the Proposed Action as the basis for the analysis in the Galton Vegetation Management Project. The cumulative effects of the Ten Lakes Travel Management Project in conjunction with past, present, reasonably foreseeable actions would result the possibility of minor impacts to individuals, but no measurable effects to populations for the PTES plants resource. There is a possibility for some individuals to be affected, due to proximity of activity, primarily non-snow activities, such as horseback riding, hiking, and mountain biking. Over-snow activities should have no measureable effect.

Cattle Grazing - Cattle allotments in the analysis area do not extend into whitebark pine habitat. Nor do cows generally reach these upper elevation roadless areas.

Noxious Weed Treatment - No noxious weed treatments in the analysis area are planned for whitebark pine habitats.

Fire Suppression -Current Forest Plan direction allows for the use of natural, unplanned ignitions to meet resource objectives on appropriate lands. These ignitions could reduce encroachment of subalpine fir in whitebark pine habitats, although it is likely that individuals would be killed by fire. Fire suppression may also be utilized, thus construction of fire lines, safety zones, or other fire control related disturbance could impact whitebark pine on a site specific basis. Avoidance of these areas would be attempted during suppression efforts but some impacts may still occur.

Road Management - There is one open road system located within whitebark pine habitat in the Analysis Area. Basic road maintenance described in the Current and Reasonably Foreseeable Actions section, would not negatively impact the resource.

Recreation Maintenance - Routine maintenance of trails would be limited to existing hardened trails and sites. Since these sites have been previously disturbed there would be no cumulative effect on whitebark pine.

Special Uses - Operations of outfitter/guides would not result in any change to whitebark pine habitats and they do not involve harvesting trees or clearing sites.

Public Use (firewood gathering, hunting, trapping, fishing, etc.) - Public use activities associated with roads would be minimal due to the mostly roadless nature of the whitebark pine habitat within the analysis area. Recreation activities such as hunting are not expected to contribute cumulative effects on whitebark pine because no cutting of trees or altering of habitat occurs.

Private Property - There are no private lands located within or adjacent to whitebark pine habitats. Therefore, no cumulative effects can be expected.

Other Agency - There are no activities planned by other agencies that would occur within the whitebark pine habitats in the Analysis Area. Therefore, no cumulative effects can be expected.

Summary of Cumulative Effects

Alternative 2

If the No Action alternative is selected and fire is continuously excluded from the analysis area, there could be a negative impact on whitebark pine due to the buildup of natural fuels, increased competition and canopy closure with a resulting decrease in health and vigor, lower cone production and higher susceptibility to mountain pine beetle and blister rust. There would be a decrease in light to the forest floor, and a decrease in naturally occurring open areas that are suitable for whitebark pine germination. In addition, to the competitive challenges of this in-growth; the dense multistoried condition makes whitebark pine particularly vulnerable to the effects of large scale stand replacing fires.

Action Alternatives 1, and 3

Cumulative effects of treatment are limited to the direct and indirect effects discussed above.

Determination of Effects

The proposed treatments are designed to restore fire processes and enhance whitebark pine ecosystems. These effects are not expected to threaten the presence or viability of whitebark pine in the project area, although individuals will be killed as a result of prescribed fire treatments. The creation of seedbeds, planting of seedlings, and reduction of shade-tolerant species should enhance whitebark pine viability. The action alternatives are not expected to jeopardize the continued existence of this species.

Other Proposed, Threatened, Endangered and Sensitive Plant Species

This section discloses the results of the threatened and sensitive plant resource analysis for the Galton Vegetation Project Area. Field surveys for this project were conducted in in the early 2000s by Forest Service employees. See project file for survey information.

Analysis Area and Methods

Analysis Area

The bounds of analysis for direct impacts to the sensitive plant resource is the Galton Vegetation Project Area, see Map 1. The analysis area for species viability is range-wide for each plant species.

Threatened Plants

Threatened plant species are species listed as threatened by the US Fish and Wildlife Service (US FWS) under the Endangered Species Act. Two species of threatened plants are found in Northwestern Montana. These two species are *Howellia aquatilis* and *Silene spaldingii*. Another species, *Botrychium lineare* was formerly proposed for listing as threatened, but is now considered a species of special concern (Category 4). Whitebark pine is a sensitive plant in the Northern Rockies, because of its decline USFWS determined that listing the species as threatened or endangered is warranted but precluded. Information regarding this species can be found in the above.

Howellia aquatilis (water howellia; family *Campanulaceae*) is federally listed as threatened and occurs on the Flathead National Forest. The US Fish and Wildlife Service (USFWS) have notified the Kootenai National Forest that this species does not occur within our boundaries and therefore it will not be addressed further with this analysis.

Silene spaldingii (Spalding's campion or catchfly; family *Caryophyllaceae*) is listed as threatened and is suspected of occurring on Forest Service lands on the Kootenai Forest. Spalding's catchfly is a plant of dry, bunchgrass steppe habitats (USDI Fish and Wildlife Service, 1999a). This plant is known from private land within the overall perimeter of the Kootenai Forest and is within 1 mile west of the Galton Vegetation Analysis Area, but is as yet not known on Forest Service lands in Montana. Neither this species nor its habitat has been found on forest lands in the Galton Vegetation Analysis Area. As such, it has low probability of occurring. Furthermore, there is no significant physical or biological connection between the analysis area and known populations or critical habitat. Therefore, Spalding's catchfly will not be considered further with this analysis.

Botrychium lineare (linear moonwort; family *Ophioglossaceae*) was formerly considered a candidate species for listing as threatened, but its listing was precluded by other priorities (USDI Fish and Wildlife Service, 2001). It is now considered a Species of Special Concern (Category 4) plant on the Kootenai National Forest. It occurs on the Rexford Ranger District on the Kootenai Forest. Linear moonwort occupies dry, disturbed limestone habitats in the grassland-forest ecotone on the east side of the Rocky Mountains and at other scattered locations in continental climates of North America (USDI Fish and Wildlife Service, 2001). This species is not known in the Galton Vegetation Analysis Area nor is its habitat found in the analysis area. As such, it has low probability of occurring. Furthermore, there is no significant physical or biological connection between the analysis area and known populations or critical habitat. Therefore, Linear moonwort will not be considered further with this analysis.

No other Proposed, Endangered, or Threatened plant species are known or suspected of occurring in the analysis area.

Sensitive Plants

Sensitive plant species are those species that have been designated by the Regional Forester because of concern for population viability, as evidenced by 1) significant current or predicted

downward trends in population numbers or density, or 2) significant current or predicted downward trends in habitat capability that would reduce an existing species distribution (Forest Service Manual 2600 Series 2670.22). Sensitive species are not protected under the Endangered Species Act. The principal objective of the sensitive plant program is to preclude their listing as threatened or endangered (36 CFR 219).

With the issuance of a sensitive species list by the Regional Forester, Region One implements the direction contained in the Forest Service Manual. The Region One Sensitive Plant Species List was first published in Reel et al. (1989) and has been since updated periodically in formal internal memos to reflect new information. The most recent update was on December 21, 2011. Species on this list that are known or suspected of occurring on the Kootenai National Forest are listed in the Sensitive Plants Project File.

All sensitive plant resources are considered in the sensitive plant program. Sensitive plant resources are existing populations and their habitats as well as unoccupied but suitable habitat. This sensitive plant analysis contains two fundamental parts: 1) identification of suitable habitats for sensitive plants, and 2) an assessment of effects to sensitive plant resources by the proposed alternatives.

Affected Environment

The analysis area is dominated by low relief mountainous topography formed from sedimentary rocks, especially argillite, dolomite and calcareous glacial till (Harrison et al., 1992). Montane coniferous forests dominate the vegetation. Sensitive plant habitats are more or less confined to specialized niches on the landscape, such as riparian forests and open sedge meadows. These habitats were subjected to a variety of different natural disturbance factors in the past. The recurrence of wildfire in the northern Rocky Mountain ecosystems has played a key role in the ecology of its vegetation (Habeck, 1987), including sensitive plant habitats. In addition, sensitive plant habitats are now also affected by humans, through timber harvest, road building, suppression of wildfires, cattle grazing, and invasion of noxious weeds.

The assessment of sensitive plants and sensitive plant habitat followed the methods outlined for the Kootenai National Forest by Leavell and Triepke (1995). Suitable habitats for each sensitive species known or suspected of occurring on the KNF have been identified by consultation with sensitive plant field guides and published and unpublished literature on sensitive plants (Lesica and Shelly, 1992; Vanderhorst, 1996, 1997) as well as through extensive field experience. Probability of occurrence of sensitive species was estimated, including both historic and existing conditions. The species included in this assessment are those with a moderate to high probability of occurrence in the analysis area. The probability analyses took into consideration numerous factors, including:

- Locations of known populations.
- Results of past field surveys.
- Ecological requirements of the individual species (e.g., elevation, potential vegetation, land type, lithology, shade and moisture regimes).
- Past disturbance.

Rare plant inventories were conducted subsequent to these assessments for a Galton Environmental Assessment (EA) in 1995. Further detailed surveys were carried out in 2004 and 2005. More recent surveys were conducted in 2007-2010. All surveys took into consideration rare plants and rare habitats in addition to sensitive species. These surveys took place in addition to

other past and concurrent surveys of sensitive plants in and around the analysis area (Vanderhorst, 1996, 1997). A total of 14 plant species currently listed as sensitive by the USDA Forest Service (Table 1) have been documented in the analysis area. In addition, 14 other species tracked as "Species of Special Concern" (SSC) by the Natural Resource Information System/Montana Natural Heritage Program have been found in the analysis area (PTES Plants Table 2). This list is important because Forest Service sensitive plant species are often designated based on review of this list.

An examination of habitat preferences for the sensitive and SSC plants in the analysis area shows that 10 (four sensitive and six SSC) are closely associated with calcareous fens and associated bog birch peatlands called carrs. Often surrounding such wetlands are calcareous spruce swamps, a habitat that supports a further 7 species (four sensitive, three SSC). Taken together, fens and spruce swamps form the core of rare plant diversity in the analysis area. Further sensitive plant habitat is provided on disturbed sites along roads and in forest clearings.

Several of the sites are on private land within the boundaries of the analysis area and were documented with landowner permission. Two of the largest sites on Forest Service lands within the analysis area are in areas designated as Management Area 3 (Special Interest Areas with a botanical emphasis), a designation that clearly limits the types of management and emphasizes the botanical resource.

PTES Plants Table 1. An overview of characteristic habitats and habitat trends of the sensitive plant species in the analysis area. Note: * indicates sensitive plant populations confirmed within the analysis area.

Species	Habitat	Habitat trends
Eriophorum gracile (slender cottongrass) ***Schoenoplectus (formerly Scirpus) subterminalis* (water bulrush)** ***Utricularia intermedia* (flat-leaved bladderwort)**	Floating species, open water and boggy margins of ponds, lakes and peatlands in valley, foothill and montane zones	Existing habitat has been in general decline since arrival of Europeans; direct impacts have been minimal in subunit
Carex prairea (prairie sedge) *Dryopteris cristata* (crested shield-fern) *Eriophorum gracile* (slender cottongrass) *Eriophorum viridicarinatum*(green-keeled cottongrass) ***Meesia triquetra* (a moss)** ***Scorpidium scorpioides* (a moss)**	Open, calcareous, rich fens, in watery channels, on tufa and in pools	Existing habitat has been in general decline since arrival of Europeans; direct impacts have been minimal in subunit
Trichophorum (formerly Scirpus) cespitosus (tufted club-rush)	Poor fens- wet meadows, sphagnum bogs in montane to alpine zones.	Existing habitat has been in general decline since arrival of Europeans; direct impacts have been minimal in subunit
***Amerorchis rotundifolia* (round-leaved orchid)** *Carex vaginata* (sheathed sedge) ***Cypripedium parviflorum* (yellow lady's slipper)** ***Cypripediumpasserinum* (sparrow's egg lady's slipper)** *Dryopteris cristata* (crested woodfern) ***Viola selkirkii* (great-spurred violet)**	Calcareous spruce swamps below 4000 feet	Existing habitat has been in general decline since arrival of Europeans; direct impacts have been minimal in subunit
Phegopteris connectillis (beechfern)	Calcareous riparian western cedar forests and shaded cliffs in the valley to subalpine zones below 5000	Existing habitat has been in general decline since arrival of Europeans; direct impacts have been minimal in subunit

	feet	
Botrychium ascendens* (upward-lobed moonwort)** ***Botrychium crenulatum* (wavy moonwort)** ***Botrychium hesperium* (western moonwort)** ***Botrychium paradoxum (*peculiar moonwort*) *Botrychium pedunculosum (stalked moonwort)*	Disturbed habitats (road and trail edges, abandoned log landings and skid trails)	Available habitats have greatly increased since European colonization
***Lathyrus bijugatus* (tule pea)**	Warm, dry forests in the valley and lower montane zones. (Larix-Pseudotsuga-Pinus ponderosa)	Existing but limited habitat. Logging disturbance increased population in subunit.
Epipactus gigantean (giant helleborine), suspected *Ophioglossum pusillum* (northern adder's tongue)	Submontane rich marshes below 4200 feet- margins of fens with springs and seeps, stream banks, lake margins	Available habitat s limited in subunit; direct impacts have been minimal
***Pinus albicaulis* (whitebark pine)**	Upper montane to subalpine forests above 5,000 feet	Fire exclusion, mountain pine beetle and blister rust have heavily impacted whitebark pine.

PTES Plants Table 2. . Species of Special Concern tracked by the Montana Natural Heritage Program known to occur in the analysis area (no status with Forest Service).

Species	Habitat	Habitat trends
Carex livida* (gray sedge) ***Carex paupercula* (boreal bog sedge)** ***Catascopium nigritum* (a moss)** ***Meesia longiseta* (a moss)** ***Meesia uliginosa* (a moss)** ***Viola renifolia* (kidney-leaved white violet)**	Open calcareous fens, in watery channels, on tufa and in pools	Existing habitat has been in general decline since arrival of Europeans; direct impacts have been minimal in subunit
Bryoria nadvornikiana (*a lichen*)* ***Melanelia septentrionalis* (a lichen)** ***Tuckermannopsis sepincola* (a lichen)**	On branches of bog birch in peatlands	Probably fairly stable: bog birch can survive some draining and probably was less affected by dredging of wetlands than other species
***Chaenotheca cinerea* (a lichen)**	Old cottonwood trees in moist forest and on forest edges; in subunit in spruce swamp	On the decline due to lower numbers of cottonwood trees
Ramalina thrausta* (lichen on conifer branches)** ***Lilium philadelphicum (*wood lily*) ***Lycopodium sitchense* (Sitka clubmoss)**	Calcareous spruce swamps/forests.	Habitat is abundant and relatively stable for lichen. Existing habitat has been in general decline since arrival of Europeans; direct impacts have been minimal in subunit
***Cladonia botrytes* (a lichen)**	On dead wood, especially larch logs and horizontal surfaces of stumps	Habitat is abundant and relatively stable

In the late summer and fall of 2015, the Marston Fire burned approximately 7,552 acres between the Deep Creek and Summit Creek drainages across the Marston mountain face. The fire burned over a mix of biophysical settings which affected many different sensitive plant habitats and

niches. Due to the dry nature of the summer and early fall that areas that are typically wet were drier and a loss of habitat and individual specimens may have occurred. It is also likely that habitat was created for other sensitive plants that rely on disturbance and fire to propagate.

Environmental Consequences

Direct and indirect effects on sensitive plant species are described below for proposed activities identified in Chapter 2. Cumulative effects were considered for all past, proposed, current and reasonably foreseeable actions listed and described in Chapter 3 and are described at the end of this section.

The following effects analysis will focus on 1) measurable effects to sensitive plant habitat and 2) effects on known populations. Habitats with moderate to high probability of occurrence of sensitive plants are considered. Sensitive plant population trends are the ultimate measure for this analysis.

Direct and Indirect Effects

Effects Common to Action Alternatives 1 and 3

No old cedar forests, wetlands or spruce swamps are included in any of the proposed harvest units or other areas proposed for ground disturbance. No sensitive plant habitats have been identified in proposed regeneration harvest units, stands proposed for intermediate harvest, or areas proposed for fuel treatment. Therefore, there would be no known direct or indirect effects to potential sensitive plant habitats or to known populations with implementation of any of the action alternatives. If any individual or populations of sensitive plants are located in areas proposed for management activities, they would be protected under the provisions of the timber sale contract. Timber Sale Contract Clause C(T) 6.251# would be applied to modify the activity so that adverse effects would be avoided (See Design Criteria).

Some sensitive plants that prefer disturbed habitats, such as the Botrychiums, also occur along roadsides used for hauling. These populations may be affected by localized road improvements, blading, increased road use, and road dust in the course of the proposed activities. However, these activities are compatible with those that originally created these habitats. The action alternatives may impact individuals but would not likely contribute to a trend towards federal listing or cause a loss of viability for *Botrychium ascendens* and *B. crenulatum*. There is no difference in this respect between alternatives.

The action alternatives have the potential to spread noxious weeds by increasing disturbed areas that are vulnerable to weed infestation, and through increased vehicle traffic. Recreational and logging traffic and equipment, contaminated gravel, livestock and wildlife can transport weed seeds from infested areas to locations not infested. Noxious weeds have a detrimental effect on sensitive plant species and other native vegetation by more effectively competing for soil moisture, sunlight, and nutrients. Eliminating noxious weed seed transport mechanisms into populations of sensitive plants can reduce these impacts. Refer to the Design Criteria for the measures prescribed to reduce the spread of noxious weeds.

Alternative 2 (No Action)

This alternative proposes no ground disturbing activity. No effects would result from this alternative. The response of each of the sensitive plant species to management activity varies by species, and in some cases, is not fully known. These plants and all 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 of management that causes these natural processes to be altered may have a negative impact on native vegetation, including sensitive plants. An example of altered natural processes would be removal of fire from the ecosystem. Continuation of active fire suppression and the lack of fuels reduction on the landscape may influence sensitive plant populations by increasing the risk of fire and its intensity when it does occur. However, these risks and potential effects are neither measurable nor quantifiable at the scale of the present analysis area. The increase in potential habitats of sensitive plants of disturbed habitats that occupy abandoned roadbeds would not be realized with the No Action Alternative.

Cumulative Effects

Past effects to sensitive plant species in the analysis area may have occurred due to soil disturbance, overstory removal, burning, fire suppression, grazing, and the recent introduction of noxious weeds. The Cumulative Effects Worksheet, located in the sensitive plants Project File, considers and describes proposed activities in addition to the past, current and reasonably foreseeable activities listed in Chapter 1. There are no activities or actions that would have a cumulative effect on sensitive plant species or their habitats. The Cumulative Effects Worksheet explains the rationale for no effects of these activities on populations and habitats.

None of the action alternatives would likely contribute to a trend towards federal listing or cause a loss of population viability to any of the known sensitive plant species in the analysis area.

Consistency with Regulatory Framework

State and Federal Laws and Regulations

- **The Forest and Rangelands Renewable Resources Planning Act of 1976** – By providing appropriate habitat and ensuring species presence productivity will be accomplished.
- **The National Forest Management Act (NFMA) of 1976** – By protecting a portion of the existing whitebark pine and providing for natural and artificial regeneration on appropriate habitat sites, the plan will provide for a diversity of plant and animal communities.
- **The Endangered Species Act (ESA) of 1973** – Requires federal agencies to conserve threatened and endangered species. Though not listed as Threatened or Endangered at this time whitebark pine has been listed as a Candidate species. Treatments described in this plan will maintain and/or restore whitebark pine where appropriate habitats are located.
- **FSM 2670.22 -** Though not listed as Threatened or Endangered at this time whitebark pine has been listed as a Candidate species. Treatments described in this plan will maintain and/or restore whitebark pine where appropriate habitats are located.

State and Federal Laws and Regulations

The Forest and Rangelands Renewable Resources Planning Act of 1976 – Provides for maintenance of land productivity and the need to protect and improve the soil and water resources. All alternatives developed comply with this act.

The National Forest Management Act (NFMA) of 1976 – The alternatives are consistent with the 2015 Kootenai Forest Management Plan are therefore compliant with NFMA.

The Endangered Species Act (ESA) of 1973 – Requires federal agencies to conserve threatened and endangered species. There is no significant physical or biological connection between the analysis area and known populations or critical habitat of Endangered, Threatened or Proposed plant species. As such, all alternatives comply with the Endangered Species Act.

Kootenai National Forest Threatened and Sensitive Plants Desired Conditions and Objectives

FW-DC-VEG-01: Treatments occurring where appropriate habitat occurs are designed to increase the presence of whitebark pine.

FW-DC-VEG-09: Though not listed as Threatened or Endangered at this time whitebark pine has been listed as a Candidate species. Treatments described in this plan will maintain and/or restore whitebark pine where appropriate habitats are located. The selected action will maintain and/or restore plant species listed under ESA where appropriate habitats are located.

FW-OBJ-VEG-01. Treatments are designed to increase the whitebark pine component on the landscape. Refer to the Vegetation section for more information regarding the alternatives.

FW-GDL-VEG-07: Treatments have been designed based on the results of existing surveys to include areas that have whitebark pine. Some protection of live trees may need to occur. Multiple surveys have occurred across the project area (1995, 2004, 2005, and 2007-2010). Treatments have been designed based on the results of these surveys to exclude areas that have threatened or sensitive plants.

GA-DC-VEG-TOB-01. Treatments have been designed to incorporate these considerations and increase the presence whitebark pine across the available habitat.

GA-DC-VEG-TOB-03: Where treatment occurs in the appropriate habitat for this species consideration for maintenance and restoration will be given. Currently there are no treatments within Spalding's catchfly habitat for this project.

Effects Determination

Based on the analysis of all alternatives, including the No Action alternative, other interrelated and interconnected activities, and the cumulative effects of other federal and non-federal activities within the Planning Area, it has been determined that the implementation of the No Action Alternative or the other Action Alternatives would have **No Effect** on Spalding's Catchfly (*Silene spaldingii*).

Regarding those plant species that are listed by the Regional Forester as being sensitive (including the newly listed whitebark pine), implementing any of the alternatives **may impact individuals or habitat, but would not likely result in a trend towards federal listing or loss of viability**. The effects analysis provided in this document meet the requirements for a biological evaluation as outlined in FSM 2672.42.

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 Galton Vegetation 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. Additionally 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

State and Federal Laws and Regulations

The Forest and Rangelands Renewable Resources Planning Act of 1976 – Provides for maintenance of land productivity and the need to protect and improve the soil and water resources.

The National Forest Management Act (NFMA) of 1976 – It is the policy of the Congress that all forested lands in the NFS shall be maintained in appropriate forest cover with species of trees, degree of stocking, rate of growth, and conditions of stand designed to secure the maximum benefits of multiple use sustained yield. Plans developed shall provide for the diversity of plant and animal communities based on the suitability and capability of the specific land area in order to meet the overall multiple-use objectives, and within the multiple-use objectives.

Federal Noxious Weed Act of 1974 – Authorizes the Secretary to cooperate with other federal and state agencies and individuals in carrying out measures to eradicate, suppress, control, or prevent the spread of noxious weeds. In 1990, the Act was amended by the 1990 Farm Bill. The revisions included designating a person adequately trained in managing undesirable plant species to develop and coordinate a program to control such plants on the agency's land.

Executive Order 13112 – Directs federal agencies whose actions may affect the status of invasive species to (1) prevent the introduction of invasive species, (2) detect and respond rapidly to and control populations of such species in a cost effective and environmentally sound manner, as appropriations allow.

FSM 2900: Sets forth National Forest System policy, responsibilities, and direction for the prevention, detection, control, and restoration of effects from aquatic and terrestrial invasive species (including vertebrates, invertebrates, plants, and pathogens).

State of Montana County Noxious Weed Management Act – States that 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 KNF has entered into an agreement with Lincoln County.

Forest Plan

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.

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).

GA-DC-VEG-TOB-02. Noxious weed treatment occurs with cooperation from the state and county to improve habitat conditions for native grasses, forbs, and shrubs.

Analysis Area and Methods

Noxious Weeds Analysis Area and Methodology

The bounds of analysis for noxious weeds are the Galton Vegetation Analysis Area.

The analysis considers information from yearly weed surveys, volunteer weed surveys, yearly project area herbicide application records, field visits within the project area, as well as, experience across the District and Forest. Intensive weed surveys within the project area were conducted in 2010 by volunteers. 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.

Affected Environment

The spread of noxious weed species has been identified as a concern for the Galton Vegetation project. The analysis area contains a variety of plant community types, varying from dry, low elevation forests to the high elevation sub-alpine forests. Table 1 displays the most recent Montana Noxious Weed List. A number of noxious weed species have been introduced throughout the Fortine Ranger District. Several populations of weeds are known to occur within and near the analysis area as displayed in Weeds Table 2 below.

Weeds Table 1. 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 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 will require eradication or containment where less abundant. **Management shall be prioritized by the 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*) - Dalmation toadflax (*Linaria dalmatica*) - St. John's-wort (*Hypericum perforatum*) - Sulphur 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)*

Weeds Table 2. Noxious Weed Populations Known to Occur in the Galton Vegetation Analysis Area

Category	**Common name (*latin name*)**	**Category**	**Common name (latin name)**
1	orange hawkweed (*Hieracium aurantiacum*)	1	meadow hawkweed (*Hieracium pratense*)
1	oxeye daisy (*Chrysanthemum leucanthemum)*	1	Canada thistle (*Cirsium arvense*)
1	bull thistle (*Cirsium vulgare*)	1	houndstongue (*Cynoglossum officinale*)
2	dalmation toadflax *(Linaria dalmatica)*	1	sulfur cinquefoil (*Potentilla recta L.*)
1	spotted knapweed (*Centaurea maculosa Lam.)*	1	common St. John's-wort (*Hypericum perforatum L.*)

Noxious weeds are classified into three categories. Category 1 weeds are established and relatively widespread. They have a high probability of causing severe economic and environmental damage. The goal with these weeds is to contain them within an infested area and reduce their plant populations. Category 2 weeds are classified as new invaders. These weeds have a high probability of causing severe economic and environmental damage. The goal for these weeds is to eradicate small infestations and reduce larger infestations. Category 3 weeds are potential invaders that are not yet known to occur in the area.

The majority of weeds in the analysis area are Category 1. The only exception is dalmation toadflax. To date, dalmation toadflax has only been found in the southern-most portion of the analysis area associated with the railroad right-of-way.

In the late summer and fall of 2015, the Marston Fire burned 7,552 acres between Deep Creek and Summit Creek along the Marston mountain face. Extensive fire suppression tactics were used in the low elevation to prevent fire spread onto private land. Methods included utilizing closed roads, creating shaded fuel breaks, and creating dozer, excavator, and hand fire lines. All fire lines were rehabilitated after the fire was contained. The fire and fire suppression created an opportunity for new weed infestations due to disturbance. Weed surveys and spraying are planned for the two years following suppression activities.

During the summer of 2010, trails and trailheads located in the Ten Lakes Wilderness Study Area were surveyed for noxious weeds. All 85 miles of trail located within the Ten Lakes Wilderness Study Area were surveyed. In addition, trails and trailheads in the four inventoried roadless areas located within the Galton Vegetation analysis area were also surveyed for noxious weeds. In the Galton Vegetation Analysis Area, 70% of the Forest Service managed lands are either located in Wilderness Study areas or Inventoried Roadless areas.

The survey work was conducted by the Wilderness Institute, affiliated with the College of Forestry and Conservation at the University of Montana. Sampling was primarily conducted along roads and trails. Off-trail areas were sampled if any weed patches were opportunistically encountered. Data collected included: weed species, size of infestation, weed density, and GPS location. Following is a summary of findings:

Weeds Table 3. Weed Survey Summary

2010 Weed Survey Locations	# of patches found	# of species found
Ten Lakes Wilderness Study area (31,942 acres)	9	5
Inventoried Roadless Areas (57,307 acres)	17	7

Canada thistle and oxeye daisy were the most common weed species found, averaging 50-60% of overall weed species. Less common species included orange and meadow hawkweed, sulfur cinquefoil, spotted knapweed, and St. Johns-wort. The majority of patch sizes in the Wilderness Study Area were <1/10th of an acre. In the Roadless Areas patch sizes averaged slightly larger. Generally, Canada thistle is located in small patches, while oxeye daisy grows in larger, linear patches.

Spotted knapweed is the most widespread weed species on the Forest. Knapweed is a biennial or perennial forb that can produce up to 18,000 seeds per plant per year under favorable conditions. These seeds are known to survive in soil or gravel for at least 12 years.

Spotted knapweed ranks as the number one weed problem on rangeland in western Montana. It is adapted to a wide range of environmental conditions. On the KNF, it was previously believed that invasions of knapweed mostly occurred on roads and roadsides; however, infestations are now known to occur on skid trails and other disturbed areas and in the native plant communities of grasslands or forest openings. Spotted knapweed is most successful in warmer, dryer habitat types (USDA Forest Service, 1991a).

Orange and meadow hawkweeds are increasing in number of infestations, size of infestations, and density of plants within the analysis area. Seeds of both of these species are wind dispersed. The hawkweeds appear to spread faster than spotted knapweed and can disperse without human assistance. The exotic hawkweeds also spread vegetatively through stolons and, once established, can form dense mats that exclude most other forms of vegetation.

Noxious weeds are most often found in disturbed sites such as gravel pits, roads or trails. Disturbed sites are especially vulnerable to new weed invasions. Weed spread appears to be strongly tied to vehicles (cars, trucks, heavy equipment; any device where weeds can readily become lodged and transported). Vehicles spread weed seeds from infested areas (usually roadsides or parking areas) to non-infested areas. Once seeds are deposited in suitable settings, weed populations can establish themselves and flourish. Wind, cattle, and wildlife also provide secondary means for noxious weed spread, but automobiles and machine equipment are particularly effective in the spread of weeds because:

- They can readily hold and transport seed and plant parts (especially in portions of the undercarriages).
- Automobiles are the most popular mode of human transportation over longer distances.
- Automobile use is concentrated in areas where weed densities are highest (disturbed roadsides and parking areas).

Heavy seeded weed species such as knapweed, hawkweed, toadflax, and hounds tongue are dependent upon some type of transport vector other than wind for their dispersal.

Noxious Weed Control

Active weed control work within and outside the analysis area began in approximately 1986 when the Fortine Ranger District contracted with Lincoln County for weed control work. Starting in 1992, the District initiated its own weed control program utilizing District employees. Weed management has resulted in limiting existing numbers and distribution of noxious weeds.

With the exception of perhaps bull thistle, the aforementioned plant species are extremely capable competitors. Preventing noxious weeds from invading new areas is the least expensive and easiest way to control them. Spraying of herbicides is currently the most effective method of control once noxious weeds have been introduced. There are current proposals to spray in or near several of the treatment units identified with this project. The Kootenai National Forest completed the Kootenai National Forest Invasive Plant Management ROD (2007) for the application of herbicides which addresses the environmental and economic consequences of weed infestations and chemical control.

Recently, biological control agents have been released on the KNF to control spotted knapweed, tansy ragwort, St. Johns-wort, and dalmatian toadflax. The result of these releases is not yet apparent on some species of noxious weeds. Bio-control agents require a number of years to increase their populations to a level that will noticeably impact their weed hosts. Another bio-control insect, *Urophora affinis*, a seed head fly, is well established in Lincoln County. At many locations in Montana, knapweed biocontrols have succeeded in reducing seed production and plant densities (Duncan et al. 2001). In general, biological controls reduce the vigor or seed production of noxious weed species. Inevitably, some seeds are still produced. Biological control agents do not eliminate weed populations and do not prevent the spread of weeds. Bio-controls have the greatest impact on their weed hosts when several agents are attacking the same plant host. Biological controls are best used on weed species which are already well established in an area rather than on new invaders. Some weed species have not had biological control agents developed for them. For instance, orange and meadow hawkweed are very similar to many native and desirable hawkweed species. If biological control agents were released on orange hawkweed there is a risk that native hawkweed species could be negatively affected.

A combined program of mechanical, biological, and chemical weed control on Forest Service lands is the goal of the Kootenai Noxious Weed Program, along with educational effort directed at the prevention and management of weed populations in Lincoln County.

Environmental Consequences

Direct and indirect effects on noxious weeds are described below for proposed activities identified in Chapter 2. Cumulative effects were considered for all past, proposed, current and reasonably foreseeable activities listed and described in Chapter 3 and are described at the end of this section.

Noxious weeds are capable of out-competing native vegetation and proliferating freely. Native vegetation provides forage for deer, elk, and other bird, animal, and insect species. In comparison, noxious weed species do not provide forage for deer and elk and can displace native vegetation. Decreases in the total number of plant species as a result of noxious weed infestations has been observed on the Kootenai. By displacing native vegetation, noxious weeds reduce the ability of wild communities to support plants and animals native to the ecosystem and reduce the ability of communities to recover from disturbance.

Direct and Indirect Effects

Harvest and fuel treatment activities, along with their associated ground-disturbing activities, would disturb forest habitats. This could favor the spread or introduction of noxious weed species, potentially impacting native vegetation. Weed spread would be facilitated by vehicle travel in and out of analysis areas and by ground disturbance resulting from log skidding, fire line construction, mechanical piling, burning, and road work and construction.

Measurement Indicators - It is difficult if not impossible to predict the actual biological, ecological, and economic consequences of noxious weeds. Measurement indicators here are presented in terms of probability: certain activities having a greater potential for negative effects than others. The amount of any activity likewise has a bearing on the probability of effects. Three measurement indicators are applicable to contrast effects of the alternatives: these represent the primary factors affecting the introduction and spread of weeds by the proposed activities in the analysis area. These indicators were chosen because, as previously discussed, weed spread is strongly tied to vehicle and heavy equipment use. Measurement indicators are given in order of importance.

(1) Regeneration harvest – Two alternatives, 1 and 3, contain regeneration harvesting as part of their proposals. Regeneration harvest involves the removal of up to 60-95% of the overstory (depending on the prescription). The ground is scarified by burning or harvest equipment to favor the mortality of competing vegetation and the regeneration of conifers in the understory. Of the action alternatives, Alternative 1 has the highest quantity of regeneration harvesting, followed by Alternative 3.

(2) Temporary road construction - More miles of road would offer noxious weeds additional pathways for spread into unoccupied areas. Road construction itself would favor the spread of noxious weeds with (1) ground disturbance, (2) the removal of native vegetation, and (3) the transport and movement of heavy equipment within analysis areas. None of the action alternatives contain any permanent road construction. Alternative 3 contains slightly more temporary road construction than Alternative 1.

(3) Intermediate harvest - Intermediate harvest, either commercial thinning, salvage, improvement harvests, or variable density thinning, involves the removal of up to 30-50% of the overstory. Ground is disturbed primarily where skid trails are made and logs are skidded. Following harvest, the ground may also be lightly disturbed with underburning or mechanical piling. With intermediate harvests, conifer regeneration is not an objective and the development and growth of existing understory vegetation is normally favored, limiting the opportunities for colonizing weeds. Retention of a majority of the overstory also helps in this respect. Of the action alternatives, Alternative 3 has the highest quantity of intermediate harvesting, with Alternative 1 having less.

Weeds Table 4 compares acres of disturbance by alternative. Higher disturbance acres correlate to more favorable conditions for spreading noxious weeds. Alternative 3 has the highest potential to create conditions favorable to spreading weeds due to the number of acres disturbed while Alternative 2 has the least potential. Alternative 3 has higher potential than Alternative 1. The total number of acres disturbed does not indicate that all of these acres would be infested with noxious weeds if the treatment were implemented. The total disturbance acres do, however, relate to the relative risk of increasing weed populations by alternative. Regeneration harvest units are more susceptible to weed infestation than intermediate harvest units.

Weeds Table 4. Disturbance Levels – Comparison of Alternatives

Alternative	1	2	3
Acres of Regeneration Harvest	359	0	334
Acres of New Permanent Road Construction (miles x 3 rounded to nearest acre)	0	0	0
Acres of Temporary Road Construction (miles x 3 rounded to nearest acre)	4	0	6
Total Acres of all Intermediate Harvest (Includes commercial thinning, Improvement cuts, variable density thinning, vista enhancement)	1419	0	1516
TOTAL DISTURBANCE ACRES	1782	0	1856

Ecosystem Burning - Prescribed underburning (outside of harvest units). This treatment was not chosen as a measurement indicator because of its minimal disturbance effect on noxious weeds on the Fortine Ranger District. Also, while underburning may kill native understory vegetation, more often burning only top-kills perennial vegetation and rejuvenates growth from the root crown. Burning would generally take place in the spring rather than the fall. Burning in spring when soil moisture is higher would minimize the mortality of existing native vegetation, allowing them to retain their habitat space and limit colonizing by noxious weeds (Cass 1998; personal communication). Burning stimulates the productivity of perennial grasses giving them a competitive advantage over invader plants.

Salvage of Incidental Mortality from Underburning
Alternatives 1 and 3 would authorize salvage of mortality that occurred during fuel treatments. There are 16 criteria listed on page 14 of the FEIS that would need to be complied with prior to any salvage occurring. These criteria provide for the protection of resources and compliance with Forest Plan direction; therefore, salvaging incidental mortality would have no further effects to theinvasive plants resource. This activity would not occur under Alternative 2, so no effects would occur if Alternative 2 is selected.

Climate Change -As discussed in detail in the KIPZ Climate Change Report (USDA Forest Service, 2010), climate change may increase the risk in the Northern Region of the spread of non-native invasive plant species, but there is a lot of uncertainty surrounding any predictions. It is likely that some noxious weeds will likely expand as the climate changes and some may decline. However, if climate change results in increased wildland fire activity as predicted, more area is likely to burn annually and the result would be an increase in highly suitable areas for weeds to spread in the future. As a result, climate change may directly, indirectly or cumulatively add to the risks resulting from all alternatives.

Alternative 2 - No Action

This alternative would have no ground-disturbing activities associated with it. Alternative 2 would not increase site disturbance through burning or harvesting. Road and trail travel on open and seasonally open roads and trails will offer opportunities for the dissemination of weeds seeds via vehicle, animal, and human carriers.

Summary of Effects

The effects to native wildlife and plants as a result of weed infestations would be concentrated along road corridors and trails where ground cover, overstory cover, and soil development are limited. Road corridor populations are also the most noticeable and the most treatable. Harvest

and burn treatments together would, however, increase the likelihood of noxious weed spread or introduction away from roads into surrounding plant communities. Hawkweeds and thistles are wind dispersed and have a higher potential for infesting harvest and burn areas than heavy-seeded perennials such as knapweed or sulphur cinquefoil. Infestations outside of road corridors are more likely if vehicles are taken off road. However, any off-road vehicle use must comply with timber sale contract provisions that require washing before being transported to the job site.

Alternatives 1 and 3 would authorize salvage of mortality that occurred during fuel treatments. There are 16 criteria listed on page 14 of the FEIS that would need to be complied with prior to any salvage occurring. These criteria provide for the protection of resources and compliance with Forest Plan direction; therefore, salvaging incidental mortality would have no further effects to the invasive plants resource. This activity would not occur under Alternative 2, so no effects would occur if Alternative 2 is selected.

All action alternatives are likely to contribute to the spread and abundance of noxious weeds, differing by the amount of disturbance and traffic implied with each alternative. However, Design Criteria, listed in Chapter 2, would be implemented to reduce the spread of noxious weeds. Additionally, ongoing District management efforts would also contribute to the identification and treatment of weed populations.

The majority of weed spread would continue to occur on roadsides, but could also occur wherever weed seeds are transported. Many noxious weeds have proven adaptable in a variety of environmental circumstances, although most problem species on the Kootenai NF compete most aggressively on warm-dry sites (Forcella and Harvey, 1983), especially if the sites have been disturbed or the tree canopy removed.

New weed species could also inhabit the analysis area in the future.

Application of the Design Criteria would limit the introduction and spread of noxious weeds. Weed management is key to maintaining the integrity of plant communities and minimizing economic impacts. Harvest and burn sites would be monitored for weeds at least three times in the first 10 years following treatment. Roads scheduled for decommissioning would be checked prior to activity and weeds treated before the road is decommissioned. New introductions or infestations would be targeted for control measures. An aggressive District Weed Control Program (of monitoring and treatment) would offset the effects contributed by this project to the spread or increase in cover of noxious weeds. The control of rush skeletonweed on the KNF has been intensive and largely successful to date. Because the seeds of many weed species are viable for a decade or more, it is improbable that mitigation measures would be completely effective.

Cumulative Effects

The Cumulative Effects Worksheet, located in the Weeds Project File, considers and describes proposed activities in addition to the past, current, and reasonably foreseeable activities listed in Chapter 3. Those activities that cumulatively contribute indiscernible effects on noxious weeds are not included in this section. Those activities that cumulatively affect the species or habitat are discussed below.

Past soil-disturbing activity and vehicle traffic have helped spread noxious weeds into the analysis area. Monitoring of roads has been conducted in the analysis area and results were used to compile the most recent published Kootenai National Forest Monitoring and Evaluation Report (USDA Forest Service, 2013).

Spraying of roads in the analysis area would reduce weed infestations along open roads in the short term. Management actions proposed in this project would increase total infested area in the short term. All alternatives, including to a lesser extent the No Action Alternative, would add cumulatively to the amount of area infested with noxious weeds in the analysis area. The best, and likely the only way to avoid this increase are through intensive weed management actions.

There are no activities or actions that are expected to have a cumulative effect on noxious weeds except for recreation, road activity, livestock grazing, private land development, and vegetation management.

The Forestwide Young Growth Vegetation Management project would treat approximately 400 to 600 acres annually, dependent on funding, using precommercial thinning or commercial thinning treatments. Stands proposed for treatment are second growth stands and would be subject to a number of criteria before they were determined eligible for treatment. The Forestwide Young Growth Vegetation Management project would increase the likely spread of weeds. However design criteria are included with this and all projects to minimize this risk.

The Ten Lakes Travel Management Project will address over-snow and mechanized travel planning for the Ten Lakes area. The area affected by the proposal includes the Ten Lakes WSA and areas with common entrance points to the WSA. There are three main over-snow entrance points to the Ten Lakes WSA: the Grave Creek corridor; Clarence and Stahl Creek; and the Burma/Blacktail area. Over-snow travel is currently not limited. Mechanized use (primarily mountain bicycles) is also currently unrestricted. The alternatives contained in the Ten Lakes Travel Management Draft Environmental Impact Statement contain various amounts of over-snow and mechanized travel for the project area. A final decision has not been made for this project and the cumulative effects analysis utilizes the Proposed Action as the basis for the analysis in the Galton Vegetation Management Project. The cumulative effects of the Ten Lakes Travel Management Project in conjunction with past, present, reasonably foreseeable actions would result in no measurable effects for the invasive plants resource due to no ground disturbing activities being proposed under this project.

Most of these activities are expected to continue into the future, and noxious weed spread is likely to continue accordingly. Cattle and wildlife movement have a minor contribution to the expansion of weed populations in the Galton Vegetation Analysis Area. Sites that become infested are likely to experience a decrease in plant species diversity and a decrease in wildlife forage.

Consistency with Regulatory Framework

State and Federal Laws and Regulations

The design features described in Chapter 2 would be applied to this project to help meet the desired conditions for invasive plant species management as stated in the Forest Plan, and in compliance with the Participating Agreement with the Lincoln County Weed District and the Federal Noxious Weed Act. 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 with noxious weed management as outlined by FSM 2900 (USDA 2011)

which stipulate that all proposed projects analyze potential weed risk and ensure that unnecessary increases of weeds does not occur.

Forest Plan Direction

Accordingly, the Kootenai Forest established weed management direction with the Forest Plan. The Forest Plan addresses noxious weed species under the Forest-wide management direction and states in its goals 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 Kootenai National Forest annually conducts weed monitoring as part of its Forest Plan Monitoring and Evaluation Report. The KNF Forest Plan Monitoring and Evaluation Report 2013 states that "monitoring indicates that several noxious weeds have increased more than 10% in the numbers of acres affected and some have had a 10% or more increase in density of existing infestation since 1987. In addition, with the discovery of new invaders over the last several years, it is apparent that the diversity of noxious weed species is continuing to increase over time."

In terms of noxious weeds, the Galton Vegetation Project is consistent with Forest Plan direction because of proposed mitigation in the form of Design Criteria, contract provisions, and Forest and District weed control policies.

In summary, the proposed project is consistent with the goals, objectives, and standards and guidelines for all noxious weeds resources set forth in the Forest Plan. Refer to the following:

Kootenai National Forest Noxious Weeds Desired Conditions and Objectives

FW-DC-VEG-10: The selected action would move the Forest toward the desired condition as prevention controls such as washing equipment would be implemented on all contracts. The Forest will continue their weed management program using herbicides and biological controls across the project area.

FW-OBJ-VEG-02: The selected action follows the Forest Plan direction to treat new non-native invaders immediately. Treatment of approximately 1,000 acres across the Rexford and Fortine Districts annually, which will include treatments in the selected action, shall contribute to meeting this objective.

GA-DC-VEG-TOB-02: The selected action continues cooperating with the state and county to complete invasive plant treatments and improve habitat conditions.

Fire and Fuels

Introduction

Fuels are composed of the various components of vegetation, live and dead, that occur on a site. The type and quantity depend upon the soil, climate, geographic features, and the fire history of the site. An adequate description of the fuels on a site requires identifying the fuel components that exist. These components include the litter and duff layers, the dead-down woody material, grasses and forbs, shrubs, timber and slash. (H.E. Anderson, 1982).

Regulatory Framework

Four guiding documents establish direction and provide the framework for fire management: Forest Plan, Forest Service Manual, Federal Wildland Fire Policy and Program Review, and the National Fire Plan. These documents provide direction for implementing a fire management program. Fire handbooks, guides, research, and technical papers also provide insight.

Forest Plan

The Forest Plan includes the following:

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 increasing 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.

FW-OBJ-FIRE-01. The outcome is the treatment of fuels on approximately 5000 to 15,000 acres annually on NFS lands, primarily through planned ignitions, mechanical vegetation treatments (these acres are also included in FW-OBJ-VEG-01), and unplanned ignitions. NFS lands within the WUI are the highest priority for fuel treatment activities.

FW-OBJ-FIRE-02. Over the life of the Plan, manage natural, unplanned ignitions to meet resource objectives on at least 10 percent of the ignitions.

MA1b,c-DC-FIRE-01. Fire plays an increased role as a natural disturbance agent.

MA1b,c-GDL-FIRE-01. Natural, unplanned ignitions may be managed to meet resource objectives.

MA1b,c-GDL-FIRE-02. Planned ignitions may be used as a tool for ecosystem restoration purposes where the need is linked to human-induced changes caused by factors such as fire suppression and/or the introduction of non-native species.

MA3-DC-FIRE-01. The use of natural, unplanned ignitions is somewhat limited in most of these special areas due to the risk that unplanned ignitions could pose to the unique characteristics and values for which these areas were identified.

MA3-GDL-FIRE-01. The use of natural, unplanned ignitions is generally not allowed in these areas unless the values and unique characteristics for which the area was designated can be maintained or enhanced by the use of fire, and the risk of harm from an unplanned ignition is small. The Northwest Peaks and Ten Lakes Scenic Areas are two exceptions, because the use of natural, unplanned ignitions in those areas is generally appropriate.

MA3-GDL-FIRE-02. Planned ignitions may be used if the values and unique characteristics for which the area was designated can be maintained, enhanced, or protected by the use of planned ignitions.

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 -GDL-FIRE-01. Natural, unplanned ignitions, as well as planned ignitions, may be used to meet resource objectives.

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.

MA6-GDL-FIRE-01. Fuels are reduced, particularly within the wildland urban interface, to reduce the threat of wildland fire.

GA-DC-FIRE-TOB-01. Threats from unplanned ignitions are reduced for the towns of Eureka, Fortine, Trego, Stryker, and outlying communities and structures.

National Fire Plan

The National Fire Plan (NFP) originated after the record-breaking wildfire season of 2000, President Bush requested a national strategy for preventing the loss of life, natural resources, private property, and livelihoods in the Wildland Urban Interface. Working with Congress, the Secretaries of Agriculture and Interior jointly developed the National Fire Plan (www.fireplan.gov) to respond to severe wildland fires, reduce their impacts on communities, and assure sufficient firefighting capabilities for the future. The National Fire Plan (2000) includes five key points:

1. Firefighting/Preparedness
2. Rehabilitation and restoration of burned areas
3. Reduction of hazardous fuels
4. Community assistance
5. Accountability

The NFP is a long-term commitment based on cooperation and communication among federal agencies, states, local governments, tribes and interested publics. The federal wildland fire management agencies worked closely with these partners to prepare a 10-Year Comprehensive Strategy. The four goals of the 10-Year Comprehensive Strategy are to:

1. Improve fire prevention and suppression
2. Reduce hazardous fuels
3. Restore fire-adapted ecosystems
4. Promote community assistance

Homes and other structures continue to be constructed near and around lands managed as National Forests. As people, homes, and structures continue to occupy the WUI and as hazardous fuels continue to accumulate, a high risk and volatile situation needs to be addressed. The proposed activities in the Galton Vegetation Project are designed to restore fire-adapted ecosystems and reduce potential fire intensities near rural values and to capture the principles from guiding documents as well as the strategies of the National Fire Plan.

Community Wildfire Protection Plan

The Wildland Urban Interface (WUI) is a 2 mile buffer around private lands, as defined by the Lincoln County Montana - Community Wildfire Protection Plan (2005). Fire suppression and a lack of recent active management in some areas have allowed fuel loads to increase over time. Within the WUI, this has led to an unwanted risk to private land owners. Without further management this condition would continue to trend toward a stand-replacement fire and a loss of private property values.

Analysis Area

The analysis area for fuels is the same as the project area. The analysis area is confined to the project boundary because only the fuels within the project area would be treated. This analysis displays the effects of prescribed fire on the four Purpose and Need statements in Chapter 1.

Affected Environment

Historical Condition

The lower elevations in the project experienced a fire return interval of 15-35 years; in the upper elevations, the fire return interval is 50-100 years or longer. Map 15 shows the fire history of the Galton area.

Existing Condition

The Forest Plan uses the biophysical setting to describe forest composition, structure and function. Previously, Vegetative Response Units were used. Information about biophysical settings, VRU's and how they relate to Fuels can be found in Fuels Table 1.In lower-elevation stands in the Warm/Dry biophysical group, fire suppression has led to increased densities of small diameter Douglas-fir that is now providing ladder fuel, capable of escalating ground fires to crown fires. The moderate-to-high fuel levels in these untreated stands have increased the risk that fire starts may escape initial suppression efforts and become stand-replacing fires, particularly during dry years. These elevated fuel levels pose a risk to those fighting fires, to forest users, and to forest resources. Many of these areas within the Warm/Dry group fall within the wildland urban interface (WUI). Access to portions of the timber stands is limited and the fine, flashy fuels in these areas can spread fire quickly. These conditions are what the Community Wildfire Protection Plan was written to address.

Due to longer fire return-intervals in upper-elevation stands (Warm/Moist and Subalpine biophysical groups) fire suppression has not made as significant an impact as in the lower elevations. Although fewer fire cycles have been missed, fire suppression has reduced the natural

mosaic of disturbance patterns on these landscapes. Fires now have access to a more continuous fuel bed and create larger patches than were historically present when starts do occur. Insect and disease mortality has also changed this mosaic and increased fuel continuity in higher-elevation stands. Access to many large areas is limited. This can delay suppression efforts, leading to the development of large-scale wildfires, as seen with the Marston Fire in 2015.

Fire starts from lightning strikes within and outside the project area will likely continue to occur at historic frequencies of 15-35 years in the lower elevations and 50 -100 plus years at the higher elevations.. Refer to the map of lightning strikes in the Fuels section of the Project File. Fire starts in Warm/Moist and Subalpine biophysical groups under dry conditions can lead to large fires, depending on the continuity, arrangement, and loading of forest fuels.

Fuels Table 1 contains information on the attributes of the VRUs (USDA Forest Service 1999).

Fuels Table 1.Fire and Fuels Attributes by Biophysical group and VRU.

BiophysicalGroups	Warm/Dry	Warm/Moist	Subalpine	Subalpine	Subalpine	Subalpine
VRU Attributes	**VRUs 2 and 3**	**VRU 5**	**VRU 7**	**VRU 9**	**VRU 10**	**VRU 11**
Reference Fuel Loading	3-15 tons/acre	18-25 tons/acre	25-35 tons/acre	18 tons/acre	7-26 tons/acre	11 tons/acre
Existing Fuel Loading	5-25 tons/acre	25-35 tons/acre	40 tons/acre (Stands containing lodgepole beetle kill and blowdown may have 50-80 tons/acre)	20-30 tons per acre (Stands containing beetle kill lodgepole and blowdown may have 30- 50 tons/acre)	10-35 tons/acre	11 tons/acre
Reference Fire Frequency	10-40 years; on wetter sites fires occurred at 25-100 year intervals	Mixed-severity fires every 50-100 years; stand-replacing fires every 100-300 years	Mixed-severity fires every 50-150 years; stand-replacing fires every 100-300 years	Mixed-severity fires every 25-70 years; stand-replacing fires every 120-350 years	Low to mixed-severity fires every 60-300 years; stand replacing fires every 100-300 years	Low to mixed-severity fires every 35-300 years; stand replacing fires every 100-300 years

Existing Fire Frequency	Fire occurrences are similar to what happened historically; however the frequencies have been interrupted due to suppression activities	Fire occurrences are similar to what happened historically; fire frequencies have not necessarily changed	Fire occurrences are similar to what happened historically; fire frequencies have not necessarily changed	Fire occurrences are similar to what happened historically; continued suppression will affect fire frequencies over time	Fire occurrences are similar to what happened historically; continued suppression will affect fire frequencies over time	Fire occurrences are similar to what happened historically; continued suppression will affect fire frequencies over time
Reference Fire Severity	A mixture of ground fires and stand-replacing fires	A mixture of ground and stand-replacing fires	A mixture of ground and stand-replacing fires	A mixture of ground and stand-replacing fires	A mixture of ground and stand-replacing fires.	A mixture of ground and stand-replacing fires.

Fire Frequencies and Fuel Characteristics

Fire Regime Condition Class (FRCC) is a qualitative measure describing the degree of departure from historical fire regimes, possibly resulting in alterations of key ecosystem components such as species composition, structural stage, stand age, canopy closure, and fuel loadings. Departure can be caused by any number of sources such as introduced exotic species, introduced insects or disease, interruption in fire return interval, and management activities. Depending on forest type, it can be an indicator for fuel reduction needs and can help prioritize treatments to improve overall landscape condition class (Hann and Strohm 2003).

Data gathered in the field and knowledge of current frequency of fire and expected fire severity has led to the determination that the Condition Class at the project landscape is moderately altered from the natural range across the analysis area (Condition Class 2). The main contributors to this rating are fire exclusion, and species composition. Other than the areas that burned in the 1990s and in 2015, it was assumed for the FRCC analysis that fire has been excluded from the majority of the project area for at least 100 years. As mentioned, this has affected Fire Regime Group 1 where at least two fire cycles have been missed and long-lived seral species such as ponderosa pine are the ecosystem components at moderate risk of being lost due to fire regime condition class departure.

Fuels Table 2. Fire Regime Condition Class

Fire Regime Condition Class	Definition
1	Fire regimes are within natural range, and risk of losing key ecosystem components is low. Vegetation attributes are intact and functioning within historic range.
2	Fire regimes and vegetation attributes have been moderately altered from natural range. The risk of losing key ecosystem components is moderate. Fire frequencies have been departed by one or more intervals.
3	Fire regimes and vegetation attributes have been significantly altered from their natural range. The risk of losing key ecosystem components is high. Fire frequencies are departed by several return intervals.

Fire return intervals in the project area generally fall into Fire Regime I, III, and V. The Fire Regime Condition Class is a general classification of the role fire would play across the landscape in the absence of modern human intervention, but including the influence of aboriginal burning (Agee 1993, Brown 1995). The natural or historical fire regimes are classified by number of years between fires (frequency) and the severity of the fire on the dominant overstory vegetation.

Fuels Table 3. Fire Regime Condition Class

Fire Regime	Definition
I	0-35 year fire frequency and low to mixed severity fires
II	0-35 year fire frequency and high severity fires
III	35-100+ year fire frequency and mixed severity fires
IV	35-100+ year fire frequency and high severity fires
V	200+ year fire frequency and high severity fires

Fire Regime Group I - 0-35 year fire frequency and low to mixed severity fires. Low severity fires would consist mostly of light intensity surface fires, whereas a mixed severity fire could result in up to 75% replacement of the dominant overstory. These include ponderosa pine and dry-site Douglas-fir.

Fire Regime Group III - fire frequency of 35-100+ years of mixed severity (defined above). In the project area, these sites would have been moister than fire regime group I. Stands would have been dominated by western larch, ponderosa pine, Douglas-fir, and some lodgepole.

Fire Regime Group V - fire frequency is 200+ years of high severity stand replacing fires. Most of the dominant overstory vegetation could be replaced. These sites would have been moister than fire regime group III and consisted of mixed conifer species with a heavier component of shade-tolerant species like grand fir. Composed of fire-sensitive species, historically this forest type was

not disturbed by fire except during periods following catastrophic wind events or extreme drought.

Fuel Loading

Excessive fuel loads created through disease, decadence, and fire exclusion now occur over large portions of the project area. Stands with excessive fuel loads can experience fire events of high severity and great magnitude. Such events result in areas with very little if any variation in age, patch size, and species composition. If these ecosystems are to experience a disturbance regime similar to that which they are adapted, fuel loads must first be reduced to keep fire effects within a historic range of variability.

Fuels in the analysis area include surface and ladder fuels. Surface fuels include all combustible material lying beneath or on the forest floor, including, roots, rotten buried logs, duff, and woody debris. Ladder fuels consist of shrubs, small trees, and low-growing branches on trees that allow fires to move from the surface to the tree canopy.

Fine fuels are continuous throughout, in the form of twigs, small branches, live and dead brush and grasses, and pine needles. As mentioned, these fine materials will contribute to the overall fire spread, especially on the drier sites where the forest floor is littered with ponderosa pine needles and the dominate surface vegetation is pine grass and brush.

Observation of past fire behavior shows that small woody material, less than 3” in diameter, has the most substantial influence on fire behavior (such as spread rates and fire intensity), which can be accurately predicted with surface fire behavior models. However, large woody fuels greater than 3”, can contribute to large fire development and high fire severity. The greater the fuel loading of this large material, coupled with the size and decay rate, can greatly influence fire severity (effects to soil, water, other forest resources) – this is generally due to smoldering and persistent burn periods (Brown, Reinhardt, Kramer 2003).

Canopy Characteristics

In the majority of the project area a crown fire could be supported due to the combination of current surface, ladder, and crown fuels. The predicted flame lengths coupled with the canopy base heights of less than 10 feet would equate to a high probability of torching the canopy (20-100%) with the potential overstory mortality being nearly 100% in some areas. Past and current activities that include natural fuels burning on southerly upper elevation aspects have had positive effects on reducing fire behavior by reducing the decadent component of the brush species and conifer encroachment. Canopy fuels adjacent to private property range from open, high energy southerly aspects on the lower elevations to dense conifer stands. These dense canopies require much lower wind speed to support and sustain crown fire.

Analysis Methods

Analysis Assumptions

One assumption for this analysis is that as a stand of vegetation grows, fuels build up over time. This results from needle loss, tree damage, self-pruning, insect and disease infestations, tree mortality, and regeneration. Left untreated, all stands become more susceptible to wildland fire as fuel loads increase. Treatment through prescribed fire or commercial timber harvest reduces fuel loads by either consuming fuel during the fire or removal of fuel from the site (timber harvest). The use of prescribed fire following timber harvest treats additional fuels left behind after the

timber is harvested. Therefore, more treatment acres equates to less fuel across the landscape and having some stands in a condition where a wildland fire would not result in widespread mortality of the remaining stand.

Another assumption for this analysis is that prescribed or wildland fire can provide additional benefits to ecosystems. Fire is a natural process in the Galton Area. By using prescribed fire, managers can gain the benefits fire provides while managing some of the negative effects that occur during a wildland fire. If enough treatment is conducted, eventually a patchwork of fuel conditions would occur across the landscape, with some stands being untouched where fuel loads would continue to increase. In treated stands, fuels would be temporarily (5-15 years) reduced and would provide different ecosystem benefits than the unmanaged stands. Therefore, more treatment acres would provide a more diverse landscape and more ecosystem benefits for a period of 5-15 years.

The final assumption for this analysis is that less fuel across the landscape creates a safer environment for fire fighters and the public during a wildland fire. When treatments are spread across the landscape, the probability that a wildland fire burns into a treatment increases. When a wildland fire burns into a past treatment unit, for this analysis, it is assumed that the fire behavior would be modified in such a way that fire suppression activities could safely be conducted under average summer day conditions. Therefore, more treatment acres would represent a safer environment for fire fighters and the public.

Measurement Indicators

Treating fuels across the landscape contributes to the desired conditions in the Forest Plan. Four Purpose and Need statements were developed for this project. Measurement indicators for these four statements are treatment acres in the Wildland Urban Interface, the acreage of stands that are treated to improve big game browse conditions, the acreage of treatment that would benefit whitebark pine, and the acreage of fire used in restoring fire to ecosystems.

Wildland Urban Interface

The Wildland Urban Interface (WUI) is a 2 mile buffer around private lands, as defined by the Lincoln County Montana - Community Wildfire Protection Plan (2005). In the warm/dry biophysical group the fuels are drier and stand composition are fire adapted species. Fire suppression and a lack of recent active management in some areas have allowed fuel loads to increase over time. Within the WUI, this has led to an unwanted risk to Forest Service land and private land owners. Without further management this condition would continue to trend toward a stand-replacement fire and a loss of Forest Service and private property values.

Big Game Browse Conditions

The same causal factors in the WUI have created problems for some big game species at higher elevations. Fire suppression and a lack of active management have led to more acres of older seral stages than desired (see Forest Vegetation Section). This has led to a decline in habitat for big game species, such as mule deer (Wildlife Section).

Whitebark Pine

Whitebark pine stands are being reduced by a number of factors. This tree species is dependent on fire for propagation and to limit encroachment by competing species. Fire suppression and a lack of recent active management have helped lead to declines in this species.

Restore Fire to Ecosystems

Fire has been absent in much of the planning area, mainly due to effective fire suppression efforts over the last 100 years. Fuel buildups are inevitable in the absence of fire. The lack of active management in this area has also led to both an increase in fuel loadings and an imbalance in age class structure across the landscape.

Environmental Consequences

Analysis of Direct and Indirect Effects

Alternative 2 – No Action

As there is no timber harvest or prescribed burning proposed in Alternative 2, there would be no reduction in fuel loading from the existing condition. Many stands in the Project Area are in a condition conducive to stand-replacing fire. If a fire were to escape initial attack suppression efforts and burn into the extensive fuel accumulations, especially during dry, windy conditions, it would likely burn with high rates of spread and high intensities. Ladder fuels exist in many of the stands and fire would easily reach the crowns and become a stand-replacing crown fire. Alternative 2 would maintain or increase the risk of stand-replacement fire and loss of property values. Alternative 2 would not improve browse conditions, whitebark pine habitat, nor would it restore fire to ecosystems or protect values-at-risk (primarily fire fighter and public safety).

Wildland Urban Interface

This alternative would not reduce any fuel loads within the WUI. Private property values and firefighter safety would not be improved with this alternative.

Big Game Browse Conditions

No additional openings for wildlife would be created using prescribed fire in this alternative. Fuel loads would continue to increase and large-scale wildfire would be needed to improve browse conditions in this area.

Whitebark Pine

No additional whitebark pine propagation sites would be created or maintained using prescribed fire in this alternative. Encroachment by subalpine fir and Engelmann spruce would continue to hinder whitebark pine stands. No additional seed beds would be created through prescribed burning. Large-scale wildfire would be needed to improve whitebark pine habitat conditions in this area.

Restore fire to ecosystems

This alternative would not restore fire to ecosystems. Wildfires escaping initial attack would be the only way fire would be reintroduced into the ecosystem. This scenario could put other resource values at risk.

Effects of Action Alternatives 1 and 3

Alternative 1 includes fuel treatment on approximately 10,880 acres, shown on Map 4. Most proposed harvest units are located to manage areas that are a high priority for fuel treatment, mostly within the WUI. Timber harvest followed by fuel treatment accounts for 1,778 acres of the total. Fuel treatments, where no harvest would occur, account for 9,102 acres.

Alternative 3 includes fuel treatment on 4,274 acres, shown on Map 8. Units where vegetation management is followed by fuel treatment accounts for 1,850 acres of the total. Fuel treatments, where no harvest would occur, account for 2,424 acres. This alternative would treat the second most acreage of fuels.

Wildland Urban Interface

Implementation of harvest and fuel treatments would result in a reduction in fine fuel hazards near private land. Opening stands and increasing the distance between trees, so that fire would not easily move from canopy to canopy, reducing the risk of a stand replacement fire. Reducing the surface fuels allows for direct fire attack for the safety of the fire fighters. These treatments would also reduce competition between trees and allow more favorable conditions for forage production for wildlife habitat.

As stated in the Purpose and Need for Action, "Fuels within the WUI need to be managed to reduce the risk of stand-replacement fires and the associated risk to private property values. Reducing those current risks through prescribed fire and other vegetation treatments may facilitate the future use of unplanned ignitions for resource benefits" The Galton project contains vegetation treatments and restoration work that is designed to affect fire behavior after a fire starts in the analysis area or burns into the analysis area.

Fire behavior can be influenced in a number of ways, including increasing the spacing between tree crowns. This action reduces the potential for a crown fire to sustain and move through the crowns, thereby reducing the intensity and heat output of the fire. Firebrands have been identified in Dr. Cohen's work as an agent that can initiate a structure fire. Treatment of surface fuels is another method to influence fire behavior. Fewer fuels on the ground results in reduced fire intensities and increases the ability for ground resources to engage and suppress a fire. The use of mechanical fuel treatments and prescribed fire in the ecosystem can manage the fine dead fuels and reduce ladder fuels, while promoting the growth and development of fire dependent species, such as western larch and ponderosa pine. Young trees growing in high densities or growing up into the crowns of more mature trees serve as the necessary ladder fuels for a fire to climb into the canopy and develop into a crown fire. The reduction of ladder fuels will reduce the potential for ground fires to develop into crown fires and produce fire brands. Fire brands are lofted into the air during a crown fire and can carry for distances of up to one half mile. These firebrands can then land in the home ignition zone on adjacent private properties.

The fire behavior within the treatment areas was modeled using atmospheric conditions that would be expected on a critical fire day during fire season and the results of this modeling showed that a fire can transition into the canopy of the timber stands and spread in the crowns at 55 to76 chains per hour. Modeling conducted for some existing conditions within the Project Area indicated that a fire could advance ahead of the flaming front by means of spotting, with a predicted spotting distance of one-third to one half mile. Modeling with the same atmospheric conditions in treated stands showed that a crown fire did not initiate, but could spread through the more dense crowns if a crown fire were to burn into the area. The proposed treatments are designed similar to the restoration work that was completed in the lower Pinkham drainage. The Camp 32 fire started on August 7, 2005 and burned into the treated area that was designed to reduce fire behavior in the WUI. The success story "Fuel Treatment and the Camp 32 Fire." (USDA Forest Service 2005) illustrates how various stand treatments, by reducing tree densities and surface fuels, interact when a wildland fire burns into an area of treated stands and from untreated stands.

In addition to treatments proposed on National Forest System Lands, private landowners can and should conduct fuels management work on private lands. Much research has been done by Dr. Jack Cohen pertaining to the home ignition zone, which is typically defined as the area 30 to 60 meters or 100-200 feet from the structure. The treatments proposed on National Forest System Lands are consistent with this research and are designed to complement any work that a private landowner may conduct on their property. The County Forester utilizes the Firewise program to help educate private landowners about treatments that can be done on private lands and is available to advise private individuals.

Alternative 1 would treat 7,019 acres of fuels in the WUI. This is the most treatment in any of the alternatives. All but one regeneration harvest unit is within the WUI boundary and would trend the landscape toward forests desired condition. Unit number not within WUI 97.

Alternative 3 would treat 3,600 acres of fuels in the WUI. This alternative would significantly improve fuel conditions within the WUI. This alternative would not treat as many acres as Alternative 1, but considerably more than Alternative 2. All but one regeneration harvest unit is within the WUI boundary and would trend the landscape toward forests desired condition. Unit number not within WUI 127.

Big Game Browse Conditions

Implementation of fuel treatments on 8,909 acres would result in a reduction in fine fuel hazards in all units, stimulate browse species for wildlife habitat, and create a dead tree component for cavity-dependent species. Over the long-term, some of the treatments would create larger openings that would create both forage areas and larger blocks of habitat as the stands grow up.

Alternative 1 would result in 8,909 acres of big game browse improvement. This alternative would improve the most acres of big game browse.

Alternative 3 would result in 4,274 acres of big game browse improvement. This alternative would improve the second most acres of big game browse. This alternative would have the smallest increase in big game browse of any action alternative, but is still significantly better than Alternative 2.

Whitebark Pine

Fuel and pruning treatments would result in whitebark pine habitat improvement. These treatments would reduce or rearrange fine fuel loads, reduce competition with subalpine fir and Engelmann spruce, and provide microsites for regeneration from on-site seed sources. Ecosystem burns implemented in whitebark pine habitat would reduce fuels within the units. Pruning treatments in Alternative 1 would increase ground fuel loads until the pruned branches get compacted by snow and eventually decompose. Pruned branches are typically pulled back away from the trees they are cut from in order to help protect the pruned trees.

Alternative 1 would improve 1,503 acres of whitebark pine habitat. This is the largest amount of improvement of any action alternative.

Alternative 3 would improve 168 acres of whitebark pine habitat.

Treatment units over 40 acres

In alternative 1 there are 4 units for 326 acres and in alternative 3 there are 4 units for 249 acres. Treating fuels within the WUI is to reduce the risk of stand replacement fire and change the fire

behavior where firefighters can directly attack the fire. The larger treatment size allows for trending toward the FW-DC-FIRE-01 and FW-DC-FIRE-02. Treating small or isolated stands without assessing the broader landscape will most likely be ineffective in reducing wildfire extent and severity.(Graham etal 2004) The larger treatment blocks within the WUI is evident that the

fire behavior is modified was the Camp 32 fire. The fire was ignited on August 7, 2005. The Black Butte Rehab treated a total of 830 acres with a combination of timber harvest and prescribed burning. “While the treated area played a large role in slowing down the Camp 32 Fire and saving many homes in its path, the other important aspect of fuel treatment is that the treated area served as a safe place for firefighters to work.”(USFS 2005)

Restore fire to ecosystems

Harvest and fuel treatments would result in reduced fuel loads within the proposed unit boundaries. Treatments in lower elevation ponderosa pine stands would help reduce litter layers and contribute to the resiliency of older, larger trees to the effects of wildfires. These treatments also help reduce ladder fuels consisting of younger trees that compete with the overstory stand and can affect fire behavior. These younger, smaller trees create a ladder fuel situation which could bring a ground fire into the overstory tree crowns under the right conditions. Subsequent treatments in the lower elevation WUI would keep the natural fuels within a FRCC 1 instead of trending back to a FRCC 2 and/or FRCC 3.

Treatments in mid and high elevation stands would create patches of both severe burn areas mixed with lower severity burn areas across the landscape. These treatments would help provide a patchwork of vegetative states and conditions across the landscape and could influence the size and effects of large wildland fires. These prescribed fire areas could also provide opportunities to safely engage wildfires due to the change in fuel conditions. The fuels treatments could allow for resource objectives to be met from unplanned ignitions over time.

The desired outcome for the proposed burns would look similar to the 2015 Marston fire. The objectives of these burns would be to reintroduce fire into the ecosystem thereby reducing surface fuels, create new openings, and maintaining existing openings. Varying levels of severity will

Fuels Figure 1. Stand replacement fire trees left standing Reynolds Creek Fire 2015

exist within the prescribed fire area boundaries with the intent of mimicking a wildfire. See pictures of fire severity below. Trees killed by the fire would be left standing on site to provide a post fire habitat. The dead trees will fall over in time as they weaken from decay, providing for nutrient cycling and habitat for various flora and fauna. Stand development would progress over unless disrupted by another disturbance such as wild fire or prescribed fire.

Fuels Figure 2. Stand replacement fire trees left standing Marston Fire 2015

Fuels Figure 3.Low severity underburn Marston Fire 2015

Alternative 1 would restore fire to 10,880 acres of the Galton area. This alternative would treat the most acres of any alternative.

Alternative 3 would restore fire to 4274 acres of the Galton area. This alternative treats the second most acreage of any alternative; considerably less than Alternative 1, but more than Alternative 2.

Salvage of Incidental Mortality from Underburning

Alternatives 1 and 3 would authorize salvage of mortality that occurred during fuel treatments. There are 16 criteria listed on page 14 of the FEIS that would need to be complied with prior to any salvage occurring. These criteria provide for the protection of resources and compliance with Forest Plan direction. Salvaging incidental mortality would reduce fuel accumulations from the areas where the salvage occurred by removing the tree boles. The slash generated by this salvage could be addressed by several methods. It could be whole tree yarded to a landing and the subsequent slash piled and burned, it could be piled on the site where the trees were harvested, it could be jackpot burned following harvest activities, or if minimal slash was created, it may be left on site to contribute toward the woody debris component and/or nutrient cycling process. This activity would not occur under Alternative 2, so no effects would occur if Alternative 2 is selected.

Climate Change

Greenhouse gas (GHG) emission amounts can be directly linked to the amount of acres treated. However, natural fuels treatments typically do not consume 100% of the fuels in the area burned. Emissions expected from alternative 1 would be greater than those from alternative 3 (8,041acres in alternative 1 and 1,792 acres in alternative 3). Alternative 2 would not result in fuels treatments and therefore would have the least amount of emissions. The potential for wildfire exists under all altneratives and it is anticipated that wildfires will occur and will contribute to greenhouse gas emissions. Although smoke from wildfires and prescribed burns contribute to GHG emissions, it is extremely difficult to quantify what these emissions mean in a global context. The fuels treatments will take place in a 10 to 15 year time frame. Planned prescribed burning will most likely be less than 1500 acres per year. Unplanned ignitions that are allowed to burn may be more than 1500 acres in any given year.

It is also difficult to quantify how the treatment of these fuels on these acres affects carbon sequestration. Some of these natural fuel prescribed burn areas were chosen because there were fuel accumulations of dead and down material that could be addressed through fire use. There were other areas that were chosen to initiate some diversity and provide more forage for wildlife. There will most likely be an immediate loss at different levels in these areas to provide for carbon sequestration, but in a short amount of time these same areas may be more capable of carbon sequestration.

Effects of Climate Change on Proposed Actions and Environmental Impacts

There is broad scientific consensus that increases in average global temperature is very likely if atmospheric concentrations of greenhouse gases continue to accumulate at current rates. Over the next 10 to 15 years, projected changes in global and continental average temperatures are much less than for later this century. Projected changes in precipitation patterns over the next 10 to 15 years are even smaller, although of greater uncertainty.

Increased global and regional temperatures may translate into longer fire seasons. The amounts, duration, and timing of rainfall is critical to fire initiation and growth. The uncertainty of how

increased global temperatures have on global weather patterns and how they interact with local topography is unknown.

Over the life of this plan, environmental changes are not expected to alter the use of prescribed fire or unplanned ignitions for resource benefit. The time frames where fuels will be available and burn objectives can be accomplished are not anticipated to vary from historic conditions enough to change burn parameters through the life of this plan.

Cumulative Effects

The Cumulative Effects Worksheet, located in the Fuels Section of the Project File, contains the detailed analysis of all past, current, and reasonably foreseeable activities listed in in Chapter 3. No significant cumulative effects to the fuels resource were identified. The analysis area considered for cumulative effects was the same as the project area.

Vegetation Management and Fuels Reduction Activities: The harvest in the Little Feet Timber Sale will reduce fuels on 178 acres. Little Feet Fuel Reduction pile burning will reduce fuels by 9 additional acres. The Ant Flat maintenance burning will maintain an additional 80 acres. Cumulatively, this will reduce fuels in the analysis area, but due to the small acreage, the effect is minimal, but important, as all these treatments are within the WUI.

Forestwide Young Growth Vegetation Management Project - The Forestwide Young Growth Vegetation Management project would treat approximately 400 to 600 acres annually, dependent on funding, using precommercial thinning or commercial thinning treatments. Stands proposed for treatment are second growth stands and would be subject to a number of criteria before they were determined eligible for treatment. The Forestwide Young Growth Vegetation Management project thinning treatments would reduce tree stocking and competition, maintain vigor, and improve species diversity, increasing canopy spacing, increase canopy base heights, and removal ladder fuels. Fuel generated as a result of thinning would be treated through entire tree yarding, excavator piling, pile burning, and/or underburning. The treatments will reduce fuels within the analysis area, the effects would be important in trending the stands toward meeting forest desired conditions. Within the WUI treatment of young growth stands will continue to reduce fuels and maintain and enhance fire tolerant species.

Ten Lakes Travel Management -The Ten Lakes Travel Management Project will address over-snow and mechanized travel planning for the Ten Lakes area. The area affected by the proposal includes the Ten Lakes WSA and areas with common entrance points to the WSA. There are three main over-snow entrance points to the Ten Lakes WSA: the Grave Creek corridor; Clarence and Stahl Creek; and the Burma/Blacktail area. Over-snow travel is currently not limited. Mechanized use (primarily mountain bicycles) is also unrestricted. The alternatives contained in the Ten Lakes Travel Management Draft Environmental Impact Statement contain various amounts of over-snow and mechanized travel for the project area. A final decision has not been made for this project and the cumulative effects analysis utilizes the Proposed Action as the basis for the analysis in the Galton Vegetation Management Project. The cumulative effects of the Ten Lakes Travel Management Project in conjunction with past, present, reasonably foreseeable actions would result in a no increase in effects or change in the air quality resource. Existing uses are expected to continue.

Cattle Grazing: Past, present and foreseeable cattle grazing reduces fine fuel buildups in grassy fuel types. This will reduce fire spread rates on localized areas within the grazing allotment. The Graves Creek Allotment is the only allotment within the project area and currently allows up to

100 cow/calf pairs. The grazing is not expected to increase over the next ten years, therefore this activity will reduce fine fuels in areas where grazing occurs and is considered minimal with respect to the overall fuel profile across the landscape.

Noxious Weed Treatment: The control of noxious weeds is an ongoing activity on the forest. Herbicide treatments occur along the system roads and in past present, and future fuels management units. The activity is expected to continue over the next ten years. These treatments reduce non-native species in the analysis area. The treatments cause the plants to die off, this activity has a negligible effect within the analysis area on increasing the amount of dead fuels.

Fire Suppression: Successful fire suppression in the past has contributed significantly to the current fuels condition of the analysis area and will continue to do so into the future within the WUI without any fuels treatments. The forest plan allows for the use of natural, unplanned ignitions to meet resource objectives where appropriate. Future fire suppression in the WUI and other areas where values at risk determine the need for suppression, will continue to negatively impact fuel loadings within the analysis area by suppressing fires that would normally burn through fuel accumulations. Suppression of fires will allow species that are not fire tolerant replace those that are and increase the probability of stand replacement fires. Suppression will also allow for ladder fuels to grow and provide a pathway for a fire to spread into the overstory canopies when conditions are right. Within the project area an unplanned ignition could be managed using the entire suite of suppression strategies. Unplanned ignitions are not predictable and wildfires that are managed in the future can reduce fuels and maintain a fire dependent ecosystem. In areas where there are risks to WUI or other values of concern direct suppression could be used.

Road Management: Road management has no measurable effect on fuels within the analysis area. The past present and future use of the roads have no negative impact on fuel loads and often contribute to access and control lines for fire suppression and fuel management activities to occur.

Ten Lakes Travel Management Project -The Ten Lakes Travel Management Project will address over-snow and mechanized travel planning for the Ten Lakes area. The area affected by the proposal includes the Ten Lakes WSA and areas with common entrance points to the WSA. There are three main over-snow entrance points to the Ten Lakes WSA: the Grave Creek corridor; Clarence and Stahl Creek; and the Burma/Blacktail area. Over-snow travel is currently not limited. Mechanized use (primarily mountain bicycles) is also unrestricted. The alternatives contained in the Ten Lakes Travel Management Draft Environmental Impact Statement contain various amounts of over-snow and mechanized travel for the project area. A final decision has not been made for this project and the cumulative effects analysis utilizes the Proposed Action as the basis for the analysis in the Galton Vegetation Management Project. The cumulative effects of the Ten Lakes Travel Management Project in conjunction with past, present, reasonably foreseeable actions would result in a no increase in effects for fuels resource due to no increase in existing open roads. The existing access would still allow suppression resources to travel into the area if a wildfire were to occur.

Recreation Maintenance: These activities are limited to existing trails and have no measurable effects on fuel loadings. Foreseeable future maintenance on trails could aid in fire fighter access and be used for control line for fire suppression actions and fuels management activities.

Special Uses: These permits typically include water transmission lines and road access to private land. Past and present permitted activities have no effect on fuel loadings. Future special uses will

continue to occur and the permitting process will ensure there are no negative fuel impacts within the project area.

Public Use: Past, present, and future firewood cutting has an effect on fuel loads within 200 feet of open roads. This activity has the potential to reduce coarse woody material, snags, and increase branch wood fuels up to 200 feet from roads. Firewood cutting will continue to occur near open roads. For the foreseeable future the limbs and branches will be on the ground the increase in fuels will have a minimal impact on fire behavior for a time until the fuels begin to decay.

Hunting, fishing, trapping, and other recreational pursuits have little effect on fuels within the Analysis Area. Other than camp fires, few activities either create or rid the forest of fuels.

Recreation in the project area has the greatest chance of an unplanned ignition through unattended or escaped camp fires, illegal fireworks, or shooting.

Private Property: Development is expected to continue within the analysis area for the foreseeable future. The vegetative conditions on private land are highly variable and range from grassland to dense forest. Private land development has converted some forested land to low-density forest or grassland and roads. In most cases, the desire of landowners has been to maintain a forested setting in the immediate vicinity of dwellings and structures that is contiguous to forested public lands. Presently and in the future the FS will continue to work with the County Forester with the Firewise program. These activities do not affect fuel loads on federal lands, but do influence fire suppression tactics and costs. An escape debris burn or unplanned ignitions on private land in the lower elevations has the greatest risk of resource damage if the fire burns onto National Forest Lands.

Other Agency: The following activities have historically occurred and are expected to continue. Grazing on state land is the same as described above. The golf course serves as a fuel break, consisting mostly of green grass and wide open space that is generally devoid of available fuel for a moving fire. Tree planting can contribute to aerial fuel loads, especially near the unit edge where fire could move from the ground to crowns adjacent to the harvest unit. The Woods Ranch has no further management planned at this time. This area would continue to be grazed by the local ungulate population, keeping fine fuel levels in check.

Consistency with Regulatory Framework

Forest Plan

FW-DC-FIRE-01.

Alternatives 1 and 3 would trend the project area toward the desired condition by reducing fuels through timber harvest (3600-7019 acres), implementing fuels reduction in the Wildland Urban Interface (WUI) areas and fuels reduction outside the WUI (4274-8909 acres). Public and firefighter safety is mandated for all fire management activities by Federal Wildland Fire policy (2009, 2001, 1995), FS policy (FSH 5104) and implementation guidance (Interagency Prescribed Fire Planning and Implementation Procedures Guide [PMS 484-9; 2013] i.e. prescribed fire burn plans).

FW-DC-FIRE-02.

Alternatives 1 and 3 would trend the project area toward the desired condition by reducing fuel loadings within the treatment units resulting in increased likelihood of low-intensity fire and

reduced crown fire potential. Reduced fuel loads would create increased opportunities for safe fire management operations, particularly in the WUI.

FW-DC-FIRE-03

Alternative 1 and 3would trend the project area toward the desired condition by reducing fuel loads in treatment areas. Planned ignitions of natural fuels would trend the vegetation toward improved wildlife habitat. In some areas, unplanned ignitions could be managed to have fire function as a natural process and other important ecosystem functions.

FW-OBJ-FIRE-01.

Alternatives 1 and 3 would contribute toward meeting this objective of annual fuel treatment acres. The amount could vary each year depending on completions of timber sale activities, weather and fuel conditions, and available funding. Portions of each action alternative would occur within the WUI. This would move the project area toward this objective by removing and re-arranging fuels within the treatment units (mechanical and prescribed fire within harvest units).

FW-OBJ-FIRE-02.

Alternative 1 and 3 would contribute toward meeting this objective by treating fuels. Treatment of fuels in these alternatives could allow unplanned ignitions to be managed for resource objectives in the future.

MA1b,c-DC-FIRE-01.

Alternative 1 proposes treatments in MA1c and would therefore trend the project area toward this desired condition. Alternatives 2 and 3would be neutral toward achieving the desired condition because proposed activities are outside the Ten Lakes Wilderness Study area.

MA1b,c-GDL-FIRE-02.

Alternative 1 considers the use of some planned ignitions (ecosystem burning) in this MA for ecosystem restoration purposes. Alternatives3 would not be prohibitive to this guideline. This project is designed in accordance with this guideline.

MA3-DC-FIRE-01.

This project is neutral towards this desired condition as decisions regarding unplanned ignitions will occur at the time of the ignition and will be made by the line officer.

MA3-GDL-FIRE-01.

This project is neutral towards this desired condition as decisions regarding unplanned ignitions will occur at the time of the ignition and will be made by the line officer.

MA3-GDL-FIRE-02.

Alternative 1 proposes some ecosystem burning within the Ten Lakes Scenic Area. The Scenic Resource could be affected for the short term but would diminish over time (See Scenic Resources Section). This guideline does not apply to Alternative 3 as no planned ignitions are proposed in MA 3.

MA5a,b,c-DC-FIRE-01.

Alternative 1 and 3 would contribute to the desired condition with 1,019-2,956 acres proposed for planned ignition/prescribed fire within MA5.

MA5a,b,c -GDL-FIRE-01

Alternative 1 and 3 were designed in accordance with this guideline for planned ignition, with approximately 1,019-2,956 acres proposed for treatment within MA5.

MA6-DC-VEG-01.

Alternative 1 and 3 would contribute to progress toward the desired condition with treatment of 1,778-1,850 acres. There are 757-3478 acres of planned ignitions/prescribed fire in non-merchantable units, including portions in the WUI.

MA6-GDL-FIRE-01

Alternatives1 and 3 are designed in accordance with this guideline. Fuels would be reduced within treatment units through approximately 1,778-1,850 acres of timber harvest within the MA and approximately 757-3,478 acres of planned ignition/prescribed fire in non-merchantable units, including portions in the WUI. The threat of wildland fire would be reduced in these units through a combination of increased spacing of overstory trees, reduction of ladder fuels and reduced surface loading through prescribed fire.

GA-DC-FIRE-TOB-01.

Alternative 1 and 3 would contribute toward Geographic Area desired conditions. These alternatives would reduce fuel loads within the project area by treating 4,274-10,880 acres through timber harvest and planned ignitions and increase opportunities for successful fire suppression, including those areas adjacent to private property. This fuels reduction would reduce the threat of unplanned wildfire within the Geographic Area by reducing fuels throughout the project area.

National Fire Plan

Alternatives 1 and 3 meet the NFP by treating fuel 4,274-10,880 acres through timber harvest and planned ignitions. Fuels reduction would reduce the threat fuels and restoration of forest land and reduce the risk to communities. Fuels reduction on federal land would allow for restoring fire into fire adaptive ecosystems.

Community Wildfire Protection Plan

Alternatives 1 and 3 meet the CWPP by treating fuels within the 2 mile radius of private land. Treatment adjacent to private land would reduce accumulate fuels from fire suppression and reduce the risk to firefighters and public safety.

Alternative 2 does not meet the CWPP because there is no treatment of the fuels within the 2 mile radius of private land on NFS lands.

Soils

Introduction

This section discloses the results of the analysis for the soils resource in the Galton Vegetation Project Area. Field surveys regarding soils for this project were conducted in 2009 and 2010. All soil surveys conducted used the R1 Soils Protocol. Where past disturbance was found within an area proposed for management, full surveys were conducted using R1 Soils Protocol.

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 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 Kootenai Forest Plan (USDA FS 2015a)

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 productive potential.

The **Regional Soil Quality Standards (R-1 Supplement No. 2500-2014-1**) provides soil quality standards to assure the statutory requirements of NFMA are met. Manual direction recommends maintaining 85% 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% to be detectable (Powers, 1990). In areas where more than 15 percent detrimental soil conditions 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 Forest Plan states that soil and water conservation practices (SWCPs) as outlined in Water Conservation Practices Handbook R-1/R-4 Amendment No. 1 (FSH 2509.22) and will be incorporated into all land use and project plans as a principle mechanism for controlling non-

point pollution sources. Best Management Practices consist of state-of-the art practices that fulfill Forest Plan objectives and are designated to minimize soil disturbance during harvest and road construction activities.

Soil resource management has a goal of maintaining or improving long-term soil productivity and soil hydrologic function. The Forest Plan states that management practices will be required to trend towards desired future conditions for vegetation and will rely on a variety of passive and active management techniques. Below is a listing of the Forest Plan goals, desired conditions, objectives, and guidelines for the soil resource which apply to the project area.

Soil productivity is defined as the inherent capacity of the soil resource to support appropriate site-specific biological resource management objectives, which includes the growth of specified plants, plant communities, or a sequence of plant communities to support multiple land uses.

Soils Table 1: Resource Indicators and Measures for Assessing Effects

Resource Elements	Resource Indicators	Measure (Quantify if possible)	Used to address: P/N or key issue?	Source (FP component, law or policy, BMPs, etc?)
Sensitive Soils	Physical, chemical, and biological properties of soils to support desired vegetation conditions and soil-hydrologic functions	Acres of activity on sensitive soils	Yes	Forest Plan GOAL-SOIL-01 FW-DC-SOIL-02 FW-GDL-SOIL-03
Soil Productivity	Volcanic ash-influenced soil 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.	Detrimental Soil Disturbance Values	Yes	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 recruitment or overheat soils	Acres of prescribed fire by treatment type	Yes	Forest Plan GOAL-SOIL-01 FW-DC-SOIL-01 FW-DC-VEG-08
Soil Productivity	Coarse woody debris as the organic matter source for nutrient cycling	Post-harvest tons per acre of CWD by biophysical setting	Yes	Forest Plan FW-GDL-SOIL-02

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 the continual cycling of nutrients and organic material. Soil quality refers to the capacity 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 area as defined by the Forest Service Manual R-1 Supplement No. 2500-2014-1):

> "Analysis Area: A soils analysis area is a discrete land area affected by 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 with range allotments. All proposed temporary roads, landings and skid trails associated with proposed harvest areas are included within the analysis area."

The soil analysis area for this project involves timber stand improvements, timber harvest, piling, fuel treatments, fire line construction, skid trails, landings, weed spraying, new and temporary road construction, and road decommissioning and storage, and post-harvest activities. System roads are not a part of the soils analysis areas because they have been removed from production.

Analysis Methods

Existing Condition

Existing condition for the soils resource were determined using timber stand records, aerial photography, GIS data, and on-the ground visits. Landtypes and hazard ratings were gathered from landtype descriptions and characteristics found in the Soil Survey of the Kootenai National Forest Area, Montana and Idaho (Kuennen and Gerhardt 1995).

The proposed action was analyzed to identify those units that would require potential design modifications to meet Regional and Forest Plan standards. Discrepancies of acres are possible due to rounding or field reconnaissance by a Soil Scientist prior to modification of timber unit boundaries. Method of assessment was based upon a number of factors including:

- Land Management area where proposed harvest activities are to occur.
- Potential for ground based harvest and yarding activities as a function of slope gradient.
- Potential for proposed treatment types to cause detrimental disturbances to the soil types in the area. Proposed prescribed burn, prescribed burn/understory improvements, and non-commercial understory thinning units are anticipated to have a low risk of increased soil disturbance because no ground-based equipment would be used. All proposed regeneration harvest and improvement units where heavy equipment was proposed received soils walkthrough field assessments (Refer to USDA FS 2011a R1 Soils tech. guide).

Field Sampling Procedure

In order to determine the severity and the aerial extent of existing soil disturbances from previous forest management activities, randomly selected soil transects were conducted across representative portions of proposed activity areas (proposed harvest polygons, temporary roads, and landings). Sample locations are equally distributed across the random transects and sampled using a common tile spade shovel to determine the resistance of penetrating into the soil. Physical resistance to penetration was found to correlate quite well with altered soil conditions related to past management activities. In areas displaying the greatest impacts from past

management activities the shovel blade is only capable of penetrating a short distance into the soil and with great effort (Page-Dumroese et al. 2009).

Field sample transect points were then categorized according to three types: 1) no disturbance; 2) disturbance present but not detrimental; and 3) detrimental soil disturbance (DSD). The detrimental disturbance category is defined in 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 or fuels treatment), exclusive of dedicated resources (such as system roads)(FSM 2550 and Region 1 Supplement 2500-2014-1).

Detrimental Soil Disturbance (DSD)

Direct Effects

Soils can be physically damaged by displacement, compaction, puddling, and severe burning in either quantitative or qualitative terms or both (Page-Dumroese et al. 2009a, b; USDA 1999). 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:

a. Compaction: A 15% 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.

b. Soil ruts: Machine-generated soil displacement having smeared the soil surface in a rut. Wheel ruts at least 2 inches deep in wet soils.

c. Displacement: Removal of one inch or more surface soil continuous area greater than 100 sq. feet which often consists of 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.

d. Surface erosion: Indicated by rills, gullies, pedestals, and localized soil deposition.

e. Severely burned soils: Physical and biological changes to the soils resulting from high-intensity burns of long duration as described in the Burned Area Emergency Rehabilitation Handbook (FSH 2509.13).

f. Soil mass movement: Any soil mass movement caused by management activity.

Soils Table 2 depicts the predicted detrimental soil disturbance (DSD) values based on a summation of past monitoring of soil productivity for the Kootenai National Forest using data collected 1988-2005 (Kuennen 2006a). The DSD percentages used for the Galton Vegetation project were developed as an average soil disturbance level equated to harvest equipment type, fuel treatment methods, and season of operation as calculated from soils data collected (2000-2005) and personal information from retired KNF Soil Scientist Louis Kuennen (2011) regarding secondary entry DSD values. Over that time period, timber removal had always occurred prior to the “post-harvest field surveys” and the monitoring results include effects from mechanical fuel abatement activities such as excavator piling activity if present. The end DSD figure is a composition of all disturbances and does not separate each category of disturbance values where present within each unit. Thus, the value of 8% 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 100% detrimentally disturbed through the removal of organic matter, displacement, and/or compaction. New temporary roads yield an average of two acres of detrimentally disturbed soils per mile of road.

Soils Table 2. Monitoring Results of DSD from Management Activities on the KNF (Kuennen 2006a; Louis Kuennen pers. comm. 2011)

Category	Season of Operation	Detrimental Soil Disturbance Coefficients (%) [1 2]
Skyline	Not Applicable[6]	3
Tractor	Summer	8
Tractor	Winter	4
Forwarder	Summer	4
Forwarder	Winter	2
Excavator Piling [2]	Not Applicable[6]	2
Feller Buncher [3]	Not Applicable[6]	2
Helicopter	Not Applicable[6]	0
Fire line Construction[24]	Not Applicable[6]	1
Grazing [2]	Not Applicable[6]	2
Tractor 2ndary entry	Summer	4 [5]
Tractor 2ndary entry	Winter	2 [5]
Forwarder 2ndary entry	Summer	2 [5]
Forwarder 2ndary entry	Winter	1[5]

1 The numbers for this document were based on soil monitoring data collected 2000-2005 and secondary entry values are related to Louis Kuennen pers. comm. 2011.

2 DSD percent is not necessarily additive to other activities. This is because the percentages present 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.

3 Feller Buncher must be operated straight up and down the fall line slopes not exceeding 45%. Where such harvest activities occur on skyline units an additional 2% DSD is expected to occur.

4 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.

5 In proposed secondary entry harvest units which currently are equivalent or exceed 8% measured DSD during field sampling, the ground based harvest activities which were harvested decades earlier in time will be estimated to have a 50% disturbance value as compared to similar harvest activities in undisturbed soils (Louis Kuennen pers. comm. 2011). This reduction in the anticipated DSD values only applies to ground based harvest operations. It is presumed that units containing less than 8% are more historic in nature and are on a recovery trend as displayed by revegetation of historic skid trails and second-growth stand conditions.

6 Not applicable because percent ground disturbance does not change based on season of operation.

Generally, detrimental effects on soils are not permanent and depend primarily on soil texture, parent material, aspect, and level of disturbance, i.e. compaction. Soil recovery begins once activities cease on the site. 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 far beyond the 70 year timeframe.

Indirect Effects

Indirect effects to soils may include the reduction of site productivity due to the removal of vegetation and nutrients. Large woody debris (woody residue >3” diameter) and finer organic material are essential for maintenance of sufficient microorganism populations and long-term site productivity. Design features (see Design Features; Table 5) 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 system roads and designated landings on the National Forest transportation system are considered dedicated lands and are not part of the cumulative effects. Permanent roads systems are analyzed in the Hydrology Section.

Assumptions and Limitations

The potential detrimental disturbance numbers for each proposed harvest unit are based on empirically derived coefficients that were obtained and averaged from numerous monitored sites throughout the Kootenai National Forest (Kuennen 2003; 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) will be implemented. The predicted values do not account for changes in soil type, the recovery of soils over time, or existing conditions.

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 watershed. Assessments of cumulative effects on soil productivity at scales larger than the specific treatment unit boundary (such as the watershed scale) misrepresent the effects of management activities by masking and/or 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 Water Resources. 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.

Scientific Uncertainty and Limitations

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 measureable decline in the timber productivity for a site. The Region 1 (R1) Supplement 2500-2014-1 requires that detrimental soil disturbance should be limited to 15% of an activity area. The value of 15% is based on the assumption that soil quality and productivity will be maintained if less than 15% of an activity area is detrimentally impacted after disturbance (Page-Dumroese et al. 2000).

Currently the Soil Quality Standards are being studied 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 over the past ten year indicate there is little evidence of adverse effects of surface organic removal or soil compaction on productivity as measured by total biomass production, and the growth and vigor of planted trees (Page-Dumroese et al. 2006a, Powers 1990, Powers et al. 2004).

Additional controversy surrounds the use of the term 'irreversible' in NFMA. NFMA has guidelines that "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 (organic matter, moisture, top soil retention, soil organisms) are in place and time is allowed for recovery.

Affected Environment

Soil Reference Condition

The bedrock underlying the project area is a part of the Belt Supergroup. This base geology is composed mostly of metamorphosed sediments of ancient sea beds from the Precambrian era (0.8-1.4 billion years before present). The ancient sea beds that were subjected to extreme heat and pressure for millions of years and metamorphosed into a different type of rock. This bedrock type is the most common bedrock type in the Northern Rocky Mountains. The metamorphosed sediments are composed of greenish-red and brown fine-grained argillite, sandstone, and quartzite. Elevations throughout the project area range from 2,700 feet to over 7,800 feet.

The project area was modified over time by alpine glaciation in the upper portion of the basin while the middle and lower portions of the basin were shaped by continental glaciation. The areas impacted by continental glaciation contributed to the rolling appearance at lower elevations. Local soils are composed of a mixture of glacial till and glacial meltwater deposits, (i.e., kames, eskers, glacio-fluvial debris). The upper drainage basin consists of U-shaped glacial valleys and undulating glacial till deposits.

Approximately 7,700 years ago (Zdanowicz and others 1999) Mt. Mazama erupted in southwest Oregon and deposited a layer of volcanic ash-influenced loess over northwestern Montana forming the topsoil horizon in many local areas. The uppermost part of the ash is usually enriched with organic matter and has been incorporated into the soil system. Such soils have a high water-nutrient holding capacity and are important for soil productivity. Local sub-soils are not as fertile.

A high amount of the surface soils formed in volcanic ash-influenced loess overlying glacial till. Slopes are gentle along the western portion of the Galton Project Area, ranging from five to 30 percent in the lower elevations with steeper slopes of 60-80 percent occurring at higher elevations of the Deep Creek drainage. Where the volcanic ash is present, it forms the topsoil layer and ranges between six to 12 inches in depth with a yellowish brown to reddish brown color.

Between the eruptions of Mt. 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 revegetated.

Historically, the most prevalent large-scale disturbance in the Analysis Area was wildfire. Stand replacing fires varied in frequency from 50-350 years, depending on vegetation type and location. Once fire passed through an area, erosion increased, especially on steep slopes in headwater swales where most vegetation was removed, until sufficient forest floor and canopy vegetation had recovered. Soils may have developed hydrophobic conditions following severe fires. However, soils on the KNF have shown little hydrophobicity following wildfires in recent decades, even when those fires burned very intensely; therefore, it is unlikely that this condition was common in the past. More frequent, low intensity underburns likely had little effect on soils due to the short contact time and low elevations with these fires. Soil productivity was maintained over the long-term as vegetative matter slowly decomposed or burned in low intensity natural wildfires.

Existing Condition

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 Analysis Area. These activities and events provide baseline conditions for the affected environment in the project area.

The criteria used to assess existing condition for soil resources were:

Kootenai National Forest Landtypes;

Identification of Sensitive Soils;

Coarse Woody Debris; and

Site Conditions

Landtypes

Landtypes are units based on soil types. There are 50 recognized landtypes on the KNF of which 34 are found in the project area (Map 16, Soils Table 3). 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 timber harvest suitability, equipment operating limitations, and the production potential of the landscape. It is an important tool for protecting soils during resource management activities. 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% 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 or trough walls.

Mid-elevation Landtypes (500 series): These landtypes are residual in nature and developed on site and are typically mid-slope in elevation.

Of the thirty-four landtypes within the project area, twenty-five have proposed harvest activities under at least one of the action Alternatives and are thus included as being in the Soils Analysis Area. Management activities proposed on each landtype are designed to be compatible with the risks associated with that landtype. Soils Table 3 provides a general description of all landtypes found in the project area and associated hazard of various land management activities.

Soils Table 3. Landtypes in the Analysis Area (Kuennen and Gerhardt 1995)

Landtype	Total Landtype Acres in Project Area	Timber Management		Road Construction/Maintenance		
		Tractor Operators	Sediment Hazard	Cut and Fill Slopes	Native Surface Material	Sediment Hazard
101	972	Soil Damage	Severe	None	Erosion	Severe
102*	778	Soil Damage	Moderate	None	Rutting	Severe
103*	2522	Soil Damage	Severe	None	Erosion	Severe
105* N/A	1368	N/A	N/A	None	None	Moderate
106*	544	Soil Damage	Moderate	None	Erosion	Moderate
107* N/A	902	N/A	N/A	None	Erosion	Moderate
108*	4095	Soil Damage	Moderate	None	Rutting/Erosion	Severe/Moderate
109	870	Soil Damage	Low	None	Erosion	Severe
110*	35	Soil Damage	Moderate	None	Rutting	Severe
111 N/A	36	N/A	N/A	None	Rutting	Severe
114 N/A	108	N/A	N/A	None	Rutting	Severe
201 N/A	30	N/A	N/A	None	Large Stones	Moderate
251*	632	Slope, Rock	Severe	None	Large Stones	Moderate
303	164	Rock	Moderate	None	Large Stones	Slight
321*	15698	Soil Damage	Moderate	None	Rutting	Moderate
322*	3368	Soil Damage	Moderate	Sloughing	Rutting	Severe
323*	11427	None	Moderate	Sloughing	Rutting	Severe
324*	8160	None	Moderate	Sloughing	Erosion	Moderate
325*	117	Soil Damage	High	None	Erosion	High
329	691	Soil Damage	Moderate	Sloughing	Erosion	Moderate

351*	1296	Slope	Severe	Landslides	Erosion	Severe
352*	1178	Slope	Moderate	Sloughing	Erosion	Moderate
353*	1029	Soil Damage	Moderate	None	None	Slight
355*	2292	Rock	Moderate	None	None	Moderate
360	256	Rock	Slight	None	Large Stones	Slight
401* N/A	16560	N/A	N/A	Avalanches	Large Stones	Moderate
403* N/A	9102	N/A	N/A	Avalanches	Large Stones	Moderate
404*	6838	Soil Damage	Moderate	Raveling	Erosion	Moderate
405*	19830	Slope	Moderate	None	Large Stones	Slight
406*	14416	Slope	Moderate	Raveling	None	Slight
407*	11946	Soil Damage	Severe	Raveling	Erosion	Severe
408*	19420	Soil Damage	High	Raveling	Erosion	Severe
510*	12127	Complex Slopes	Severe	None	None	Slight
999^	1343					
Total Acres	170149					

N/A Not Applicable because landtype has only scattered stands of trees.

*Landtypes present in the Soils Analysis Area Scale

^Landtype 999 can be termed as an unclassified landtype and typically refers to acres containing waterbodies such as lakes and ponds.

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 35,627 acres or 21 percent of the entire project area. Sensitive soils are best addressed through avoidance, Best Management Practices (BMPs), buffers, and/or through design criteria.

Landtypes of Concern

There are soils on the Kootenai that have been designated “landtypes of concern”, and should be given additional consideration prior to the introduction of management activities. These are landtypes 102, 112, 325, 351, 365, 370, and 520 (Kuennen 2006b). Within the analysis area, only three landtypes of concern (102, 325, and 351) are present and consist of 2,191 acres or 1% of the entire acreage. Refer to the Soils Project File for further information on soil landtypes of concern.

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 all or most of the year, and moist soils are more prone to compaction, displacement, rutting, and/or puddling. Harvest and road construction activities associated with the analysis area will avoid timber harvest activity in wetland areas (FW-GDL-RIP-05) and as a result this factor will not be carried forward in the Soils Report.

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 KNF 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. It is important to realize that of the low productivity soils only a minor amount is located within the proposed harvest activity area.

The majority of the project area has moderate to high soil productivity. Landtypes 201, 303, 353, 360, 405, and 510 are all rated as having low soil productivity. This equates to 33,436 acres or 20 percent of the entire project area being identified as having low soil productivity. Application of appropriate management precautions (BMP’s) such as avoiding timber harvest in wet seasons, and skidding over snow or frozen ground can decrease the negative impacts to soil productivity.

Site Conditions in the Activity Areas

Site conditions are considered for each activity area in the effects analysis portion of this assessment. Past activities in the project area have resulted in impacts that persist today and will be characterized and quantified in a cumulative effects analysis. Past activities affecting soils include, but are not limited to, road construction, timber harvest (including skid trails and landings), prescribed or natural wildfire, cattle grazing, firewood gathering, and off-road vehicle use.

The four factors which have created the most impacts to soil conditions associated with the project area are:

- Road Construction
- Timber Harvest
- Fire Impacts
- Livestock Grazing

Road Construction

Common impacts to soils from road construction are displacement, compaction, and erosion (road-related runoff). Road building has accompanied most other management activities. 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 in various degree depending on passage of mechanized vehicles. When road use ceases, soils gradually begin to recover.

Implementation of BMPs reduces erosion and the rerouting of water associated with roads. Refer to the Hydrology Specialist report for more detailed information about specific road conditions and roads analysis.

Presently, there are approximately 691 miles of roads within the Galton Project Area. This includes 326 miles of private, 18 miles of State, 56 miles of County, 28 miles of Highway 93, and 261 miles under Forest Service jurisdiction. Of the 261 miles road on National Forest System lands, 260 are National Forest System Roads recorded in the Kootenai transportation atlas. One mile of road is considered of undetermined status and is not authorized for public or administrative motor vehicle use. Of the 260 miles of National Forest System road, 122 miles are restricted to motor vehicle use yearlong, 116 miles are open yearlong, and 24 miles are seasonally restricted (December 1st-April 30th).

All authorized roads (whether FS, state, county, or private jurisdiction) are considered permanent structures on the landscape for the purposes of calculating soil disturbance. As such, these "dedicated road" do not contribute to 15% detrimental soil disturbance thresholds as soil productivity is not the goal in these locations. However, the land area associated with undetermined roads, proposed temporary roads, excavated skid trails, and landings do contribute toward to detrimental soil disturbance calculations. Implementation of BMPs reduces erosion associated with such roads. Refer to the Project File and the Hydrology Report for more detailed information about specific road conditions.

Timber Harvest

Two of the more important impacts to soils are detrimental soil disturbance (compaction, displacement, rutting, etc.) and removal of organic matter. Soil disturbance as a result of timber harvest and fuels reduction is usually associated with mechanized activity. Harvest activities can physically alter soils and reduce soil organic matter, which can lead to reduced site quality and soil productivity. Detrimental soil disturbance is defined in FSM 2500-99-1 and typically is the result of compaction, displacement, and rutting. Soil compaction results from the packing together of soil particles due to increased pressure on the soil surface. Compaction associated with equipment is often accompanied with formation of ruts, which collect and concentrate runoff, thus increasing erosion. The loss of surface organic matter through mechanical removal or burning can cause nutrient and carbon cycle deficits and negatively affect physical and biological soil conditions.

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 300-1000 years (Thurow 1991). To date a total of 26,237 acres of past vegetative management in the project area has occurred which equates to 15% of the area. Of this total 6,439 acres (25%) are Intermediate harvest activities; 5,420 acres (21%) consist of Pre-commercial thinning; 13,024 acres (49%) consist of Regeneration harvest acres; and 1,354 acres (5%) consist of private land regeneration harvest. The total acres of past intermediate harvest activities on State and Private land is not available.

Fire

Wildfire is a natural component in forest watersheds and has influenced forest soils for thousands of years (Ice 2003). Records of historic wildfires enforce that the potential for future wildfire

remains, especially if a fire ignites in untreated areas under dry weather conditions. Past fire information indicates that approximately 2,377 acres of wildfire have occurred within the project area. The largest fire on record, until 2015, occurred in 1998 (Kopsi Fire) and burned approximately 1,060 acres, while in 1994 the High One Fire burned approximately 650 acres. Both of these fires were lightning caused. Several smaller fires included the 2001 Blue Sky (approximately 0.5 acres) and 2005 Gibralter (22 acres). A historic fire map displays historic fire occurrence in the Grave Creek drainage (1910, 1914, 1919); Williams/Blue Sky Creek drainages (1917, 1929); Deep Creek (1910, 1914, 1919); Dickey Lake Area (1910, 1926); Ten Lake Basin (1910, 1934); and numerous smaller "spot-fires" in the early 1900's which were the result of natural lightning fire events. Such activities are believed to have only impacted very small areas of land upon (refer to Fire/Fuels report for more detail). Additionally approximately 4,902 acres (3%) have been burned using prescribed burning activities such as fuel treatments. In 2015, the Marston Fire occurred as a result of very dry conditions and lightning activity. This fire burned relatively hot and occurred on approximately 7,552 acres of the planning area in the Deep Creek and Summit Creek drainages. As a result some of the previously defined units were removed from consideration.

Many fire effects on soil are not observable with the naked eye (Parsons et al 2010). Severe deteriorating effects that wildfires have on soils usually 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 fly-ash (DeBano 1991; Amaranthus et al 1989).

A wildfire occurring on site 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 six years (DeBano 1981; Dyrness 1976) and other studies have documented a much more rapid recovery of one to three 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 near stream crossings. It should be noted that soils within the analysis area currently do not display hydrophobic concerns.

Disturbance from fire suppression of small natural wildfires is sometimes limited to hand tools. 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. Existing soil disturbance related to fire and suppression within each activity area is displayed in Soils Table 5.

Livestock Grazing

Compaction and stream bank trampling/shearing are among the most common soil disturbances resulting from grazing (Thurow 1991; Kaufman and Krueger 1984). Livestock grazing impacts generally occur in localized areas where cattle tend to congregate season after season (areas

offering good forage). Generally these areas include riparian zones (water sources), harvest units, road corridors, and meadows. Even in these areas, compaction tends to be discontinuous and localized. Stream bank trampling/shearing occurs when cattle cross a stream and collapse the bank. This can lead to an increase in bank scour during high flows. There is one range allotment within the analysis area, the Grave Creek Allotment. A maximum of 100 cow/calf pairs are allowed in the Grave Creek Allotment from May 15 to September 30. The Grave Creek Allotment consists of approximately 5,584 acres which consists of approximately 3.3% of the total project area. Conditions are fair within the allotment due to moderate use by cattle (Tobacco Siding/Grave Creek Range Allotments EA 1999). This allotment is restricted between FS Road 7016 (Graves Creek) south to FS Road 368 in the Deep Creek drainage system. The steepness of slopes and distance to water tend to limit cattle use to the southeast portion of the project area and cattle are not found as one travels east further up in either the Graves or Deep Creek drainages. Existing soil disturbance related to fire and suppression within each activity area is displayed in Soils Table 5.

Environmental Consequences

Direct and Indirect Effects

Direct and indirect effects on the soils resource are described below for proposed activities identified in Chapter 2.

Three alternatives were developed for the Galton Vegetation Project. These alternatives are discussed below in the Environmental Consequences section. Some of the key difference between action alternatives are total acres for harvest and miles of road construction.

Measurement Indicators

No soils issues were identified by the public for Soil Resources during the scoping process.

Therefore, law regulation, and policy drive the effects analysis, specifically:

Compliance with NFMA; and

Compliance with Forest Plan Direction

Effects of the Alternatives on soil resources will be analyzed in terms of:

1. Sensitive Soils;
2. Detrimental Soil Disturbance and the 15% Standard; and
3. Nutrient Cycling

Sensitive Soils

Soils Table 4 displays the acres of management activities on sensitive soils by alternative.

Soils Table 4. Displays the Acres of Management Activities on Sensitive Soils by Alternative

Sensitive Soils	Alt. 1 (Proposed Action)	Alt. 2 (No Action)	Alt. 3

Sensitive Soils	Alt. 1 (Proposed Action)	Alt. 2 (No Action)	Alt. 3
Total Acres of Proposed Harvest Units (irrespective of sensitive soils)	**1778**	**0**	**2685**
Proposed Harvest Acres on Sensitive Landtypes (102, 325, and 351)	68	0	91
Percent of Proposed Harvest Acres in Landtypes Sensitive Soils (102, 325, and 351)	4%	0%	3%
Total Acres of Non-Harvest Fuels Units (irrespective of sensitive soils)	**8231**	**0**	**1996**
Total Activity Acres on Low Productivity Soils (353, 405, and 510)	791	0	225
Percent of Proposed Non-Harvest Fuel Units on Low Productivity Soils (353, 405, and 510)	9%	0	11%
Total Acres of Proposed Vegetation Management and Fuel Reduction	**10,009**	**0**	**4,681**

Effects of the No Action Alternative 2 - Sensitive Soils

Alternative 2 (No Action) does not propose any new management activities on sensitive soils. Therefore, no direct, indirect, or cumulative effects to sensitive soils would result from Alternative 2.

Direct and Indirect Effects of the Action Alternatives – Sensitive Soils

Landtypes 102, 325, and 351 are all considered as being landtypes of concern. Harvest activities are proposed on these landtypes under all Action Alternatives. These landtypes are located in proposed Units 22, 94, 95, 88, 106, and 204. Alternatives 1 would result in harvest activities occurring on 68 acres of such landtypes while Alternative 3 would occur on approximately 91 acres. Should Alternative 1 be selected there would be approximately 4% harvest on sensitive soils while Alternative 3 would involve 3% harvest on sensitive soils (Soils Table 4).

Landtypes 201, 303, 353, 360, 405, and 510 are all considered as being low productivity soils; however, only landtypes 353, 405, and 510 contain proposed harvest activity (refer to Table 4). Under Alternatives 1 and 3 a total of 791 and 225 acres respectively would propose activities on such low productivity soils. This would equate to 7% and 5% respectively of the total harvest activities for Alternatives 1 and 3.

Landtype 353 is only located in proposed unit 88 (prescribed burn with mechanical pre-treatment manipulation) for Alternatives 1 and 3. Landtype 405 is the most widely spread and is located in proposed units 15, 21, 22, 23, 56, 57, 65, 66, 68, 69, 70, 71, 72, 73, and 97. Management prescriptions in all of these units except unit 97 are ecosystem burn with underburn fuel treatments. Proposed unit 97 is prescribed for a clearcut reserve with excavator pile/underburn in both Alternatives 1 and 3. Landtype 510 is only located in proposed unit 12 which proposes understory thinning fuels reduction with combined handpile/underburn activities for both of the proposed action alternatives. Direct effects of such activities are expected to leave a fully stocked stand. Potential indirect effects would allow for a continuous input of nutrients through needle-cast and coarse woody debris and would maintain soil productivity.

Potential indirect effects of harvest on low productivity soils may include a slower vegetative return associated with nutrient cycling capabilities. Low productivity soils are not necessarily the same as 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 fuel treatment units retain a forest canopy which will continue to deliver nutrients to soils through deposition of needles and litter.

Additional measures contained in the project design criteria (FEIS pp. 26-27) will help to ensure that soil productivity is retained in the post-treatment environment.

No harvest activities are proposed in riparian areas or wetlands with Alternatives 1 and 3, therefore no sensitive soils within these areas would be affected.

Detrimental Soil Disturbance (DSD)

Predicting detrimental and foreseeable activity disturbance has been calculated based on soil monitoring information from 2006a, and Kuennen pers. comm. 2011. Furthermore, since 1988 the KNF has been actively completing soil monitoring on an annual basis which includes walk-thru soil reviews as well as transects. The outcome of these soil reviews strengthens the capability of the KNF to determine potential results of different machinery operations during harvest activities. The cumulative percent is derived by adding the percentage of disturbance expected from proposed activities and reasonably foreseeable activities to the existing disturbance percentage. Existing disturbance is based on field surveys. All harvest activities, prescribed burning, skid trails, landings, fire lines, excavator piling, and temporary roads are included in this analysis. Best Management Practices (BMPs) would be followed (Appendix 2), and additional design criteria have been specified in order to minimize disturbance (refer to the Management Requirements in Chapter 2). Complete soils survey data can be found in the project file at the Fortine Ranger District. Soils Table 5 displays existing, proposed, and cumulative DSD for each activity area.

Soils Table 5.Detrimental Soil Disturbance in Proposed Harvest Units of the Galton Project Area for Alternatives 1, 2, and 3. Alternative 2 would involve no harvest activities.

Unit #	Activity Area (acres) Alts 1/2/3	Proposed Vegetation Treatment Actions Alts 1/3	Proposed Fuels Treatment Alts 1/3	Proposed Logging System Alts 1/3	Existing Detrimental Soil Disturbance DSD (%)[3]	Action Alternatives 1/2/3 Potential DSD		
						Predicted Temp Road DSD%[4] Alts 1/2/3	Predicted Harvest DSD%[5] Alts 1/2/3	Cumulative DSD% Post-Harvest Alts 1/2/3
5 ^	161/0/161	IMP/IMP	EPwUB/EPwUB	T/T	5*	0/0/0	8/0/8	13/5/13
6 ^	43/0/43	IMP/IMP	EPwUB/EPwUB	T/T	4*	0/0/0	8/0/8	12/4/12
7 ^	27/0/27	IMP/IMP	EPwUB/EPwUB	T/T	6*	0/0/0	8/0/8	14/6/14
8 ^	307/0/307	IMPwVD/IMPwVD	EPwUB/EPwUB	T/T	<1*	0/0/0	8/0/8	8/0/8
10 ^	88/0/88	IMP/IMP	EPwUB/EPwUB	T/T	0*	0/0/0	8/0/8	8/0/8
12 ^	101/0/101	UTFR/UTFR	HPwUB/HPwUB	NA/NA	DNA	0/0/0	0/0/0	0/0/0
13 <	1035/0/0	EB/NT	UB/NT	NA/NA	DNA	0/0/0	0/0/0	0/0/0
14 <	213/0/0	EB/NT	UB/NT	NA/NA	DNA	0/0/0	0/0/0	0/0/0
15 <	348/0/0	EB/NT	UB/NT	NA/NA	DNA	0/0/0	0/0/0	0/0/0
16 ^	778/0/400	EB/EB	UB/UB	NA/NA	DNA	0/0/0	0/0/0	0/0/0
19^	244/0/232	EB/EB	SLwUB/SLwUB	NA/NA	DNA	0/0/0	0/0/0	0/0/0
21^	334/0/120	EB/EB	UB/UB	NA/NA	DNA	0/0/0	0/0/0	0/0/0
22 ^	300/0/48	EB/EB	UB/UB	NA/NA	DNA	0/0/0	0/0/0	0/0/0
23 <	546/0/0	EB/NT	UB/NT	NA/NA	DNA	0/0/0	0/0/0	0/0/0
24 <	191/0/0	EB/NT	UB/NT	NA/NA	DNA	0/0/0	0/0/0	0/0/0
47 <	258/0/0	EB/NT	UB/NT	NA/NA	DNA	0/0/0	0/0/0	0/0/0
50 ^	530/0/421	EB/EB	SLwUB/SLwUB	NA/NA	DNA	0/0/0	0/0/0	0/0/0
52 <	108/0/0	EB/NT	UB/NT	NA/NA	2% Ocular Est[7]	0/0/0	0/0/0	2/2/2
53 <	304/0/0	EB/NT	UB/NT	NA/NA	DNA	0/0/0	0/0/0	0/0/0
54 <	205/0/0	EB/NT	UB/NT	NA/NA	DNA	0/0/0	0/0/0	0/0/0
56 ^	112/0/73	EB/EB	UB/UB	NA/NA	DNA	0/0/0	0/0/0	0/0/0
57 <	133/0/0	EB/NT	UB/NT	NA/NA	DNA	0/0/0	0/0/0	0/0/0
58 <	201/0/0	EB/NT	UB/NT	NA/NA	DNA	0/0/0	0/0/0	0/0/0
59 ^	68/0/57	EB/EB	UB/UB	NA/NA	DNA	0/0/0	0/0/0	0/0/0
63 <	13/0/0	EB/NT	UB/NT	NA/NA	DNA	0/0/0	0/0/0	0/0/0
64 <	86/0/0	EB/NT	UB/NT	NA/NA	DNA	0/0/0	0/0/0	0/0/0
65 <	118/0/0	EB/NT	UB/NT	NA/NA	DNA	0/0/0	0/0/0	0/0/0
66 <	95/0/0	EB/NT	UB/NT	NA/NA	DNA	0/0/0	0/0/0	0/0/0

Unit #	Activity Area (acres) Alts 1/2/3	Proposed Vegetation Treatment Actions Alts 1/3	Proposed Fuels Treatment Alts 1/3	Proposed Logging System Alts 1/3	Existing Detrimental Soil Disturbance DSD (%)[3]	Action Alternatives 1/2/3 Potential DSD		
						Predicted Temp Road DSD%[4] Alts 1/2/3	Predicted Harvest DSD%[5] Alts 1/2/3	Cumulative DSD% Post-Harvest Alts 1/2/3
67 <	103/0/0	EB/NT	UB/NT	NA/NA	DNA	0/0/0	0/0/0	0/0/0
68 <	74/0/0	EB/NT	UB/NT	NA/NA	DNA	0/0/0	0/0/0	0/0/0
69 <	59/0/0	EB/NT	UB/NT	NA/NA	DNA	0/0/0	0/0/0	0/0/0
70 <	113/0/0	EB/NT	UB/NT	NA/NA	DNA	0/0/0	0/0/0	0/0/0
71 <	77/0/0	EB/NT	UB/NT	NA/NA	DNA	0/0/0	0/0/0	0/0/0
72 <	139/0/0	EB/NT	UB/NT	NA/NA	DNA	0/0/0	0/0/0	0/0/0
73 <	312/0/0	EB/NT	UB/NT	NA/NA	DNA	0/0/0	0/0/0	0/0/0
74 <	9/0/0	EB/NT	UB/NT	NA/NA	DNA	0/0/0	0/0/0	0/0/0
79 ^	65/0/78	EB/EB	SLwUB/UB	NA/NA	DNA	0/0/0	0/0/0	0/0/0
81 <	255/0/0	EB/NT	UB/NT	NA/NA	DNA	0/0/0	0/0/0	0/0/0
84 ^	87/0/76	EB/EB	UB/UB	NA/NA	DNA	0/0/0	0/0/0	0/0/0
88 ^	110/0/110	PBwMPT/PBwMPT	SLwUB/SLwUB	NA/NA	0	0/0/0	2/0/2	2/0/2
92 <	87/0/0	EB/NT	UB/NT	NA/NA	DNA	0/0/0	0/0/0	0/0/0
93 <	162/0/0	EB/NT	UB/NT	NA/NA	DNA	0/0/0	0/0/0	0/0/0
94 ^	36/0/36	EB/EB	SLwUB/UB	NA/NA	DNA	0/0/0	0/0/0	0/0/0
95 ^	76/0/76	EB/EB	SLwUB/UB	NA/NA	DNA	0/0/0	0/0/0	0/0/0
96 ^	57/0/57	EB/EB	SLwUB/UB	NA/NA	DNA	0/0/0	0/0/0	0/0/0
97 <	133/0/0	CCR/NT	EPwUB/NT	NA/NA	0*	0/0/0	2/0/0	2/0/0
104 ^	18/0/18	UTFR/UTFR	SLwHP/SLwHP	NA/NA	DNA	0/0/0	0/0/0	0/0/0
105 <	3/0/0	UTFR/NT	SLwHP/NT	NA/NA	DNA	0/0/0	0/0/0	0/0/0
106 ^	89/0/89	IMP/IMP	EPwUB/EPwUB	T/T	2*	<1/0/<1	8/0/8	10/2/10
107 ^	46/0/46	CT/CT	EPwUB/EPwUB	T/T	5% Ocular Est[6]	0/0/0	8/0/8	13/5/13
108 ^	23/0/23	IMP/IMP	EPwUB/EPwUB	T/T	0*	0/0/0	8/0/8	8/0/8
110 ^	80/0/80	SW-STwR/SW-STwR	EPwUB/EPwUB	T/T	3*	0/0/0	8/0/8	11/3/11
111 ^	45/0/45	SW-STwR/SW-STwR	EPwUB/EPwUB	T/T	5*	0/0/0	8/0/8	13/5/13
112 ^	33/0/33	SW-STwR/SW-STwR	EPwUB/EPwUB	T/T	<1*	0/0/0	8/0/8	8/0/8
113 ^	110/0/111	IMP/ IMP	EPwUB/EPwUB	T/T	2*	<1/0/<1	8/0/8	10/2/10
114 ^	68/0/68	SW-STwR/SW-STwR	EPwUB/EPwUB	T/T	0*	1/0/1	8/0/8	9/0/9
115 ^	55/0/55	IMP/IMP	EPwUB/EPwUB	T/T	2*	1/0/1	8/0/8	11/2/11
116 ^	80/0/80	IMP/IMP	EPwUB/EPwUB	T/T	4*	0/0/0	8/0/8	12/4/12
117 >	0/0/47	NT/IMP	NT/EPwUB	NA/T	3*	0/0/0	0/0/8	3/3/11

Unit #	Activity Area (acres) Alts 1/2/3	Proposed Vegetation Treatment Actions Alts 1/3	Proposed Fuels Treatment Alts 1/3	Proposed Logging System Alts 1/3	Existing Detrimental Soil Disturbance DSD (%)[3]	Action Alternatives 1/2/3 Potential DSD		
						Predicted Temp Road DSD%[4] Alts 1/2/3	Predicted Harvest DSD%[5] Alts 1/2/3	Cumulative DSD% Post-Harvest Alts 1/2/3
118 >	0/0/51	NT/CT	NT/EPwUB	NA/T	1*	0/0/0	0/0/8	1/1/9
119 >	0/0/67	NT/IMP	NT/EPwUB	NA/T	5*	0/0/1	0/0/8	5/5/14
127 >	0/0/29	NT/SW-STwR	NT/UB	NA/S	0*	0/0/0	0/0/3	0/0/3
133 >	0/0/56	NT/SW-STwR	NT/UB	NA/T	2*	0/0/1	0/0/8	2/2/11
201 ^	65/0/65	IMP/IMP	EPwUB/EPwUB	T/T	0*	0/0/0	8/0/8	8/0/8
202 ^	43/0/43	IMP/IMP	EPwUB/EPwUB	T/T	5*	0/0/0	8/0/8	13/5/13
204 ^	26/0/26	IMP/IMP	EPwUB/EPwUB	T/T	6*	0/0/0	8/0/8	14/6/14
210 ^	93/0/93	IMP/IMP	EPwUB/EPwUB	T/T	3*	<1/0/<1	8/0/8	11/3/11
301 ^	19/0/34	UTFR/UTFR	SLwEP/SLwEP	NA/NA	0	0/0/0	2/0/2	2/0/2
302 ^	36/0/36	UTFR/UTFR	SLwEP/SLwEP	NA/NA	0	0/0/0	2/0/2	2/0/2
303 ^	14/0/14	UTFR/UTFR	SLwEP/SLwEP	NA/NA	0	0/0/0	2/0/2	2/0/2
304 ^	11/0/11	IMP/IMP	EPwUB/EPwUB	T/T	0*	0/0/0	8/0/8	8/0/8
305 ^	76/0/76	IMP/IMP	EPwUB/EPwUB	T/T	3*	0/0/0	8/0/8	11/3/11
306 ^	32/0/33	IMP/IMP	EPwUB/EPwUB	T/T	3*	0/0/0	8/0/8	11/3/11
310 >	0/0/8	NT/EB	NT/UB	NA/NA	2*	0/0/0	0/0/0	2/2/2
Vista<	43/0/43	VE/0/0	ETYwL&S&EP/NT	T/NA/NA	5% Ocular Est[6]	0/0/0	8/0/0	13/5/5
401	0/0/355	0/0/WBBP	NT/NT	NA/NA	DNA	0/0/0	0/0/0	0/0/0
402	0/0/106	0/0/WBBP	NT/NT	NA/NA	DNA	0/0/0	0/0/0	0/0/0
403	0/0/153	0/0/WBBP	NT/NT	NA/NA	DNA	0/0/0	0/0/0	0/0/0
404	0/0/221	0/0/WBBP	NT/NT	NA/NA	DNA	0/0/0	0/0/0	0/0/0
Total acres by Alt	**1,778**[1] **2,685**[2]							

IMP – Stand Improvement (Intermediate Harvest)
EB – Ecosystem Burn
SW-ST/R – Shelterwood or Seed Tree with Reserves (Regen Harvest)
UTFR – Understory Thin Fuels Reduction
EBPR – Ecosystem Burn Product Removal
PBwMPT – Prescribed Burn with Mechanical Pre-Treatment
INT – Intermediate Harvest
CCR – Clearcut with Reserves (Regen.)
CT – Commercial Thinning
IMPwVD – Stand Improvement with Variable Density

EPwUB – Excavator Pile with Underburn
EP – Excavator Pile
UB – Underburn
HPwUB – Handpile with Underburn
SLwUB – Slash with Underburn
SPwUB – Spot Pile with Underburn
SLwHP – Slash Handpile
SLwEP – Slash with Excavator Pile
ETYwL&S – ETY with Lop and Scatter
L&S – Lop and Scatter

T – Tractor
S – Skyline
NA – Not Applicable

Unit #	Activity Area (acres) Alts 1/2/3	Proposed Vegetation Treatment Actions Alts 1/3	Proposed Fuels Treatment Alts 1/3	Proposed Logging System Alts 1/3	Existing Detrimental Soil Disturbance DSD (%)[3]	Action Alternatives 1/2/3		
						Potential DSD		
						Predicted Temp Road DSD%[4] Alts 1/2/3	Predicted Harvest DSD%[5] Alts 1/2/3	Cumulative DSD% Post-Harvest Alts 1/2/3
VE – Vista Enhancement WBPP – Whitebark Pine Planting								
NT – No Treatment under this Alternative DNA – Does Not Apply								

<Units proposed for harvest only under Alternative 1.
>Units proposed for harvest only under Alternative 3.
^Units proposed for harvest under both Alternatives 1 and 3.
*Units individually spot-checked using the Region 1 Soil Sampling Protocol. Field forms are present in the Galton Soil files.

[1]The sum of proposed Alternative 1 harvest activity.

[2]The sum of proposed Alternatives 3 harvest activity.

[3]The Galton soil survey was conducted using the Region 1 Soil Sampling Protocol which meets the R1 definition of detrimental soil disturbance, and therefore the Galton pre-activity conditions meet the R1 definitions.

[4]For determining temporary road soil disturbance value of 2 acres per mile of temp road has been applied for calculating area of DSD. Following harvest all temp roads and landings used for harvest activities will be scarified at least 6-12" based on the depth. Temp roads only refer to proposed Units 106 (0.38 miles), 113 (0.15 miles), 114 (0.44 miles), 115 (0.31 miles), 119 (0.31), 133 (0.32) and 210 (0.08 miles). Note Units 119 and 133 only have temporary road construction under Alternative 3.

[5]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.

[6]Ocular estimation of 5% were provided to Units 107 and the Vista Units 5 through 10 which have weak signs of past harvest activities, firewood collection or signs of cattle.

[7]Unit 52 has received limited harvest, possibly 100-200 feet and as a result ocular estimate of 2%.

Note: An existing condition of 0% DSD can mean either: 1) No disturbance is present or 2) there is some disturbance present but does not amount to 1%.

Effects of the No Action Alternative 2 - DSD

Alternative 2 (No Action) does not propose any new vegetative management, fuels activities, or temporary road construction. However, natural changes in climate and vegetation would continue to occur. 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, natural freeze-thaw activities, and increased soil nutrients from decomposition of forest litter and CWD. Therefore, no direct or cumulative DSD would result from Alternative 2.

Direct and Indirect Effects of the Action Alternatives – DSD

Alternatives 1 and 3 (Action Alternatives)

The percent detrimental soil disturbance (DSD) is the measurement indicator for soil compaction for this analysis. Direct impacts on soils from management activities could result in 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 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. Soils Table 6 identifies the extent of these impacts for each unit for Alternatives 1 and 3.

Soil compaction is most common where heavy equipment makes repeated passes over the same ground, particularly during times of high soil moisture. Soil compaction occurs as a result of applied loads, vibration, and pressure from equipment that is used during harvesting and site preparation activities (Adams and Froehlich 1984). Soil compaction can be characterized as a breakdown of surface aggregates, which leads to decreased macroporosity (Adams and Froehlich 1984; Pritchert and Fisher 1987; Gomez et al. 2002). Maximum soil compaction normally occurs within the first 10 passes of a harvesting machine (Gent and Ballard 1984), with the greatest impact occurring in the first few passes (Froehlich et al. 1980; Han et al. 2006). Soil is especially vulnerable to damage during wet weather and moist soil conditions (Adams 1998). Pore space reduction can increase overland flow which can lead to surface erosion and/or soil mass movement (Archuleta and Baxter 2008). 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. Effects of temporary roads and skid trails will be temporary due to planned ripping and seeding post-harvest.

Regeneration harvest activities would result in fewer skid trails to reach to desired silviculture objectives. Related post-harvest unit entry over time would be for thinning and scheduled to occur several decades later (refer to Tables 2 and 4). Proposed intermediate harvest prescriptions and commercial thinning are potentially subject to higher detrimental soil disturbance due to additional skid trails as a result of navigating leave trees and the higher potential for excavator piling.

Alternatives 1 and 3 both include burn activities with and without timber harvest such as underburning, spot pile with underburning, slash hand pile, slash with excavator pile, or lop and scatter activities. The impacts to soils from burning activities are discussed later in this document. Underburning activities may require construction of firelines around the unit; the effects of this disturbance are included in the figures identified in Soils Table 5. The construction of a fire line directly impacts soils by removing (displacing) the organic layer down to mineral soil for 2-3 feet

wide around the perimeter of the units. Some compaction along the fire line could occur from foot, all-terrain vehicle, and/or heavy equipment traffic. The effects of hand dug firelines are minimal as such lines are only dug to the extent needed to control fire or fuel activities.

Fuels treatments may also include mechanical piling. The effects of such activities are included in the figures identified in Soils Table 6. The direct effects of mechanical piling with heavy equipment operations are discussed below in this document. Because mechanical piling is reducing the amount of woody material within a unit, it can also affect nutrient cycling. Nutrient cycling is discussed in depth below.

Indirect impacts from management activities could include erosion from surface water runoff being channeled into ruts, firelines, 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. Again, these impacts would be minimized by implementing BMPs (Appendix 2 of the EIS) and the following specific management requirements and design features (refer to Table 5 Design Features).

Detrimental Soil Disturbance – Permanent Roads

Alternative 2 (No-Action)

Direct, Indirect and Cumulative Effects

It should be noted that Authorized Forest 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% soil quality standard (FSM 2500-2014-1). Therefore, road management would have no 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.

Detrimental Soil Disturbance – Temporary Roads

Alternative 2 (No-Action)

Direct, Indirect and Cumulative Effects

Alternative 2 has no temporary road construction and closure occurring. Therefore, temporary road management would have no cumulative effects 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.

Alternatives 1 and 3 (Action Alternatives)

Direct and Indirect Effects

All new landings and temporary roads are considered 100% detrimentally disturbed through removal of organic matter and compaction. Related mitigation activity following timber harvest would include attempting to return the soils in these areas back to their original condition. Indirect effects from the action alternatives include the temporary soil erosion related to the exposure of more mineral soil. Without a protective mat of vegetation and stable soil profile, these areas are more susceptible to the erosive forces of wind, water and the dynamic temperature changes (frost heaves) sometimes seen in and around the Galton analysis area. These localized

effects are typically short-term (5-10 years) due to the warmer wet climate found on the KNF. Refer to Soils Table 5 for information regarding DSD calculations related to miles of temporary road under Alternatives 1and 3.

Following harvest operations there are plans to reduce the overall DSD values in units by scarification of temporary roads, skid trails, and landings in order to minimize the impacts to soils to the extent feasible. However, new skid trails may be required in areas where the existing network does not fit the current operations. The effects of temporary roads and skid trail networks on vegetative regrowth are expected to be temporary due to the planned seeding following harvest operations. Post-harvest temporary roads would include the following rehabilitation treatments: the road or landing surface would be ripped to remedy compaction, the berm would be pulled back (on roads), woody debris would be spread to stabilize soil from movement and to provide organic material, and all disturbed areas would be seeded. Post-harvest rehabilitation activities would help offset the harvest activities to soil productivity by allowing previously disturbed soils to re-establish as a productive area capable of producing future natural vegetation cover which in turn may one day be harvested again. Such activities would help to offset the harvest activities to 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.

This activity would beneficially impact approximately 2 acres under Alternative 1 and approximately 3.2 acres under Alternative 3. No acres of temporary road construction and closure would occur under Alternative 2. Based on this analysis, while some increase in DSD is expected with proposed management activities, all activity areas are expected to remain at/or below the 15% soil quality standard.

Detrimental Soil Disturbance - Fuel Treatments

Alternative 2 (No-Action)

Direct, Indirect and Cumulative Effects

Alternative 2 does not propose any fuels treatments. Therefore, no direct, indirect, or cumulative effects to soils would result from Alternative 2. Alternative 2 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 damage to soil heating (Keane et al. 2002). The potential effects include alteration of soil invertebrates, reduced nitrogen, and loss of soluble nutrients (Kuennen 2000). However, past experience with wildfires on the Kootenai National Forest indicate that there is very low risk of these effects even with high intensity fire.

Alternatives 1 and 3 (Action Alternatives)

Direct and Indirect Effects

Due to the suppression of wildfires over the last century, fuels have accumulated in many areas throughout the analysis area. The intent of fuels treatments is to reduce fuel levels and meet vegetation management objectives. Soils Table 6 summarizes the fuels treatment proposed with this project by alternative.

Soils Table 6. Types and Amount of Fuels Treatments by Alternative (acres)

Activities	Alt 1	Alt 2	Alt 3

Activities	Alt 1	Alt 2	Alt 3
Non-Commercial Understory Thinning with Fuel Reduction	193	0	204
Ecosystem Burn	7,929	0	1,682
Prescribed Burn with Mechanical Pre-Treatment	109	0	110
Total Fuels Treatments	8,231	0	1,996

Alternatives 1 and 3 (Action Alternatives)

Direct and Indirect Effects

Alternatives 1 and 3 include underburning with and without timber harvest. In particular, Alternatives 1 and 3 include approximately 8,231 and 1,996 total fuel treatment per action alternative. Of these totals the largest percent (acres) consists of ecosystem burn acres (7,929 and 1,682) for Alternatives 1 and 3 respectively. Such activities do not consist of timber removal activities. Additionally, there will be prescribed burn with mechanical pre-treatment under both Alternative 1 and 3 (109 and 110 acres respectively) along with proposed understory thinning/fuel reduction (193 and 204 acres respectively) for Alternatives 1 and 3. Refer to Soils Table 6 above. Excavator (grapple pile) activities will only occur in areas which can be feasibly reached by machinery along skid trails and/or clipper cut trails used during harvest activities in order to reduce soil impacts.

The burning prescriptions in each action alternative were designed to use the minimum fire intensity needed to achieve the management objectives. Direct effects resulting from 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 conditions 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). Therefore, implementation of an action alternative containing post-harvest burns is expected in the long term to trend the conditions towards a desired condition regarding fire impacts to soils. This is supported by Forest Soil Productivity Monitoring (refer to the Soil and Water Project File).

Nutrient Cycling

Forest ecosystems have evolved with a continual flux of coarse woody debris (CWD). As defined in the 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). Disturbed soil organic layers, which play an important role in soil nutrient cycling and microbial population/function, takes time to rebuild after harvest activities. In the Forest Plan provides CWD retention level recommendations for the individual habitat types were aggregated into five general categories – two were Warm/Dry Biophysical Setting, one for Warm/Moist Biophysical Setting, and two for Subalpine Biophysical Setting. Those five correspond to Vegetative Response Units (VRU's) and can also be correlated with Habitat Type Groups. 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 ectomycorrhiza, 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 Weils 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.

Nitrogen (N) is the most limiting nutrient in forest ecosystems and is almost totally dependent on microbial action by way of both symbiotic and non-symbiotic N fixation. Except when nitrogen fixing plants are abundantly present such as alder, most nitrogen acquisition in forest soils comes from non-symbiotic fixation that depends on soil organic matter. Another group of microorganisms that depends on soil organic matter and is important to a conifer's ability to acquire nutrients such as nitrogen is the ectomycorrhizae fungi associated with roots. Using ectomycorrhizae fungi as a bio-indicator of healthy productive forest soils, Graham and others (1994) developed conservative recommendations for leaving CWD after timber harvesting to ensure organic matter will be left to maintain long-term soil productivity.

Alternative 2 (No-Action)

Direct, Indirect and Cumulative Effects

Alternative 2 does not propose any new management activities. Therefore, no direct, indirect, or cumulative effects to nutrient cycling could result from Alternative 2. Nutrient cycling would continue at present rates until a natural disturbance occurs.

Alternatives 1 and 3 (Action Alternatives)

Direct, Indirect Effects

A direct impact from management activities in Alternatives 1 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 organic matter is removed (Graham et al 1994; Brown et al 2003). Allowing the accumulation and decomposition of woody debris maintains both short-term and long-term soil productivity. The different decomposition rates provide for the slow, continual release of nutrients. Prescribed burning could potentially remove woody debris that would otherwise provide nutrient to the soil as the decay process occurs (Page-Dumroese et al. 2006b). 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.

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 over-story is being removed, each activity area has been assigned a habitat-specific retention level for CWD (Soils Table 7). In under-burn with mechanical treatment and commercial thin harvest units, 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 decadence. 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 need less CWD left on the ground following harvest activity and FW-GDL-SOIL-02 and FW-GDL-VEG-03 will be met as required under the Forest Plan. In stand improvement units such as commercial thins future CWD is expected to result from natural events such as blow-over, root rot, and beetle kill.

Soils Table 7. Recommended Levels of CWD (> 3' diameter) for proposed Regeneration Timber Treatment Harvest Units

Biophysical Setting	Recommended CWD Tons per Acre^	Unit(s)
Warm Dry	Drier Sites 5 to 20	5, 6, 7, 8, 106, 107, 108, 110, 111, 112, 113, 114, 115, 116, 119, 133, 201, 202, 204, 210, 304, 305, and 306
Warm Moist / Cool Moist	Moister Sites 10 to 30	10, 97, 117, 118, and 127

^It should be noted that VRU CWD values should be looked at as local estimations and are dependent on local precipitation levels and vary across the KNF from north to south.

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 Analysis Area is consistent with natural ecological processes of these forest types (Arno 1996). Positive impacts from fire may include a short-term (1 to 2 years) increase in plant-available nutrients (Choromanska and Deluca 2001; Hart et al 2005; Certini 2005). Additionally, MacKenzie et al (2006) found that light to moderate fire effects may maintain higher nutrient availability in the long-term with the positive influences from charcoal.

In summary, soil productivity would be maintained through retention of CWD at levels recommended in the Forest Plan for both all action alternatives. Therefore, implementation of either of the action alternatives is not expected to adversely impact nutrient cycling in the analysis area. This is supported by Forest Soil Productivity Monitoring (refer to the Soil and Water Project File).

Salvage of Incidental Mortality from Underburning

Alternatives 1 and 3 would authorize salvage of mortality that occurred during fuel treatments. There are 16 criteria listed on page 14 of the FEIS that would need to be complied with prior to any salvage occurring. These criteria provide for the protection of resources and compliance with Forest Plan direction; therefore, salvaging incidental mortality would have no further effects to soil productivity and ecological processes. This activity would not occur under Alternative 2, so no effects would occur if Alternative 2 is selected.

Cumulative Effects

Cumulative effects are the result of all the impacts that past, current, and reasonably foreseeable activities have on a resource. A summary of activities are listed in Chapter 3 of the FEIS. 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 analysis areas for consideration of cumulative effects consist of the same activity areas 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 R-1 Supplement No. 2500-2014-1.

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 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 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. Harvest on steeper slopes, at times, involved stair-step excavated trails (i.e. jammer roads). 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 1995). 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. Project specific BMPs would be incorporated into all land management activities as a principle mechanism for protecting soil resources (FW-GDL-SOIL-05).

- Avoid impacts to sensitive soils
- Avoid skidding on unstable slopes and slopes that exceed 40 percent unless not causing excessive erosion (State of Montana BMPs Section IV.B).
- Use excavator for mechanized slash piling and fire line construction
- Operate equipment over a slash mat where feasible
- Limiting harvest operation to dry conditions (less than 18% soil moisture) or during winter when the ground is frozen
- Use existing skid trails and landings where feasible
- Ground-based equipment should only operate on slopes less than 40 percent, in order to avoid detrimental soil disturbance (FW-GDL-SOIL-01)
- Rehabilitate, scarify, re-seed, and waterbar project areas deemed necessary upon completion
- Space skid trails where feasible 75 to 125 feet apart
- Ensure that enough coarse woody debris is left to sustain long term soil productivity while still meeting fuel reduction objectives
- Bring slash to landings using whole tree yarding where appropriate
- Use excavators or hand pile activities instead of dozers for slash piling
- Reduce erosion and sedimentation through timber harvest unit design
- Exclude RHCAs from harvest and equipment entry
- Determining the proper log retrieval system for the timber harvest unit slope to protect from degradation of water quality or soil productivity
- Use light intensity burns following harvest operations to remove excess fuel materials
- Control erosion during and after harvest activities to protect water quality and soil productivity. Some examples include ripping and/or water barring skid trails and landings, seeding, and fertilizing spraying for weeds, etc.
- Light intensity burns following harvest activities

Ongoing and Reasonably Foreseeable Actions

In the following discussion, the effects of past, current, and/or reasonably foreseeable activities are considered cumulatively with activities proposed with this project.

Vegetation Management and Fuels Reduction Activities - There is an estimated 178 acres of reasonably foreseeable Forest Service vegetative management and fuels reduction (pile burning) that is scheduled to occur in the next 5 years associated with the Little Feet timber sale. Harvest activities have been completed but an estimated 90 acres associated with pile burning still remains. Additionally an estimated 40 acres of prescribed fire activities is anticipated to occur with the Ant Flat Project area over the next 10 years. Associated light, short-duration burning that does not consume the entire duff layer does not strongly affect soils. Duff acts as an insulator, protecting the soil from excessive heating (Hartford and Frandsen 1992). Effects of this type of burning are generally short-lived (Neary et al 1999). As a result no impacts to soil conditions are expected to occur at the soils Analysis Area scale.

The Forestwide Young Growth Vegetation Management project would treat approximately 400 to 600 acres annually, dependent on funding, using precommercial thinning or commercial thinning treatments. Stands proposed for treatment are second growth stands and would be subject to a number of criteria before they were determined eligible for treatment. If thinning occurs, proper analysis would be conducted in order to limit potential soil disturbance associated with authorized harvest activities. All thinning will occur outside of the units treated under the selected alternative, therefore, no additional detrimental soil disturbance is expected within the soils analysis areas. The Forestwide Young Growth Vegetation Management project would not contribute additional effects to soil resources.

It is expected that there would be salvage of blown-down trees within the analysis area Treatment acres are not expected to exceed 20 acres per year over the next 10 years. If blowdown were to occur, proper analysis would be conducted in order to limit potential soil disturbance associated with authorized harvest activities. Therefore, no additional detrimental soil disturbance is expected within the soils analysis areas. Some of the salvage is likely to occur outside of the units treated under the selected alternative; therefore, any such impacts would not be additive activity areas analyzed in this decision.

It is expected that approximately 200 acres per year of pre-commercial thinning is anticipated to occur within the project area over the next ten years. Ongoing and reasonably foreseeable pre-commercial thinning activities within the Project Area would contribute indiscernible effects to soils at the analysis area scale. This is because pre-commercial thinning is done by hand and as a result no additional ground disturbance is expected to occur. In addition, trees removed during thinning projects are left on-site.

Approximately 50 acres per year are planned for tree planting. No heavy equipment is associated with tree planting. Tree planting does not create detrimental soil disturbance or increase sedimentation rates. Therefore, tree planting would not contribute additional effects to soil resources.

Ten Lakes Travel Management -The Ten Lakes Travel Management Project will address over-snow and mechanized travel planning for the Ten Lakes area. The area affected by the proposal includes the Ten Lakes WSA and areas with common entrance points to the WSA. There are three main over-snow entrance points to the Ten Lakes WSA: the Grave Creek corridor; Clarence and Stahl Creek; and the Burma/Blacktail area. Over-snow travel is currently not limited. Mechanized use (primarily mountain bicycles) is also unrestricted. The alternatives contained in the Ten Lakes Travel Management Draft Environmental Impact Statement contain various amounts of over-snow and mechanized travel for the project area. A final decision has not been made for this project and the cumulative effects analysis utilizes the Proposed Action as the basis for the analysis in the Galton Vegetation Management Project. The cumulative effects of the Ten

Lakes Travel Management Project in conjunction with past, present, reasonably foreseeable actions would result in a no increase in effects or change in the soils resource. Existing uses are expected to continue.

Noxious Weed Treatments - The control of noxious weeds on National Forest land is an ongoing activity that normally occurs within the summer months. The Kootenai National Forest Invasive Plant Management ROD (USDA 2007) provides direction for noxious weed control on the District. Noxious weed control is expected to continue over the next ten years. Most herbicide treatments are conducted along existing 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 Invasive Plant EIS, 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. The level of noxious weed control within the analysis area is not expected to increase much over the next ten years. All activities will follow approved application methods as analyzed in the KNF Invasive Plant Management ROD (2007); therefore no adverse cumulative effects would occur.

Fire Suppression - Fire suppression activities would occur as needed. Effects from wildfire suppression would vary with location and size of the fire; however suppression activities are expected to follow Forest Plan direction. Such activities may include construction of fire lines, safety zones, and helispots by hand and equipment. 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.

Road Management - Routine road maintenance is likely to occur as funds become available and would follow BMPs and INFS guidelines in order to minimize effects on soil resources. The permanent road system is not a part of the Soils activity areas and therefore, would not contribute additional effects. When viewed from a cumulative effects input to soils such activities would result in contributing further cumulative effects to soil conditions when viewed at the individual timber harvest unit.

Administrative use in the project area will be ongoing. Use is associated with road maintenance, permit administration, noxious weed control, data collection, monitoring, and general administration of public lands. Road use will follow Forest and/or District policies.

Recreation Maintenance - Approximately 159 miles of non-motorized trails are maintained each year in the Project Area. Routine 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% standard. In addition, the trails are individually small, scattered across many watersheds, and not all work would occur in the same year.

Special Uses - There are 26 special use permits including road access to private property within the Project Area. This activity would have no effect on soils within the analysis area. This conclusion is based on the limited amount of activity and the location of the activity that is mainly on existing trails and disturbed areas. These special use permits include road access to

private property. Therefore, these activities would not add detrimental disturbance to the amounts listed in Soils Table 5. The level of special uses within the project area is not expected to change much over the next ten years.

There are six patented mining claims in the Project Area. These are as follows: Independence Load; Swansea Rose; Bluebird Quartz; Redbird; Midnight; and Copper Kettle Claims. These claims all date back to the 1890's and early 1900's. No production from these mines has been documented in the Eureka-Grave Planning Unit Environmental Statement Final. Between 1980 and 1989 the Federal Government has purchased five of the six claims. The remaining claim (Bluebird) was not purchased. Based on the fact that these mines are not displaying both current and reasonably for-seeable mining activities and that the Bluebird sale area is currently not active mining activities are not anticipated to contribute additional effects to soil resources at both the soils project area and analysis area scales.

Public Use - 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 ten 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 and scattered across many watersheds.

Off-highway vehicle (OHV) use was left off the list above as determined under USDA 2001 because it is currently limited only to existing trails and open roads (OHV Record of Decision and Plan Amendment for Montana, North Dakota, and Portions of South Dakota, 2001). Therefore, no additional disturbance is expected from OHV use because soil productivity effects are spatially static and productivity in one location does not affect productivity in another location.

Christmas tree cutting and bough gathering for both personal and commercial use on National Forest land is both a current and reasonably foreseeable activity over the next ten years. Each of these activities requires a permit. Approximately 20 acres per year is anticipated to be affected by this activity within the project area over the next ten years. This activity does not create additional ground disturbance or remove enough vegetation to affect soil productivity and therefore would not contribute additional effects to soil resources at both the soils project area and analysis area scales.

Private Property - Assume 2 new residences will be built per year within the planning area. Currently no subdivisions are formally planned. 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.

Other Agency - Currently the State of Montana Trust Lands located at T37N R27W Sec 36 SW ¼ has a grazing lease that is expected to continue. T37N R27W Sec 36 NE 40 acres is under land use license to the Indian Springs Ranch Golf Course. In T36N R26W Sec 16 and 36 no treatment is planned for the next 5 years. The lands within T36N R26W Sec 36 have been previously harvested and some planting may occur.

Such activities 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. No activities are planned to occur at this time at the Fish Wildlife and Parks Woods Ranch.

Finally, this project is adjacent to the US/Canada Border and receives a great deal of use year round by the Department of Homeland Security and Forest Service Law Enforcement. The use is expected to continue in the area.

Cattle Grazing - The Grave Creek Grazing Allotment EA and Decision Notice, which follows Forest Plan direction, provide direction for the management of this allotment. The effects of livestock grazing on soils are constantly being evaluated as part of the allotment management plan. In the recent past, the trend within the allotment for cattle-induced soil compaction and erosion seemed to be stable. In both upland and wetland areas, compaction due to grazing is discontinuous and localized. It is lightest in areas with heavy timber and alder or willow cover. Compaction is heaviest in areas that are easily accessible, have high summer soil moisture content, and have concentrated or season-long use. Compacted soils comprise less than two percent of the total allotment area.

Because of topography and vegetation, existing riparian impacts associated with cattle grazing are localized. Steepened slopes, deadfall, and dense stands of trees surround most streams, allowing cattle only sporadic access to riparian areas. Most of the wetlands and ponds within the analysis area are not easily accessed by cattle.

Only livestock grazing was determined to contribute to cumulative effects. Livestock grazing and associated activities are expected to continue in the analysis area through the operating period of 10 years. Currently 100 cow/calf pairs are permitted to graze on the Grave Creek allotment from May 15 to September 30 and is not expected to increase in the next 10 years. Cattle tend to use existing skid trails and are not expected to increase soil compaction in activity areas by more than two percent (Kuennen 2003). Due to the fact that the proposed units located within the Grave Creek allotment (harvest units 108, 110, 112, 113, 115, 117, 118, 301, 302, 303, 304, 305, 306, and 310) are all of lower anticipated soil compaction values (Soils Table 5) it is not expected that these units have the potential to be above the 15% standard at the individual unit basis when analyzed cumulatively. As a result, grazing in combination with the effects of prior management and the proposed activities is not expected to exceed the threshold of 15 percent for detrimental soil disturbance in any activity area.

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. All activity areas would remain below 15 percent detrimentally disturbed soils per Regional Soil Quality Standards (Region (R1) Supplement 2500-2014-1).

Forest Plan Direction

The BMP implementation and effectiveness have been monitored and documented since 1988. 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. From 1998–2005, none of the units surveyed were above the 15% threshold. Kuennen (2003; 2006d; and 2006e) compiled all monitoring data to date, which was used as the basis for soils analysis and specifying design criteria for this project All management activities would follow the BMPs outlined in Soil and Water Project File and would be consistent with 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.

From 2012-2013 the KNF initiated a 2-year study to determine soil recovery in timber sale units initially monitored following harvest activities from 1992-2006. During this two-year study the KNF re-sampled 183 Timber Sale Units using identical procedures to those used from 1992-2006 (Kuennen 2006a; Kuennen and Gier 2013, Gier et al. 2013 unpublished). Results of this study indicated that 86% of the units resampled displayed reduced detrimental soil disturbance values. Such changes in recovery are believed to primarily be based on soil freeze-thaw and vegetative relationships. In summary, the proposed project is consistent with the goals, objectives, and standards and guidelines for all soil resources set forth in the Forest Plan Refer to below regarding the Kootenai National Forest Soil Goals, Desired Conditions, Objectives, and Guidelines:

Goals

FW-GOAL-SOIL-01: The selected action would maintain long term soil productivity by ensuring that harvest activities would only occur on NFS lands where soil, slope, and other watershed conditions will not be irreversibly damaged. Recall that soil productivity is spatially statics and productivity in one location does not affect productivity in another location. Therefore, Galton Vegetation project activities would contribute toward achieving FW-GOAL-SOIL-01.

Desired Conditions

FW-DC-VEG-08: The selected action would maintain soil productivity through retention of CWD at levels adequate to maintain a healthy ectomycorrhiza, and soil micro-organisms community which in turn play an important role in the uptake of nutrients and water by woody plants (Graham et al 1994). Therefore, Galton Vegetation project activities would contribute toward achieving FW-DC-VEG-08.

FW-DC-SOIL-01: Adequate levels of coarse woody debris will be maintained in order to meet adequate levels required for a healthy ectomycorrhiza, and soil micro-organisms community which in turn play an important role in the uptake of nutrients and water by woody plants (Graham et al 1994). Therefore, Galton Vegetation project activities would contribute toward achieving FW-DC-SOIL-01.

FW-DC-SOIL-02: The selected action is expected to avoid physical disturbance of landtypes 102, 325, and 351 by protecting areas in units known to consist of such soils during unit lay-out procedures and by applying Best Management Practices (BMPs) into all land management practices (refer to Table 5 Design Criteria). Therefore, Galton Vegetation project activities would contribute toward achieving FW-DC-SOIL-02.

FW-DC-SOIL-03: The selected action would help to achieve the desired condition by retaining coarse woody debris on site in order to physically protect soil from erosion and mechanical disturbance. Retained woody debris is expected to disrupt airflow and provide shade that insulates and protects new forest growth and provides 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 growth. Therefore, Galton Vegetation project activities would contribute toward achieving FW-DC-SOIL-03.

FW-DC-SOIL-04: In units where existing historical skid trails already exist, these skid trails will be used to the extent feasible to minimize impacts to surface erosion, bulk density, and water holding capacity to the extent feasible. Effects of temporary roads and skid trails will be temporary due to natural vegetative recovery following harvest activities following scarification and seeding. As a result, while some increase in detrimental soil disturbance and related soil characteristics is expected with proposed management activities, all activity areas are expected to remain at/or below the 15% soil quality standards and in the long run soil conditions will be trending towards desired future conditions by enhancing secondary stand replacement in areas of diminishing stands. Therefore, Galton Vegetation project activities would contribute toward achieving FW-DC-SOIL-04.

Objectives

FW-OBJ-SOIL-01: No soil restoration activities are proposed. Therefore, the Galton Vegetation project does not contribute, nor prevent attainment of FW-OBJ-SOIL-01.

Guidelines

FW-GDL-SOIL-01: In areas where slopes are consistently greater than 40 percent units where prescribed skyline/cable yarding systems are expected to occur (refer to Tables 2 and 4). Therefore, the Galton Vegetation project is designed in exact accordance with FW-GDL-SOIL-01.

FW-GDL-SOIL-02: Appropriate levels of Coarse woody debris would be retained throughout the planning area in order to 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. Therefore, the Galton Vegetation project is designed in exact accordance with FW-GDL-SOIL-02.

FW-GDL-SOIL-03: No nutrient deficient soils are present in the Galton Vegetation Project Area. Project specific surveys were conducted as part of the planning process and verified that nutrient deficient soils are not present in the project area, therefore the project is designed in accordance with FW-GDL-SOIL-03.

FW-GDL-SOIL-04: 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 Galton project is designed in exact accordance with FW-GDL-SOIL-04.

FW-GDL-SOIL-05: All project activities would incorporate project specific Best Management Practices (BMPs) as a principle mechanism for protecting soil resources in the Galton Vegetation Project Area. Therefore, the project is designed in exact accordance with FW-GDL-SOIL-05.

Hydrology

Introduction

This section contains the results of the analysis for the physical aspects of the water resources in the Galton Vegetation Project Area on the Kootenai National Forest (KNF). The biological aspects of the water resource are addressed in the Fisheries Section. Chapters 1 and 2 of the Galton Vegetation Project have more detail regarding the project and associated alternatives.

Regulatory Framework

The regulatory framework pertaining to Water Resources is summarized below. For additional information, please refer to the Water Project File.

State and Federal Laws and Regulations

The **Clean Water Act (CWA)** established Federal water quality policies, goals and programs. Both the Environmental Protection Agency (EPA) and the State of Montana have responsibility for carrying out the CWA. The objective of the Act is to "restore and maintain the chemical, physical, and biological integrity of the Nation's waters."

> Section 313 of the CWA requires Federal agencies to comply with all Federal, State, interstate and local requirements, administrative authority, processes, and sanctions with respect to control and abatement of non-point sources of water pollutants. For example, section 313 requires the Forest Service to apply all reasonable land, soil, and water conservation practices (i.e., specialized National Core Best Management Practices (BMPs) and Montana State BMPs).
>
> Section 404 of the CWA authorizes the Secretary of the Army (operating through the Army Corps of Engineers) to issue permits for the discharge of dredged or fill material into wetlands (33 CFR 323). Silvicultural activities are exempt from the 404-permit process, as are associated roads if constructed and maintained using BMPs (Federal Register 323.4(a), 7/91). Potential effects on wetlands are required to be analyzed and disclosed. If a practical alternative to affecting a wetland exists, the wetland will be avoided (40 CFR 230.1).
>
> The CWA also requires states to establish water quality standards that allow for the protection of designated beneficial uses, and to identify water bodies that do not meet these standards. The identified water bodies are called water quality limited segments (WQLS). A WQLS is a water body not fully meeting water quality standards or not fully supporting its intended uses.

The Multiple-Use Sustained-Yield Act of 1960 states that management of the National Forests must provide sustained yields without impairment of the productivity of the land.

The Forest and Rangelands Renewable Resources Planning Act of 1974 (as amended by the National Forest Management Act of 1976), Section 5 directs the Secretary of Agriculture to use a systematic, interdisciplinary approach to achieve integrated consideration of physical, biological, economic, and other sciences in National Forest Land Management Planning.

Executive Order 11988, Floodplain Management directs that each agency shall provide leadership and shall take action to reduce the risk of flood loss, to minimize the impacts of floods on human safety, health and welfare, and to restore and preserve the natural and beneficial values served by floodplains in carrying out its responsibilities for: acquiring, managing, and disposing

of federal lands and facilities; providing federally undertaken, financed, and assisted construction and improvements; and/or conducting federal activities and programs affecting land use, including but not limited to water and related land resources planning, regulation, and licensing activities.

Executive Order 11990, Protection of Wetlands Order directs that each agency shall provide leadership and take action to minimize the destruction, loss, or degradation of wetlands, and to preserve and enhance the natural and beneficial values of wetlands in carrying out the agency's responsibilities for: acquiring, managing, and disposing of federal lands and facilities; providing federally undertaken, financed, and assisted construction and improvements; and/or conducting federal activities and programs affecting land use, including but not limited to water and related land resources planning, regulation, and licensing activities.

The **Montana Administrative Rule Chapter 36.11** states that, "land management activities must not generate pollutants in excess of those that are naturally occurring, regardless of the stream's classification." Naturally occurring, as defined by the Montana Administrative Rule is the water quality condition resulting from runoff or percolation over which man has no control or from developed lands where all 'reasonable' land, soil, and water conservation practices (BMPs) have been applied; BMPs are considered reasonable only if beneficial uses are protected. Non-point source water quality in the Analysis Area is currently managed through the application of BMPs, which are the foundation for maintaining water quality in the State of Montana.

The **Montana Streamside Management Zone Law** (77-5-301 to 307) and rules (26.6.601 to 610) establish a system for classifying streams and determining widths of Streamside Management Zones (SMZs) and allowable activities within them. This law works in combination with Forest Plan. In most cases, the Forest Plan Riparian Habitat Conservation Areas (RHCAs) specify a wider buffer than State mandated SMZs. A document summarizing the State SMZs and RHCAs can be found in the Water Project File (SMZ RHCA Crosswalk). Any deviations from the SMZ Law require an Alternative Practice Permit from the Montana Department of State Lands.

Forest Plan

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.

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.

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-WTR-04. Municipal watersheds and public water systems (source water protection areas) meet water quality standards.

Standards

FW-STD-WTR-01. Management activities shall maintain or improve water quality in public source water areas, and be consistent with applicable state source water protection requirements. Short-term effects from activities in source water areas may be acceptable when those activities support long-term benefits to aquatic resources.

Guidelines

FW-GDL-WTR-01. Management activities in impaired watersheds (listed by the state under section 5 of the Integrated 303(d)/305(b) Report) with approved TMDLs are designed to comply with the TMDL. Management activities in watersheds with streams on the 303(d) list are designed to maintain or improve conditions relative to the cause for impairment and will not cause a decline in water quality or further impair beneficial uses. A short-term or incidental departure from state water quality standards may occur where there is no long-term threat or impairment to the beneficial uses.

FW-GDL-WTR-03. Project-specific National Core BMPs and Montana State 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.

Tobacco Geographic Area

GA-DC-WTR-TOB-02. Source water protection is provided for the Tobacco River and its tributaries (including Deep Creek) for the towns of Eureka, Fortine, and Trego.

Analysis Area and Methods

Analysis Area

The analysis area for water resources includes all watersheds containing proposed activities; watershed boundaries are used as analysis boundaries. These areas are displayed in the Streams, Lakes, and Watersheds Map in the Water Project File. Watersheds were chosen because, by definition, a watershed is a unit of land upon which water flows downhill to a common outlet (Black 1996). Therefore, activities in adjacent watersheds would typically not affect each other. There are nine watersheds within the Project Area: Wigwam River, Phillips Creek, Indian Creek, Grave Creek, Sinclair Creek, Therriault Creek, Deep Creek, Lower Fortine Creek, and the Stillwater River.

Direct, indirect, and cumulative effects from past, proposed, current and reasonably foreseeable activities are discussed for the watersheds in the analysis area. In general, a cumulative effects boundary is adequate when all the upstream activities are included and the effects are not discernible at a downstream boundary. For this project the Tobacco River is that boundary for those streams that flow into the Tobacco and the US/Canadian border is the boundary for the

Wigwam Watershed. Therefore the cumulative effects boundary is the same as the direct and indirect effects boundary for this analysis.

Analysis Methods

Water Quantity

In this analysis, Equivalent clearcut acres (ECAs) were used along with other information (e.g., stream condition) to describe the existing condition and potential impacts resulting from past, current and proposed land management activities in each watershed in the Analysis Area. ECAs are commonly used to analyze potential changes in water yield by translating canopy removal from timber harvest, road building or natural disturbances (e.g., wildland fire) to a common unit. While ECA units are in acres, they are usually displayed as a percentage of the watershed area. ECAs take into account the initial percentage of crown removal and subsequent recovery through re-growth of the vegetation after the initial harvest or disturbance.

Water Quality

Effects of road management, recent large-scale disturbances (i.e., Marston wildfire) and timber harvest were incorporated in the analysis of water quality through ECA analysis as well as analysis of monitoring data and sediment contribution potential using the Water Erosion Prediction Project (WEPP) Road model.

The WEPP model was used to model sediment contribution potential of the existing road system in the analysis area based on field survey data. The model was developed to replace the universal soil loss equation by an interdisciplinary team of scientists from multiple agencies. The WEPP model incorporates several decades of daily weather data to predict infiltration, runoff and sediment detachment, transport, deposition and delivery along a hill slope and through a drainage system. Soil loss is distributed spatially at a given point on a hill or in the stream channel network as well as temporally. Road design, surface, traffic level, segment length, gradient, width, fill gradient, buffer gradient, buffer length, and rock fragment are factors utilized by the model.

While road management and large-scale disturbances will be discussed under direct and indirect effects, timber harvest activities were designed to protect beneficial uses without required mitigation. Timber harvest activities have the potential to create soil disturbance and increase overland flow, resulting in soil erosion and sediment delivery to streams. This is primarily due to soil compaction and disturbance associated with skid trails and landings. However, Research has shown that the level of sediment production resulting from timber harvest is dependent on the level of planning and attention to site-specific conditions (Chamberlin et al 1991). All proposed harvest and fuels treatment activities would be conducted with strict adherence to applicable BMPs.

Studies of erosion and sediment transport in harvest units have shown that application of BMPs, including installing skid trail drainage and designating riparian buffers, results in sediment retention within the harvest unit and riparian buffer (Croke et al 1999; Wallbrink and Croke 2002; Litschert and MacDonald 2009) and limit sediment introduced to the stream. Stream monitoring and BMP implementation and effectiveness monitoring on the KNF supports these findings, and has shown that BMPs have been properly implemented 97% of the time and have been 95% effective in reducing and/or eliminating sedimentation to streams (USDA Forest Service 2011).

The proposed timber harvest activities are not expected to measurably affect sedimentation levels in streams through the use of design criteria, RHCA buffers and BMPs (FW-DC-WTR-02, FW-

GDL-WTR-01, FW-GDL-WTR-03, FW-DC-RIP-02) and will not be discussed further in this analysis. A list of BMPs specific to this project can be found in Appendix 2. These measures, combined with specified Design Criteria and adherence to the Forest Plan requirements for Riparian Habitat Conservation Areas (RHCAs), are expected to maintain or improve water quality conditions.

Stream Channel Processes

Stream channels are dynamic and change as a result of both human-caused and natural disturbance. These changes are an indicator of the effect of past disturbance and/or the sensitivity of the drainage to disturbance. In this analysis, collected stream data was compared with reference stream data to determine watershed condition. In order for a stream to be considered healthy, not all measured parameters need to fall within reference parameters. These are natural systems and even unmanaged reference streams do not fit entirely within all parameters of their classification.

Field data was collected across much of the analysis area. This data is the foundation of the existing condition and the effects analysis for this project. Stream discharge and sediment data was collected using USGS methodology. Stream classification, stability, dimensions and substrate data were collected using the Region 1 Aquatic Ecosystem Unit Inventory (AEUI) technical guide which incorporates the Rosgen Stream Classification System (Rosgen 1996) methodology as well as PACFISH/INFISH Biological Opinion (PIBO) protocols. This data provides an indicator of trends in watershed condition.

The Rosgen Classification (Rosgen 1996) was used to help explain the processes, functions and patterns of channels and to predict channel responses to management activities. The Rosgen Classification is derived from field measurements of stream attributes including entrenchment, width-depth ratio (W/D), sinuosity, and slope. Water Table 1 gives a brief description of each the channel types in the classification system.

Water Table 1Stream Channel Types and Associated Attributes (Rosgen 1996).

Channel Type	Thread	Entrenchment	Width/Depth	Sinuosity	Slope
A	Single Channel	< 1.4	< 12	1 – 1.2	4 – 10%
B	Single Channel	1.4 – 2.2	> 12	> 1.2	2 – 4%
C	Single Channel	> 2.2	> 12	> 1.2	< 2%
D	Multiple Channels	NA	> 40	> 1	< 4%
E	Single Channel	> 2.2	< 12	> 1.5	< 2%
F	Single Channel	< 1.4	> 12	> 1.2	< 2%
G	Single Channel	< 1.4	< 12	> 1.2	2 – 4%

Different channel types operate under different energy conditions (e.g., slope) and input conditions (i.e., type of material delivered to the channel), and have different capacities for stability. The combination of these factors results in different channel structures that range from cascades and waterfalls (Steep A); to step-pools (A and G); to riffles (B); to riffle-pool (C and F); to braided (D) (Rosgen, 1996).

A numerical classification of particle size is added to the basic Rosgen Channel Type to characterize the size of the material that makes up the channel bed. Bed material size is an important factor in determining channel stability and response (e.g., smaller particles can be more

easily eroded and transported by lower energy flows than larger particles). The particle size categories are identified in Water Table 2.

Water Table 2. Bed Material Size Categories (Rosgen 1996)

Category	Description	Particle sizes (mm)
1	Bedrock	N/A
2	Boulder	> 256
3	Cobble	64 – 256
4	Gravel	2 – 64
5	Sand	.062 – 2
6	Silt or Clay	< .062

Assumptions and Limitations

Water Quantity

When analyzing ECAs, effects will be evaluated with regard to normal or average conditions and impacts to watershed processes to clearly compare alternatives. Episodic climatic events such as rain-on-snow, high-intensity thunderstorms, saturation caused mass soil movement or shorter-duration peak flow events cannot be addressed using ECAs. Precipitation events with return intervals greater than 1-6 years are highly variable in nature and largely speculative in terms of quantifying effects (Birkel et al 2012, Grant et al 2008). Stream bank instability and sediment movement are not uncommon in dynamic landscapes where disturbance such as large fires, major floods and extreme precipitation events occur (Benda et al 1998). The magnitudes of these disturbances far overshadow the potential effects to water yield from ECAs associated with any of the action alternatives. When needed, analysis of major disturbances must be completed using professional judgment and/or other models. The professional interpretation of predicted consequences and determination of regulatory compliance is based on field reviews, data collection and analysis, model projections, experience and review of similar projects in the vicinity. This forms the basis for conclusions and comments about meeting Forest Plan requirements and protecting beneficial uses (FW-DC-WTR-02, FW-GDL-WTR-03). Potential impacts to water yield from this project are analyzed within the context of the desired conditions in the watershed, not in the context of large scale disturbance events.

Water Quality

The WEPP Road model was not designed, nor is it used to develop exact estimates of sediment generated from roads and sediment entering the stream system. The model provides a consistent method of comparing alternatives to each other as well as to modeled natural conditions and/or measured stream conditions. Values generated by the model are not to be considered as an absolute measure, nor by themselves provide an answer in regard to the effects roads have on sedimentation. Because WEPP Road is process-based, it can be applied to any condition where the necessary input data are known. Users can select the most appropriate climate from a climate database. Soil properties are based on research findings. The road is assumed to be free of vegetation, the fillslope to be covered with sufficient vegetation to give about 50 percent ground cover and the buffer surface covered with litter from a 20-year old forest (generally 100 percent). Climates with less than 500 mm of precipitation may have somewhat less cover as drought conditions will limit the amount of vegetation growth modeled in WEPP Road (WEPP: Road, Technical Documentation, Elliot, W.J., Hall, D.E., Scheele, D.L, 1999).

Stream Channel Processes

Representative stream reaches were monitored in anticipated response reaches on Forest Service lands and are assumed to represent the overall condition of the watershed within the Analysis Areas. These measured reaches comprise a small percentage of each stream network and portions of stream channel that have not been monitored quantitatively may have varying levels of stability. Therefore, in addition to the measured sites, the majority of channels in the Analysis Area have been walked to identify potential concerns that may not have shown up in the measured stream data.

Scientific Uncertainty

Scientific uncertainty in estimating management effects to stream channels is due to the degree of natural variability in the system. Because of this natural variability, it is difficult to separate the management induced changes from changes due to natural disturbances. There are instances where the degree of management induced change is over-riding (e.g. dams). However, with regard to forest management activities, potential geomorphic effects are similar to those that would occur from natural disturbances. Forest management activities may change the magnitude of certain variables within the system which may "in turn produce responses, perhaps only acceleration or deceleration, in the fundamental geomorphic processes. The appropriate [geomorphic] principles are not [nullified]" (Leopold et al. 1964 p. 434).

There is uncertainty when quantifying changes in runoff resulting from timber harvest activities and roads. "With reference only to the effects of forest harvest on peak flows, results differ from study to study, watershed to watershed, and region to region" (Grant et al. 2008). Compounding these results are the changes in land management practices that have taken place over the last few decades. For example, research from the 1960s and 1970s typically included complete clearcuts with no riparian buffers, dozer piling, and little or no BMPs (Grant et al. 2008). And, while it is generally accepted that roads can affect runoff by changing the way water is routed through a watershed, the amount and the direction of change are highly dependent on how the increased flow and accelerated timing of runoff interacts with other water delivery processes (Luce 2002).

A study that was conducted in northwestern Montana found that no apparent correlations exist between the amount of timber harvest and the magnitude of peak flows, and climatic differences are the dominant control on the size of peak flows in the study area (MacDonald and Hoffman 1995). Grant et al. (2008) found that management caused increases in peak flow diminish with storm magnitude and that there is little evidence that forest harvest increases peak flows for storms with return intervals greater than 6 years. This follows basic watershed principles that "as with rainfall, the influence of vegetative changes diminishes as the magnitude of precipitation increases" (Brooks et al. 1997).

As a result of the research discussed here, this watershed analysis used average conditions as a basis for predicted effects. Once outside average conditions (return intervals > 6 years), the effects of changes in ECAs from land management are immeasurable.

Affected Environment

Introduction

Before forest management-induced changes began to occur, watersheds in the analysis area developed over time by adjusting to changes in flow regimes, sediment inputs and vegetation caused by natural disturbances including insects, disease, wildfire and climate.

Pre-settlement conditions in this area were likely a result of a repetitious cycle of disturbance and recovery; a pattern referred to as a pulse disturbance regime. Under a pulse disturbance regime, a disturbance occurs resulting in a short duration increase in water and/or sediment delivery that would potentially trigger some channel destabilization. The affected channel would then recover through time and generally stabilize until the next disturbance event. These disturbances typically occurred in a patchy, mosaic pattern (in both time and space), so that some areas remained undisturbed by a given event and provided refuge habitat for fish and other aquatic organisms.

Historically, the most prevalent large-scale disturbance in the analysis area was wildfire. High-intensity, stand replacing fires varied in frequency, but had the most pronounced effects to the watersheds in the analysis area. Once high-intensity fire passed through an area, sediment delivery and water yield increased until forest floor and canopy vegetation had sufficiently recovered. During the fire disturbance cycle, large woody debris usually remained within channels and riparian zones and greatly aided the recovery of these areas. It is likely that some erosion followed these fires; especially on steep slopes and in headwater channels where most stabilizing vegetation would have been burned. More frequent and lower-intensity fires likely had little effect on these watersheds due to the minimal loss of tree canopy and understory duff layers.

Other types of disturbances that occurred included floods and debris slides. Floods may have affected several adjacent drainages or even the entire analysis area at the same time and occurred in a similar temporal pattern as the wildfires with time for recovery between major events. Channel stability and aquatic habitat can be affected by floods – steep reaches tend to scour and the material may be deposited in lower gradient reaches.

Over the last century, there has been a change in the watershed disturbance regime from the pulse disturbance regime described above to that of a ‘press’ disturbance regime (Wegner 1996). Management activities in the Analysis Area (e.g., road building, forest canopy removal) have resulted in changes to water and sediment routing. These changes are lower in magnitude than the immediate post-disturbance effects that result from natural disturbances, but are generally higher than baseline conditions. Watersheds have not returned to their pre-management level due to the persistence of water and sediment increases contributed from roads at stream crossings and other continuing management activities.

In summary, the existing ‘press’ disturbance regime is characterized by nearly constant, moderate levels of effects (changes in water and sediment yields). The historic pulse disturbance regime had higher levels of effects, but the disturbances were less frequent and typically allowed time for system recovery between disturbance events.

Existing Conditions

The existing condition is the result of past management activities (e.g. road construction, timber harvest, prescribed burning) and natural events (e.g. wildfire, floods, landslides) that have occurred within the analysis area.

Geology and Climate

The physical characteristics of streams and lakes are determined by the geology and climate of the watershed. These drivers define the inherent sensitivity of a watershed to disturbance. For example, watersheds with higher mean annual precipitation have greater potential for flood events and erosion on sensitive areas or steep slopes. The greater the input of water, the greater the potential for soils to become saturated, leading to surface runoff. In addition, areas with shallow soils have less water holding capacity and are more likely to have higher runoff.

The analysis area is within KNF Hydraulic Region III, which is seldom influenced by rain-on-snow events (USDA Forest Service 1990; Hoffman 1993; MacDonald et al 1997). Mean annual precipitation in the Analysis Area ranges from 13 to 68 inches (refer to Average Annual Precipitation Map in the Water Project File). At lower elevations most of the precipitation falls as rain, while at the upper elevations most falls as snow.

Geology in the analysis area was strongly influenced by alpine and continental glaciers. At higher elevations alpine glaciers created steep bedrock headwalls, valley troughs, cirque basins, and rocky ridges. At lower elevations continental glaciers generally scoured the ridge tops and noses and filled the side-slopes and valleys. Terraces and rolling topography characterize the base of the mountains. Elevation ranges from less than 2,600 feet near the town of Eureka to 7,830 feet at the top of Poorman Mountain near the Canadian Border.

The analysis area is underlain by metamorphic sedimentary rocks known as the Belt Formation. These rocks were formed approximately one billion years ago from fine sediments that accumulated at the bottom of ancient seas. These deposits were changed into hard dense rock formations under great pressure and heat. They form a relatively stable foundation for the watersheds in this area (Kuennen and Gerhardt 1995). For more information on the geology in the analysis area, refer to the Soils Section in this document.

The inherent geology and climate does not change as a result of management; it merely set the stage for analysis of effects. Therefore, geology and climate will be discussed further in this analysis only as they pertain to other indicators.

Riparian Areas and Wetlands

Riparian areas are transition zones between permanently saturated wetlands and dryer upland areas. These areas exhibit vegetative or physical properties characteristic of permanent surface or subsurface water influence (USDI Bureau of Land Management 1993). Natural, undisturbed or well-managed riparian/wetland areas provide values and benefits far in excess of the land area they occupy (Brooks et al 1997). Riparian areas maintain the integrity of aquatic ecosystems by (1) influencing the delivery of coarse sediment, organic matter, and woody debris to streams, (2) providing root strength for channel stability, (3) shading the stream, and (4) protecting water quality (USDA Forest Service 1995). Depending on the stream channel type and volume (rate of flow), the relative magnitude of these functions can vary widely. For example, large woody debris (LWD) is often a significant component of physical channel structure in small streams that do not have enough flow to easily move LWD, but it plays a significantly smaller role in large rivers where LWD is continuously moved through the system.

Riparian areas are defined based on proximity to streams and rivers. Wetlands are defined by having a water table usually near the ground surface or where the land is at least seasonally covered by shallow water. Riparian areas and wetlands are important components of the overall landscape, forming some of the most dynamic and ecologically rich areas on the landscape. The Riparian Areas and Wetland Map located in the Water Project File shows locations of riparian areas, wetlands, streams, ponds and lakes in the analysis area. Past concerns with regard to grazing impacts to riparian areas and wetlands have been aggressively restored in the analysis area. There are no existing concerns identified for the riparian areas and/or wetlands within the analysis area (FW-DC-WTR-03, FW-DC-RIP-02, FW-DC-RIP-03).

Water Quantity

In this analysis, quantity of stream flow will be described in terms of annual water yield or peak flow. The greatest potential for change within a stream channel occurs during high-flow periods (King 1989). Therefore, changes in magnitude and duration of peak flows are the most concerning potential effect to stream channel stability. Spring peak flows in the Analysis Area normally occur during May or June (Hoffman 1993), but elevated flows can occur throughout the year in response to precipitation events. The timing, magnitude, and duration of runoff events may be changed by vegetation and road management activities or natural disturbances.

In addition, the removal of forest canopy through natural disturbances and/or management activities affects snow accumulation and melting processes. This commonly results in an increase in snow-pack accumulation and snowmelt rates, thereby increasing runoff magnitude and volume (MacDonald et al 1997; and Hoffman 1993). Generally, there is an increase in water yield due to the combination of reduced evapotranspiration and precipitation interception. However, higher water yield does not always translate into higher peak flows. Effects on water yield from treatments that remove 20 percent or less of the basal area are not likely measurable and effects of thinning, fuel treatments and partial cuts are likely short-lived and unmeasurable (Troendle et al. 2009).

Furthermore, runoff patterns can be affected when water is rerouted by roads. The compacted soils associated with roads and trails can act as sources of overland flow and can intercept groundwater, converting it to surface flow. If not properly drained, roads and corresponding ditches can extend the stream channel network and increase the drainage efficiency of the watershed. Changes in flow patterns could result in higher but shorter peak flows and/or a series of smaller, more prolonged peak flows depending on aspect, elevation, precipitation, drainage pattern, etc. Interception and re-direction of runoff by roads and other compacted surfaces can add to the consequences of any additional runoff caused by vegetation removal. The Roads and Ownership Map in the Water Project File displays the location of roads within the analysis area watersheds. The existing ECAs for the analysis area, including ECAs due to the Marston Fire, are presented in Water Table 3.

Water Table 3. Existing Equivalent Clearcut Acres (%ECA)

Watershed	Road ECAs	Harvest ECAs	2015 Fire ECAs***	Total ECAs	Watershed Acres	Existing % ECA
Wigwam River*	160	316	0	476	26127	2
Deep Creek	196	193	479	868	12413	7
Lower Fortine**	1012	595	1759	3366	39079	9
Grave Creek	492	806	0	1298	48232	3
Therriault Creek	384	348	0	732	13517	5
Sinclair Creek	184	398	36	618	8083	8
Indian Creek	156	3	0	159	11358	1
Phillips Creek*	292	56	0	348	17611	2
Stillwater River*	116	52	0	673	6642	10

* Only a portion of these watersheds exist within the KNF.
** Lower Fortine is only partially within the PA, but the entire watershed was analyzed.
***This number includes ECAs that resulted from fire suppression as well as ECAs from wildfire.

Water Quality

The Clean Water Act (CWA) requires states to identify water bodies that they believe are not meeting water quality guidelines and are at risk of not supporting their designated beneficial uses, or Water Quality Limited Segment (WQLS). The WQLS streams and beneficial use concerns within the analysis area are identified in Water Table 4. Only one watershed, Deep, is identified by MT DEQ as an A1 stream and is a source water watershed supplying the town of Fortine. However, many of the watersheds in the project area (Lower Fortine Creek, Deep Creek, Upper and Lower Grave Creek, Therriault Creek, and Sinclair Creek) are tributaries to the Tobacco River, and are delineated as source water for the city of Eureka's public water supply in the city's Source Water Delineation and Assessment Report (Richard, 2001). A TMDL for Grave Creek was completed in 2005 (MTDEQ, 2005) and the remaining WQLS streams within analysis area are covered in the Tobacco TMDL which was completed in 2011 (MTDEQ, 2011). The TMDL reports assume "median conditions of natural background and natural disturbance" and recognize that water quality targets may not be met under some natural conditions such as a large fire or flood event until the stream and/or watershed recovers from the natural event. According to the discussion of forest management practices in the TMDL, modern forestry practices under existing conditions, are not considered significant sediment loads due to required applications of BMPs, Forest Plan standards and other reasonable land, soil and water conservation practices (FW-DC-WTR-02, FW-GDL-WTR-01).

Water Table 4.WQLS in the Galton Analysis Area[1]

Listed Stream Segment	Beneficial Use of Concern	Cause of Concern	Source of Concern
Grave Creek	Aquatic Life Support Cold Water Fishery Recreation	Riparian alteration Flow alterations Sedimentation/siltation	Water diversions Silviculture Roads
Therriault Creek	Aquatic Life Support Cold Water Fishery	Sedimentation/siltation	Grazing Agriculture
Fortine Creek	Aquatic Life Support Cold Water Fishery Recreation	Riparian alteration Flow alterations Sedimentation/siltation	Agriculture Channelization Flow Diversions Roads Silviculture Grazing
Deep Creek	Aquatic Life Support Cold Water Fishery Recreation	Riparian alteration Sedimentation/siltation	Grazing
Tobacco River	Aquatic Life Cold Water Fishery	Physical substrate & Habitat alteration Sedimentation/siltation	Grazing Channel modification

[1] Information in this table was taken from the 1996 and 2010 305(b) Reports including 303(d) Lists.

Studies have shown that roads can be the highest contributors of non-point source sediment in forested areas (Brooks et al 1997; Luce and Wemple 2001; Reid and Dunne 1984; Waters 1995). The Roads and Ownership Map in the Water Project File displays the roads in the analysis area.

Roads have the potential to re-route surface runoff and sub-surface flow and/or increase sedimentation. Poorly maintained and located roads are often contributors of non-point source sediment in forested areas (Brooks et al. 1997; Luce and Wemple 2001) and impact aquatic habitat (Furniss et al. 1991; Schnackenberg and MacDonald 1998). Recent research in southwest Idaho found that relatively few sediment source points on a small percentage of roads are causing the majority of the sediment delivery to streams (Black et al. 2012). Furthermore, this study found that, in the middle Fork of the Payette River, 7% of all drain points (967 points in this study) deliver 90% of the sediment, and 2% deliver 50% of sediment (276 points). A study on the KNF found that roads are a significant source of fine sediment, particularly roads located near streams (MacDonald et al. 1997). Roads and ditches, if not properly drained and disconnected from streams, can extend the stream channel network. This increases the drainage efficiency of the watershed and may result in a higher and more rapid runoff or, alternatively, can desynchronize the flow for a lower, more prolonged peak flow.

The effects of roads on stream systems can be minimized once the interactions of water, soil, vegetation, and topography are understood. Roads can affect streams directly by accelerating erosion and sedimentation, altering channel morphology, and/or changing the runoff characteristics of the watershed (Furniss et al 1991; Gucinski et al 2000). Roads can also intercept groundwater and convert it to surface flow. Water flowing on roads often picks up and carries sediment that is more readily available on non-vegetated native road surfaces. Sediment laden water can be delivered directly into the stream channel where roads cross streams. A single road surface gully that forms can contribute large amounts of road-derived sediment to a stream channel. Predicting the probability of these types of failures is difficult. Reducing the likelihood or risk of these occurrences through road maintenance and application of BMP standards protects both the roads and the connected stream systems. Ditch relief culverts in riparian areas can also deliver water and sediment if they carry enough water to scour a channel that eventually connects to a stream. Improperly drained and/or located roads can accelerate erosion rates and increase sedimentation in streams. The frequency and amount of sediment delivery to streams is highly variable and is largely influenced by contributing road segment length, slope and location within the watershed (Luce and Black 1999; King and Tennyson 1984; Reid and Dunne 1984; Schnackenberg and MacDonald, 1998). BMPs are implemented to reduce and in most cases eliminate these effects by disconnecting storm water runoff from streams.

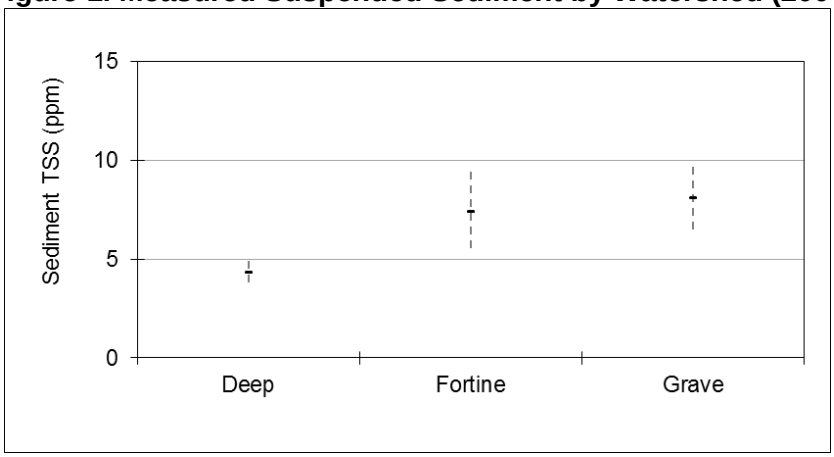
There are 691 miles of existing road within the analysis area. Less than half of the road miles (263 miles) are Forest Service Roads. While this project does not propose new road construction, mass soil movement associated with roads could occur due to culvert or road fill failure. However, changes in the transportation system within the analysis area are not being addressed with this project. There will be no change in the number of system roads as a result any alternatives and discussions of road length or number of roads will not be carried forward in the analysis.

Additionally, ground disturbing activities have the potential to increase suspended sediment, which has both physical and biologic implications for stream channel conditions. Typically there are higher levels of suspended sediment during high spring runoff events in snow-dominated systems. During the remainder of the year, suspended sediment levels remain low. Brooks et al (1997) states that suspended sediment concentrations in undisturbed forested watersheds are relatively low, or approximately 10-20 parts per million (ppm). Suspended sediment samples have been collected since 2004 on Deep, Fortine and Grave Creeks. Based on samples collected from 2004 to 2015, suspended sediment regimes appear to be below those expected in undisturbed

forested watersheds. Water Figure 1 displays the 12-year average of sediment measured as total suspended solids (TSS) at the 90% confidence interval.

While all three streams are listed as WQLS streams for sediment, it appears that suspended sediment levels from National Forest Lands have not been the major contributor during the past ten years Water Table 4 and Water Figure 1. Much of this can be attributed to reduced management activity, improved logging practices, designating riparian buffer zones, and improved BMPs for both timber harvest and roads.

Water Figure 1. Measured Suspended Sediment by Watershed (2004-2015)



Stream Channel Processes

The Rosgen Stream Classification System (Rosgen 1996), derived from field measurements, was used in this analysis to help explain the processes, functions and patterns of channels and to predict channel responses

As discussed in the methods section, different channel types have different capacities for stability. The combination of these factors results in a range of potential channel forms that result from different energy conditions and input conditions. The results of the field measurements and classification of streams in the analysis are compared to reference stream data is displayed in Water Table 5.

Water Table 5. Stream Survey Data Compared to Reference Stream Data

Stream	Reach #	Year	Channel Type	Bank Full Width (BFW) (feet)	Width-Depth Ratio*	Substrate Percent Fines (PIF) *	% Stable Banks**
Blue Sky	1	2007	B3	21.1	24	1	100
Blue Sky	1	2001	B4	17	10	2.9	98
Blue Sky	2	2001	B4	23.3	13	No Data	100
Blue Sky	3	2001	B4	18.8	11	No Data	99
Clarence	1	2007	B3	24.5	24	6	100
Clarence	1	2001	B4	17.0	5	2.9	86
Clarence	2	2001	C4	16.4	6	4.3	82
Clarence	3	2001	B4	13.7	11	5.4	99
Clarence	4	2001	B3	16.8	14	3.3	100
Clarence	5	2001	B4	16.6	12	2.4	100

Stream	Reach #	Year	Channel Type	Bank Full Width (BFW) (feet)	Width-Depth Ratio*	Substrate Percent Fines (PIF) *	% Stable Banks**
Clarence	6	2001	B4	6.7	9	No Data	No Data
Foundation	1	2001	B4	18.4	23	0.4	96
Foundation	2	2001	B4	12.6	19	No Data	No Data
Foundation	3	2001	B3	6.7	11	No Data	No Data
Foundation	4	2001	A3	6.3	16	No Data	No Data
Grave	1	2003	C3	37.0	30	2	100
Grave	1	2008	C3	41.2	22	4	95
Grave	2	2002	F4b	42.3	19	8.6	99
Grave	3	2002	F2b	52.3	15	7.9	92
Grave	4	2002	B4	79.5	26	5.7	99
Grave	5	2002	B3	49.2	29	3.7	97
Grave	6	2002	B4c	50.2	13	3.8	97
Grave	7	2002	B3	50.8	18	4.3	98
Grave	8	2002	C4	37.7	21	5	99
Grave	9	2002	B4	26.2	13	7.1	100
Grave	10	2002	C4	34.4	20	13.1	99
Grave	11	2002	B4	29.5	17	3.6	100
Lewis	1	2008	B3	17.1	16	0	100
Lewis	1	2001	B4	11.9	12	10	100
Lewis	2	2001	C4	13.1	10	11	99
Lewis	3	2001	B4	16.1	17	10	100
Lewis	4	2001	B4	6.9	5	No Data	No Data
Lewis	5	2001	B3	12.3	9	No Data	No Data
Deep	1	2005	B3	17.2	24	6	98
Deep	1	2007	B3	18.8	13	8	100
Kopsi	1	2001	B4	14.9	11	No Data	No Data
Kopsi	2	2001	B4	14.4	12	No Data	No Data
Laughing	1	2011	B4	8.9	13	14	100
Laughing	1	2007	B4	5.8	12	10	100
Laughing	1	2005	B4	5.7	16	No Data	No Data
Bluebird	1	2009	C4	30.5	35	0	100
Otter	1	2009	C4	10.6	20	0	98
M. Fortine	1	2004	B3	20.7	22	7	No Data
M. Fortine	1	2009	B3	23.3	23	3	99
Stahl	1	2001	B4	32.9	17	14	96
Stahl	2	2001	A3	19.9	11	6	98
Stahl	3	2001	A3	17.0	10	6	97
Stahl	4	2001	A4	17.0	8	1	98
Stahl	5	2001	B3	16.4	13	No Data	No Data
Stahl	6	2001	B4	12.2	13	No Data	No Data
SF Stahl	1	2001	B4	11.9	18	No Data	No Data
Williams	1	2002	B3	28.1	15	6	98
Williams	2	2002	A3	38.7	35	4	100
Williams	3	2002	B3	22.6	18	12	99

Stream	Reach #	Year	Channel Type	Bank Full Width (BFW) (feet)	Width-Depth Ratio*	Substrate Percent Fines (PIF) *	% Stable Banks**
Williams	4	2002	B3	17.3	20	12	100
Williams	5	2002	A3	15.7	17	12	100
Wms lake trib	1	2002	B3	20.0	20	27	100
Wigwam	1	2003	B3	34.5	29	1	96
Wigwam	1	2008	B3	37.9	21	No Data	98
Weasel	1	2003	C4	29.1	25	No Data	100
Weasel	1	2008	C3	38.9	16	No Data	95

* PIBO Reference Data from Tobacco TMDL (Montana DEQ, 2011). (BFW < 30 = W/D ≤ 27; BFW > 30 = W/D ≤ 35) (PIF ≤ 6 mm ≤ 15%)

** INFISH 1995, Page A-4 (≥ 80). Are only required on non-forested streams but can be used on forested as well.

The reaches monitored in the analysis area fall close to or completely within reference reach ranges (FW-DC-WTR-03). Review of the physical stream parameters in Water Table 5 show that all stream indicators are within reference ranges with the exception of one parameter in one stream. Williams Lake Tributary has percent fine sediment (< 6mm) that is outside the reference range. However, all streams meet the reference range for width/depth ratio and bank stability. The high percent fine sediment in Williams Lake Tributary cannot be linked to management as there have not been new activities occurring above where the stream is monitored that would lead to the increase. The increase in fine sediment may be a result of natural events or a result of old sediment sources working through the system.

Direct and Indirect Effects

Direct and indirect effects on Water Resources are described below for proposed activities identified in Chapter 2 of the FEIS. This section presents the potential effects of proposed management activities.

Measurement Indicators

The measurement indicators for compliance with law, regulation, and policy are:

1) Changes to Water Quantity – ECAs, and

2) Changes to Water Quality – sediment delivery.

3) Changes to Stream Channel Processes

Changes to Water Quantity

The removal of tree canopy and modification of the road system (e.g., road drainage) can increase water yield and interrupt normal runoff patterns, which can lead to localized adverse hydrologic responses depending on magnitude of increase, stream type and channel condition. In northwest Montana, these increases are primarily due to modifications in snow accumulation, snowmelt runoff and changes in evapotranspiration rates (USDA Forest Service 1973b).

The intent of ECA analysis is to compare the potential effects of changes to water yield due to management activities. The ECA numbers represent the best information available to indicate where proposed activities may need modification or mitigation to ensure protection of beneficial uses. Beginning in the 1970s with the release of Hydrology Part 2, recommended ECA values have been revised over time as watersheds were compared with modeled results (USDA Forest Service 1973b). Other documents, publications and field analyses have been completed since that

time which has been used to help identify a level of flow that can be allowed while still maintaining beneficial uses. These values are continually reviewed as the KNF watershed professionals implement activities and monitor results. Numbers are usually reported as single values, but are viewed as a range of allowable ECAs based on local geology, climate, and stream systems.

Historically, ECAs ranged from 5 to 55 percent a result of natural disturbance (primarily wildfire). For more details on how historic ECA were calculated refer to the document, Historic ECA, located in the Water Project File.

Alternatives 1 and 3

The vegetation activities proposed in Alternatives 1 and 3 would have no change in ECAs (Water Table 6) for all watersheds except Deep Creek. Alternatives 1 and 3 would increase ECAs by one and two percent respectively in Deep Creek. Still, the highest potential ECA increase is two percent; this difference between the alternatives and the existing condition is not expected to be measurable in the stream channel as ECAs would remain within historic ranges. ECAs resulting from all action alternatives are expected to, at a minimum, protect beneficial uses, including community source water areas, at current levels and/or not impede recovery.

Alternative 2

The No-Action Alternative would result in no increases in ECAs (Water Table 6). ECAs are currently within historic ranges; as vegetation continues to grow ECAs would continue to decrease. There would be no increase in the risk of bank erosion from new management activities. There would be no harvest activity, and therefore, no additional risk of erosion on harvested areas. Channel conditions would remain the same or improve. This alternative is expected to maintain beneficial uses, including community source water areas, at current levels because no activities are proposed that would increase ECAs.

Water Table 6 displays the existing ECA and the change in ECA associated with each alternative, by watershed, in the Analysis Area. As seen in the numbers presented here, ECAs fit well within historic levels (5 to 55%).

Water Table 6. Changes in Equivalent Clearcut Area (% ECA)

Watershed	Existing ECA	Alt. 1 ECA	Alt. 2 ECA	Alt. 3 ECA
Wigwam River*	2	0	0	0
Deep Creek	7	1	0	2
Lower Fortine**	9	0	0	0
Grave Creek	3	0	0	0
Therriault Creek	5	0	0	0
Sinclair Creek	8	0	0	0
Indian Creek	1	0	0	0
Phillips Creek*	2	0	0	0
Stillwater River*	10	0	0	0

Note: The alternatives are the maximum change in ECA (worst-case-scenario) that would occur if all harvest took place in 2016. In reality, most harvest would not occur before 2017 and would be spread over a 5+ year range.
* Only a portion of these watersheds exist within the KNF.

** Lower Fortine is only partially within the PA, but the entire watershed was analyzed.

Changes in Water Quality

Roads are the dominant source of sediment in this project area. This project was designed to reduce the impacts that roads have on aquatic resources by identifying and treating known sources and potential sources of road-associated sediment through road BMP improvements for those roads associated with timber harvest activities. Road drainage improvements would focus on preventing water and sediment generated by the road network from entering streams. Improvements would emphasize disconnecting storm water runoff from perennial and non-perennial streams. The primary methods for accomplishing this are improvements to road surface and ditch drainage, road surfacing, and modifying stream crossings (Furniss et al 1991). These activities fall under the definition of road maintenance. Improvement activities contractually required under timber sales would occur prior to and during harvest and would be inspected after harvest to ensure they still meet specifications. Water Table 7 displays a summary of the proposed road BMP improvements and predicted changes in sediment derived from roads within the analysis area for each alternative.

Water Table 7.Sediment Reduction from BMP Improvements

Road Activities	Alt. 1	Alt. 2	Alt. 3
Existing Sediment from Roads (tons/year)	2*	2*	2*
Proposed Miles Road BMP Improvements	50	0	45
Potential Stream Crossings Improved	20	0	19
Sediment Reduced - BMP Improved (tons/year)	1.3*	0	1.2*
Percent Sediment Reduction	65%	0%	60%

*Calculated from WEPP Model Run Regression Curves

Also, although roads are the dominant source of sediment in the project area watersheds, there is potential for additional sediment from natural sources such as high intensity fire. Past experience with wildfires on the KNF indicate there is low risk of these effects even with high intensity fire; the forest experienced large fires in 1988, 1994, 1998, 2000 and 2015.

Alternative 1 and 3

Alternatives 1 and 3 include road BMP improvements that would occur under timber sales (Water Table 7). Potential sediment reduction in Alternative 1 and Alternative 3 are essentially equal. This work is assured and the timing would be tied to the timber sales distributed over the next 10 years. Because timber sales require road work to be done before logs can be hauled, contractual road improvements done with timber sales would be accomplished in a more immediate timeframe than the annual road maintenance budget could achieve in any given year (Alternative 2).

Research has shown that improved road design and road maintenance can reduce road-related erosion (Gucinski et al 2001; Kennedy 1997). Road maintenance in Alternatives 1and 3 would focus on reducing the distance water flows in ditches, reducing road surface erosion, disconnecting ditch water from entering streams and reducing the probability of stream crossing failures. Although minor inputs of sediment into streams are possible from road improvements and increased traffic, the long-term benefit is a reduction in routed water and sediment. Short-term sediment inputs into streams from road improvements increased traffic are expected to be minimized or eliminated through the use of BMPs and adhering to the Forest Plan. For more in-

depth discussion of sediment analysis and research, please refer to the document titled Road/Sediment Analysis in the Water Project File.

The overall sediment reduction from road BMP improvements would be 1.3 tons per year for Alternative 1 and 1.2 tons per year for Alternatives 3 (Water Table 7). Therefore, it is expected that Alternatives 1 and 3 would have a greater potential benefit to water quality in a shorter amount of time than Alternative 2. The road improvements in Alternatives 1and 3 would at least maintain, and probably improve, water quality and beneficial uses throughout the analysis area. Application of BMPs during and after all road activities would minimize their short-term effects on water quality.

Additionally, the majority of forest management activities proposed in Alternatives 1and 3 that have the potential to influence fire severity (e.g., understory thinning/fuel reduction, intermediate harvest, underburn) are located in the lower portion of Forest Service ownership within the watersheds. Activities in these locations have the greatest potential for mitigating the risk of direct effects to water quality should a large fire occur.

Alternative 2

Alternative 2 would not implement timber-related road improvements, resulting in no new impacts and no additional benefits to water quality. However, regular district road maintenance (estimated 3 to 4 miles per year) would continue as funding becomes available. Over the 10-year planning period, the condition of the roads would slightly improve above existing condition but not to the levels of the action alternatives. The risk of road erosion during large events would improve as compared to existing condition. However, the risk of an extreme runoff event triggering road erosion and culvert failures would remain higher with Alternative 2 than Alternative 1 or 3.

In addition, Alternative 2 does not propose any activities that would reduce the potential for high intensity wildfire and could result in both cumulative and indirect effects to water quality (see Soils Specialist Report for further discussion).

Changes in Stream Channel Processes

Stream channel conditions are the culmination of effects within a watershed. Stream channels are formed and maintained by physical interactions between valley slopes, riparian vegetation, stream flow regime, and channel materials. Over time, stream types can be altered in their pattern and profile by various influences. These influences can affect factors such as stream flow, sediment supply, and channel stability (Rosgen 1996). Management activities such as timber harvest, road construction, and livestock grazing are examples of activites that can alter stream channel processes and lead to changes in channel processes.

The Rosgen Classification provides management interpretations for various stream types based on sensitivity to disturbance, recovery potential, sediment supply, stream bank erosion potential, and vegetation as controlling influences for stability. These elements suggest the manner in which channels could respond to disturbance. Water Table 8 displays the surveyed stream channel types and management interpretations for streams in the analysis area.

Water Table 8. Channel Types and Management Interpretations

Stream	Channel Type	Sensitivity To Disturbance[a]	Recovery Potential[b]	Sediment Supply[c]	Bank Erosion Potential	Vegetation controlling influence[d]
Blue Sky	B3	Low	Excellent	Low	Low	Moderate
Clarence	B3	Low	Excellent	Low	Low	Moderate
Lewis	B3	Low	Excellent	Low	Low	Moderate
Deep	B3	Low	Excellent	Low	Low	Moderate
Deep	B3	Low	Excellent	Low	Low	Moderate
Laughing	B4	Moderate	Excellent	Moderate	Low	Moderate
Laughing	B4	Moderate	Excellent	Moderate	Low	Moderate
Bluebird	C4	High	Good	High	High	Very High
Otter	C4	High	Good	High	High	Very High
M. Fortine	B3	Low	Excellent	Low	Low	Moderate
M. Fortine	B3	Low	Excellent	Low	Low	Moderate
Wigwam	B3	Low	Excellent	Low	Low	Moderate
Wigwam	B3	Low	Excellent	Low	Low	Moderate
Weasel	C4	High	Good	High	High	Very High
Weasel	C3	Moderate	Good	Moderate	Moderate	Very High
Grave	C3	Moderate	Good	Moderate	Moderate	Very High
Grave	C3	Moderate	Good	Moderate	Moderate	Very High

a includes increases in streamflow magnitude and timing and/or sediment increases.
b Assumes natural recovery once cause of instability is corrected.
c Includes suspended and bedload from channel derived sources and/or from stream adjacent slopes.
d Vegetation that influences width/depth ratio-stability.

Alternative 1 and 3

Alternatives 1 and 3 are not expected to negatively affect stream channel processes and beneficial uses are expected to be maintained or improved. The survey data from Water Table 8, and Water Figure 1 show that streams within the analysis area are currently stable and in good condition. The majority of streams in the analysis area have a low to moderate sensitivity to disturbance and a good to excellent recovery potential. ECAs (Water Table 6) are within historic ranges and are not expected to initiate adverse channel changes (FW-DC-WTR-03).

Road maintenance work would occur under Alternatives 1 and 3; both with the timber sales and as appropriated funds become available. Road maintenance in Alternatives 1 and 3 would focus on reducing the distance water flows in ditches, reducing road surface erosion, filtering ditch water before entering streams, and reducing the probability of stream crossing failures. Stream crossing enhancements would improve the streams ability to handle stream flow and sediment that may be restricted in some cases due to undersized structures. With all road work, there would be some short-term sediment introduction from crossing restoration and increased traffic, but the long-term potential sediment yield from each site would decrease (refer to Water Project File document Short vs. Long-Term Effects). No new road construction is proposed, however, there would be temporary road construction to access some of the units. Two miles of temporary road are proposed for both Alternative 1 and 3. None of the temporary roads would include construction of new stream crossings. In addition, the temporary roads would be used for only one season and then re-contoured after use. Therefore, no sedimentation is expected to reach the

stream channel network and no measureable effects to stream channel processes are expected as a result of this project.

Alternative 2

As discussed above, alternative 2 would not implement timber-related road improvements, resulting in no new impacts to stream channel processes and no additional benefits to water quality. However, the risk of an extreme runoff event triggering road erosion and culvert failures with the potential to effect stream channel processes would remain higher with Alternative 2 than Alternative 1 or 3.

Salvage of Incidental Mortality from Underburning

Alternatives 1 and 3 would authorize salvage of mortality that occurred during fuel treatments. There are 16 criteria listed on page 14 of the FEIS that would need to be complied with prior to any salvage occurring. These criteria provide for the protection of resources and compliance with Forest Plan direction; therefore, salvaging incidental mortality would have no further effects to water quality, water quantity, and stream channel conditions. This activity would not occur under Alternative 2, so no effects would occur if Alternative 2 is selected.

Cumulative Effects

Cumulative effects described in this section are a result of the sum of potential effects of the proposed (direct and indirect effects), past (existing condition), and current and reasonably foreseeable activities in a watershed (summary listed in Chapter 3). The analysis area for cumulative effects with regard to Water Resources consists of the same watersheds identified earlier in the document for Existing Condition and Direct and Indirect Effects.

Implementation of any of the alternatives would at least maintain and potentially improve Water Resources. This conclusion is based on the cumulative effects analysis of past monitoring of stream flow, water quality, and channel stability. In addition, all laws, regulations and policies related to water resources will be met further ensuring the protection of all beneficial uses. The following is the rationale for this conclusion.

Current versus Historic Management Practices

There are clear differences between past and current land management practices and policies. Improvements in land management practices are due to improvements in science and technology, ongoing monitoring actions, and changing public values.

The earliest harvest methods involved harvesting the biggest, most valuable trees and leaving the remaining trees on-site. Streams were sometimes used to transport logs (i.e., splash dams, skid trails) causing direct impacts to the stream channel and adjacent riparian areas. Harvest methods in the 1950-70s focused primarily on providing low-cost wood products. Harvest placement often occurred in the highest volume and most easily accessible stands including the riparian areas. At times equipment was driven through or down streams to skid logs to landings. Logging systems were selected based on economics; the least expensive method to transport trees from the forest to the mill was usually selected. This sometimes involved harvest on steep slopes that created excessive soil disturbance and increased the risk of erosion. In addition to the harvest activities, fuels reduction and site preparation for natural regeneration or planting often included dozer piling and subsequent burning.

During the early to mid-20th century road construction was focused primarily on the easiest access route to a given area with little thought to road maintenance. As a result, many roads were constructed in river bottoms, floodplains and adjacent hillsides. The roads efficiently provided access but frequently constricted streams, reduced the effectiveness of riparian areas and provided an avenue for erosion and discharge of sediment into streams. Roads were often expanded from existing trails or abandoned railroad beds to accommodate newer equipment and current land uses. Therefore, the location and design were predetermined from the previous historic use. As time progressed, roads were designed and located to provide access and haul product at minimum cost. In the decades following World War II (1950s to 1970s), the road network was rapidly expanded to support the domestic need for lumber and recreation.

Over the last thirty years impacts to water resources from logging and road activities have been reduced because of Montana State BMPs, National Core BMPs, riparian habitat conservation areas (RHCAs) required in the Forest Plan and other changes based on new science and technology. It is well documented that BMPs and RHCAs significantly reduce sediment delivery to streams compared with historical practices.

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 to address objectives such as seed production, site sheltering, water quality, soil productivity, wildlife protection and/or visuals. Elements of modern harvest prescriptions that address specific resource concerns include retention of snags and down wood for soil nutrition and maintaining sediment filtering vegetation in riparian areas near lakes and streams. Jammer roads and splash dams are practices no longer used and dozer piling is rarely used.

Road management activities have also changed significantly over time. With improved land management methods, the need for high road densities in a given area has decreased. Excess roads are often decommissioned, reducing water and soil impacts and allowing those areas to recover.

In 2015, a new Forest Plan was adopted and INFISH management direction (USDA Forest Service 1995) was retained. The implementation of the Forest Plan gives greater protection to Water Resources in riparian areas adjacent to streams, lakes and wetlands and gives riparian dependent resources priority over other resources in RHCAs. RHCAs do not completely exclude management. Rather, the primary purpose for management within them is aquatics. Activities that occur in them must either benefit the riparian area and associated aquatic features or, at a minimum, not slow the rate of recovery within the riparian area.

Current and Reasonably Foreseeable Actions

In the following discussion, effects of current and/or reasonably foreseeable activities are considered cumulatively with activities proposed in this project. The effects were either described as not contributing effects, contributing indiscernible effects or having a measurable effect on Water Resources. Those actions that may have measureable effects were then analyzed further, by the same three indicators used in the Direct and Indirect Effects Section.

Vegetation Management and Fuels Reduction Activities - While the harvest for the Little Feet Timber Sale is finished, approximately 90 acres of hand piling and burning is yet to be completed. This is not expected to affect ECAs because no additional tree canopy will be

removed and no sedimentation is expected because soils would not be detrimentally disturbed from these activities. No measurable effects are expected as a result of this activity.

Approximately 40 acres of maintenance burning at Ant Flat is proposed. Burning associated with this treatment typically does not result in crown removal that would change water yields and sediment outputs are not measurable. Therefore, burning activities are expected to contribute indiscernible effects to Water Resources.

Pre-commercial thinning is an ongoing and reasonably foreseeable activity. It is expected that approximately 200 acres per year over the next ten years would be thinned within the analysis area. Pre-commercial thinning does not result in measurable crown removals and there is no additional ground disturbance. All thinning projects follow the Forest Plan direction. Pre-commercial thinning activities within the analysis area would contribute indiscernible effects to riparian vegetation and structure, water yield, sediment delivery, and water quality within the analysis area and beneficial uses would be protected.

Tree planting activities would occur on approximately 50 acres per year over the next ten years. Tree planting does not increase ECAs or sedimentation rates and no heavy equipment is associated with this activity. Therefore, tree planting would contribute indiscernible effects to Water Resources.

The Forestwide Young Growth Vegetation Management project would treat approximately 400 to 600 acres annually, dependent on funding, using precommercial thinning or commercial thinning treatments. Stands proposed for treatment are second growth stands and would be subject to a number of criteria before they were determined eligible for treatment. Thinning generally does not result in measurable crown removals and additional ground disturbance is limited. Some short-term sediment could be generated from ground disturbance related to mechanized equipment. Such equipment is typically restricted to existing trails, roads, and fire lines, but there are cases where new disturbance is created. It is expected that BMPs, riparian buffers, and design criteria would minimize or eliminate the risk of generated sediments reaching live streams; this assumption is supported through forest monitoring data. All thinning projects follow the Forest Plan direction. Thinning activities within the analysis area would contribute indiscernible effects to riparian vegetation and structure, water yield, sediment delivery, and water quality within the analysis area and beneficial uses would be protected. The Forestwide Young Growth Vegetation Management project would have indiscernible effects to water resources.

The Ten Lakes Travel Management Project will address over-snow and mechanized travel planning for the Ten Lakes area. The area affected by the proposal includes the Ten Lakes WSA and areas with common entrance points to the WSA. There are three main over-snow entrance points to the Ten Lakes WSA: the Grave Creek corridor; Clarence and Stahl Creek; and the Burma/Blacktail area. Over-snow travel is currently not limited. Mechanized use (primarily mountain bicycles) is also currently unrestricted. The alternatives contained in the Ten Lakes Travel Management Draft Environmental Impact Statement contain various amounts of over-snow and mechanized travel for the project area. A final decision has not been made for this project and the cumulative effects analysis utilizes the Proposed Action as the basis for the analysis in the Galton Vegetation Management Project. The cumulative effects of the Ten Lakes Travel Management Project in conjunction with past, present, reasonably foreseeable actions would result in no measurable effects with regards to the hydrologic resource because no vegetation management activities being proposed with this project and no disruption to hydrologic function is expected.

It is expected that there would be salvage of blown-down trees within the analysis area. Treatment acres are not expected to exceed 20 acres per year over the next 10 years. Removal of blown-down trees does not affect water yield because no additional trees canopy would be removed and therefore would not contribute additional flow volume. However, some short-term sediment could be generated from ground disturbance related to mechanized equipment. Such equipment is typically restricted to existing trails, roads, and fire lines, but there are cases where new disturbance is created. It is expected that BMPs, riparian buffers, and design criteria would minimize or eliminate the risk of generated sediments reaching live streams. This assumption is supported through the monitoring data presented above. Therefore, with regard to sediment, the salvage of blown-down trees is expected to contribute indiscernible effects to Water Resources.

Cattle Grazing - The analysis area provides range for one grazing allotment, the Grave Creek Allotment. The Tobacco Siding / Grave Creek Grazing Allotments EA and Decision Notice (1998) provide direction for the management of this allotment. Currently 100 cow/calf pairs are permitted to graze the allotment from approximately May 15 to September 30. Much of the forage in the allotment is transitory and occurs along roads and in harvest openings. Because of topography and vegetation, existing riparian impacts associated with cattle grazing are localized. Steep slopes, deadfall, and dense stands of trees surround most streams, allowing cattle only sporadic access to riparian areas. Trends in livestock grazing numbers appear to be stable to declining.

Current and reasonably foreseeable grazing activities within the analysis area would not contribute additional effects to ECAs because no canopy removal results from grazing. However, grazing could contribute measurable effects to riparian vegetation and structure, sediment delivery, and/or water quality. Stream monitoring indicates that grazing, at current levels, is not adversely affecting stream channels and water quality (see Existing Condition above). Areas that were a potential concern have been addressed, primarily through riparian exclosures. The effects of livestock grazing on Water Resources are under constant evaluation as part of the allotment management plan. Due to the amount, location, and type of activities proposed with this project, no further measurable effects are anticipated and beneficial uses would be protected.

Noxious Weed Treatments - Control of noxious weeds on National Forest land is an ongoing activity that normally occurs from late spring to early fall. Most herbicide treatments are conducted along existing roads; some treatments occur in harvest units. The 2007 KNF Invasive Plant Management ROD provides direction for noxious weed control. Noxious weed control is expected to continue over the next ten years.

This activity is expected to contribute indiscernible effects to Water Resources as defined by the KNF Invasive Plant Management Project (USDA Forest Service 2007). Approved application methods and design criteria would be used. Water quality monitoring has shown that no chemical contamination has occurred (MSU 2008). Although new weed infestations may occur due to ground disturbance, activities, improvements in treatment chemicals and application of both National Core BMPs and Montana State BMPs during timber sale and burning operations should minimize the occurrence and effects of new infestations. The level of noxious weed control within the Analysis Area is not expected to increase much over the next ten years. Therefore, effects are expected to be indiscernible.

Wildfire and Fire Suppression - There is potential for large fires to occur in the analysis area in the future. These fires have the potential to produce measurable effects on Water Resources

including temporary increases in sedimentation rates and/or nutrient and metal levels locally. Research has found that nutrients increase short term followed by rapid recovery back to baseline with some periodic spikes during high runoff (Spencer et. al. 2003, Hauer and Spencer 1998, Spencer and Hauer 1991). Similarly, mercury, a metal often found in streams after a fire, can increase short term and also shows a rapid recovery back to baseline. Periodic spikes can be seen that are associated with runoff after the short term increases, but recovery is more rapid after a fire than after roaded logging (Garcia and Carignan 1999).

Large fires have occurred in the analysis area in the past (High One Fire, 1994; Kopsi fire, 1998; Marston Fire, 2015) and no concerns around increased sediment in groundwater that impacted private wells, municipal water supplies, or existing infrastructure were documented. While sediment effects from large fires may be measurable in streams, these effects are expected to be indiscernible in the ground water. Furthermore, due to the unpredictable nature of wildfire occurrence, cumulative effects from this potential natural disturbance could not be meaningfully quantified in this document.

Fire suppression activities would occur as needed and may include the construction of fire lines, helicopter landing spots, and safety zones. Effects from wildfire suppression would vary with location and size of the fire; suppression activities are expected to follow Forest Plan direction. Fire retardants would be used outside of RHCAs when feasible. Suppression of small fires would contribute indiscernible effects to Water Resources within the analysis area. The suppression of large fires could have measurable effects to Water Resources. These effects could include bank destabilization and/or bank erosion from equipment in or crossing wet areas, or increases in water yield and potentially peak flows due to harvest used to create shaded fuel breaks. However, efforts to restore areas disturbed by suppression activities have been effective in protecting Water Resources (refer to Water Project File document 2002 Fire Rehabilitation Monitoring of the 2000 Fires).Therefore, if restored effectively, suppression of large fires will have indiscernible effects to water resources.

Road Management - Routine road maintenance would occur as needed and money is available on the roads in the Analysis Area. This maintenance is separate from, and in addition to, any road maintenance proposed in this project. Maintenance includes road blading, gate repair/replacement, cleaning ditches and culverts, installing culverts, replacing culverts, bridge replacement, installing drain dips and surface water deflectors, placing riprap to armor drainage structures, placement of aggregate, brushing, and debris removal. Road maintenance follows BMPs identified in the Soil and Water Conservation Handbook and Forest Plan direction. Ongoing and reasonably foreseeable road maintenance activities within the Analysis Area could contribute measurable effects to Water Resources, primarily short-term sedimentation rates, within the analysis area. However in the long-term, road maintenance reduces the risk of road failures that can contribute large quantities of sediment into live channels by disconnecting storm water flows from streams. No significant changes in the amount of annual road maintenance are expected over the next 10 years.

Travel Management - The Ten Lakes Travel Management Project is currently being analyzed. This would have indiscernible effects to water resources as no ground disturbing activities or are proposed.

Recreation Maintenance - Routine maintenance will occur on approximately 159 miles of non-motorized trails in the Analysis Area. Maintenance may include brushing; removing blown down trees, debris, and hazard trees; repairing or adding water bars; repairing trail tread; repairing or replacing signs; and improving vistas. Routine trail maintenance would have indiscernible effects

to Water Resources because trails are individually small, scattered across many watersheds, and activities are not all occurring in the same year.

Special Uses -There are 26 special use permits in the Analysis Area. The operation of outfitter/guides and the grooming of existing roads for snowmobile travel would not result in canopy removal or soil disturbance. These activities would contribute indiscernible effect to Water Resources within the Analysis Area and beneficial uses would be protected. Other special use permits including road access to private property, water lines crossing FS lands, water diversions, etc. could have effects but currently have no known concerns with regard to Water Resources. The greatest potential for effects is from roads. However, the roads under special use permits were included in the roads analysis above. The level of special uses within the Analysis Area is not expected to change much over the next ten years.

Public Uses - Recreational use of the Analysis 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 ten 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 Water Resources within the analysis area and beneficial uses would be protected. This conclusion is based on the fact that these activities are individually small and scattered across many watersheds. In addition, terms of the firewood cutting permit prohibit cutting within 150 feet of a live stream, pond, lake, or wetland. This ensures stream banks are protected, large woody debris is available, and minimizes the potential for sediment production.

Off-highway vehicle (OHV) use was left off the list above because it is currently limited only to existing trails and open roads (OHV Record of Decision and Plan Amendment for Montana, North Dakota, and Portions of South Dakota 2001). Therefore, no additional disturbance is expected from OHV use.

Private Property - It is expected that private land will continue to be developed within the analysis area. Based on information regarding new services provided by Lincoln Electric Cooperative it is expected that an estimated two residences per year would be constructed in each major watershed containing private land. The following activities associated with land development are expected to occur: Land clearing from home sites will clear a total of 35 acres and approximately 17.5 miles or 70 acres of access roads would be built over the next ten years.

The construction of roads, clearing of vegetation, construction of residences, and installation of improvements during the development process can create a variety of changes to the landscape. Land development can have varied effects on the aquatic environment depending on the magnitude of the development, the type of development, and the amount of private land on the landscape. National Core BMPs and Montana State BMPs apply to some of these activities. In consideration of recent trends in land development, the activities on private land could have a measurable effect on Water Resources within the analysis area. Approximately 105 ECAs are expected from private land development over the next ten years. These ECAs are included in the Cumulative Effects Analysis below.

Other Agency - There are no current or proposed timber sales on State Lands within the analysis area. There are no known concerns with grazing leases on State Lands. Therefore, no effects to

Water Resources are anticipated because no tree canopy would be removed, no soils would be disturbed and no riparian areas or stream channels would be affected.

The Department of Homeland Security patrols the project area. Their activities are ongoing and typically occur on existing trails and roads, but at times could extend into other areas. Their activities would contribute indiscernible effects to water resources within the analysis area. No additional tree canopy is removed; therefore no change in ECAs is expected. Furthermore, activities do not take place in riparian areas and thus are not affecting stream sedimentation. In addition, no watershed concerns have been identified to date as a result of their activities.

Cumulative Effects to Water Quantity

The cumulative effects water yield analysis includes ECAs from past, proposed, current and reasonably foreseeable activities on federal, state timber and private lands within each watershed. Effects of timber harvest, road management and recent large-scale disturbances (i.e., Marston wildfire) were incorporated into the cumulative effects analysis of water quantity through consideration of: effects from past, proposed, current and reasonably foreseeable activities and disturbances; past decisions and analyses; and monitoring data. The results of cumulative effects analysis of past, proposed, current and reasonably foreseeable activities are displayed in Water Table 9.

Water Table 9. Cumulative Changes in ECA by Alternative (%)

Watershed	Alt. 1 ECA	Cum Alt. 1 ECA	Alt. 2 ECA	Cum Alt. 2 ECA	Alt. 3 ECA	Cum Alt. 3 ECA
Wigwam River*	2	2	2	2	2	2
Deep Creek	8	8	7	7	9	9
Lower Fortine**	9	9	9	9	9	9
Grave Creek	3	3	3	3	3	3
Therriault Creek	5	6	5	6	6	6
Sinclair Creek	8	8	8	8	8	8
Indian Creek	1	1	1	1	1	1
Phillips Creek*	2	2	2	2	2	2
Stillwater River*	10	10	10	10	10	10

None of the alternatives show a measureable increase in ECAs from what each alternative added to the existing condition as a result of cumulative activities. In all watersheds, ECAs would remain at or below previous/historic levels. All alternatives would have ECAs within historic ranges and protect beneficial uses and source water areas (FW-DC-WTR-02, FW-DC-WTR-04, FW-STD-WTR-01, FW-GDL-WTR-01, GA-DC-WTR-TOB-02).

Cumulative Effects to Water Quality

Cumulative effects analysis of water quality includes analysis of past, proposed, current and reasonably foreseeable activities on federal, state and private lands. Effects of timber harvest, road management and recent large-scale disturbances (i.e., Marston wildfire) were incorporated into the cumulative effects analysis of the water quality. The findings of this assessment conclude that timber harvest within the analysis area would cumulatively contribute indiscernible effects to

sediment delivery. Road related activities would potentially cause some short-term increases in sedimentation but an overall reduction in long-term sedimentation. Effects from the Marston fire are expected to include temporary localized sediment increases and changes in water yield that are within historic variability and will diminish over time as the affected area recovers. Therefore, water quality within the Analysis Area would be maintained or improved and beneficial uses and the source water area for the town of Eureka would be protected (FW-DC-WTR-02, FW-DC-WTR-04, FW-STD-WTR-01, FW-GDL-WTR-01, GA-DC-WTR-TOB-02).

Cumulative Effects to Stream Channel Processes

Cumulatively, there is the potential for measurable short-term negative effects and long-term positive effects to water quality (Wegner 1999; Hickenbottom 2001). In addition, stream monitoring has shown that similar levels of activity have maintained or improved conditions within the watersheds (Existing Condition). The following includes additional rationale for these findings.

When analyzed cumulatively, alternatives 1and 3 would at least maintain, and probably improve, water quality and beneficial uses throughout the analysis area. The streams within the analysis area are currently stable and in good condition and the majority of streams have a low to moderate sensitivity to disturbance and good to excellent recovery potential. ECAs (Water Table 6) are within historic ranges and are not expected to initiate adverse changes to stream channels (FW-DC-WTR-03) or have measureable effects on water quality. Application of BMPs for all vegetation management and fuel treatments would maintain or improve water quality.

In addition, the road surface drainage improvements that would occur under all action alternatives would reduce the risk of road erosion during extreme events. Even in areas that are not currently eroding, major runoff events could cause enough concentration of flow to initiate road surface gullying, ditch scour, or culvert failure. The BMP improvements in road surface and ditch relief drainage are designed to reduce these risks and to keep storm flows from entering directly into channels (FW-DEC-WTR-01, FW-DC-WTR-03, FW-GDL-WTR-01).

Alternative 2 would maintain, but would not improve water quality as quickly as the action alternatives. There would be no increases in ECAs and no risk of increased bank erosion. Because there would be no harvest activity, there would be no risk of additional erosion in harvested areas. However, road improvements and maintenance associated with timber harvest and associated benefits to the watershed would not occur as quickly as with Alternatives 1 and 3. Road maintenance would continue and recurring sediment contributions from roads would remain about the same as today. The risk of an extreme runoff event triggering road erosion and culvert failures would remain higher than under the action alternatives because fewer improvements through BMP implementation would occur.

Consistency with Regulatory Framework

Compliance with the CWA – Protection of Beneficial Uses

The Clean Water Act (CWA) established federal water quality policies, goals, and programs. The objective of the CWA is to “restore and maintain the chemical, physical, and biological integrity of the nations’ waters.” *The Environmental Protection Agency (EPA) and the State of Montana have the responsibility to implement the intent of the CWA. States are required to establish water quality standards that allow for the protection of beneficial uses. Any action within a given watershed should maintain or improve stream conditions within that watershed. All alternatives*

comply with the CWA. Each alternative is expected to maintain or improve stream conditions in the analysis area. This expectation is based on: surveys of existing watershed conditions; the conclusion of the ECA analysis that ECAs would not exceed historic levels; the designation of RHCAs; the application of BMPs to all proposed road work, timber harvest and under burning activities; evidence from Forest monitoring results and the literature regarding the effectiveness of BMPs; and the conclusion that the effects of BMP improvements to roads would reduce existing water and sediment contributions from the road network.

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 (2008), 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 FEIS (Appendix 2) and Water Project File outline the BMPs designated for each potential activity. These measures are fully expected to minimize soil disturbance and erosion. Road drainage improvements are designed to disconnect storm water flow from the stream network. The improvements are expected to reduce recurring sediment delivery in the long term, which is expected to maintain or improve stream conditions in the analysis area. Based on Wegner (1999), a measurable decrease in percent fine sediment in pool tails is expected. Monitoring of BMPs on the KNF has been shown to be 95 percent effective in reducing sediment (KNF 2011). The Montana BMP 2012 Monitoring report states that "across all ownerships, BMPs were effective in protecting soil and water resources 99% of the time" (MDNRC 2012 BMP Executive Summary p. 2). Additionally, across all ownerships, "for all applied BMPs, 98% were shown to be effective in preventing sediments from reaching draws or streams" (MDNRC 2012 BMP Executive Summary p. 5).*

The CWA requires states to identify waterbodies that do not fully support all their designated beneficial uses, or WQLS. *Implementation of the proposed activities, including the Design Criteria and BMPs specified in the EIS and Water Project File, would at least maintain beneficial use conditions and may improve them for all watersheds including WQLS and TMDL watersheds in the analysis area.*

Compliance with Protection of Riparian Areas and Wetlands

The Forest Plan (USDA Forest Service, 2015) and the Montana Streamside Management Zone (SMZ) Law provide standards and guidelines for activities in riparian areas and wetlands. *These regulations would be strictly followed during sale design and layout and any other action resulting from the decision.*

Section 404 of the CWA authorizes the Secretary of the Army to issue permits for the discharge of dredged or fill material into wetlands (33 CFR 323). *Silvicultural activities are exempt from the 404 permit process, as are associated road construction and maintenance that adhere to BMPs (33 CFR 323.4a). Silvicultural treatment and roadwork near wetlands would be done in accordance with the Forest Plan and the Montana SMZ Law.*

Forest Plan

All alternatives are consistent with the Forest Plan watershed goal to maintain or improve watershed condition in order to provide water quality, water quantity, and stream channel conditions that support ecological functions and beneficial uses (GOAL-WTR-01). In addition, all alternatives are consistent with applicable desired conditions, standards and goals in the Forest

Plan. *This statement is based on conclusions from analysis of this project regarding Forest Plan direction discussed below. Implementation of any of the proposed alternatives would at least maintain, and action alternatives would likely improve, the support of ecological functions and beneficial uses within the analysis area.*

FW-DC-WTR-01. The activities proposed in all alternatives would have little or no change in ECAs in the watersheds of the analysis area, and would continue to be well within historic ranges. Implementation of the proposed activities, including the Design Criteria and BMPs specified in the EIS and Water Project File, would maintain or improve inherent resilience of the watersheds to respond and adjust to disturbance in the analysis area.

FW-DC-WTR-03. The activities proposed in all alternatives would have little or no change in ECAs in the watersheds of the analysis area, and would continue to be well within historic ranges. Therefore no change in stream flows are expected and channel and floodplain dimensions will continue to mimic reference conditions and maintain riparian and aquatic ecosystems.

FW-DC-WTR-04, FW-STD-WTR-01, GA-DC-WTR-TOB-02. No measurable changes to water quality are expected as a result of proposed alternatives. In all alternatives, changes to ECAs and sediment are expected to be unmeasurable at the stream channel. Source water protection will be provided and beneficial uses, including community source water areas, will be protected at current levels through the designation of RHCAs, the application of BMPs to all proposed road work, timber harvest and under burning activities.

FW-DC-WTR-02, FW-GDL-WTR-01, FW-GDL-WTR-03. Each alternative is expected to at least maintain and potentially improve stream conditions in the analysis area. This expectation is based on: surveys of existing watershed conditions; the conclusion that ECAs would not exceed historic levels; the designation of RHCAs; the application of BMPs to all proposed road work, timber harvest and under burning activities; evidence from forest monitoring results and the literature regarding the effectiveness of BMPs; and the conclusion that the effects of BMP improvements to roads would reduce existing water and sediment contributions from the road network.

Both the Grave Creek and the Tobacco TMDL link sediment sources to Forest Roads (Road Construction and Use) (Montana DEQ, 2005, Montana DEQ, 2011). The implementation of BMPs on all haul routes would occur in both alternatives 1 and 3. All BMP work would disconnect ditch and road surface runoff from streams and other water bodies. This is expected to maintain or improve conditions relative to the cause for impairment and would not cause a decline in water quality or further impair beneficial uses. Implementation of the proposed activities, including the Design Criteria and BMPs specified in the EIS and Water Project File, would at least maintain beneficial use conditions and may improve them for all watersheds including WQLS and TMDL watersheds in the analysis area.

Required Permits

All required permits related to BMPs (i.e., stream crossing culvert replacements and upgrades) will be obtained prior to project implication. Potential permits include:

1. Montana Stream Protection Act (SPA 124 permit)
2. Short term water quality standard for turbidity (318 Authorization).

Statement of Findings

Through the analysis of the physical aspects of the water resources in the Galton Vegetation Project Area, all alternatives were found in compliance with the following regulatory framework:

Clean Water Act and Protection of Beneficial Uses;

Protection of Riparian and Wetland Areas; and

Forest Plan Direction.

Implementation of any alternative would at least maintain, and action alternatives would likely improve, watershed condition and the support of beneficial uses.

Alternatives 1and 3 are expected to maintain or improve stream channel processes (enhanced crossings are expected to improve conditions). ECAs are within historic ranges; as vegetation continues to grow, ECAs would continue to decrease. This conclusion is based on the analysis of direct, indirect, and cumulative effects to sediment delivery, stream flow, riparian condition, and channel stability. Stream channel conditions are expected to be maintained or improved throughout implementation and beneficial uses would be protected.

Alternative 2 would result in no increases in ECAs. ECAs are within historic ranges; as vegetation continues to grow, ECAs would continue to decrease. Because there would be no harvest activity, there would be no risk of additional erosion on harvested areas. Alternative 2 would not implement timber-related road improvements, resulting in no new impacts and no net benefits to water quality. However, regular district road maintenance would continue. Over the 10-year planning period, the condition of the roads would remain nearly the same as the existing condition. The effects of roads on aquatic resources would remain about the same. The risk of road erosion during large events would remain the same as the existing condition. However, the risk of an extreme runoff event triggering road erosion and culvert failures and channel destabilization would remain higher for Alternative 2 than Alternative 1or 3.

Riparian, Aquatic Habitat, and Aquatic Species

Introduction

This section outlines the analysis results for the biological aspects of the Aquatic Resources in the Galton Vegetation Project Area (hereafter referred to as project area), including aquatic habitat, aquatic populations, riparian areas, and amphibians. The physical aspects of the aquatic resource are addressed in the Water Resources Section.

One comment during scoping requested "that at least one alternative meet all water quality and fish habitat standards, including supporting all beneficial uses and meeting all Riparian Management Objectives, as part of the desired future conditions". Since this comment was received, the Forest Plan was signed, which adopted the Inland Native Fish Strategy (INFISH) as a retained decision, where all components of that 1995 Decision Notice and Finding of No Significant Impact became part of the Forest Plan. Riparian Management Objectives (RMOs) were defined under that decision. These objectives were developed using inventory data for stream characteristics (e.g., pool frequency, large woody debris) and were determined to be good indicators of ecosystem health. RMOs represent a good starting point to describe the desired condition for fish habitat. No alternatives in this project include actions that would retard the attainment of Riparian Management Objectives. Thus for all alternatives in this project, RMOs would be met over time, as intended by INFISH.

A second comment during scoping stated, "The Grave Creek Watershed EAWS at pp 41-42 includes an extensive list of terrestrial and aquatic Proposals and Recommendations. Please consider adding those items to your Proposed Action." The only fisheries-related recommendation from the Grave Creek Watershed EAWS was to replace the culvert passing Foundation Creek under FS Road # 319 with a structure that would allow for fish/aquatic organism passage. This action was considered for inclusion in the Galton Vegetation Project; however, was dropped for the following reasons:

1. Currently, this culvert is functioning appropriately and the fill around the culvert is stable, supported by abundant riparian vegetation. The primary concern with removing this culvert is that the riparian vegetation at the site would have to be removed to replace the culvert. A large amount of fill, coupled with no stabilizing riparian vegetation, could lead to large quantities of fill entering Foundation Creek during the excavation phase of the culvert replacement, despite the most intensive erosion control plan and BMPs. This would likely happen due to the steep terrain on both sides of the fill, the total removal of riparian vegetation at the road crossing site, and precipitation events occurring at a time when a large amount of bare soil is exposed. This project would take a minimum of 6 weeks to complete; a long time to have large quantities of unvegetated, exposed soil and not expect several precipitation events to occur.
2. This culvert is a fish barrier and is preventing upstream migration of fish and aquatic organisms in Foundation Creek. Man-made fish barriers can produce negative effects on fish populations by isolating subpopulations and fragmenting habitat. This isolation can reduce genetic exchange among fish and lead to inbreeding in the subpopulation above the barrier. However, barriers can have positive effects, by protecting pure-strain populations of fish from invasion of non-native fish or hybridization with similar species. In this case, a pure population of westslope cutthroat trout exists above the culvert. There are known non-native invader species (brook trout) and potential hybridizing species (rainbow trout) in the watershed. Thus, the presence of a barrier

(i.e., the culvert) is providing protection for this subpopulation of westslope cutthroat trout.

3. The integrity of the culvert is satisfactory and it is handling flows from the upper Foundation Creek watershed adequately. Overall, the risks associated with removal of this culvert are greater than the expected benefit at this time.

Regulatory Framework

Endangered Species Act

The Endangered Species Act (ESA) of 1973 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.

White sturgeon and bull trout are currently listed as threatened and endangered, respectively, under the ESA. However, due to ongoing consultation with the US Fish and Wildlife Service (Wilson 2001), it was determined that projects above Libby Dam have no effect on white sturgeon, therefore this species will not be considered further. Critical habitat for bull trout has been designated within the project area. Effects to bull trout and designated critical habitat are considered in more detailed analyses below.

National Forest Management Act

This analysis considers how the action provides 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, and within the multiple use objectives of a land management plan adopted 16 USC 1604 (g)(3)(B).

The Kootenai National Forest provides habitat for over 300 different species of fish and wildlife (KIPZ Analysis of the Management Situation, USDA Forest Service 2003b: 45, 59-64), many of which occur on the Fortine Ranger District and within the analysis area. The presence or absence of these fish and wildlife species depends on the amount, distribution, and quality of each species preferred habitat. In addition to habitat changes, many of these species are impacted by fishing, hunting or trapping. Montana Fish, Wildlife & Parks (MFWP) regulates fish and game populations. The Forest Service and the MFWP work together to ensure that an appropriate balance is maintained between habitat capability and population numbers.

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, Weldon 2011). Sensitive species are those that need special management to maintain and improve their status in National Forests and Grasslands, and prevent a need to list them under the ESA. Sensitive aquatic species identified on the Kootenai National Forest include interior redband trout (*Oncorhynchus mykiss gairdneri*), westslope cutthroat trout (*O.clarki lewisi*), western pearlshell mussel (*Margaritifera falcata*), Coeur d'Alene salamander (*Plethodon idahoensis*), Northern leopard frog (*Rana pipiens*), and Western toad (*Bufo boreas*). Because interior redband trout, Coeur d'Alene salamander, and Northern leopard frog occur outside the analysis area for project effects, the proposed alternatives would have *no impact* on these species. The historic distribution of interior redband trout lies south and west of the project area. No surveys have found Coeur d'

Alene salamanders or Northern leopard frogs within the project area. They do not occur in the project area and are therefore not considered in further detail.

State-wide distribution of westslope cutthroat trout and western pearlshell mussels include the majority of western Montana and some portions of the upper Missouri River drainage in central Montana. Western pearlshell mussels have been historically documented in portions of Fortine Creek and the Tobacco River. However, despite intensive aquatic sampling, none have been documented within the project area. Suitable habitat does exist within the analysis area, but anticipated effects from proposed activities would not negatively impact potential habitat for the western pearlshell mussel. Therefore, the western pearlshell mussel will not be considered in further detail. Westslope cutthroat trout do occur in the project area; habitat and population trends are discussed further in the Fish Habitat and Population sections below.

Forest Plan

The Forest Plan provides overall guidance for the management of the lands on the KNF. It describes the desired conditions the management of the land should be directed toward. The plan establishes standards and guidelines to help achieve or maintain desired conditions, to avoid or mitigate undesirable effects, and to meet applicable legal requirements.

Specific resource direction relevant to this analysis is found in the riparian areas, aquatic habitat, and aquatic species sections of the Forest Plan. These include goals, objectives, desired conditions, standards, and guidelines, Management Area direction, Geographic Area direction, and Inland Native Fish Strategy (INFISH) direction. Below is a listing of specific Forest Plan direction excluding INFISH direction. INFISH is a retained decision within the Forest Plan. Direction contained in INFISH will be referred to as Forest Plan direction for the rest of this analysis.

Riparian

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-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.

MA1b-DC-WTR-01. Water bodies and riparian areas provide quality habitat for fish, amphibians, and other aquatic-associated species.

MA1c-DC-WTR-01. Water bodies and riparian areas provide quality habitat for fish, amphibians, and other aquatic-associated species.

MA5a, b, c-DC-WTR-01. Water bodies and riparian areas provide quality habitat for fish, amphibians, and other aquatic-associated species.

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.

GA-DC-WTR-TOB-01. Recovering systems such as the Tobacco River are improved and support designated beneficial uses.

GA-DC-WTR-TOB-02. Source water protection is provided for the Tobacco River and its tributaries (including Deep Creek) for the towns of Eureka, Fortine, and Trego.

GA-DC-WTR-TOB-03. Native aquatic species, particularly bull trout populations, expand into additional areas, and respond to restoration activities in the Grave Creek Watershed.

FW-OBJ-RIP-01. Annually, maintain or improve 10 to 50 acres of riparian habitat.

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 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 2):

- 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.

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

FW-GDL-RIP-02. Grazing management should prevent livestock from trampling of native fish redds (i.e., nests).

FW-GDL-RIP-03. When conducting wildland fire operations, Minimum Impact Suppression Tactics should be used within RHCAs.

FW-GDL-RIP-04. When drafting water from streams, pumps should be screened and located away from spawning areas to prevent entrainment of fish and aquatic organisms. During the spawning season for native fish, pumping sites should be located away from spawning gravels. Drafting equipment should be cleaned and inspected for aquatic invasive species prior to use in a water body.

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.

Aquatic Habitat

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

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.

FW-OBJ-AQH-01. Annually, enhance or restore 15 to 50 miles of habitat to maintain or restore structure, composition, and function of habitat for fisheries and other aquatic species.

FW-OBJ-AQH-02. Over the life of the Plan, the assemblage of macroinvertebrates present across the planning area as measured by the KNF River Invertebrate Prediction and Classification System (RIVPACS) analysis Observed/Effect (O/E) Model maintains a score of between 0.80 and 1.20 at all sites monitored on individual water bodies within the planning area.

FW-OBJ-AQH-03. Over the life of the Plan, reconnect 30 to 55 miles of fragmented habitat in streams where aquatic and riparian-associated species' migratory needs are limiting distribution of those species.

Aquatic Species

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.

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.

FW-DC-AQS-03. Cooperation and coordination with state agencies, federal agencies, tribes, and other groups leads to an upward trend of native species and desired non-native aquatic species.

FW-DC-AQS-04. Bull trout – Recovery and delisting of bull trout is the long-term desired condition. Bull trout population trends toward recovery through cooperation and coordination with USFWS, tribes, state agencies, other federal agencies, and interested groups. Recovery is supported through accomplishment of Bull Trout Recovery Plan tasks under Forest Service jurisdiction. On NFS lands spawning, rearing, and migratory habitat is widely available and inhabited. Bull trout have access to historic habitat and appropriate life history strategies (e.g., resident, fluvial, and adfluvial) are supported.

FW-DC-AQS-05. Bull trout. Habitat conditions improve in occupied bull trout streams and in connected streams that were historically occupied, resulting in an increase in the

overall number of stronghold populations. Bull trout habitat and populations continue to be protected through the application of INFISH standards and guidelines.

FW-DC-AQS-06.Kootenai River white sturgeon. The recovery of Kootenai River white sturgeon is the long-term desired condition and coordination with stakeholders, such as tribes, state and other federal agencies, and adjacent landowners, is emphasized.

FW-DC-AQS-07. Macroinvertebrates. Macroinvertebrate communities have densities, species richness, and evenness comparable to communities found in reference conditions.

FW-OBJ-AQS-01. Over the life of the Plan, improve 5 percent of subwatersheds that contain populations of sensitive or threatened and endangered species. Improvements in condition ratings may also be accounted for in the trend described in FW-OBJ-WTR-01.

FW-GDL-AQS-01. Management activities that may disturb native salmonids, or have the potential to directly deliver sediment to their habitats, should be limited to times outside of spawning and incubation seasons for those species, as identified in Table 5.

FW-GDL-AQS-02. When conducting management activities and fire suppression, all equipment used in water should be treated to prevent the introduction of aquatic invasive species and aquatic borne diseases.

The Forest Plan designated a macroinvertebrate assemblage as an aquatic Management Indicator Species (MIS). This MIS will be measured through the use of the River Invertebrate Prediction and Classification System (RIVPACS) Index. This index describes the similarity of the invertebrate species composition at a reach (observed) to the species composition predicted to occur at a reference site within similar environmental conditions (expected).

Recreational Fisheries Executive Order and Stewardship Initiative (Executive Order 12962)

This order mandates the conservation, restoration, and enhancement of aquatic systems to provide for increased recreational fishing opportunities (USDA Forest Service 2008).

Methodologies

Aquatic Habitat Data

PACFISH/INFISH Biological Opinion (PIBO) sampling and Aquatic Ecological Unit Inventory (AEUI) reach monitoring protocols were used to measure aquatic habitat parameters (indicators) in Project Area streams and thus provide most of the aquatic habitat data for this effects analysis. The PIBO and AEUI sampling protocols are very similar; both are standardized and measure habitat indicators similarly. Use of these protocols allows for standardization of aquatic habitat sampling and trend monitoring. For a complete explanation of the PIBO and AEUI protocols, refer to the Project File (Heitke et al 2011; AEUI protocol).

Monitored habitat indicators include frequency of pools and large woody debris (LWD), width/depth ratio of stream and water temperature. More numerous pools and LWD provide complex habitat needed by varying species and life stages of fish to survive, feed, and reproduce. Lower width/depth ratios in streams typically indicate greater channel stability; a stream characteristic essential for successful spawning of many fish species. It is important to note that width/depth ratios for fisheries purposes are based on wetted stream widths, not bankfull widths used for hydrologic purposes. Thus, any differences in reported width/depth ratios between the Water Resources and Fisheries sections are a result of different methodologies. Daily maximum water temperatures below 15°C are ideal for cold-water species (e.g., bull and westslope cutthroat

trout). Measured indicators were compared with INFISH RMOs to check for attainment or progress toward attainment (Fisheries Table 2). Proposed activities comply with law, regulation and policy if they do not retard the attainment of RMOs.

Stretches of stream flowing through similar features on the landscape and have similar properties are called “stream reaches”. Within a stream reach, a smaller reach is designated to be surveyed for hydrologic and fisheries data. This smaller reach is called a “sampling reach”. Sampling reaches within streams are typically designated within stream reaches lower in the watershed (called “response reaches”), where effects from management activities are more likely to be measurable (Montgomery and MacDonald 2002). Length of sampling reaches is a minimum of 20 times the width of the stream at bankfull flows (to be statistically valid); a value that was widely accepted during the peer-reviewed development process of the PIBO protocol. Information obtained from surveying the sampling reach can be used to explain what is happening in the larger stream reach, in terms of aquatic habitat or populations. Using data obtained from sampling reaches to make inferences about change and trends in aquatic habitat and populations is an appropriate way to conduct environmental analyses (Guy and Brown 2007, pages 42-43).

In 2001 and 2002, aquatic habitat surveys were conducted at the stream reach scale (instead of using a sampling reach within a stream reach with PIBO/AEUI protocols), and mean values of habitat parameters by reach are reported. These surveys were similar, although not directly comparable, to the current PIBO and AEUI surveys. These past habitat surveys provide similar habitat data on multiple streams within the Project Area, and are accordingly presented in Fisheries Table 2. Some streams have been surveyed under both the older 2001-2002 reach scale protocol and again under the newer PIBO and AEUI protocols. In these instances, the more current data (i.e., PIBO/AEUI) are presented.

Aquatic Population Data

Aquatic population surveys were conducted in lakes and streams within the Analysis Area by Montana Fish, Wildlife, and Parks (FWP) or Forest Service (FS) personnel using a variety of sampling methods over multiple years (Fisheries Table 2). The majority of the fishery data gathered from streams in the Analysis Area is from electrofishing surveys. Electrofishing surveys were typically either presence/absence surveys to determine species distribution and population demographics or multiple-pass depletion surveys to estimate population size (Guy and Brown 2007, pages 348-349), in addition to species distribution and population demographics. Redd counts have also been conducted annually by FWP and used to estimate numbers of bull trout adult spawners. Macroinvertebrate (aquatic insect) data were also used in this analysis. Qualitative and quantitative samples were taken in several streams within the Analysis Area and PIBO data were also incorporated into the analysis (see Project File for complete methodologies, full report, and data). Data from lakes within the Analysis Area originated from the MFISH database, field visits, and personal observations.

Amphibian Presence Data

Western Toad

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. Western toad occurrence data comes from District wildlife observation records and Forest historical data (NRIS Wildlife) and the Montana Natural Heritage Program (MNHP).

Northern Leopard Frog and Coeur d' Alene Salamander

Surveys for leopard frogs were conducted at the same time as western toad surveys, and all other amphibian and reptile surveys. To date no leopard frogs have been documented within this Analysis Area. Therefore, no further discussion of the leopard frog is necessary. In the event that this species is found during implementation, steps to avoid their habitat would be taken. Coeur d' Alene salamander habitat is found mainly in the cliff habitats associated with Koocanusa Reservoir. Therefore, no further discussion of the salamander is necessary.

Affected Environment

Analysis Area

The analysis area for aquatic habitats and populations is composed of the streams and lakes within watersheds where ground-disturbing activities (e.g., timber harvest, prescribed burning, temporary road construction, road BMP improvements) are proposed within the project area (Fisheries Table 1). Some streams within the analysis area have not been surveyed for aquatic habitat and populations, but are similar in size, gradient, and other hydrological characteristics to nearby fish-bearing streams (Fisheries Table 1). In these instances, these streams were assumed to be fish-bearing, thus giving them the same protection as known fish-bearing streams with respect to RHCA widths. Additionally, numerous lakes exist throughout the project area, although none are in proximity to ground disturbing activities. Watersheds that do not have any activities proposed in them are still included in Fisheries Table 1, even though this project would not affect those water bodies. Information on these streams still helps build a broader picture of the cumulative effects in this analysis area.

The designated analysis area is appropriate because the lakes (via outlets) and streams within the analysis area form an interconnected watercourse. Effects to one waterbody have the potential to affect other connected waterbodies that are downstream. Effects to waterbodies are typically greatest in close proximity to ground-disturbing activities. These effects diminish further from these activities, due to dilution from the influx of other water sources (e.g., tributaries). Given the potential for ground-disturbing activities to affect water quality and quantity (see Water Resources Section), effects to aquatic habitat for fish and other aquatic species can occur.

The analysis area for project impacts and cumulative effects to individual amphibians and their habitat is the Galton and associated Planning Subunits (PSUs). The PSUs are subunits of the Galton Vegetation analysis area and are appropriate effects analysis areas because they break the analysis area into small enough areas to determine the level of effects of natural and prescribed fire, natural tree mortality, recreation activities, timber harvest, thinning, roads and road management across the landscape. The PSUs in this analysis area include the Wigwam, Grave, Stillwater, and parts of the Ksanka and Murphy PSUs.

The temporal boundaries for these analyses include short-term and long-term timeframes. Short-term effects are generally limited to the time sediment-producing activities are occurring in or near streams plus 4-8 hours afterward. Long-term effects are anything beyond short-term effects. These generally last for years (e.g. stream connectivity due to the restoration of fish passage). For amphibians, short-term effects occur during ground-disturbing activities when individuals may be affected directly. Long-term effects are effects that occur afterward, such as habitat alterations.

An additional, and ongoing change to the existing condition, is the occurrence of the Marston Fire in the summer of 2015. This fire burned at a high severity on over 3,200 acres and at a moderate severity on just over 900 acres in the Deep, Fortine, and Stillwater River drainages. Minor

changes to the existing conditions of these streams is expected to occur over the next several years as the streams adjust to changes in runoff, sediment, and large woody debris inputs. These changes are anticipated to be very minor and not likely measurable in most cases due to the relatively minor extent of occurrence in each watershed. Past fires in this area (Pink Stone and Young J in 2000) resulted in minor changes to streams even though the fires burned much higher percentages of the watersheds at high and moderate severities. Much of the change that did occur in these watersheds resulted from runoff events driven by snowpack amounts and spring weather events rather than the fires themselves and the changes resulted in the creation of more habitat for fish.

Fisheries Table 1. Fish population and habitat surveys conducted by stream, reach/rivermile, and year within the analysis area (See Project File). Lower values for reach designations or river miles indicate stream reaches that are further downstream in the watershed.

Stream / (Lake)	Rivermile / (Reach)	Survey type*	Data collector	Year	Species present**
Grave	0-0.1	Pop. Estimate	FWP	1997-1999	BT, WCT, EB, RB
	0.5-0.6	Pres./Abs.	FWP	2006-2008	
	1.8-1.9	CPUE, Pres./Abs.	FWP	2006-2008	
	2.4-2.6	CPUE	FWP	2000-2002	
	3.5-3.6	CPUE, Pres./Abs.	FWP	2000-2008	
	11.8-15.9	Genetics	FWP	2000	
	12.1-12.3	Pop. Estimate, Pres./Abs.	FWP	1997-2010	
	12.5 (PIBO)	Habitat	FS	2003, 2008	
	12.5-12.6	Pres./Abs.	FS	2009	
	14.7-14.8	Pres./Abs.	FS	2009	
Foundation	(1)	Habitat	FS	2002	BT, WCT
	(1)	Pres./Abs.	FS	2008	
Lewis	(1)	Pop. Estimate	FS	2008	BT
	(1)	Habitat	FS	2008	
Clarence	(1)	Habitat	FS	2007	BT, WCT
Stahl	(1)	Habitat	FS	2001	BT, WCT
	(1-3)	Habitat	FS	2002	
Blue Sky	(1)	Habitat	FS	2007	BT
Williams	(1)	Habitat	FS	2001	BT, WCT
	(1-4)	Habitat	FS	2002	
Wigwam	26.0 (PIBO)	Habitat	FS	2003, 2008	BT, WCT
	Section 10	Pres./Abs.	FWP, FS	1980	
	Section 10, 16	Pres./Abs.	FWP	1975	
	River Mile 35.7 – 35.8	Pres./Abs.	FS	2009	
Bluebird	(1)	Habitat	FS	2009	BT, WCT
Wolverine	(1)	Pres./Abs.	FS	2008	BT, WCT
Rich	(1)	Pres./Abs.	FS	1999	BT, WCT
Divide	(1)	Visual observation	FS	2008	WCT
Otter	(1)	Habitat	FS	2009	BT
	(1)	Pres./Abs.	FS	2008	
Weasel	1.5 (PIBO)	Habitat	FS	2003, 2008	BT, WCT

	(1)	Pres./Abs.	FS	2008	
Deep	(1) (1) (2) (2)	Habitat Pop. Estimate Pop. Estimate Genetics	FS FS FS FS	2005, 2007 00, 05, 07 2000, 2005 2009	BT, WCT, EB
Laughing Water	(1) (1)	Habitat Pres./Abs.	FS FS	2005, 2007 2007	EB
Martin	(1) (1)	Habitat Pop. Estimate	FS FS	2005, 2007 2007	EB
Therriault	(1, 2) 1.0-1.1 1.5-1.6 2.3-2.4 5.0-5.2	Habitat CPUE, Pres./Abs. CPUE, Pres./Abs. CPUE, Pres./Abs. Genetics	FS FWP FWP FWP FWP	2000 1997-2008 1997-2008 1997-2008 2008	BT, WCT, EB, RB
Sinclair	1.6-1.7 1.9-2.0 3.7-3.8 7.2-7.3	Pop. Estimate, Pres./Abs. Pop. Estimate, Pres./Abs. Genetics Pop. Estimate, Pres./Abs.	FWP FWP FWP FWP	1997-2002 1997-2002 1987 1985, 97-02	BT, WCT, EB, RB
Tobacco R.	Primarily private ownership	No survey	-	-	BT, WCT, EB, RB
Dickey	(2) (2)	Habitat Pres./Abs.	FS FS	2006, 2010 2010	EB, RSS
Summit	0.0-0.1 (1)	Pres./Abs. CPUE	FS FS	1994 2001	EB, KOK
Murphy	(1)	Pres./Abs.	FS	2000	LMB, PKS
Fortine	Primarily private ownership	No survey			WCT, EB, RB
Mud	Primarily private ownership	No survey	-	-	EB
Indian	Primarily private ownership	No survey	-	-	EB, WCT
Blacktail	-	No survey	-	-	WCT
Snowslide	-	No survey	-	-	WCT
(Lower Wolverine)	Lake	MFISH	FWP	2001-2007	WCT
(Dickey)	Lake	MFISH	FWP	2011	RB, SMB, KOK
(Murphy)	Lake	MFISH	FWP	2011	LMB, PKS, YP, NP
(Big Therriault)	Lake	MFISH	FWP	2011	WCT
(Little Therriault)	Lake	MFISH	FWP	2011	WCT
(Martin)	Lake	MFISH	FWP	2011	EB

*For survey type; Pop. = Population, Pres./Abs. = Presence/Absence, CPUE = Catch Per Unit Effort, and MFISH = MFISH database review (see MFISH Lake data in Project File).

**Species designations are BT=bull trout, WCT=westslope cutthroat trout, EB=brook trout, RB=rainbow trout, RSS=redside shiner, KOK=kokanee salmon, LMB=largemouth bass, SMB=smallmouth bass, PKS=pumpkinseed, YP= yellow perch, NP=northern pike.

Aquatic Habitat Status

The amount of aquatic habitat dictates the abundance and distribution of aquatic organisms. In general, healthy aquatic habitats include adequate water quantity and quality to ensure aquatic species populations can grow, thrive, and reproduce. Certain aquatic species use various habitat types depending on the season, environmental conditions, or life stage of the organism.

A summary of existing aquatic habitat conditions in streams within the analysis area is presented in Fisheries Table 2. No streams within the Analysis Area met all the RMOs established in INFISH (Fisheries Table 2). Approximately half the streams are currently meeting the RMO for pools/mile and all but Lewis Creek and the Wigwam River are attaining the RMO for Large Woody Debris (LWD). Where temperature data are available, most streams are meeting the RMO for maximum water temperature. No stream within the Analysis Area met the width-to-depth ratio RMO. However, none of 726 surveyed stream reaches (including 136 reference reaches) met the width-to-depth RMO in a study conducted to determine if current RMOs are consistent with values found in the population of reference streams sampled within the interior Columbia basin (Kershner and Roper 2010). Further, data collected on over 80 stream reaches within the Rexford Ranger District has yet to yield a wetted width/depth ratio value of less than 10, further supporting the conclusion that interim “one size fits all” RMOs are not applicable in all systems.

Fisheries Table 2 Existing habitat conditions related to RMOs and attainment for streams within the Analysis Area by reach and year. Bold values indicate observed values that are currently not meeting RMO values. LWD= Large Woody Debris.

Stream	Reach	Year	Pools / mile		LWD / mile		Width / Depth ratio		Water temp. <15°C
			RMO (range)	Observed	RMO	Observed	RMO	Observed	
Grave	PIBO	2003	23-26	44	>20	25	<10	**53**	Yes
Grave	PIBO	2008	23-26	25	>20	45	<10	**50**	Yes
Foundation	1	2002	56-96	**32**	>20	59	<10	**20**	-
Lewis	1	2008	56-96	73	>20	**15**	<10	**13**	Yes
Clarence	1	2007	47-56	50	>20	100	<10	**22**	Yes
Stahl	1	2001	56-96	136	>20	112	<10	**24**	-
Stahl	1	2002	56-96	78	>20	98	<10	**19**	-
Stahl	2	2002	56-96	93	>20	77	<10	**22**	-
Stahl	3	2002	56-96	135	>20	72	<10	**18**	-
Blue Sky	1	2007	56-96	70	>20	259	<10	**24**	Yes
Williams	1	2001	56-96	**47**	>20	120	<10	**11**	-
Williams	1	2002	56-96	**44**	>20	75	<10	**22**	-
Williams	2	2002	56-96	**40**	>20	59	<10	**19**	-
Williams	3	2002	56-96	**34**	>20	65	<10	**20**	-
Williams	4	2002	56-96	**51**	>20	108	<10	**23**	-
Wigwam	PIBO	2003	23-26	31	>20	N/A	<10	**67**	**No**
Wigwam	PIBO	2008	23-26	Dry	>20	**12**	<10	N/A	-
Bluebird	1	2009	47-56	**16**	>20	644	<10	**30**	Yes
Otter	1	2009	>96	207	>20	505	<10	**18**	Yes
Weasel	PIBO	2003	Dry	Dry	>20	38	<10	N/A	N/A
Weasel	PIBO	2008	Dry	Dry	>20	37	<10	N/A	N/A
Deep	1	2005	56-96	**34**	>20	120	<10	**22**	-
Deep	1	2007	56-96	58	>20	190	<10	**19**	Yes
Laughing Water	1	2005	>96	**82**	>20	108	<10	**16**	-
Laughing Water	1	2007	>96	109	>20	217	<10	**24**	**No**
Martin	1	2005	>96	**47**	>20	70	<10	**16**	-
Martin	1	2007	>96	**45**	>20	67	<10	**18**	**No**
Therriault	1	2000	>96	**56**	>20	102	<10	**11**	-
Therriault	2	2000	>96	98	>20	181	<10	**23**	-
Dickey	2	2006	56-96	**39**	>20	221	<10	**17**	-
Dickey	2	2010	56-96	**35**	>20	352	<10	**28**	-

Aquatic Population Status

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% 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). Forest management, 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 (< 2%) of gravel/cobble substrate with water depths between 0.1 and 0.6 m and velocities from 0.1 to 0.6 m/s. 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 (McPhail and Baxter 1996; Weaver and White 1985), less than 25% of sediments smaller than 6.35 mm 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 (<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).

Bull trout and bull trout critical habitat are listed separately under the Endangered Species Act and are therefore analyzed differently. First, bull trout are analyzed according to the USFWS Diagnostic/Pathways and Indicators. Second, critical habitat is analyzed utilizing the 9 Primary Constituent Elements (PCEs) identified under the critical habitat section below.

Analysis of Bull Trout

Description of the Upper Kootenai Core Population within the Analysis Area

The Upper Kootenai Core Population of bull trout is primarily comprised of subpopulations residing in two watersheds within the analysis area, Grave Creek (with associated tributaries of Williams, Blue Sky, Clarence, Stahl, Lewis, and Foundation creeks and migration corridor of the Tobacco River), and Wigwam River (with associated tributaries of Bluebird, Wolverine, Rich, Otter, and Weasel). Resident (non-migrating) and migratory bull trout are present in the Grave Creek and Wigwam River watersheds, with resident fish likely occupying most tributaries. Migratory bull trout residing in Lake Koocanusa travel up the Tobacco River and spawn within the Grave Creek watershed or migrate up the Elk River and spawn in the Wigwam River and tributaries. Grave Creek supports the largest spawning run of migratory bull trout in the U.S. portion of the Upper Kootenai basin. The spawning run in the Wigwam River is considerably larger than that of Grave Creek, although the majority of the bull trout spawn in the Canadian portion of the Wigwam River. Other streams within the analysis area supporting limited bull trout use are Therriault, Sinclair, and Deep Creeks (incidental use; discussed further below).

Grave Creek

Framework to analyze existing condition of the Grave Creek subpopulation of bull trout is provided by the USFWS Diagnostic/Pathways and Indicators. Data incorporated into this analysis is from ongoing redd counts and electrofishing surveys conducted by FWP and from the scientific literature.

1) Subpopulation (stock) Size: Density of age-1 and older bull trout in upper Grave Creek (river miles 12.1–12.3) varied from 7.9–15.6 fish per 100m^2 from 1997–2010 (MFISH Grave Creek data in Project File). Using the most conservative density of bull trout observed since 1997 (i.e., 7.9 fish/100m^2), and a mean stream width of 11 m in the upper watershed (PIBO stream habitat data), approximately 1.5 miles of habitat similar to that sampled to produce density estimates would be needed to support 2,000 individuals (the threshold outlined in the USFWS Matrix of Diagnostics/Pathways and Indicators) to merit a “functioning appropriately” designation). Given that over 15 miles of habitat exist within the mainstem Grave Creek and accessible tributaries above the KNF boundary in the watershed, it is probable that the subpopulation size of bull trout in the Grave Creek watershed greatly exceeds 2,000 fish, and is likely closer to 15,000 fish.

Redd surveys conducted on mainstem Grave Creek and several tributaries indicate the number of spawning adults increased substantially immediately following listing under the Endangered Species Act in 1998 (Fisheries Table 3). However, redd numbers have declined since 2008. Recent declines in redd numbers could be attributable to unfavorable environmental conditions (e.g., autumn water levels, varying conditions in Koocanusa Reservoir) or changes in angling pressure and harvest in the US and Canada. No major land management activities have been conducted in the watershed since the 1980s. Despite recent declines in redd counts; it is clear spawning potential for bull trout in Grave Creek remains high.

Fisheries Table 3. Summary of bull trout redd surveys for Grave Creek, 1993–2015 (Montana Fish, Wildlife, and Parks unpublished data).

Year Surveyed	No. of Redds	Miles Surveyed
1993	36	17.1
1994	71	11.5
1995	15	9

1996	35	17
1997	49	9
1998	66	9
1999	134	9
2000	97	9
2001	173	9
2002	199	9
2003	245	9
2004	141	9
2005	194	9
2006	148	9
2007	208	9
2008	207	9
2009	87	9
2010	120	9
2011	64	9
2012	117	9
2013	90	9
2014	74	9
2015	90	9

2) Growth and Survival: Growth of juvenile bull trout in Grave Creek appears to be functioning appropriately, given similar length at age of juvenile bull trout reported from several other populations in Montana and Oregon (Fisheries Table 4).

Fisheries Table 4. Mean length (mm) at age of juvenile bull trout in Grave Creek, North Fork (NF) and Middle Fork (MF) Flathead River, Montana, and South Fork (SF) Walla Walla River, Oregon.

Stream	Age			
	I	II	III	IV
Grave Creek[a]	**77**	**125**	**187**	**270**
NF Flathead River[b]	**73**	**117**	**165**	**301**
MF Flathead River[b]	**52**	**100**	**165**	**297**
SF Walla Walla River[c]	**-**	**-**	**190**	**260**

[a] Montana Fish, Wildlife, and Parks unpublished data; [b] Fraley and Shepard 1989; [c] Al-Chokhachy and Budy 2008 (estimated from figure)

3) Life History Diversity and Connectivity: Both migratory and resident bull trout are present in Grave Creek and some of its major tributaries, indicating a diverse subpopulation. With both life histories present, the bull trout in Grave Creek comprise the strongest subpopulation in the US portion of the Upper Kootenai basin.

There is complete connectivity between Lake Koocanusa and the Grave Creek watershed. Bull trout can migrate from Lake Koocanusa to the Grave Creek drainage (via the Tobacco River) unimpeded. With the modification of the Glen Lake Irrigation District (GLID) diversion in 2000, no barriers remain in Grave Creek that significantly affect bull trout migrations or more localized movements within the watershed.

4) Persistence and Genetic Integrity: The US portion of the Upper Kootenai Core Population has persisted despite the fragmentation of the Kootenai River drainage by the construction of Libby Dam in 1972 (MBTSG 1996). Persistence of the population is likely attributable to several factors, including accessibility to high-quality spawning habitat in Grave Creek, increased rearing habitat and forage in Koocanusa Reservoir, and connectivity with the Wigwam River (British Columbia, Canada) subpopulation of bull trout (MBTSG 1996).

Brook trout are known to occur in the Tobacco River and in the lower reaches of Grave Creek, but currently do not appear to be an introgression threat to the Grave Creek subpopulation of bull trout. Brook trout occur in low abundance in Grave Creek, and primarily occupy the section of Grave Creek below the KNF boundary; an area where bull trout do not frequently spawn. Additionally, no hybridization between the two species has been documented in Grave Creek (Montana Fish, Wildlife, and Parks unpublished data).

Wigwam River

Framework to analyze existing condition of the Wigwam River subpopulation of bull trout is provided by the USFWS Diagnostic/Pathways and Indicators. Data incorporated into this analysis is from ongoing redd counts and electrofishing surveys conducted by FWP, British Columbia, and from the scientific literature.

1) Subpopulation (stock) Size: Redd surveys conducted on the US portion of the mainstem Wigwam River indicate that the number of spawning adults has fluctuated annually. Fluctuations in redd numbers may be partially driven by the strength of the spawning run of bull trout returning to the portion of the Wigwam River in Canada (Fisheries Table 5). However, it is more plausible that the US portion of the Wigwam River represents the uppermost suitable spawning habitat in the watershed and the level of spawning use is limited by suitable spawning substrate. Additionally, portions of the mainstem Wigwam River flow sub-surface for parts of some years, likely further influencing numbers of spawners accessing the upper Wigwam River. Since 1996, redds counted in the US portion of the Wigwam River have constituted no more than 2.8% of the total number of redds counted in the entire Wigwam River (i.e., US and Canada portions combined; Fisheries Table 5). Survey data from the FS in 2009 showed the presence of bull trout ranging from 65–195 mm in length, indicating multiple year classes of likely resident bull trout, or juvenile migratory fish, in the upper drainage. Electrofishing data from the upper Wigwam drainage also indicates low densities of bull trout.

Fisheries Table 5. Summary of bull trout redd surveys for the US and Canada (for reference purposes) portions of the Wigwam River and percent US redds of total Wigwam count, 1996–2015 (Montana Fish, Wildlife, and Parks and Canadian Fish Org. unpublished data).

Year surveyed	No. of redds (US)	No. of redds (CAN)	% US redds of total
1996	12	500	2.3
1997	17	581	2.8
1998	6	673	0.9
1999	21	838	2.4
2000	9	1186	0.8
2001	19	1477	1.3
2002	11	1881	0.6
2003	10	2043	0.5
2004	27	2106	1.3

2005	7	635	1.1
2006	13	2285	0.6
2007	33	1850	1.8
2008	6	1827	0.3
2009	8	1567	0.5
2010	4	1114	0.4
2011	8	1198	<0.01
2012	3	1367	<0.01
2013	6	1441	<0.01
2014	7	1420	<0.01
2015	1	1601	<0.01

2) Growth and Survival: Growth of juvenile bull trout in the Wigwam appears to be functioning appropriately, given that in 2009, Forest Service surveys showed multiple age classes in limited sampling of the mainstem of the Wigwam (V06_D026, Wigwam MFISH Data). This assumption is also based on the high numbers of adult spawners that have matured and are fit enough for migration and spawning.

3) Life History Diversity and Connectivity: Both migratory and resident bull trout are present in the Wigwam River. Resident populations of bull trout appear to be established in several tributaries (Weasel, Otter, Rich, and Wolverine creeks). Life history diversity is functioning appropriately based on these measures.

There is unrestricted access for bull trout between Lake Koocanusa and the Wigwam River. A natural barrier exists on the Wigwam River at rivermile 50. This barrier is passable at high flows; however, it is likely not passable to most bull trout during most years. Additionally, portions of the Wigwam River flow subsurface periodically in some years. The extent and duration of subsurface flow are unknown. Subsurface flows may limit connectivity in some years; however, the phenomenon of subsurface flows can be naturally occurring in some systems. Based on the consistent return of spawning adults to the reach of the Wigwam River below the natural barrier, this indicator is functioning appropriately.

4) Persistence and Genetic Integrity: The US portion of the Upper Kootenai Core Population has persisted despite the fragmentation of the Kootenai River drainage by the construction of Libby Dam in 1972 (MBTSG 1996). Persistence of the population is likely attributable to several factors, including accessibility to high-quality spawning habitat in the US and Canada portions of the Wigwam River, increased availability of rearing habitat and forage in Koocanusa Reservoir, and connectivity with the Wigwam River (British Columbia, Canada) subpopulation of bull trout (MBTSG 1996).

Angling pressure in the British Columbia portion of the river is managed as a trophy fishery and that continued management allows for all life histories to persist through time. There are few brook trout throughout this drainage and it is likely that they are separated during spawning times by stream temperatures. These indicators are functioning appropriately.

Analysis of Bull Trout Critical Habitat

Existing Condition of Primary Constituent Elements (PCEs) of Critical Habitat

Critical habitat for bull trout has been designated by the USFWS in Grave Creek, lower portions of Clarence and Blue Sky creeks, Tobacco River, Koocanusa Reservoir, and the Wigwam River

up to Wolverine Creek. Koocanusa Reservoir is not affected by this project in any measurable way, as it is too far away in space from project activities. It will not be discussed further. Existing condition of bull trout critical habitat is analyzed using the 9 Primary Constituent Elements (PCEs) outlined in the final rule for critical habitat. Within the designated critical habitat, the PCEs for bull trout are those habitat components that are essential for the primary biological needs of foraging, reproducing, rearing, migration, and overwintering (75 FR 200 [63931-63932]). Analysis of the PCEs in Grave Creek includes data from the Tobacco River, Clarence, Stahl, Williams, Blue Sky, and Lewis creeks because these streams form an interconnected watercourse and are used by the same subpopulation of migratory bull trout. The Tobacco River primarily provides a migratory corridor for bull trout between Lake Koocanusa and Grave Creek. Analysis of the PCEs in the Wigwam River includes data from the Wigwam River, Bluebird, Otter, and Weasel creeks. Data for the analysis of the existing condition of PCEs are from habitat surveys conducted by FS and PIBO field crews and the scientific literature. To avoid duplication, PCEs for these two watersheds are displayed together.

1. Ground water function: Little disturbance has occurred over most of the riparian areas in the Grave Creek and Wigwam drainages. Ground water pathways are largely intact throughout the systems and are functioning appropriately.

2. Migratory habitats: The migratory corridor is currently functioning appropriately. Past human-created barriers have been removed or modified so bull trout passage is possible during active migration in summer and fall, even in low flow years. Migratory bull trout have unrestricted access from Lake Koocanusa to the Tobacco River and then to Grave Creek. The same is true of the Wigwam system, with the exception of a natural woody debris jam that seems to be affecting migration near the international border.

3. Food base: Riparian areas and aquatic habitats are intact within the Grave Creek watershed. Habitat complexity is provided by LWD and pool/riffle sequences within the watershed. This complexity provides aquatic habitat for invertebrates (fed upon by juvenile bull trout) and other native fishes (fed upon by subadult and adult bull trout). Results from macroinvertebrate sampling in Grave Creek indicate a diverse community structure that is fairly uniformly distributed across taxa (see Macroinvertebrate Report in Project File). Due to a lack of human activity in the Wigwam, it is assumed that macroinvertebrate assemblages would be similar to those found in Grave Creek.

4. Complex habitat: Fish habitat complexity is typically provided by varying habitat types and structure within those habitat types. This element is functioning appropriately given the RMOs for LWD and pools per mile are being attained in Grave, Clarence, Stahl, Lewis, Blue Sky, and Otter creeks. Bluebird Creek was slightly below the RMO for pools in 2009, and flows in Weasel Creek were subsurface during surveys in 2003 and 2008. The same was true for the Wigwam River in 2008. The RMO for width-to-depth ratio is not being attained in any of the sampled streams.

5. Water temperature: Water temperatures in Grave Creek and its tributaries are consistently cool and ideal for bull trout habitation and spawning. Water temperatures are <15°C in Grave, Clarence, Lewis, and Blue Sky creeks, thus these streams are attaining the RMO. Stream temperatures are generally cool enough in the Wigwam system; however, when stream flows diminish to a point where parts of the stream dry up, they do not meet the temperature RMO. This appears to be a function of geology more than a function of riparian areas.

6. Spawning substrate: Substrates are suitable sized for bull trout spawning in the Grave Creek watershed. Currently, adult migratory fish are utilizing reaches in mainstem Grave Creek, as well as Clarence, Stahl, Williams, and Blue Sky creeks for spawning. Sediment levels are very low (1-14%) in the Grave Creek watershed; well below levels known to affect bull trout reproduction and hatching success (>25%). The Wigwam River in 2003 had fine sediment levels less than 1%; again, well below levels known to affect bull trout reproduction and hatching success.

7. Hydrograph: The hydrograph in the Grave Creek drainage is functioning normally at the present time. Very few human disturbances (e.g., timber harvest, road construction) that affect the hydrograph have been conducted in recent years. Most of the human-caused activities in this drainage occurred >30 years ago. The hydrograph in the Wigwam drainage is functioning normally; however, portions of stream dry up in most years in Camp, Divide, Weasel, and the main Wigwam. This appears to be dictated by the geology of the area.

8. Water quality/quantity: Grave Creek is listed as a water quality limited segment by the Department of Environmental Quality (DEQ; see Water Resources section). A TMDL was completed for Grave Creek in 2005 and assigned targets for certain stream parameters linked to sedimentation (see Grave Creek TMDL in Project File). As of 2008, Grave Creek (above the KNF boundary) was meeting all TYPE I and II TMDL targets for stream parameters. Macroinvertebrate sampling conducted upstream of the KNF boundary indicate a diverse community of aquatic insects; one that would be expected in aquatic environments with relatively pristine conditions (Macroinvertebrate Report in Project File). Further, all but one taxa of macroinvertebrates identified in Grave Creek were considered pollution intolerant, indicating "excellent" water quality conditions in the stream (Macroinvertebrate Report in Project File). The portion of Grave Creek below the KNF boundary is primarily private land and is influenced by private land practices including grazing and irrigation withdrawals.

Water quality/quantity in the U.S. portion of the Wigwam is largely unaffected by humans due to the majority of the watershed being within the Ten Lakes Scenic Area and Wilderness Study Area. The few roads in the area are at low densities and crossings are in relatively good condition. There are no significant sediment sources in this portion of the watershed.

9. Nonnative species: Historically, competition from rainbow trout and eastern brook trout has been limited to the lower portion of Grave Creek, primarily below the KNF boundary. Future increases in water temperature (due to climate change, for example) could allow non-native fish to invade further upstream in Grave Creek, although currently there is no evidence of non-native fish range expansion within the watershed. There are no nonnative species in the Wigwam at this time. Future invasion is unlikely due to cold water temperatures and short growing seasons throughout the drainage.

Other Streams Supporting Bull Trout in the Analysis Area

Therriault Creek

Catch per unit effort data indicate low abundance of bull trout (3.5–15 fish per 1000 m) relative to abundance of brook and rainbow trout (unpublished MTFWP data). Both resident and migratory bull trout are thought to be present in Therriault Creek. Electrofishing surveys indicate smaller bull trout (likely residents) and a few larger fish (likely migrants) are present in Therriault Creek.

Sinclair Creek

Catch per unit effort data indicate low abundance of bull trout (1–2 fish per 1000 m) in Sinclair Creek (unpublished MTFWP data). Both resident and migratory bull trout may be present in

Sinclair Creek, although it is uncertain at this time. Except for the headwaters, Sinclair Creek is surrounded primarily by private property.

Deep Creek

Only one bull trout has been documented in Deep Creek over multiple years of sampling. Accordingly, bull trout presence in Deep Creek is viewed as incidental at this time.

Tobacco River

The Tobacco River is a migratory corridor for bull trout. Summer water temperatures are not conducive to long-term residency by bull trout.

Sensitive and Desired Non-native Species

Westslope cutthroat trout are the only sensitive aquatic species known to reside within the analysis area. Multiple factors have contributed to the decline of westslope distribution and abundance; these factors are discussed in detail below in "Description of General Population and Habitat Status". This document serves as the biological evaluation for this species.

There are several non-native species in the analysis area that are valued as a recreational fishery. Rainbow trout and eastern brook trout are the most common stream-dwelling non-native fishes. Many more non-native fish have been stocked, primarily in lakes. Except for kokanee salmon, these species are warm-water fishes, such as largemouth bass, perch, and pumpkinseeds. These fish species were originally planted by MFWP and are managed as game species for recreational purposes.

Description of General Population and Habitat Status-Westslope Cutthroat Trout

Westslope cutthroat trout (*Oncorhynchus clarki lewisi*) are common on the Kootenai National Forest, although their distribution and abundance has declined from historic levels (Shepard et al 2005). Westslope cutthroat trout persist in only 27% of their historic range in Montana, with genetically pure populations only present in only 2.5% of that range (Rieman and Apperson 1989). Some of these remaining genetically pure populations of westslope cutthroat trout are found above fish passage barriers that protect them from nonnative fish populations, but also isolate them from other cutthroat populations.

Factors contributing to the decline of westslope cutthroat trout include introductions of nonnative fish species and habitat fragmentation (Shepard et al 1997; McIntyre and Rieman 1995). Introduced species (such as rainbow and brook trout) have hybridized with or displaced westslope cutthroat trout populations across much of their range (Boyer et al 2008; Rubidge and Taylor 2005; Allendorf et al 2004; Hitt et al 2003). Hybridization causes loss of genetic purity of the cutthroat population through introgression (Allendorf et al 2004; Allendorf and Leary 1988). Brook trout are believed to have displaced many westslope cutthroat trout populations (Nakano et al 1998). Where the two species co-exist, westslope cutthroat trout tend to predominate in higher gradient reaches or headwaters, while brook trout prevail in lower gradient reaches (Griffith 1972). This isolates westslope cutthroat trout populations and fragments habitat, further increasing the risk of local extinction from genetic and stochastic factors (McIntyre and Rieman 1995). The probability that a cutthroat population in any locality will persist depends on habitat quality and proximity to other populations (Rieman and McIntyre 1993).

Westslope cutthroat trout exhibit both migratory and resident life histories on the Kootenai National Forest. Westslope cutthroat are capable of traveling over 100 kilometers on their spawning migration (Schmetterling 2003). Migratory fish typically rear in their natal streams

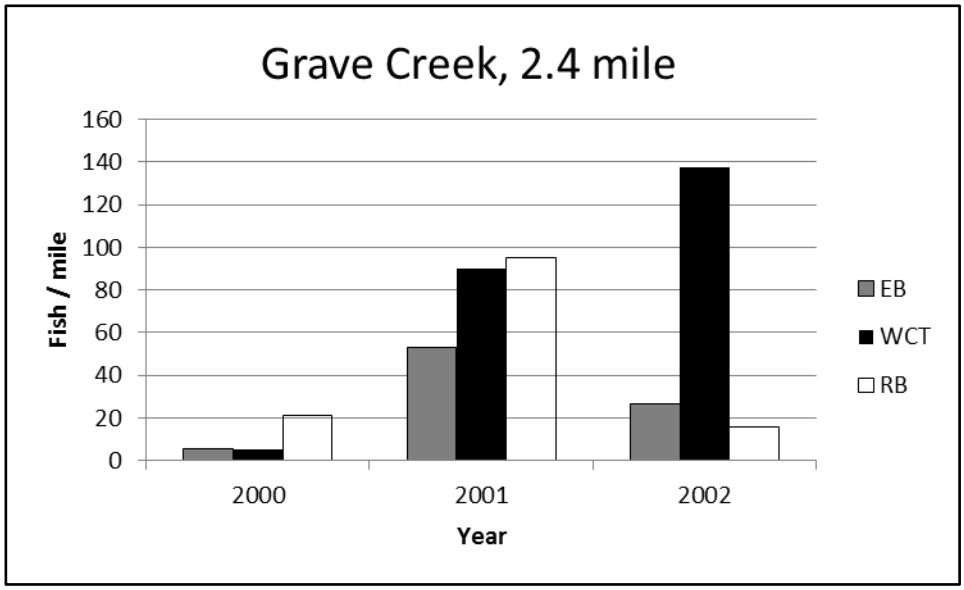
until their third year, at a length of 7-9 inches, when they migrate to either a larger stream or lake to rear to maturity. Sexual maturity of migratory fish is typically attained at either age 4 or 5, at which time these fish migrate back to their natal streams to spawn. Resident fish are significantly smaller than their migratory counterparts and reach sexual maturity in 2 to 4 years (Downs et al 1997). Common lifespan for this species is seven years. Westslope cutthroat feed primarily on aquatic insects in streams and larger zooplankton in lakes and can reach lengths in excess of 20 inches and weigh in excess of three pounds.

Description of the Westslope Cutthroat Trout and Desired Non-native Populations within the Project Area

Currently, westslope cutthroat trout occupy many of the streams and lakes within the Project Area (Fisheries Table 1), with the majority of these populations likely composed of smaller, resident fish. Brook and rainbow trout occupy many of the same streams as westslope cutthroat (Fisheries Table 1).

Grave Creek

Westslope cutthroat, brook, and rainbow trout occupy the lower reaches of Grave Creek (Fisheries Figure 1). Further upstream (between 3.5 and 12.1 mile), abundance of brook and rainbow trout decline markedly, with genetically pure westslope cutthroat (and bull trout, discussed earlier) predominating (MFISH Grave Creek data in Project File). Westslope cutthroat trout have also been documented in most of the major tributaries to Grave Creek, including



Foundation, Clarence, Stahl, Blue Sky, and Williams creeks.

Fisheries Figure 1. Abundance of brook (EB), westslope cutthroat (WCT), and rainbow (RB) trout at 2.4 mile of mainstem Grave Creek, 2000-2002.

Wigwam River

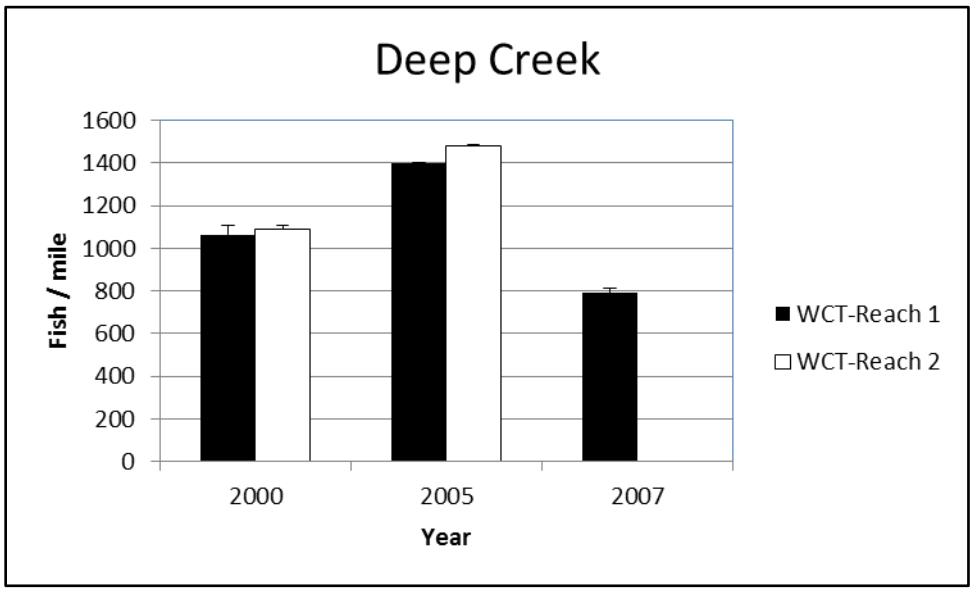
Fisheries data for westslope cutthroat in the Wigwam River are limited. Electrofishing surveys conducted in 1975 and 1980 indicated very low densities of westslope cutthroat trout, but multiple year classes of fish. The presence of multiple year classes of fish shows that fish are utilizing available habitat for spawning and maintaining stable populations, albeit at low

densities. As long as no stochastic event occurs within the drainages, westslopes are expected to continue use of the Wigwam River and maintain stable populations.

Stocking records indicate the presence of stocked Yellowstone cutthroat trout is some lakes within the Wigwam drainage. Hybridization between Yellowstone and westslope cutthroat trout is possible when the two species overlap in distribution; however, the occurrence or extent of hybridization in the Wigwam River is unknown. FWP is currently collecting genetic samples to detect any hybridization of westslopes in the Wigwam River. No rainbow trout or brook trout have been captured in the Wigwam River.

Deep Creek

Westslope cutthroat trout are the most abundant fish species in Deep Creek (Fisheries Figure 2). Genetic testing in Deep Creek indicates genetically pure westslope cutthroat. The presence of multiple year classes of fish shows that fish are utilizing available habitat for spawning and maintaining stable populations. As long as no stochastic event occurs within the drainages, westslopes are expected to continue use of Deep Creek and maintain stable populations. One brook trout was sampled in Reach 1 in 2007. Brook trout likely occur in low densities within lower Deep Creek and have not invaded further upstream at this point. No rainbow trout have



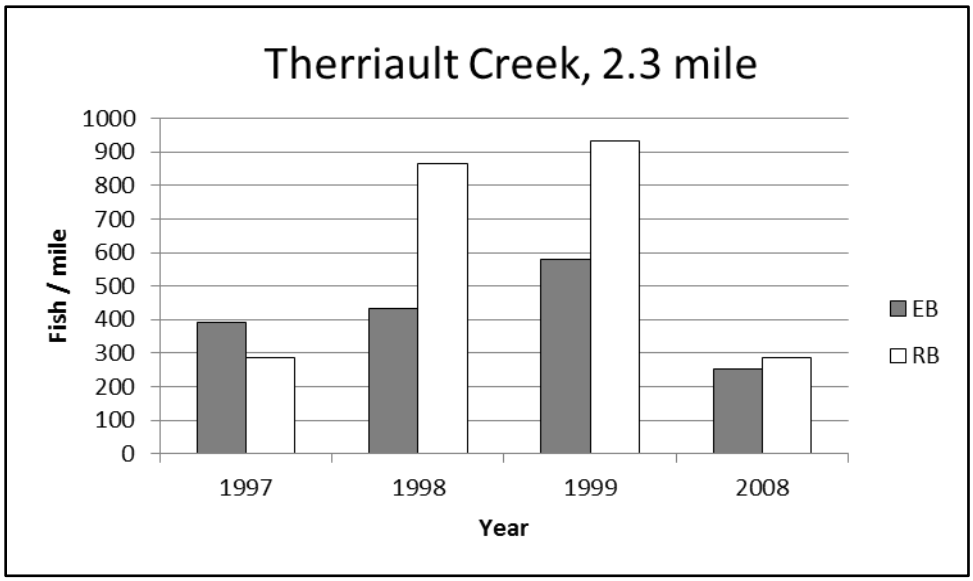
Fisheries Figure 2. Abundance of westslope cutthroat trout (WCT) from two reaches in Deep Creek, 2005-2007.

been captured during electrofishing surveys in Deep Creek

Therriault Creek

No westslope cutthroat trout have been captured during surveys in Therriault Creek; however, brook and rainbow trout occupy the lower portions of the creek. Abundance of brook trout has remained relatively stable through time, in both surveyed reaches (Fisheries Figure 3). Typically, rainbow trout have outnumbered brook trout in both reaches; however, abundance of rainbow trout has fluctuated widely (Fisheries Figure 3). The presence of multiple year classes of fish shows that fish are utilizing available habitat for spawning and maintaining stable populations. As

long as no stochastic event occurs within the drainages, brook and rainbow trout are expected to continue use of Therriault Creek and maintain stable populations.

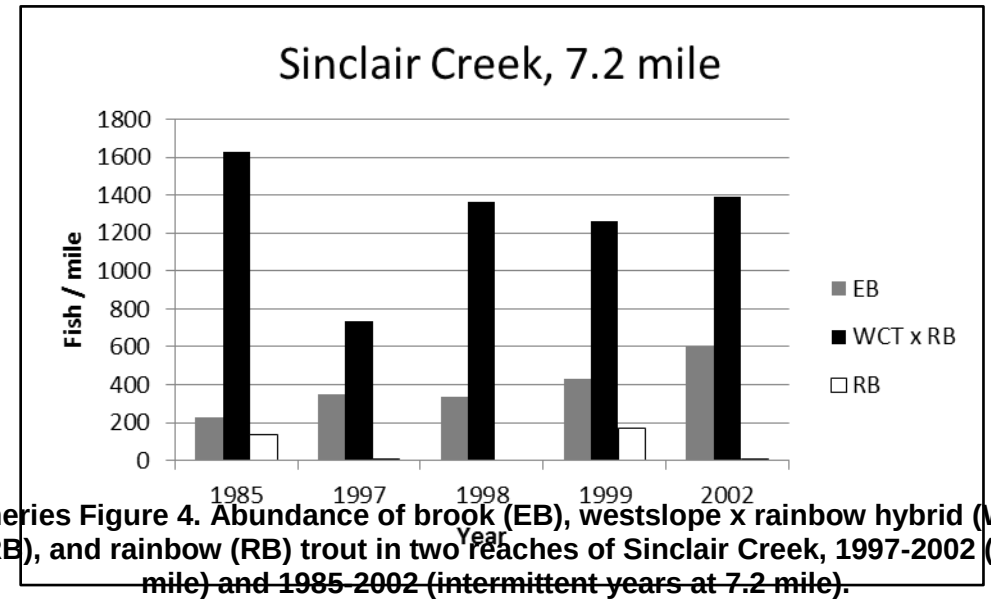


Fisheries Figure 3. Abundance of brook (EB) and rainbow (RB) trout in two reaches of Therriault Creek, 1997-1999 and 2008.

Sinclair Creek

Genetic testing in 1987 indicated hybridization between westslope cutthroat and rainbow trout within Sinclair Creek. Hybridized fish make up the majority of the species composition within Sinclair Creek. The presence of multiple year classes of fish shows that fish are utilizing available habitat for spawning and maintaining stable populations. As long as no stochastic event occurs within the drainages, hybridized westslope cutthroat trout are expected to continue use of Sinclair Creek and maintain stable populations.

In addition to hybridized cutthroat trout, brook and rainbow trout are also present in Sinclair Creek. Abundance of brook trout appears to have increased within both surveyed reaches of Sinclair Creek since 1997 (Fisheries Figure 4). Rainbow trout occur at low densities in Sinclair Creek (Fisheries Figure 4).



Fisheries Figure 4. Abundance of brook (EB), westslope x rainbow hybrid (WCT x RB), and rainbow (RB) trout in two reaches of Sinclair Creek, 1997-2002 (1.9 mile) and 1985-2002 (intermittent years at 7.2 mile).

Tobacco River
Westslope cutthroat, brook, and rainbow trout are present in the Tobacco River (MFISH 2011). However, no fish population surveys are available, as the Tobacco River flows almost exclusively through private land.

Fortine Creek
Westslope cutthroat, brook, and rainbow trout are present in Fortine Creek (MFISH 2011). However, no fish population surveys are available, as Fortine Creek flows almost exclusively through private land within the Analysis Area.

Laughing Water Creek
Brook trout were the only species captured during electrofishing surveys in Laughing Water Creek in 2007. The presence of multiple year classes of fish shows that fish are utilizing available habitat for spawning and maintaining stable populations. As long as no stochastic event occurs within the drainages, brook trout are expected to continue use of Laughing Water Creek and maintain stable populations.

Martin Creek
An electrofishing survey conducted in Martin Creek in 2007 yielded a brook trout population estimate of 745 fish/mile. The presence of multiple year classes of fish shows that fish are utilizing available habitat for spawning and maintaining stable populations. As long as no stochastic event occurs within the drainages, brook trout are expected to continue use of Martin Creek and maintain stable populations.

Indian, Blacktail, and Snowslide creeks
No surveys have been conducted on these streams. Indian Creek primarily flows through private land, with only the headwaters portion of the stream on the KNF. The headwaters are not easily accessible and likely support limited, if any, habitat and fish populations.

Blacktail and Snowslide creeks are located on the KNF and are relatively remote. Given the absence of formal fisheries surveys on these streams, they are treated as fish-bearing (until proved otherwise) with respect to RHCA widths.

Lower Wolverine Lake
The lower lake is 5.3 acres and is accessed from Trail 84. Westslope cutthroat trout have been stocked by MFWP since at least 2000. Angling pressure has varied from 56 to 135 angler days in 2001, 2003, and 2009 (Note, one angler day equals the angling effort of one angler during a 24 hour cycle).

Dickey Lake
Dickey Lake is 585 acres and is the largest lake in the Analysis Area. The lake is accessed by U.S. Highway 93, Road 3785, and Road 3788. There is a developed campground with a boat launch and boat slips on the north end of the lake, a day use area on the south side of the lake, and the west side is privately owned. Dickey Lake supports a mixed-fishery including rainbow and eastern brook trout, kokanee, and most recently smallmouth bass. The lake has been stocked with rainbow trout since at least 1990. Fishing pressure is moderate to heavy, ranging from 210 to 2212 angling days per year between 1982 and 2007. Average angling days since 2001 is 465 days per year.

Murphy Lake

Murphy Lake is 141 acres and is accessed by U.S. Highway 93 and Road 7008C. There is a small primitive campground at the north end of the lake. This lake is mainly a warm-water fishery with predominately largemouth bass, yellow perch, and northern pike. Angling pressure is high, ranging from 85 to 1654 angling days between 1982 and 2007. Angling days have averaged 1096 days per year since 2001.

Big Therriault Lake

This 56 acre lake is accessible by Road 319. There is a developed campground with a primitive boat launch available. The lake has been stocked with westslope cutthroat trout since at least 1991. Angling use is high, ranging from 81 to 1326 angling days between 1982 and 2007. The average since 2005 is 296 angling days annually.

Little Therriault Lake

This 28 acre lake is accessible by Road 319. There is a developed campground, with a primitive boat launch and two handicap-accessible fishing platforms on the lake. Westslope cutthroat, rainbow trout, and possibly some hybridized fish occupy the lake.

Martin Lake

Martin Lake is a 35 acre lake accessible by Trail 418. Fish presence in this lake is intermittent and believed to be affected by winter kills. It is occasionally stocked by MFWP. Angling pressure is light and averaged 47 angling days per year between 1989 and 2005.

Amphibians

Western Toad

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 2000). As summarized in Maxell (2000), over-wintering may take place in underground caverns 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 in terrestrial uplands. The highest elevation the species has been documented in Montana is 9220 feet.

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; however, these toads are often encountered during field work by personnel. 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 of breeding sites (tadpoles and eggs) were found at only eight sites (Corn et al 1998). Historic and active breeding sites by planning unit on the Kootenai National Forest are summarized by Johnson (1999). Forest-wide, approximately 35 breeding sites were verified between 1995 and 1998 (Ibid).

There are two known breeding sites within the Galton AA. Their recent use status is unknown. The last date larvae were documented at these sites was 1998. Adult or juvenile toads have been

found at seven wetland locations within the AA not excluding the known breeding sites. These documented use sites are located in various parts of the Galton AA. Additional breeding habitat is likely to occur in temporal ponds and road ditches because informal surveys have found breeding evidence in these types of micro-habitats on numerous occasions. The terrestrial habitat within the Galton AA is considered upland foraging habitat.

Criteria used to compare the alternative impacts on the western toad and its habitat includes:

1. known breeding/rearing habitat impacted
2. acres of upland foraging habitat harvested and burned
3. acres of upland foraging habitat (prescribed burned only)

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, has been 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).

Environmental Consequences

This section considers the direct and indirect effects of the alternatives including the proposed action on aquatic populations and habitat, riparian areas, and amphibians within the analysis area. Direct effects to fish and other aquatic organisms are rare during land management activities, partially because these activities are rarely conducted directly in occupied aquatic habitat. Instead, most management activities occur in upland areas outside of RCHAs designated by INFISH. Direct effects to amphibians are possible if western toads or their habitat are found in activity units. Indirect effects to aquatic habitats and species are more common due to downstream and hill slope processes that move effects from an activity area to areas of occupied aquatic habitat (e.g., sediment transport from a road to a stream, down a stream, etc.).

Effects of Alternative 2 (No Action)

Alternative 2 does not propose management activities within the analysis area. With this alternative, it is expected that vegetative recovery from past management activities would allow peak flow levels to decrease below current levels. Existing stream conditions and trends are expected to continue through time under this alternative, as natural recovery would continue. These trends include maintaining or improving the existing level of RMO attainment and current fish habitat levels in all streams within the analysis area.

Continued sediment input from existing road sources to streams with fish populations would continue to occur under Alternative 2. Currently, sediment introduction into streams within the project area from road crossings on open and stored roads is estimated at 2 tons annually (see Water Table 8). This amount of sediment introduction is expected to decrease slightly under

Alternative 2, because some maintenance of open roads would occur. However, no BMPs would be applied to roads associated with timber harvest because no harvest would occur under Alternative 2. Currently, sediment levels in streams in the analysis area are low (refer to the Water Resources Section). Given existing habitat and population conditions, aquatic habitat and fish populations are expected to persist under this alternative.

Under Alternative 2, no harvest or prescribed burning would take place. No direct effect to the western toad would be expected with this alternative. Plant succession would continue on all sites. Indirectly, this would result in an increase in canopy closure and density of understory conifers. This increase in canopy closure and understory conifer density would have no direct or indirect effect on breeding habitat, and little, if any, effect on upland habitat. Fuel loads would continue to accumulate on the upland sites. Should wildland fire occur, typically aquatic breeding habitats would not be directly affected; however, surrounding upland habitat could be burned. Western toads have been noted to re-colonize burned areas the following year with vegetation re-growth (B. Maxell, Herpetologist, State Zoologist with MTNHP, personal communication April 2003, Troy Mt., J. Holifield (Libby District Biologist) personal observation).

Direct and Indirect Effects of the Action Alternatives

Road Management

Road Maintenance to Meet Current BMPs

Alternatives 1 and 3 would reduce long-term sediment inputs into analysis area streams due to the implementation of BMPs associated with timber harvest. There would likely be some short-term inputs due to the BMP activities, but these amounts would be less over time than doing no BMP upgrades. Sediment levels under Alternative 2 would be higher than those of the action alternatives because BMPs would not be implemented, although some routine road maintenance would still occur. Currently, sediment levels are low throughout most of the analysis area. Some higher sediment loads have been identified in valley bottom streams (e.g., Laughing Water, Dickey creeks); however, these streams are low gradient, low volume drainages that likely exhibited higher sediment loads historically. Road maintenance to meet current BMPs would not retard the attainment of RMOs because no riparian vegetation would be removed, thus stream temperature and LWD availability would remain unaffected. Equivalent Clearcut Acres (ECAs) would not increase as a result of this activity; therefore no changes to pool frequency or width to depth ratio are expected. Road maintenance to meet current BMPs is expected to be beneficial to aquatic resources and habitats because of reduced sediment levels.

Temporary Road Construction

Two miles or less of road are proposed to be constructed under Alternatives 1and 3. These temporary roads are relatively short in length and scattered across the analysis area. No new stream crossings would be made with these roads. No riparian vegetation would be removed with this activity, thus stream temperature and LWD availability would remain unaffected. ECAs would not increase as a result of this activity; therefore, no changes to pool frequency or width to depth ratio are expected. Amphibian habitat would not change due to the timing of road construction and the single season nature of the roads.

No temporary roads would be constructed under Alternative 2. No effects above existing conditions are anticipated for this alternative for this activity.

Vegetation Management

Timber harvest activities can impact aquatic habitat and populations by increasing peak flow. Excessive ECA increases can destabilize the stream channel causing degradation of aquatic habitat by decreasing habitat diversity (loss of pools, cover, stable substrates) and increasing in-channel sediment production. Channel instability occurs when the scouring process leads to downcutting or excessive sediment deposition (Rosgen 1996).

Ground-based timber harvest systems and associated road construction in or adjacent to RHCAs can increase sediment delivery to aquatic habitats. Excessive sediment may decrease habitat diversity, degrade spawning and rearing habitat and consequently impair fish reproduction and survival. The density of salmonids in rearing habitat has been shown to be inversely proportional to the level of fine sediment (i.e., more sediment equals lower densities of fish) (Bjornn and Reiser 1991). Fine sediment can greatly reduce the capability of winter and summer rearing habitats and decrease survival to emergence when sediment levels reach 30% or greater (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 can also alter macroinvertebrate abundance and diversity.

Whitebark pine planting is proposed in Alternative 3 in appropriate areas that were burned during the Marston Fire. Planting 835 acres of ground in high elevation areas would have no impact to fisheries.

Regeneration/Intermediate/Commercial Thin/Intermediate Variable Density Harvest

Acres of regeneration timber harvest are from 334 acres in Alternative 3 to 359 acres in Alternative 1. All regeneration harvest units are within the Grave, Deep, and Wigwam watersheds. The proposed acreage of timber harvest within these respective drainages is small relative to total watershed acreages. Stream flow modeling and analysis show that ECAs would remain within historic ranges under both action alternatives. Watershed Table 7 in the Water Resources section displays the expected ECA increases for each alternative. Direct effects to the fisheries resource are not expected with these levels of ECA increases because they are within historic ranges (see Direct and Indirect Effects in Water Section).

RHCAs would protect these streams from non-channelized sediment inputs (i.e., sediment carried by overland flow, not traveling down an active stream channel) associated with timber harvest. A review associated with INFISH (USDA Forest Service 1995) concluded that non-channelized sediment flow rarely travels more than 300 feet and that 200-300 foot riparian buffers are generally effective at protecting streams from sediment from non-channelized flow. RHCAs would also ensure that stream temperatures and the recruitment of large woody debris within these watersheds would not be affected.

Typically, there is a 3 to 4 year increase in nitrogen and phosphorus in streams draining a newly harvested area. These nutrients come from the breakdown of logging slash, the flushing of some soil nutrients normally taken up by trees, and in some cases, slash burning. Nitrogen and phosphorus are limited in supply in natural systems and are thus readily utilized by plants and animals. Because of their rapid uptake, short-term water quality effects do not generally extend very far downstream (Chamberlin et al 1991). However, these nutrients would increase aquatic productivity for a short time.

The only watershed that has enough harvest to even affect a change in water yield is in Deep Creek. The harvest units in Deep Creek are all over 300 feet from Deep Creek and are uphill of the main, open Deep Creek Road. All of these units are in the lower portion of the watershed, which would create a greater warming effect than if they were in the upper portion of the watershed. However, the overwhelming majority of the watershed area occurs above these harvest units, in areas where there is less thermal heating and the majority of the water contribution (mostly in snowpack) to the watershed. Given these facts, there is a very small chance that there would be a detectable change in water temperature within the watershed. In addition to this, the highest 7-day average temperature in Deep Creek was in 2009 at 10.5°C, which is 4.5°C lower than the temperature RMO. This makes it very unlikely that harvest more than 300 feet from the stream, in the lower portion of a timbered watershed, would increase 4.5°C in order to violate the temperature RMO.

Alternatives 1 and 3 propose similar acreages of intermediate harvest (1023-1112 acres), commercial thinning (46 – 97 acres), and identical acreages for intermediate variable density harvest (307 acres). Alternative 1 includes 43 acres of vista enhancement that is not in Alternative 3. Direct and indirect effects of the intermediate harvest regimes are similar to those described above for regeneration harvest. RHCAs would protect streams from increased sedimentation and water temperatures, and allow for future recruitment of large woody debris to streams. Protecting these characteristics of healthy riparian areas by not retarding the attainment of RMOs is critical to protecting bull trout populations and their habitat. For these reasons, all proposed timber harvest under Alternatives 1and 3 are not expected to affect aquatic species populations or degrade their habitat.

The effect of timber harvest on amphibians in Montana has had limited studies (Maxell 2000). 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 that 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). Timber harvest (especially clearcutting) and associated silvicultural practices appear detrimental to terrestrial amphibian populations (Bury et al 2000). Impacts from intensive forest management (e.g. even-aged harvesting) practices extend beyond the boundaries of harvested stands (deMaynadier and Hunter 1998). Recommendations for buffer zones and terrestrial habitats for corridors of movement for amphibian species are discussed by several authors (Semlitsch 1998, 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).

The direct effects of proposed timber harvest activities could result in incidental mortality to western toads due to ground disturbance (crushing by logging equipment).

Alternatives 1 and 3 would be similar in their timber harvest effects. Please see Fisheries Table 6 for acreage comparisons. None of the action alternatives propose new permanent road construction, however, they do propose from 1.25 to 2.0 miles of temporary road. The use of

ground-based logging systems and road construction machinery could impact or remove individual toads. Dispersal across the landscape would not be compromised because of the high percentage of cover provided across the landscape after proposed activities would be accomplished. Riparian corridors are maintained as well through all action alternatives.

Fisheries Table 6. Toad Habitat Impacted by Alternative on NFS lands in the Galton Vegetation Analysis Area

Comparison Criteria	Existing Condition Alternative 2	Alternative 1	Alternative 3
Known breeding/rearing habitat impacted	0	0	0
Acres upland foraging habitat harvested and burned	0	1778*	1850*
Acres upland foraging habitat treated by prescribed burned only	0	8038*	1792*

* Treated acres adding to the existing condition.

Under Alternative 2, no increases in ECAs are anticipated from timber harvest. Vegetative recovery from past disturbances would continue. The lack of disturbance and continued decline in water yield can limit the amount of habitat that is created during spring runoff and major storm events. This can have a negative effect on fish habitat and populations over time. Currently, most streams in the analysis area are at the lower end of their historic ranges for ECAs (Water Table 4 and Direct and Indirect Effects in the Water Resources Section).

This alternative also leaves the landscape more susceptible to further large-scale disturbances, such as Marston Fire in 2015, by not creating and maintaining a variety of habitats across the landscape (Arkle, Pilliod, and Welty 2012; Omi, Martinson, and Chong 2007; Ager, Vaillant, and Finney 2010). These varied patches left by management allow fire suppression forces to try tactics that limit wildfire spread during times when wildfires may be able to burn large portions of some watersheds, or by simply allowing the fire to burn into previously treated areas and going out on its own. Since very little vegetative management has occurred in some portions of the analysis area in the last 30 years, there are currently few opportunities to employ these fire management tactics. This puts several larger watersheds at risk of having large tracts of land burned within their boundaries. Because of existing infrastructures, such as roads and culverts, subsequent climatic events could trigger road washouts, culvert failures, or mass land movements that could introduce large amounts of sediment into aquatic habitats.

Scenic Vista

Scenic vista clearing is proposed in Alternative 1 (43 acres), all of which are located in the Wigwam River watershed. Proposed clearing sizes would be small (<6 acres) and are all located outside of RHCAs, thus this activity would not retard the attainment of RMOs. This activity is limited in scope and would not occur near waterbodies, thus no direct or indirect effects to aquatic species populations or their habitat are expected.

Under Alternatives 2 and 3, no changes to the existing condition are anticipated.

Fuel Treatment

Non-commercial Understory Thinning/Fuel Reduction, Prescribed Burn Only, Prescribed Burn with Mechanical Pre-Treatment

Alternatives 1 and 3 propose similar acres of fuel treatments occurring within most of the watersheds from Deep Creek south within the analysis area. However, in the northern portion of the analysis area, there are several watersheds that have burning proposed in them in Alternative 1, but not in Alternative 3. Overall, burn acres in Alternative 1 (7929 acres) are substantially higher than in Alternative 3 (1682 acres). Prescribed fire can expose bare soil and some burn units may have fireline constructed that also exposes bare soil. Standard BMPs and erosion control practices would be applied to minimize sediment production. Rare instances of storm-event erosion, channeling of water down soil depressions, or minor road surface erosion from equipment use may result in minor, additional fine sediment loads in streams proximate to operations. However, sediment generated from fire-related fuel treatments is expected to be minimal. Because the magnitude of the expected sediment change is so small, the minor additional load that may result from the fuel treatments in Alternatives 1 and 3 is anticipated to have a negligible effect on aquatic populations and habitat.

Fuel treatment activities in Alternatives 1 and 3 would have some short-term indirect effects on site nutrient levels. The effects of any increased nutrient levels due to the prescribed burning would likely be indistinguishable from natural fluctuations in nutrient levels, unlike the expected short-term spike in nutrient levels from the Marston Fire. Given the distribution over time and space of the proposed burn units and the dilution of any increased nutrients within aquatic habitats, any effects from nutrient increases would be minor or neutral.

Under Alternative 2, no changes to the existing condition are anticipated from proposed activities. However, similar to the effects described under the timber harvest, above, the lack of proposed management under this alternative makes the landscape susceptible to large-scale stochastic events.

Cumulative Effects to Threatened, Endangered, and Sensitive Fish Species

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 are described in the section titled "Summary of Existing Condition" below. The anticipated effects from proposed activities were added to the existing condition and described in the section titled "Summary of Direct and Indirect Effects of the Action Alternatives on the Existing Condition". Then the impacts of current and reasonably foreseeable actions are added to the effects described in the direct and indirect effects section below. The sum of all these effects is the cumulative effects.

All past actions that have occurred in the project area are listed in Appendix 1. Given that fish inhabit most of the streams in the project area, all activities within these drainages were considered to be relevant to this analysis, as they could have some incremental effect on aquatic conditions and/or populations. Based on past monitoring of stream flows, aquatic habitat, and aquatic populations, all laws, regulations, and policies regarding the fishery resource would be adhered to under the implementation of any of the action alternatives. Below is the rationale for this conclusion.

Summary of Existing Condition

Past federal and private vegetation management within the project area occurred on approximately 26,000 acres, or roughly 15% of the project area. Fish population data indicate

stable fish populations. Aquatic habitat data (Fisheries Table 2) show that habitat conditions have remained stable or improved in most streams within the analysis area. Hydrologic data (see Water Resources section) also indicates that physical stream conditions are currently providing suitable habitat and based on their current stability, are expected to continue to provide suitable habitat in the future. Cumulatively, this assessment of existing conditions considers the activities found in Appendix 1 in the FEIS within the Galton project area watersheds, in addition to the roads and trails, cattle grazing, private and state land activities, and all climatic and environmental variables that are outside of human control.

Summary of Direct and Indirect Effects of the Action Alternatives on the Existing Condition

All action alternatives would add negligible effects to streams within the analysis area in the long-term. Stream flow changes, in light of current stream data, should not produce any negative effects to aquatic habitat because they are within historic ranges and below levels of peak flow increase that monitoring has shown to not degrade channel conditions. BMP implementation would minimize any potential management-related increase in sediment from reaching the stream network over the long-term. Changes in RMO attainment have not been tied specifically to any type of management. According to the PIBO EM report (2008), nine of the eleven parameters examined showed favorable trends between the original sample period in 2001 or 2002 and the revisit in 2006 or 2007. Of the nine improved parameters, four had statistically significant improvements. One negatively trending parameter (residual pool depth) had a statistically significant change, but the trend was the same for managed and unmanaged streams, likely due to a lack of scouring flows prior to the revisit surveys. In light of the PIBO EM data and current site-specific habitat, hydrologic, and fish population data, it is unlikely that any action alternative would have a measurable negative impact on aquatic habitat, population numbers, or population viability. Despite not meeting all the RMOs, these streams are providing stable habitat that has changed very little or improved in the last ten years despite wildfires, timber harvest, prescribed burning, and road maintenance activities, while fish populations have remained stable.

Salvage of Incidental Mortality from Underburning

Alternatives 1 and 3 would authorize salvage of mortality that occurred during fuel treatments. There are 16 criteria listed on page 14 of the FEIS that would need to be complied with prior to any salvage occurring. These criteria provide for the protection of resources and compliance with Forest Plan direction; therefore, salvaging incidental mortality would have no further effects to riparian, aquatic habitat, and aquatic species habtiat conditions. This activity would not occur under Alternative 2, so no effects would occur if Alternative 2 is selected.

Cumulative Effects

The spatial and temporal boundaries for this analysis are the same ones used for the analysis of direct and indirect effects. These boundaries are discussed under the *Affected Environment* section of this analysis.

Effects of Current and Reasonably Foreseeable Actions

Vegetation Management and Fuels Reduction - All proposed vegetation management listed in Chapter 3 was considered in this analysis. It was determined that these activities would not increase ECAs beyond historic ranges (refer to Water Resources section). Due to the limited scope, types of activities listed, and the location of the activities (e.g., away from streams and lakes), effects to aquatic species populations and habitat would be negligible.The Forestwide Young Growth Vegetation Management project would have no measurable effects due to the

small scale of treatments, the minor amount of crown removal associated with these treatments. Further, the use of RHCAs would provide adequate vegetative buffer strips to preclude the delivery of sediment into streams from vegetation management and fuels reduction activities. Burning associated with post-harvest fuel treatment and maintenance does not result in crown removal that would change water yields, and sediment outputs are negligible, based on past experience with these activities.

Ten Lakes Travel Management Project - The Ten Lakes Travel Management Project will address over-snow and mechanized travel planning for the Ten Lakes area. The area affected by the proposal includes the Ten Lakes WSA and areas with common entrance points to the WSA. There are three main over-snow entrance points to the Ten Lakes WSA: the Grave Creek corridor; Clarence and Stahl Creek; and the Burma/Blacktail area. Over-snow travel is currently not limited. Mechanized use (primarily mountain bicycles) is also unrestricted. The alternatives contained in the Ten Lakes Travel Management Draft Environmental Impact Statement contain various amounts of over-snow and mechanized travel for the project area. A final decision has not been made for this project and the cumulative effects analysis utilizes the Proposed Action as the basis for the analysis in the Galton Vegetation Management Project. The cumulative effects of the Ten Lakes Travel Management Project in conjunction with past, present, reasonably foreseeable actions would result in no effects for riparian, aquatic habitat, and aquatic species. This is due to the fact that this project would result in only administrative changes and no new ground-disturbing activities.

Cattle Grazing - The Grave Creek Allotment is the only allotment within the project area and currently allows up to 100 cow/calf pairs to graze from May 15 to September 30. Grave and Deep creeks bound the allotment on the north and south, respectively, and are the only fish-bearing streams within the allotment. Sediment levels in Grave and Deep creeks are very low (<5%) and aquatic habitat in both streams does not show any negative effects from grazing. Steep topography adjacent to both streams limit access for cattle. The amount of grazing is not expected to increase within the next ten years, therefore it is expected that there will be no cumulative effects from grazing.

Noxious Weed Treatments - The control of noxious weeds on National Forest System Land is an ongoing activity that normally occurs from late spring to early fall. Most herbicide treatments are conducted along existing roads; some treatments occur in harvest units. The 2007 Kootenai National Forest Invasive Plant Management ROD (USDA Forest Service 2007) provides direction for noxious weed control on the district. Noxious weed control is expected to continue over the next 10 years. This activity is expected to contribute negligible effects to the fisheries by following the modeled limits for treatment acreages, in addition to all design criteria in the 2007 Kootenai National Forest Invasive Plant Management FEIS. More specifically, no effects to fisheries resources are expected from this activity because: 1)1/20th of the LC50 (concentration of herbicide needed to kill 50% of fish in 96 hours of exposure time) provides a large measure of safety in order to prevent negative effects on fish, and to account for other unforeseen activities; 2) modeling watersheds at low flows (near baseline) limits treatment acres; and 3) the use of LC50 values with 96-hour exposure times is well beyond the exposure time anticipated to occur in the field.

Wildfires and Fires Suppression - Fire suppression effects are not site-specific enough to determine precise effects. However, in general, fire suppression personnel attempt to mitigate their effects to aquatic resources through the use of Minimum Impact Suppression Tactics, screens on pump foot valves, hazardous material equipment at pump sites, placement of fire

suppression infrastructure outside of riparian areas, and the use of strategies and tactics that minimize ground disturbance (where safe and practical).

Aerial retardant drops on wildfires have occurred historically and are expected to continue in the analysis area. Frequency of aerial retardant drops is directly related to frequency of high-intensity fires occurring in the analysis area, which is difficult to predict. Retardant entering waterways can kill fish and other aquatic life, if concentrations are high enough. However, Fire Management Standard FM-3 in the Forest Plan states “Avoid delivery of chemical retardant, foam, or additives to surface waters.” With the implementation of this standard, no effects to aquatic habitat or populations are expected.

Helicopters dipping from any waterbody have the potential to spread aquatic nuisance species if their drop point is near another waterbody. However, aerial deployments of water are not to be within 300 feet of any waterbody, if the source is known to be occupied by aquatic nuisance species (R1 Aquatic Nuisance Species Prevention Strategy 2007). With the implementation of the Prevention Strategy, no negative effects to fish populations are expected with the use of aerial water delivery.

Road Management - Short-term sediment increases from road management activities would not likely affect fish populations negatively in the short- or long-term because: 1) fish can move downstream to where work-related sediments are more diluted; 2) fish can tolerate short-term sediment increases without having lethal effects on them; 3) all applicable BMPs would be implemented during these activities; and 4) the long-term benefits of reducing road failure risk and chronic sediment inputs outweighs any short-term sediment increases from road management activities.

Short-term sediment increases from road management activities would be expected in aquatic habitat. The level of sediment expected from these activities is very low and typically limited to several hundred feet of stream. This sediment would likely remain in those portions of streams until the next flushing flow. Given the expectation of low levels of sediment introduced into streams from road management activities, the long term benefits of reducing chronic sediment sources outweigh the short term influx of sediment with respect to aquatic habitat.

Recreation Maintenance - Routine maintenance will occur on approximately 159 miles of non-motorized trails in the analysis area. No effect on the fisheries resource is expected because of the scope of the activity (generally waterbar installation, clearing, or tread reconstruction with hand tools) and distance from streams. These activities do not produce sediment and are generally done in upland areas. Monitoring has shown no negative effects to aquatic habitat or fish populations as a result of these activities, which have occurred historically in the project area.

Special Uses - There are 26 special use permits/easements issued for various activities within the analysis area. These activities include road access to private property, water transmission pipelines, livestock areas, outfitter/guide services, an irrigation diversion, a powerline, and one area of cultivation. Most of these activities are in areas far-removed from waterbodies or limited in scope (e.g., hiking) and thus do not affect aquatic resources or retard attainment of RMOs.

One activity within the analysis area currently affecting aquatic resources is the Glen Lake Irrigation Diversion. The decades-old diversion originates from Grave Creek on NFS land and supplies water for agricultural and livestock purposes to users in the Tobacco Valley. Authorization for the diversion is through a special use permit. A fish screen was installed at the diversion in the year 2000 to substantially reduce the possibility of fish entering the ditch (a term

called “entrainment”). However, total elimination of fish entrainment was not possible because fish screens with a reduced mesh size capable of screening out all sizes of fish would not meet the permitted water volume needs of the irrigation district. Thus, some small (~25-50 mm) bull trout fry are still being entrained. Resource agencies and the Glen Lake Irrigation District continue to explore alternatives to further reduce bull trout and other fish entrainment.

Public Use - Recreational use of the project area is expected to include hiking, camping, fishing, hunting, photography, small forest product gathering, Christmas tree cutting, firewood gathering, driving for pleasure, mountain biking, sight-seeing, wildlife viewing, cross country skiing, snowshoeing, trapping and snowmobiling. These activities are expected to continue over the next ten years. Some levels of use for certain activities may increase because of the increasing number of people moving to local communities. This is not expected to have an effect on the fisheries resource because none of these activities retard the attainment of RMOs or produce enough sediment to impact aquatic habitat or populations. These activities have been ongoing for many years in the project area and long term monitoring has indicated no negative effects on aquatic species populations or aquatic habitat.

Private Property - The addition of two new residences a year per planning area will likely not have any cumulative effects on aquatic habitats. Residences constructed proximate to streams can influence characteristics within RHCAs (e.g., removal of riparian vegetation, stream bank alterations); however, all private parties are bound by county, state, and federal laws regulating activities near streams. The permitting process for private parties to modify stream characteristics is quite rigorous and proposed projects are well-reviewed. In addition, private landowners cannot be in violation of the Endangered Species Act. Therefore, no effects to aquatic populations or aquatic habitat are expected.

Other Agency Activities - Activities on state lands within the project area include a grazing lease, land use license for a golf course, and some tree planting. These activities are very limited in scope and are not near any waterbodies. These activities have occurred historically, are expected to continue, and have had negligible effects on aquatic habitat or populations in the analysis area. Therefore, no cumulative effects to aquatic habitat or populations are expected.

Montana Fish, Wildlife and Parks owns and maintains several sections of land within the project area. No actions are planned at this time, thus no cumulative effects to aquatic habitat or populations are expected.

This project is adjacent to the US/Canada Border and receives a substantial amount of year-round use by the Department of Homeland Security and Forest Service Law Enforcement. This use is expected to continue in the area. Law enforcement activities do not interfere with the attainment of RMOs or affect aquatic populations or habitat, due to the scope (primarily patrolling and law enforcement exercises) and duration of activities. Past monitoring has indicated these activities have not affected bull trout or westslope cutthroat trout populations or their habitats. Thus, no negative effects to aquatic resources are expected.

Summary of Cumulative Effects

In summary, it is possible that fire suppression could reduce short-term aquatic habitat and have effects to individual fish during a fire. However, these effects may or may not occur during the time-frame of this project due to a lack of fires or the location and size of fires that do occur within the analysis area. Road management activities would also have short-term effects to aquatic habitat and individual fish at a site-specific level, typically at a very small scale (several

hundred feet). These effects, in addition to the effects from past and current activities, are expected to have a negligible effect on aquatic populations, but may have minor and short-term effects at small spatial and individual scales. These effects would not transfer to population level effects, nor would they affect aquatic habitat at the reach scale. Therefore, population viability and stream level habitat productivity are expected to be maintained under any of the alternatives described in this document. This is supported by the fact that similar levels of all of these activities have occurred at some point during the monitoring period where habitat and fish populations have remained stable or increased.

Statement of Effects

Alternatives 1 and 3 may impact individuals, but would not contribute to a loss of population viability for westslope cutthroat trout and western toad or result in a trend toward federal listing. This determination is based on: 1) these alternatives having immeasurably low effects on aquatic systems within the analysis area; 2) utilization of RHCAs that would protect riparian systems, filter sediment from management activities before it would reach live water, and maintain habitat characteristics needed by westslope cutthroat trout; and 3) road maintenance and BMP improvements should decrease risk of long-term road-related sediment delivery to streams within the analysis area. This assessment serves as the biological evaluation for westslope cutthroat potentially affected by this project.

Alternative 2 would have no impact on westslope cutthroat trout. This determination is based on: 1) no new disturbance because of no proposed activities; 2) sediment levels in streams are expected to decrease slightly with road maintenance; 3) other routine management activities (road maintenance, planting, thinning, etc.) are low impact and improve watershed conditions.

Consistency with Regulatory Framework

Endangered Species Act - Threatened and Endangered Fish Species

Currently, the Grave Creek and Wigwam River watersheds are strongholds for bull trout in the upper Kootenai River basin. Abundance of spawners migrating to natal streams has increased since the formation of Lake Koocanusa and federal listing of the species. Ongoing habitat surveys have consistently documented high-quality bull trout habitat in Grave Creek and its tributaries. Alternatives 1 and 3 may affect, but not likely adversely affect bull trout or critical habitat for the following reasons: 1) none of the alternatives would increase ECAs outside of historic ranges; 2) the distance to suitable habitat from any proposed harvest activities; 3) the use of RHCA buffers would preclude sediment delivery to streams; and 4) in the action alternatives, bringing roads up to BMP standards would be a long-term benefit to aquatic habitat.

Alternative 2 would have no effect on bull trout or critical habitat due to the lack of new activities. Any effects due to a lack of action are generally dependent on climatic or stochastic events that are not predictable in time, space, or scale. Therefore, effects are impossible to quantify.

National Forest Management Act

On December 18, 2009 the Department of Agriculture issued a final rule reinstating the National Forest System Land Management Planning rule of November 9, 2000, as amended (2000 rule) (74 FR 242 [67059-67075]). The 2000 rule states: Projects implementing land management plans must comply with the transition provisions of 36 CFR §219.35, but not any other provisions of the planning rule. Projects implementing land management plans must be developed considering

the best available science in accordance with §219.35(a). Projects implementing land management plans must be consistent with the provisions of the governing plans. Based on the reinstated 2000 planning rule this project level analysis:

1. Considers the best available science in evaluating the effects on the species and;
2. Considers how the action complies with applicable standards and guidelines in the Forest Plan.

In addition, the analysis considers how the action provides 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, and within the multiple use objectives of a land management plan adopted 16 USC 1604 (g)(3)(B).

Fish population surveys within analysis area streams clearly indicate stable populations of westslope cutthroat trout (native sensitive species), brook trout (desired non-native species), and rainbow trout (desired non-native species). Multiple year classes of these species are present indicating successful survival, reproduction, and sustainability. These species are widely distributed across the analysis area, indicating diverse, suitable habitats that are providing the foundation for all life stages and life histories of native and desired non-natives fish species to thrive.

Forest Plan

Aquatic habitat surveys were conducted from 2001-2010 for streams within the Galton project area. Results of these surveys are shown in Fisheries Table 3-2. RMO attainment has generally remained the same or improved over time. RMO attainment is not expected to be retarded due to actions from any action alternative for the following reasons: 1) use of RHCAs that would protect riparian vegetation and provide a buffer to minimize potential land management effects on streams; 2) multi-region data analysis shows that where INFISH is being implemented, stream conditions are improving in both managed and unmanaged streams; and 3) management would not change ECAs above a point where they would negatively affect stream channels. All Alternatives would be consistent with the Forest Plan because none of the proposed actions would retard the attainment of RMOs.

Riparian

Alternatives 1 and 3 would help achieve GOAL-RIP-1 and FW-DC-RIP-01 through 05 by maintaining appropriate RHCAs around all waterbodies. Alternative 2 would help maintain this goal and desired conditions through passive management in the short-term. All Alternatives would help achieve FW-OBJ-RIP-01 by maintaining riparian habitat in different ways and by different amounts. Alternatives 1 and 3 may remove excess fuels in some RHCAs through burning or harvesting units up to the SMZ boundary to improve riparian conditions. Alternative 2 would maintain riparian habitats passively in the short-term. Alternatives 1 and 3 were designed in exact accordance with FW-STD-RIP-01 and 03, and FW-GDL-RIP-01, 04, and 05. FW-STD-RIP-02 and FW-GDL-RIP-02 and 03 do not apply to this project because no riparian areas were identified as not functioning, no grazing is being proposed, and fire suppression is outside the scope of this project, respectively. Alternative 2 cannot follow any of the riparian standards and guidelines because there are no activities proposed.

Aquatic Habitat

Alternatives 1 and 3 would make progress toward GOAL-AQH-01 through BMP improvements to roads. Alternative 2 would be neutral toward helping achieve this goal through inactivity. Alternatives 1 and 3 would help achieve FW-DC-AQH-01, 02, 04, and 05 through BMP improvements, use of appropriate RHCAs, and by maintaining ECAs within historical ranges. Alternative 1 helps achieve FW-DC-AQH-03 in more watersheds and to a greater degree than Alternative 3, which helps achieve the desired condition in more watersheds and to a greater degree than Alternative 2. This is for the same reasons as Desired Conditions 01, 02, 04, and 05. Alternatives 1 and 3 would help achieve FW-OBJ-AQH-02 in the long-term and Alternative 2 would achieve this in the short-term and possibly the long-term. FW-OBJ-AQH-01 and 03 do not apply to this project.

Aquatic Species

Alternatives 1 and 3 would help achieve GOAL-AQS-01 by maintaining native aquatic species through time by actively managing the landscape to limit the effects of stochastic events. Alternative 1 accomplishes this to a greater extent than Alternative 3. Alternative 2 achieves the maintenance of native aquatic species through passive management in the short-term. This alternative has much greater risk of not being able to maintain aquatic species over time due to an increased risk for stochastic events occurring. Alternatives 1 and 3 help make progress toward achieving FW-DC-AQS-01, 02, 03, 04, 05, and 07 through actively managing the landscape to limit the negative effects of future, large, stochastic events (i.e. wildfire). Alternative 2 would maintain these Desired Conditions in the short-term, but at a greater risk of more severe effects from future, large wildfires. FW-DC-AQS-06 does not apply to projects upstream of Libby Dam. Alternatives 1 and 3 would contribute toward meeting FW-OBJ-AQS-01; however, these alternatives do not propose enough management in any watershed to change the condition rating. Alternative 2 would not contribute toward, nor prevent the attainment of this objective. Alternatives 1 and 3 are designed in accordance with FW-GDL-AQS-01 and 02 for management activities. These guidelines do not apply to Alternative 2, as it does not propose any management activities. The fire suppression aspect of FW-GDL-AQS-02 does not apply to any of these Alternatives.

Recreational Fisheries Executive Order and Stewardship Initiative (Executive Order 12962)

All streams and lakes identified within the analysis area are open to recreational fishing for some, if not all, fish species. None of the proposed alternatives would degrade aquatic habitat measurably. By not retarding the attainment of RMOs, aquatic habitat conditions within the analysis area are expected to maintain or improve. Concurrent with the maintenance of habitat conditions, it is reasonable to expect that fish populations would remain stable, thus maintaining recreational fishing opportunities.

Alternatives that change the current accessibility to fisheries resources can also impact recreational fishing opportunities. None of the Alternatives would change the current accessibility to fisheries resources, so no change in this is expected.

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 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 Forest Plan, such as those proposed by the Galton Vegetation project, would provide a diversity of habitat conditions for the numerous wildlife species that inhabit the Forest. The Galton Vegetation project's preferred alternative, Alternative 3, proposes approximately 2685 acres of harvest and 1,996 acres of non-harvest fuels treatments, including about 1,682 acres of ecosystem burns, 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 Forest Plan desired conditions.

Many of these 300 species of wildlife occur within the 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 are 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."

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. The wolverine is currently proposed for listing under the 2013 proposed ruling.

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 (Threatened, Endangered and Proposed (T, E & P) Species Table 1). The species list comes from the USFWS Montana Ecological Services Field Office website, www.fws.gov/montanafieldoffice/, which is current as of January 2016.

T, E, and P Species Table 1. Threatened, Endangered, andProposed Terrestrial Wildlife Species in the Galton Project Area

Species	Determination*	Comments
Grizzly Bear (Ursus arctos horribilis) Threatened	MALAA – Alternative 1 MANLAA – Alternative 3	Grizzly bears and their home ranges are documented within the project area.
Canada Lynx (Lynx canadensis) Threatened	MALAA – Alternative 1 MANLAA – Alternative 3	Lynx presence documented within the project area.
Canada Lynx Critical Habitat	MALAA – Alternative 1 MANLAA – Alternative 3	The analysis area is located in designated critical habitat within Northern Rocky Mountains Critical Habitat Unit #3.
Wolverine (Gulo gulo) Proposed	WNJCE – Alternative 1 WNJCE – Alternative 3	Wolverine presence documented within the project area

* Determination Key: MALAA = May Affect, Likely to Adversely Affect and MANLAA = May Affect, Not Likely to Adversely Affect and WNJCE = Will Not Jeopardize the Continued Existence

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. 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.

Summary of Conclusions

The Galton Vegetation Project's proposed activities would move treated stands towards more 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. Also, large blocks of Core habitat are available within both sub-BMUs would remain available for bears should they be temporarily displaced during activities. There would be minor short term temporary changes to habitat parameter levels in Alternative 3 during project activities that would return to the existing condition post-project in the BMU. Therefore implementation of Alternative 3 would result in a determination of may affect, is not likely to adversely affect grizzly bears. Summer time harvest of one unit in Core is proposed in Alternative 1 that may result in adverse effects to grizzly bears during that timeframe. Therefore implementation of Alternative 1 would result in a determination of may affect, is likely to adversely affect grizzly bears; Alternative 2 would have No Effect, due to lack of action.

Regulatory Framework

Forest Plan

The 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. It also 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:

FW-DC-WL-04	FW-STD-WL-02	FW-STD-WL-03
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 majority of the proposed Galton Vegetation project is located in the Northern Continental Divide Ecosystem (NCDE) grizzly bear recovery zone. A smaller part of the project area is located south of the recovery zone and includes a portion of the Tobacco BORZ, as defined in the Forest Plan grizzly bear access management direction. Separate analyses were done for the area within the recovery zone and the area within the Tobacco BORZ.

Inside the Recovery Zone

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 Forest Plan identifies five potential key stressors under Forest Service control: 1) attractants, 2) road impacts,3) motorized over-snow vehicle use after spring emergence, 4)livestock/grizzly bear interaction, and 5)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 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 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."

Effects analysis for the Galton Vegetation Project considers the potential key stressors, compliance with management direction, and best science. In addition, potential effects from agency implemented or permitted activities (e.g., disturbance effects from timber harvest) will be addressed.

Outside the Recovery Zone

The Tobacco BORZ is located outside the recovery zone or sub-BMUs, but within the project area. The analysis for this area will focus on access management and attractants.

Interagency grizzly bear management guidelines (IGBC 1986) have been incorporated into the Forest Plan (FW-GDL-WL-15). The NCDE Grizzly Bear Conservation Strategy is currently in a draft form, and would be incorporated as an amendment to the Forest Plan once the grizzly bear in the NCDE is delisted. The Galton project's alternatives were designed with consideration of the elements in this strategy (FW-GDL-WL-15).

Resource Indicators and Measures

Inside the Recovery Zone

For the grizzly bear analysis within the recovery zone, the parameters of Core, Open Motorized Road Density (OMRD), and Total Motorized Road Density (TMRD) (FW-STD-WL-03) 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 T&E Species Table 2) for the habitat parameter of Core (changes in percent 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-03. 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 (stressors identified in the Forest Plan such as attractants, forage and cover, movement, denning habitat) and the potential for mortality. These are assessed in the effects section to follow.

T & E Species Table 2. Resource Indicators and Measures for Assessing Effects (inside the recovery zone).

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	FW-STD-WL-03
Core Habitat	Changes in the acres of Core Habitat in the BMU	Acres Core Habitat	Purpose and need	FW-STD-WL-03
OMRD	Changes in the percent OMRD in the BMU	Percent OMRD	Purpose and need	FW-STD-WL-03
TMRD	Changes in the percent TMRD in the BMU	Percent TMRD	Purpose and need	FW-STD-WL-03
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	FW-DC-WL-19

Outside the Recovery Zone

Tobacco BORZ

The project area lies mainly within the Northern Continental Divide Ecosystem, however a portion of the project lies outside of any recovery zone. Grizzly bear use of lands outside known recovery zones has been recognized and documented for many years. The Forest Plan Access Management direction looked at these areas, referred to as bears outside recovery zones or BORZ polygons. The project lies within one of the four BORZ polygons identified on the forest, the Tobacco BORZ. Within each polygon, baseline conditions have been established for access, attractants and livestock presence. There is to be no net increase in the established baseline conditions for open or total miles in these areas. Attractants and livestock presence have also been identified as potential stressors that are under FS control in these area as well.

T & E Species Table 3. Resource Indicators and Measures for Assessing Effects (outside the Recovery Zone).

Resource Element	Resource Indicator	Measure	Used to Address: P/N or Key Issue?	Source
Access	Linear miles of open and linear total miles are not to increase	Total miles of open roads; Miles of all (total open and closed).	Purpose and need	FW-STD-WL-02
Attractants	Changes in the Presence of Attractants	Attractants created	Purpose and need	FW-STD-WL-02
Livestock Presence	Changes to Livestock Presence	Increase in numbers/type of livestock	Purpose and need	FW-STD-WL-03

Methodology

In 1994, the Interagency Grizzly Bear Committee (IGBC) created a taskforce to evaluate current state and federal procedures for evaluating the effects of motorized access on grizzly bears within recovery areas. A revised final report from this taskforce was completed in 1998 (IGBC, 1998), and included standardized recommendations and definitions established to provide consistent methods of analyzing and displaying the effects of human access on grizzly bear habitat. These recommendations were based on the Mace and Manley (1993) progress report from research on grizzly bears in the South Fork of the Flathead River which introduced the concept of using a "moving window" GIS-based analysis to quantify Open Motorized Road Density (OMRD) and Total Motorized Road Density (TMRD), as well as defining areas free of motorized access (Core areas). In 1995, the Flathead National Forest produced a Biological Assessment for an amendment to their Forest Plan (A19) using the moving window analysis approach and applying findings of Mace and Manley to determine a Core: OMRD: TMRD standards for BMUs within the NCDE on the Flathead National Forest. Other Forests within the NCDE (including the Kootenai's portion of this ecosystem) followed the 1998 IGBC recommendations as "best science". The 2011 Access Amendment amended the Forest Plan and replaced the required linear road density and habitat effectiveness analysis within grizzly bear habitat with the moving window analysis described above and established Core, TMRD and OMRD parameters for the Krinklehorn and Therriault sub-BMUs.

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 the totals presented for each area may not match the overall totals for each alternative as provided in Chapter 2.

Data Sources

Grizzly bear population ecology, biology, habitat description and relationships identified by research are described in USFWS (1993), Mace, 2011, annual progress reports and Kendall et al. 2009 for the Northern Continental Divide Ecosystem (NCDE). They are also described by the

Kootenai National Forest Plan Amendment for Motorized Access management Within the Selkirk and Cabinet-Yaak Grizzly Bear Recovery Zones (2011) and corresponding biological opinion (USFWS 2011), herein referred to as the Access Amendment. That information is summarized below. Grizzly bear occurrence data comes from recent District wildlife observation records, Forest historical data (NRIS Terrestrial), and other agencies (USFWS, 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 majority of the proposed project is located in the Northern Continental Divide (NCDE) grizzly bear recovery zone (USFWS 1993). The NCDE 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.

Grizzly bear habitat in the NCDE was initially delineated into BMUs or Bear Management Units. It was then further divided into sub-BMUs to better reflect grizzly home range sizes. On the Fortine Ranger District, the Murphy BMU is the portion of the NCDE that occurs on the KNF and is made up of the. Therriault and Krinklehorn sub-BMUs (Map 18) which will each be analyzed separately.

Breaking the ecosystem down into smaller units, i.e. Bear Management Units or sub-BMUs (NCDE) allows for analysis to consider effects associated with the activity's area of influence and so that potential effects will not be minimized by considering too large an area (IGBC 1990). These units 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 these 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, national or state forests.

Christensen and Madel (1982), in Cumulative Effects Analysis Process chose a 515,000 acre cumulative analysis area which represented 56% of the Cabinet-Yaak recovery zone and was the focal point of mineral exploration and development on the forest. In this analysis it was assumed that if each smaller bear unit within that analysis area is maintained in a viable condition, the total of all bear units would remain a viable habitat. This well-established premise led to the establishment of the sub-BMU in the NCDE as the analysis area for analyzing and monitoring effects, including cumulative effects, to the grizzly bear (IGBC 1994, McMaster 1995, IGBC 1998).

Project activities are proposed both inside and outside of the Therriault and Krinklehorn sub-BMUs. Proposed harvest in these areas would occur adjacent to main roads, and are adjacent to large blocks of core. Two large contiguous blocks of core, over 35,000 acres each, are located adjacent to all proposed timber harvest in both sub-BMUs, providing large blocks of secure habitat. Other, smaller blocks of Core are found within both these areas and would provide additional secure habitat. Any bears potentially displaced during project activities would likely

move to the interior of the BMUs to these large, unroaded areas that are currently providing secure habitat. Therefore, affects to bears in the recovery area will be assessed on each of the sub-BMUs, Therriault and Krinklehorn.

The analysis also includes portions of the Tobacco BORZ, as defined by the Forest Plan Access Management direction. (Map 18). Grizzly bear use in this area is known to occur and generally thought to be used as portions of bear home ranges which also include the recovery area. These areas are also thought of as connectivity areas between the NCDE and the Cabinet Yaak Ecosystem (CYE). Because each BORZ polygon has established parameters for access, effects to bears in this area will be assessed on the entire Tobacco BORZ polygon.

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, and harvest 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 15-20 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.

Existing Condition – Inside Recovery Zone

Introduction

There are two grizzly bear recovery zones on the KNF, the CYE and the NCDE. The project area encompasses a portion of the NCDE. The portion of the NCDE that is on the KNF is only 2% of the entire NCDE Recovery Zone. Habitat conditions in this area have improved over the last 20 years as documented by annual Kootenai Forest Plan Monitoring Reports (monitoring item C7). USFWS (1993) estimated that there were between 549-813 bears within the whole ecosystem. More recent information (Kendall et al. 2009) estimated there were 765 bears within the ecosystem in 2004 and a minimum of 15 unique grizzly bear were known to have used the project area. After 7 years of grizzly trend monitoring work, the results estimate that there are over 1000 grizzly bears residing in and adjacent to the NCDE recovery area, and the population is growing at a mean annual rate of approximately 3% (Mace, 2011). District sighting reports and Forest Plan monitoring have also shown that the number of grizzly bear sightings on the District have increased over the last 25 years. Information also suggests the NCDE grizzly bear population is also expanding its range. A mapping effort in 2002 (Wittinger et. al., unpublished report) used five years of data to map the area outside the grizzly bear recovery zones where grizzly bears were consistently being documented. Results indicated a relatively recent (10 to 15 years) of expansion of grizzly bears outside the NCDE recovery zone boundaries to the east, south and west (Tobacco BORZ). These results have been consistent with observations on the Fortine and Rexford District south and west of the BMU, as well as increased bear management actions on private land.

Human use patterns in these areas can be characterized by dispersed recreation accessing the area by the one main open road dividing the two BMUs, limited spur roads off the main road, as well

as roads accessing the southwest edge of both BMUs. A network of non-motorized trails allows access to the interior of both sub-BMUs. There has been a consistent but not overwhelming human presence.

The majority of the Galton Vegetation Project Area (much of which includes the two sub-BMUs) lies within Inventoried Roadless areas, or MAs with a non-motorized management emphasis (MA 5a, and 1c). Much of the past timber harvest within the Galton Vegetation Project Area occurred below 4000 feet, outside of the BMUs. Because of the management emphasis, and inaccessibility of much of the Project Area's land base, very little timber harvest or road building has occurred in the higher elevations, with much of it adjacent to the existing open roads.

Causes of grizzly bear mortality have generally been due to factors beyond Forest Service control (e.g. train collision, hunter mistaken identity or defense of life and illegal kill by a human). Much of the recent bear mortality continues to be associated with conflicts arising from attractants on private land.

Grizzly Bear Occurrence

Throughout the majority of the Therriault sub-BMU, highly suitable habitat occurs and seasonal or yearlong grizzly activity is common. Over the last 10 years, numerous grizzly sightings have been recorded including grizzly bear family sightings (females with young) within and adjacent to the BMU (sighting information located in permanent District files). There were also two documented grizzly bear mortalities in this area within the last 10 years.

The Krinklehorn sub-BMU also contains highly suitable seasonal and yearlong habitat. Over the last 10 years, numerous grizzly sightings have been recorded including grizzly bear family sightings (females with young) within and adjacent to the sub-BMU (sighting information located in permanent District files). Within this sub-BMU, there were no documented grizzly bear mortalities within the last 10 years.

Description of Analysis Areas

Both the Krinklehorn and Therriault sub-BMUs are entirely located within the Fortine Ranger District and are located entirely within the 127,380 acres of National Forest in the project area. Their northern boundary is shared with the district boundary as well as the U.S./Canada border (Map 18). The Tobacco BORZ is larger than the Project area. The Galton Project area encompasses only 2% of the Tobacco BORZ which includes NFS lands making up the southern portion of the Fortine and Rexford Ranger district.

Within the Recovery Zone

Key Stressors and 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 goal is accomplished by addressing and mitigating the key stressors described above and achieving goals, desired conditions, objectives, standards, and guidelines identified by the Forest Plan applicable to grizzly bear recovery.

1) Attractants

Implementation of 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.

Twelve Forest Service facilities or permitted facilities are found within or along the boundary of the sub-BMUs. These include three small fee campgrounds, five dispersed campgrounds, three lookouts, (one a rental), and two FS cabins (non-rentals). There are also a number of dispersed camping sites in this area as well. All facilities within the Project Area require users to pack out their garbage. In addition, food storage lockers were installed in major campgrounds and campsites within both sub-BMUs to keep attractants unavailable to bears. Major backcountry camp sites also have food storage poles to help users manage their attractants. Minimal conflicts between humans and bears have been reported in either sub-BMU. Attractants can also include such items as garbage collection sources. There are no garbage collection sites or food storage sites within either sub- BMU.

In 2011, the Kootenai National Forest signed a Food Storage Special order # F14-083-L-11. This order enacts occupancy and use restrictions on the entire Kootenai National forest designed to minimize adverse interactions between humans, bears and other wildlife and to provide visitor safety. This order required that food attractants (human, pet and livestock food) and refuse be stored in a bear-resistant manner. This order has been incorporated into all permits and contracts the Forest currently has and will authorize in the future.

Other primary sources of attractants in the area would be associated with the private homes located along the southeast 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. Taking into consideration the status of the habitat components listed above, mortality risk to the bear is generally low throughout most of BMU.

2) Road Impacts

Current management of motorized routes, primarily roads, within grizzly bear habitat on the KNF is guided by the 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 0.3 mile away from motorized roads and trails indicates the existing habitat parameter levels in the analysis area (see project file for habitat parameter outputs).

The following analysis describes the existing condition for each sub-BMU and how those conditions meet the standards relating to access (FW-STD-WL-03) T &E Species Tables 4 and 5 below summarize the parameters of the grizzly bear analysis by BMU. Following that are general objectives followed by a description by BMU to discuss how these standards are met.

T & E Species Table 4. Existing Habitat components and objectives for Therriault sub-BMU

Habitat Component	Existing	Objective
Core (% of BMU)	71%	>71%
OMRD (% BMU > 1 mi./sq. mi.)	23%	<23%
TRMD (% BMU>2 mi./sq. mi)	10%	<10%

T & E Species Table 5. Existing habitat components and objectives for Krinklehorn sub-BMU

Habitat Component	Existing	Objective
Core (% of BMU)	75%	>75%
OMRD (% BMU > 1 mi./sq. mi.)	18%	<18%
TRMD (% BMU>2 mi./sq. mi)	11%	<11%

A. Core Areas: The requirements of a core area include: no motorized access (roads or trails) during the active bear season (4/1 thru 11/30); core must be at least 0.3 miles from open or gated roads or high use trails; and consists of habitat blocks that are at least 2500 acres in size. The goal is to maintain core at the listed objective level or higher. Another goal is no net loss of core area on federal ownership within the BMU. Core habitat blocks function as displacement areas for grizzly bears. The amount of core habitat can increase or decrease with activities that open or restrict roads/trails to motorized use. Refer to Map 19 for the map showing the existing core habitat. The adjacent sub-BMUs on the Flathead National Forest are managed under Amendment 19 (A-19) which gives management parameters for Core, TMRD and OMRD and were based on grizzly bear studies done in the NCDE (Mace and Manley, 1993). This amendment requires that core areas on the Flathead strive for 68% or more of their sub-BMUs function as core habitat. Both the Therriault and Krinklehorn sub-BMU core levels are well above this level.

Therriault sub-BMU - Seventy-one percent of the Therriault sub-BMU provides core habitat which meets FW-STD-WL-03 (T&E Species Table 4). There are no high use trails within the sub-BMU. There is one large block of core within this area that totals approximately 42,000 acres and portions of two others adjacent to the Flathead NF and Canada that each total at least 2500 acres.

Krinklehorn sub-BMU - Seventy-five percent of the Krinklehorn sub-BMU provides core habitat which meets FW-STD-WL-03 (T&E Species Table 5). There are no high use trails within the sub-BMU. The There is one large block of core within this area that totals approximately 35,490 acres (75% of the entire sub-BMU). This core block runs north and south and extends east-ward onto the Flathead NF and Stillwater State forest, making this block even larger.

B. OMRD: Open Motorized Route Density is calculated on a sub-BMU basis using moving window analysis. Using the definitions found in the 1998 IGBC Motorized Access Management Taskforce Report, OMRD includes open roads, other roads not meeting all restricted or obliterated criteria, and open motorized trails. The desired condition (GA-DC-WL-TOB-03) is to retain the current levels (FW-STD-WL-03) of OMRD on National Forest System Lands within the sub-BMUs. Density is displayed as a percentage of the sub-BMU in a defined density category OMRD can increase or decrease with activities that open or restrict roads/trails to motorized use. Refer to Map 20 for the map showing the existing OMRD.

Therriault BMU - The existing OMRD for the Therriault sub-BMU is 23%, which meets OMRD direction. There are no motorized trails within the BMU.

Krinklehorn BMU - The existing OMRD for the Krinklehorn sub-BMU is 18%, which meets OMRD direction. There are no motorized trails within the BMU.

C. TMRD: Total Motorized Route Density is calculated on a sub-BMU basis using moving window analysis. TMRD includes all open and restricted roads and motorized trails (IGBC 1998). The desired condition (GA-DC-WL-TOB-03) is to retain the current levels (FW-STD-WL-03) of TMRD on National Forest System Lands within the sub-BMUs. Density is displayed as a percentage of the sub-BMU in a defined density category. TMRD can increase or decrease with activities that construct or decommission roads and motorized trails. Refer to T & E Species Map 21 for the map showing the existing TMRD.

Therriault sub-BMU - The existing TMRD for the Therriault sub-BMU is 10%, which meets TMRD direction.

Krinklehorn sub-BMU - The existing TMRD for the Krinklehorn sub-BMU is 11%, which meets TMRD direction.

The current grizzly bear population mean annual growth rate is estimated at 3% for this ecosystem (Mace et al., 2011). Because the growth rate is positive, it is believed that the existing Core, TMRD, and OMRD, levels are providing sufficient amount and distribution of habitat for bear use and minimizes the risk for human bear mortalities.

3) Motorized Over-Snow Vehicles

Over-snow motorized use during and after bears have emerged from their dens in the spring (typically after April 1st) has the potential to disturb bears, particularly females with cubs of the year still confined to the den vicinity during spring (Mace and Waller, 1997, Haroldson et al. 2002). It is therefore assumed that the greater impacts may occur during, or shortly after the den emergence period (primarily the month of April) and particularly for females with cubs of the year that are less mobile than yearlings or 2-year-old bears. There is a potential of separating a mother from the cub, which could result in cub mortality, although these affects have not been documented. No known grizzly bear mortality has been directly or indirectly attributed to people using snowmobiles anywhere in the NCDE (C.Servheen, electronic message. 2012). Currently, over-snow activities extend beyond the April 1 date and are limited only by snow conditions. Although currently much of the area within the Therriault an Krinklehorn sub-BMUs is open to over-snow vehicle use, approximately 21% of that is within potential denning habitat (Forest Plan). Of the 21% of potential denning habitat, much of this area is not actually useable by over-snow vehicles due to slope (steepness), vegetation (e.g. too densely forested), dangerous avalanche potential, and personal preference. Spring time use of the routes to these areas 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.

Although over the snow motorized use could occur beyond the April 1 date within core, the increasing grizzly bear population trend in the NCDE indicates that the current over-the-snow levels are not affecting grizzly bears in significant ways. This over-snow use has been occurring for several decades during the same period bear numbers have been increasing to the point of potential delisting in the near future. The project does not make decisions or changes to existing over-snow motorized use, and will therefore not be addressed further.

4) Livestock/Grizzly Bear Interaction

Although one grazing allotment does overlap in the Krinklehorn sub-BMU, the increasing grizzly bear population trend in the NCDE indicates that the current grazing levels are not displacing grizzly bears in significant ways and are not affecting vegetation enough to result in direct competition for forage species. The project does not make decisions or changes to grazing allotments, and will therefore not be addressed further.

5) Major Ground Disturbing Activities (Mining)

There are no large mining operations located within the project area nor are any proposed; therefore, this activity is not a key stressor for grizzly bears in the 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 both sub-BMUs. Both sub-BMUs contain one large contiguous core block that makes up the majority of the sub-BMUs. The Therriault sub-BMU includes one large core block which includes some lower elevation habitats along the foothills of the Galton range and includes high elevations in the Ten Lakes Wilderness Study Area, Ten Lakes Scenic Area and lies adjacent to Canada. The Krinklehorn sub-BMU also includes one large core block and includes some lower elevation habitat along the foothills of the Galton range and is adjacent to core habitat found on the Flathead N.F. and Stillwater State Forest.

The Ten Lakes Wilderness Study Area is located within the Therriault sub-BMU. It totals approximately 34,000 acres and its boundaries are generally within the identified core block. Recommended Wilderness (MA1b) was identified within approximately 16,000 acres of the Krinklehorn BMU with much of this acreage within the identified core block. Both sub-BMUs also contain IRA's or Inventoried Roadless Areas. Similarly, Management Area 5a is found within both core blocks. This MA also provides non-motorized access year-round. These large tracts of unroaded lands provide excellent habitat security, low levels of human disturbance, and functions as large remote areas for natural wildlife interactions.

Landscape Connectivity and Local Area Movement

The Forest Plan grizzly bear access management direction describes the importance of habitat connectivity or linkage for wildlife including the grizzly bear. Without this connectivity, species such as the grizzly bear, can be hindered physically (i.e.fitness and fecundity), demographically, and genetically (diversity/health). Habitat linkage or fragmenting factors that the Forest Service can address include the presence of highways, railways, forest roads, recreation developments and or use, and forest cover. These factors are addressed under the project based on their presence in the analysis areas (BMU / BORZ).

The Forest Plan's Geographic Area Direction identifies one movement area near the Galton Vegetation Project. Wildlife move between the large blocks of NFS lands across Highway 93 southeast of Murphy and Dickey lakes. (GA-DC-WL-TOB-02). This area was identified previously in July 2001 in the document "Identification and Management of Linkage Zones for Grizzly Bears Between the Large Blocks of Public Land in the Northern Rocky Mountains" (Servheen, et. al). The document identifies linkage zones based on landscape views from the Linkage Zone Prediction Model. The project area is included in the NCDE to Cabinet/Yaak

Linkage Zone Prediction Model. The linkage zone runs southeast of Trego to north of Olney and runs in a northeast to southwest configuration, across U.S. Highway 93 (Map 22).

On a sub-BMU scale, the Therriault sub-BMU provides a high percentage of cover (95%) and the few existing openings do not prohibit movement for the bear within the sub-BMU. The availability and quality of existing movement corridors within the Therriault BMU is high. Adjacent to the sub-BMU, connectivity is available to the north of the sub-BMU to Canada, east of the sub-BMU to the Upper North Fork Flathead BMU, and south of the sub-BMU to the Krinklehorn sub-BMU.

The Krinklehorn sub-BMU provides a high percentage of cover in the northern two thirds of the BMU. The southern third of the sub-BMU experienced a wildfire in the summer of 2015. Post fire, the landbase within this approximately 7500 acre wildfire area, resulted in a mosaic of seral stages that will provide both forage and cover conditions, and provide more potential use of the area, than in its pre-fire heavily vegetated condition. This wildfire did not generally burn down to open roads, so avoidance of open roads should not affect the use of the Marston fire area by bears. Movement within or through the fire area was not compromised for the bear due to the mosaic of cover and openings remaining, as well as the location of the fire relative to open roads. Adjacent to the sub-BMU, connectivity is available to the north to the Therriault sub-BMU, the Upper North Fork Flathead BMU to the east, and the Stryker BMU to the south.

The two large core blocks in each of the sub-BMUs are separated from each other only by one open road (Grave Creek) which is a single lane gravel road for much of the length of the road. These large core blocks also facilitate movement within and between the two sub-BMUs. Adjacent large core blocks to the north and east of both sub-BMUs provide secure habitat for use within and movement through these sub-BMUs.

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.

Within the lower elevations of the Therriault and Krinklehorn BMUs, timber harvest began in the early 1900's. During the 1950's and 1960's, timber was harvested in response to spruce bark beetle infestations occurring in the higher elevations. Treatment areas associated with the beetle infestation were generally over 40 acres in size and stands were primarily regenerated. More recent regeneration timber harvest occurred in the 1980s. From 1990 to present, most of the treated stands were selectively harvested. Almost all of the past regenerated timber stands, larger than 40 acres in size, have trees now growing in them and currently provide cover. Three of these larger regeneration harvest units do not provide cover in the Therriault BMU. All of the past regenerated timber stands larger than 40 acres in size within the Krinklehorn BMU, currently provide cover. Past harvest, both regeneration and intermediate, has taken place across approximately 15% of the analysis area.

There are a number of natural openings within the BMU that are also larger than 40 acres in size. These natural openings often provide key foraging opportunities for the bear. Many of these natural openings support patches of cover. The largest opening in the Therriault BMU (133 acres) was created by the 1994 High One Fire. This opening has scattered small trees and brush growing in but overall still functions as an early seral foraging area. The southern portion of the

Krinklehorn sub-BMU experienced a wildfire in the summer of 2015. Post fire, the land base within this 7500 acre fire area, resulted in a mosaic of structural stages that will provide an ideal mix of both forage and cover conditions, and result in more potential use of the area, than in its pre-fire heavily vegetated condition.

Maintain/Improve Habitat Suitability With Respect to Bear Food Production

Mace et al. (1996) and Mace and Waller (1997) point out the importance of other habitat components as determinants of grizzly bear habitat selection. Specifically, their data emphasized that habitats were used primarily because of their attractiveness as a food source and that displacement from roads occurred as a subsidiary element of grizzly bear habitat use (e.g., spring habitat selection near roads in Mace et al. 1996, and Waller et al. unpublished). The Northern Continental Divide Ecosystem provides huckleberry bushes, later in the summer and roots and forbs in the spring. These food sources and their locations contributes to habitat selection, which in the case of the Northern Continental Divide Ecosystem resulted in bears selecting low, mid, and higher elevation areas where these foods are found.

Timber harvest, prescribed burns, and post-harvest treatments such as prescribed burning, when conducted within Forest Plan standards, generally have a positive effect on the growth of forage plants important to bears. Most past harvest units of the right elevation will generally contain huckleberry bushes, however huckleberries are also scattered across the project area. Riparian habitats are also know to provide plants important to the bear. The two sub-BMUs are split by the larger Grave creek drainage as well as having numerous smaller tributaries that flow into this drainage. The Therriault sub-BMU also contains the Wigwam drainage which begins at Big and Little Therriault lakes and eventually flows into Canada. These drainages provide important foraging sites for bears. Adherence to Forest Plan riparian area standards will ensure protection of the food resources in this important zone. Additional habitat improvement projects conducted with sale receipts (prescribed burning and planting whitebark pine etc.) could further improve foraging conditions, especially in the project area, where early seral habitat (outside the Marston fire area) is minimal.

Seasonal Components

In areas with important seasonal components such as spring range, the Interagency grizzly bear management guidelines (IGBC 1986) suggest scheduling proposed timber harvest activities to avoid known spring habitats during the spring use period (April 1 to June 15) and known denning habitats during the winter (December 1 to March 31).

Seasonal habitat components occur throughout the sub-BMUs. The availability of stand openings and early successional vegetative communities are limited within portions of the BMU. In the springtime, bears are known to forage in areas that green up early such as open sidehill parks and in wetter habitats such as snow chutes. The available spring habitat was modeled within the project area by BMU. There are 14,726 and 10,413 acres of mapped spring habitat (south and southwest-facing slopes) within the Therriault and Krinklehorn (respectively) BMUs. Many of these stands include areas where the lack of natural disturbance (fire) has allowed small trees to grow, shading out the early successional vegetation important to bears. In addition, there are approximately 265 and 166 acres of avalanche chutes/slide areas that also provide spring habitat within the Therriault and Krinklehorn BMUs. This habitat is well distributed throughout the BMUs (Map 23).

Grizzly bear denning habitat was identified in the Forest Plan. The Galton Vegetation Project does not propose activities that would occur during the timeframe bears would be in a den

(December 1 – March 31), nor would activities reduce or change denning habitat. Because of this, grizzly bear denning habitat will not be addressed further.

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). 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 Forest Plan direction. In summary, the following existing conditions of the 2 sub-BMUs promote the recovery of grizzly bears within the NCDE: 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 meet the standards for both sub-BMUs; 3) large blocks of Core habitat facilitate movement throughout both sub-BMUs as well as into adjacent sub-BMUs and Canada to the north; 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 Therriault or Krinklehorn sub-BMUs in 2015. Taking into consideration the status of the habitat components listed above, as well as the restrictions identified in the Forest's Food Storage Order (USFS 2011), mortality risk to the bear is generally low throughout most of BMU.

Existing Condition - Outside Recovery Zone

Tobacco BORZ

A small portion of the project area lies outside the recovery zone (NCDE) for grizzly bear. The project area includes NFS land south of Highway 93 located within the Murphy Planning Area (Map 18).

Areas outside of the recovery zones that are experiencing recurring use have been identified as "Bears Outside Recovery Zones" or "BORZ". The Forest Plan Grizzly Bear Access Management Direction set standards for these areas limiting increases in the linear miles of total and open roads within these BORZ areas. A portion of the project outside the recovery zone lies within the Tobacco BORZ polygon (USFS 2013).

Three stressors identified in the Forest Plan that may limit grizzly bear recovery and fall under Forest Service control include: 1) access management; 2) food attractants (human and livestock food storage and garbage); and 3) livestock presence. The project area includes a small portion of the Tobacco BORZ. In the last ten years, there have been numerous observations of grizzly bears

within this area, as it is adjacent to the NCDE recovery zone. No known grizzly bear mortalities on FS lands have occurred within the last 10 years (sighting information is located in the permanent District files). No grizzly bear dens are known to occur within the Tobacco BORZ, however one den site was recently located adjacent to this area. Due to low elevations (genereally <5500') and gentle slopes potential denning habitat within this portion of the analysis area is generally limited.

1. Access Management: The baseline open and total road density values for National Forest System Lands within the Tobacco BORZ Polygon are displayed in the following table. (USDA, 2015).

T & E Species Table 6. Cumulative Baseline Condition of Tobacco BORZ

BORZ Name	Grizzly Bear Ecosystem	Total Size (acres)	NFS1 Lands (acres)	Total Linear Miles of Roads on NFS Lands	Total Linear Miles of OPEN Roads on NFS Lands
Tobacco	Between SCYE and NCDE	287,240	266,947	1,123.9	867

2. Attractants: are present within the Tobacco BORZ polygon and in the Galton Vegetation Project Area. Community garbage collection sites occur, along with domestic livestock on private lands. The garbage collection site located on private land with the project area, was recently fenced and has successfully eliminated bear interactions at this site. Management of attractants on private lands are outside of FS control, however local FS representatives work cooperatively with State wildlife personnel to inform private land owners on how to live compatibly with grizzly bears. Ongoing efforts by agency and nongovernment organizations continue to focus on educating landowners on how to reduce attractants (through electric fencing, proper garbage and animal feed storage) on their property.

In 2011, the Kootenai National Forest signed the Food Storage Special order # F14-083-L-11. This order enacts occupancy and use restrictions on the entire Kootenai National Forest designed to minimize adverse interactions between humans, bears and other wildlife and to provide visitor safety. This order required that food attractants (human, pet and livestock food) and refuse be stored in a bear-resistant manner when on National Forest System lands. There has been no history in the Tobacco BORZ of attractant issues on public land. This order will be incorporated into all permits and contracts the Forest currently has and authorizes in the future.

3. Livestock Presence: Livestock occur in the Tobacco BORZ polygon, however are not present in the BORZ area located within the project area. There are 43 grazing allotments on the Kootenai National Forest, however, only 13 are presently active. It must be noted that even though the areas under permit are quite large, actual use area within each allotment is much smaller. This is because most of the available forage area is transitory range created through timber harvest and along roadsides. There have been no known depredations of cattle by grizzly bear on any of the allotments on the KNF.

Environmental Consequences

Alternative 2 – 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 analysis 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.

Specifically, the dry forest types (VRUs 2 and 3) have historically experienced fairly frequent, low-intensity, and mixed severity fires as a predominant natural disturbance. Disturbance drives the development of forest structure and there are noticeable trends that can influence ecosystem health and landscape patterns. If vegetation development continues without a disturbance event (e.g. harvest, wildfire) these stands would continue their trend toward a higher representation of Douglas-fir at the expense of western larch and ponderosa pine, which require disturbance to maintain their presence. This trend would continue to reduce the forage potential for wildlife, would not promote the maintenance of ponderosa pine and western larch, and would not move toward a more open stand structure that is better suited to the re-introduction of fire as an ecosystem process. Fewer fires have also reduced the amount of natural openings, structural diversity, and the number/size of patches across the landscape.

In comparison with many of the other habitat settings, the influence of no action and continued fire exclusion on vegetation in many moist landscapes (VRU's 5, 7, 9, 10, and 11) is less evident in the short term. This is because the fire-free intervals have historically been longer. Moist sites such as this are characterized as having mixed severity and infrequent stand-replacement fires within a range that is similar to recent historic levels. However based on fire history research and recent wildfire experiences on the Kootenai National Forest in 1994 and 2000, it is expected that no action and continued suppression of ecologically important mixed severity fire would eventually promote larger stand-replacing fires than typical.

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 Forest Vegetation sections for more detail.

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. 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.

Alternatives 1 and 3 - Direct and Indirect Effects

Within the Recovery Zone

Project Design Features

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 as well as operational limits on road work required for harvest. These design features will be discussed in more detail for the chosen action in the Biological Analysis as well as in the following effects discussion.

Key Stressors and Forest Plan Direction to Facilitate Grizzly Bear Recovery

1) Attractants

Therriault and Krinklehorn sub-BMUs - None of the action alternatives would create any attractants such as garbage sources that increase the risk of conflict with humans. All camping or day use activities located within the BMUs require removal of garbage. Contracts 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, food storage lockers are available in major campgrounds and campsites within both BMUs. Major backcountry camp sites also have food storage poles to help users manage their attractants. The district has also employed a bear ranger for the last several years to provide education to campers and recreationists, as well as FS campground hosts about proper food/attractant management while using Forest Service lands. All of these efforts have resulted in minimal conflicts on FS lands between humans and bears in either BMU.

In addition, proposed prescribed burn treatments in all alternatives would create new natural food sources by increasing areas of early seral habitat, which is currently lacking over the majority of the Therriault sub- BMU and a portion of the Krinklehorn sub-BMU. These treatments include mainly high elevation prescribed burns in both spring and summer range. Units in important seasonal habitat components would be designed to minimize conflicts between humans and bear. Risk-of-mortality would not change appreciably in any action alternative.

2) Road Impacts

A. Core Areas

Therriault BMU: No net increase in core would occur from the implementation of either action alternative. Project activities would slightly decrease core from the existing condition during project implementation. Alternative 1 proposes harvest in one unit during the summer. This would decrease core temporarily (<1%, and not enough to result in a percentage change) for approximately a three month period. After project implementation, core would return to the existing condition. Alternative 3 would not reduce security core during project implementation and would remain at 71% (existing condition levels) throughout the life of the project. The effects of the temporary decrease in security core in Alternative 1 would be temporary avoidance (at least 3 months) of grizzly bears from the activity area due to the harvest and road activity in the area.

Security core remains well above the 68% adjacent FNF objective both during and after project implementation for both action alternatives (T & E Species Table 7). Project activities for both alternatives were compared to the current Draft Conservation Strategy which allow for a temporary 2% decrease in secure core for each subunit.

Krinklehorn BMU: No net increase in core would occur from the implementation of either action alternative. Project activities would temporarily decrease core habitat by 1% during project activities in both action alternatives. Affects to core during project implementation would be due to harvest associated road work required adjacent to and in core areas and would only affect core in two areas for one week pre-harvest and one week post-harvest. Harvest activities for these areas would be accomplished during the winter and would therefore not affect core. After completion of the road work, security core would return to 75% in both alternatives. The effects of the temporary decrease in security core in both alternatives would be short-term temporary displacement of grizzly bears from the activity area due to the road work in the area. These activities are located on the edge of core, along an old road prism, and would occur for two, one week periods over the span of two to three seasons. Both areas are adjacent to large core blocks with no other planned activities. Therefore the potential effects are expected to be minimal to any bears that may happen to be using those areas, during either of those week long timeframes and effects would be limited to a very short-term displacement.

Security core remains well above the 68% standard used on other forests in the NCDE, and exceeds this percentage both during and after project implementation for both action alternatives (T & E Species Table 8). Project activities for both alternatives were compared to the current Draft Conservation Strategy which allow for a temporary 2% decrease in secure core for each subunit.

Alternative 2 (existing condition) would maintain security core at 71% and 75% in the Therriault and Krinklehorn BMUs (respectively). No activities in the form of road work or planned activities would affect this core or displacement habitat. This existing level meets the security core standard.

B. OMRD

Therriault sub-BMU: OMRD is not affected in Alternative 3 and would remain at 23% during and after project implementation. During project implementation in Alternative 1, OMRD would slightly increase (1%) (T&E Species Table 7). The increases to OMRD during project implementation in Alternative 1 would be due to opening closed roads for harvest of one unit in this sub-BMU. OMRD would return to 23% after harvest (and roadwork) were completed (approximately 3 months). The effects of the temporary increase in OMRD in Alternative 1 include a temporary decrease in security core which could result in a temporary displacement of grizzly bears from the activity area due to the road work and harvest in the area.

No net increase in OMRD would result from the implementation of any of the action alternatives. Project activities for both alternatives would take into consideration the Draft Conservation Strategy which allow for a 5% temporary increase in OMRD (10 year running average) for each subunit.

Krinklehorn BMU: OMRD would increase 2% in both action alternatives during project implementation (T&E Species Table 8). The increases to OMRD during project implementation would be due to road work required before and after harvest in two areas in both alternatives. The effects of the temporary increase in OMRD in both action alternatives

include a temporary decrease in security core (3-4 weeks) which could result in a temporary displacement of grizzly bears from the activity area due to the road work pre and post-harvest.

No net increase in OMRD would result from the implementation of either action alternative. OMRD would return to 18% after road work and road rehab were completed. Project activities for both alternatives take into consideration the Draft Conservation Strategy which allow for a 5% temporary increase in OMRD (10 year running average) for each subunit.

C. TMRD

Therriault BMU: TMRD would remain at 10% in both action alternatives during and after project implementation (T&E Species Table 7). No net increase in TMRD will result from the implementation of either action alternative. Both action alternatives would meet and exceed standards used by other forests in the NCDE of having TMRD at 19% or less.

Krinklehorn BMU: TMRD would remain at 11% in both action alternatives during and after project implementation (T&E Species Table 8). No net increase in TMRD will result from the implementation of either action alternative. Both action alternatives would meet and exceed standards used by other forests in the NCDE of having TMRD at 19% or less.

When applying FW-STD-WL-03 to proposed project activities, this standard states that within the Kootenai portion of the NCDE recovery zone, BMU subunits shall maintain or improve the access and habitat parameters. Site specific motorized access densities and security core habitat are developed at the project level in consultation with the USFWS and through appropriate public involvement and NEPA procedures. Informal consultation with the USFWS was implemented throughout this project and will continue with BA development of the selected action.

T & E Species Tables 7 and 8 summarize the effects to Core, OMRD, and TMRD for each alternative by BMU.

T & E Species Table 7. Therriault BMU Grizzly Bear Habitat Effects by Alternative during and after project implementation

HabitatComponent	**Alt. 1Cumulative % &(direct effect)**		**Alt. 2 No Action (Existing Condition)**	**Alt. 3Cumulative % &(direct effect)**	
	During	After	During/After	During	After
% Core	71% (0%)	71% (0%)	71%	71% (0%)	71% (0%)
% OMRD	24% (+1%)	23% (0%)	23%	23% (0%)	23% (0%)
% TMRD	10% (0%)	10% (0%)	10%	10% (0%)	10% (0%)

T & E Species Table 8. Krinklehorn BMU Grizzly Bear Habitat Effects by Alternative, during and after project implementation

HabitatComponent	**Alt.**	**Alt. 2No**	**Alt.**

	1Cumulative % &(direct effect)		**Action(Existing Condition)**	**3Cumulative % &(direct effect)**	
	During	After	During/After	During	After
% Core	74% (-1%)	75% (0%)	75%	74% (-1%)	75% (0%)
% OMRD	20% (+2%)	18% (0%)	18%	20% (+2%)	18% (0%)
% TMRD	11% (0%)	11% (0%)	11%	11% (0%)	11% (0%)

Managing Habitat to Contribute to Grizzly Bear Recovery

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 the two sub- BMUs. Both action alternatives include timber harvest that is primarily located in the lower elevations outside of core habitat. Both action alternatives also include ecosystem burn units that are located both within and outside of core habitat. Both proposed activity types would increase early seral habitat within the BMUs and provide a diverse landscape that provides both forage and cover for movement across the landscape. Alternative 1 includes one harvest unit that would decrease core for up to a three month period during harvest. Alternative 1 also includes more acres of ecosystem burns across the landscape. The implementation of these helicopter burns would be accomplished over a ten year period with limited helicopter activity within the BMU. Alternative 3 would result in a reduction of core for one week during pre-harvest road work, and one week post-harvest and fewer helicopter-ignited ecosystem burns. Alternative 3 would result in a very short-term reduction of core. Both action alternatives may result in short-term disruption of movement by grizzly bears but would increase use over the entire landscape in the long term by introducing some early seral patches that will provide forage for bears and other species. No new roads are proposed with either action alternative, and core blocks in both areas would remain at the existing levels after harvest. The project proposes no changes to IRAs, the Ten Lakes Wilderness Study Area, Recommended Wilderness, or Management Area designations in this area, and would not negatively affect large remote areas in the long term.

In summary, the Galton Vegetation project would maintain large remote areas that experience low levels of disturbance and would be consistent with the Forest Plan desired condition FW-DC-WL-02.

Landscape Connectivity and Local Area Movement

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 July 2001, Servheen, et al. published "Identification and Management of Linkage Zones for Grizzly Bears between the Large Blocks of Public Land in the Northern Rocky Mountains". The document identifies linkage zones based on landscape views from the Linkage Zone Prediction

Model. The project area (the southeast edge of the Krinklehorn BMU) is included in the NCDE to Cabinet/Yaak Linkage Zone Prediction Model. The linkage zone runs southeast of Trego to north of Olney and runs in a northeast to southwest configuration, along U.S. Highway 93, to provide linkage form north to south across Highway 93 (Map 22).

Both action alternatives include one ecosystem burn located in the general vicinity of the identified linkage corridor. This burn would be intended to create a mosaic of forage and cover and would not affect this corridor or animal movement moving through this linkage area. The project does not propose any changes in land ownership in this area, and proposes no developments in this area on NFS lands. On NFS lands in the Project area, no changes are proposed to the areas adjacent to Hwy 93 in the linkage corridor area from the existing condition.

Project design criteria calls for leaving unharvested patches to be maintained within the larger units to provide site specific travel areas, or between proposed harvest units and unrecovered existing harvest units. Cover levels would remain high in this BMU after implementation of proposed harvest and prescribed burn units.

In the short term, individual project activities, including prescribed burning and harvest may temporarily disrupt grizzly bear movement within the BMUs. The harvest units and prescribed burns would occur over a 10+ year period. It is estimated that approximately four to five hundred acres of prescribed burns/year within the Therriault sub-BMU in Alternative 1 over a 10 year period would be attempted, and 1491 acres in 10 units would be attempted in the Krinklehorn sub-BMU. In Alternative 3, approximately 800 acres in 8 units total could result in up to 200+ acres/year over a 10 year period over both sub-BMUs. Both cases would be dependent on weather/burn conditions in that year and are funding dependent. The ecosystem burns units identified for helicopter ignition would follow the 2009 “Guide to Effects Analysis of Helicopter Use in Grizzly Bear Habitat”. Additionally, activities would also occur over the two BMUs (encompass over 100,000 acres) over the 10 year period (see design criteria in Chapter 2).

In summary, these projects may result in short-term disruption of movement by grizzly bears within the sub-BMUs, but are not expected to affect movement through the identified linkage zone because of the high cover levels, and the geographic and temporal separation of the disturbance of proposed activities.

Juxtaposition of Foraging Habitat and Cover

Therriault BMU and Krinklehorn BMUs - Harvested and burned openings are currently limited within the Therriault sub-BMU and the northern portion of the Krinklehorn sub-BMU. Natural openings and limited past wildfires provide the majority of the openings that could provide bear food production. Riparian habitats and avalanche chutes are also generally considered to be valuable feeding sites and are well-dispersed throughout the BMU. The proposed timber harvests do not include any riparian harvest and would follow other Kootenai Forest riparian management guidelines, Montana Streamside Management Act (HB 731), and INFISH guidelines. Adherence to riparian area standards would ensure protection of the food resources in this important zone.

Salvage of incidental mortality from underburning harvested or underburn units may occur in both alternatives on no more than 20 acres/year for no more than 200 acres. This salvage is subject to a number of conditions (page 14 of FEIS) and would occur within or adjacent to treatment areas. Effects to bears would be similar to the effects shown for the original unit this salvage would occur in or adjacent to.

Both action alternatives propose similar amounts of timber harvest, however Alternative 1 proposes significantly more acres of ecoysystem burn acres in the Therriault sub-BMU that would improve early seral production of forbs and shrubs that bears feed on. Both action alternatives also include ecosystem burn units that are located both within and outside of the BMU. These helicopter burns were designed to increase early seral habitat within the BMUs and provide a diverse landscape that provides both forage and cover for movement across the landscape. These projects may result in short-term disruption of movement by grizzly bears while the burns are being completed, but will increase use over the entire landscape in the long term by introducing some early seral patches that will provide forage for bears and other species. Given the lack of early seral habitat within the entire Therrialt BMU, these proposed actions would increase/improve the habitat suitability with respect to bear food production (see Grizzly table 7 above). These actions help create a variety of successional stages that are spread across the landscape which provide a range of habitats (FW-DC-VEG-02, FW-DC-VEG-03, FW-DC-VEG-04, FW-DC-VEG-05).

Seasonal Components

Spring Burns

There are 381 acres of spring range proposed for underburning during the spring in both action alternatives. Because of the large size of the proposed burn units, the spring range acres occur only over portions of the proposed burn polygon. These acres occur in three general areas and would treat from 6 acres to 319 acres of spring range. All three of these units would be hand-ignited and occur near private land. Hand ignition would allow for a slower ignition time in which fire personnel would walk the units in a grid pattern, lighting the vegetation as they walk. This type of activity would allow any bears using these areas more time to move out of the area to adjacent spring range. These acres all occur within the Therriault sub-BMU and represent only 3% of the spring range found in this sub-BMUs and represents 1.5% of the spring range in the entire BMU. These underburns would occur over a 10 year period and would not include more than one area in any given year. These areas are spread across the landscape and have adjacent spring range nearby that would not be treated.

Because of the large acreage of spring range available, the limited acreage that could be burned in any one year, the planned hand ignition, and the adjacent spring range that would not be treated, the affects to bears using this area in the spring would be limited to short-term displacement.

Spring Range Enhanced

Therriault BMU - Alternative 1 proposes to treat 19.5%, while Alternative 3 proposes far fewer acres at 3% of the available spring range within the sub-BMU (see Table 9 below). The majority of the proposed treatment acres are prescribed burns. These burns would occur over a period of 10 years which would maintain a large percentage of undisturbed spring range in any given year. These treatments would enhance existing or create early seral vegetation by creating openings where fire suppression has encouraged tree growth instead of early seral forb and grasses. Early seral vegetation provides forage species (forbs and grasses) that would enhance the existing spring range. Alternative 1 enhances far more spring range than Alternative 3. Alternative 2 (No Action) proposes no new enhancement of spring range. Without prescribed fire, existing openings will continue to decrease as small trees grow and shade out early seral species.

Krinklehorn BMU - Alternatives 1 and 3 propose treatment of 12% and 3% (respectively by alternative) of the available spring range within this BMU (Table 9). The majority of the treatment acres would be prescribed burns. These burns would occur over a period of 10 years to

maintain a large percentage of undisturbed spring range in any given year. These treatments would maintain or create early seral vegetation to provide forage species (forbs and grasses) that would enhance the existing spring range. Alternative 1 would enhance slightly more spring range than Alternative 3. Alternative 2 (No Action) proposes no new enhancement of spring range. Without prescribed fire, existing openings would continue to decrease as small trees grow and shade out early seral species.

T & E Species Table 9. Acres of Proposed Spring Range Enhancement by Alternative Acres Treated & the % of Total Modeled Spring Range

BMU	Alternative 1	Alternative 2Existing Condition	Alternative 3
Therriault	2874ac (19.5%)	14,726 (0%)	461ac (3%)
Krinklehorn	1214ac (12%)	10,413 (0%)	325ac (3%)

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 Forest Plan direction (FW-GDL-WL-15). 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). In addition, FW-GDL-WL-15, also discusses using a conservation strategy as applied to management activities, once a grizzly bear population is delisted. Currently a draft conservation strategy has been written in anticipation of the delisting of the NCDE grizzly bear population. This strategy has not been finalized but reflects the best available science and was considered during the Galton Vegetation grizzly bear analysis.

The 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. Therefore meeting Forest Plan goals, desired conditions, objective, standards and guidelines would meet the intent of IGBC guidelines. 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. This is reiterated in the Forest Plan Standard (FW-STD-WL-03). The Galton Vegetation Project, as consulted on with the USFWS, would be compatible with these guidelines in concert with the best available science.

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 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.

Alternative 1 and 3 - Direct and Indirect Effects

Outside the Recovery Zone

Tobacco BORZ

1. Access Management: The following access management standards apply to the seven grizzly bear recurring use areas (i.e., BORZ areas) located outside of recovery areas on the Kootenai National Forest (BA 2010; see also Appendix A1 of BO). The standards below are specific to the Tobacco BORZ area with a discussion of how the Galton project affects these standards.

a. No permanent increases in the total linear miles of "open roads" and "total roads" on National Forest System lands in any individual BORZ area above baseline conditions, except in cases where the Forest lacks discretion to prevent road building across national forest lands due to legal or other obligations (examples include, but are not limited to, ANILCA access claims, identification of RS2477 thoroughfares, etc.). *The Galton Vegetation Project does not propose any permanent increase in either linear open or total road miles above baseline conditions and is therefore consistent with the FW-STD-WL-02.*
b. Potential increases in linear miles of open or total roads must be compensated for with in-kind reductions concurrently or prior to such increases. *This standard is not applicable to the Galton Vegetation Project because no additional linear miles of road, open or restricted are necessary to implement the project.*
c. There would be provisions for temporary increases in linear miles for projects but also measures to minimize the impacts of such increases, such as seasonal restrictions of public use to the June 16 – August 31 period. *There is 0.27 miles of temporary road planned to be built in the BORZ area in all alternatives. Any public use, such as personal firewood gathering, subsequent to Galton Vegetation Project activities, would adhere to agreed upon timing restrictions during the active grizzly bear year season.*
d. Scheduling considerations in future timber sale planning to avoid concurrent disturbance in multiple adjacent watersheds. *Only 6,090 acres of the 266,947 acre Tobacco BORZ area occurs in the Galton Vegetation Project area. The activities in BORZ portion of the project all fall into the same watershed, therefore this direction (avoid concurrent disturbance in multiple adjacent watersheds) is met.*

2. Food attractants: None of the action alternatives would change the availability of food attractants within the Galton Vegetation Project area portion of the Tobacco BORZ polygon. In 2011, the Kootenai National Forest signed a Food Storage Special order # F14-083-L-11. This order enacts occupancy and use restrictions on the entire Kootenai National forest designed to minimize adverse interactions between humans, bears and other wildlife and to provide visitor safety. This order required that food attractants (human, pet and livestock food) and refuse be stored in a bear-resistant manner. This order is incorporated into all permits and contracts the District authorizes in the potential implementation of a selected action.

3. Livestock presence: None of the action alternatives would change livestock presence within the Galton Project area portion of the Tobacco BORZ polygon. No grazing allotments are present within this area and the Project does not propose to change this situation.

Cumulative Effects

Past, Present and Ongoing Actions

Timber harvest and associated activities started in the early 1900's within the lower elevations of the Therriault and Krinklehorn BMUs. During the 1950's and 1960's, timber harvest accelerated in response to the Spruce Bark Beetle infestation occurring in the higher elevations. The Grave Creek road was extended into the Wigwam drainage to access the dying trees. Within the last 40 years there has been little vegetation management in the Therriault BMU and limited vegetation management in the Krinklehorn BMU. Some harvest has occurred within the BMU, but the majority of the harvest has occurred outside of the BMUs in isolated parcels of FS land and includes approximately 4500 acres of harvest from 1982 – 2002. This included a variety of harvest types; sanitation salvage, clearcut with reserves, shelterwood, and seed tree. Other activities associated with these projects include ecosystem burning, and decommissioning of roads in the BMU in Rich, Wigwam, Clarence, Weasel, and Stahl drainages. These activities are now complete.

During the summer of 1994, one wildfire (High One) occurred within the Therriault BMU. During the summer of 1998, the Kopsi wildfire occurred and in 2015 the Marston wildlfire occurred within the Krinklehorn BMU.

Past management activities, as well as wildfires within the BMUs have created some variety in age and stand structure classes. More prominent on the landscape are large blocks of un-harvested areas including Inventoried Roadless Areas and a Wilderness Study Area. There are also areas that support natural disturbances like insect and disease infestations, and wildfire. The past treatment areas and wildfires provide habitat conditions favorable for grizzly bear and for forage production such as huckleberries. Past road decommissioning has resulted in decreased Open and Total Road Densities within the BMU over the last 15 years. As a result, the amount of core habitat has increased.

Vegetation altering events, whether man-caused or naturally occurring have been largely beneficial for grizzly bear in that they have provided early seral areas as foraging habitat. Because of past Forest Plan MA direction in the Galton Project Area, very little timber harvest has occurred in the higher elevations, with much of it adjacent to the existing open roads or side drainages. Many of the side roads that accessed the timber in the side drainages have been closed to motor vehicles and are now non-motorized trails. These past harvest units (most of which are hiding cover) are intermingled with other habitat elements necessary for grizzly bear survival. Roads and trails constructed to facilitate timber harvesting and other forest management activities have made it easier for humans to access habitats that were once more remote. This increase in access can result in an increase in the risk of mortality through vehicle collision, illegal taking or poaching, and malicious killing, although little of this is known to have occurred in these BMUs.

Basic road maintenance, pre-commercial thinning, mushroom picking, prescribed burning, timber hauling, wildlife habitat improvement projects and various recreational uses are additional activities that have occurred and will continue to occur within the project area. These activities are generally not considered to have adverse impacts on wildlife species. These activities may incidentally affect wildlife use within some areas on a temporary basis.

Effects of Current and Reasonably Foreseeable Actions

NCDE Forest Plan amendment: A draft conservation strategy has been written in anticipation of the delisting of the NCDE grizzly bear population. Once finalized this Conservation Strategy

would be incorporated as an amendment into the Forest Plan and be utilized as the document giving direction for grizzly bear management in the NCDE strategyarea.This strategy has not been finalized but reflects the best available science and was considered during the Galton Vegetation grizzly bear analysis. FW-GDL-WL-15 in the Forest Plan discusses using this conservation strategy as applied to management activities, once the NCDE grizzly bear population is delisted. The Galton project considered the information within this Conservation Strategy, thus no cumulative effects would be expected from the delisting of the NCDE population and adoption of this amendment into the Forest Plan.

Ten Lakes Travel Management Project: The Ten Lakes Travel Management Project will address over-snow and mechanized travel planning for the Ten Lakes area. The area affected by the proposal includes the Ten Lakes WSA and areas with common entrance points to the WSA. There are three main over-snow entrance points to the Ten Lakes WSA: the Grave Creek corridor; Clarence and Stahl Creek; and the Burma/Blacktail area. Over-snow travel is currently not limited. Mechanized use (primarily mountain bicycles) is also unrestricted. The alternatives contained in the Ten Lakes Travel Management Draft Environmental Impact Statement contain various amounts of over-snow and mechanized travel for the project area. A final decision has not been made for this project and the cumulative effects analysis utilizes the Proposed Action as the basis for the analysis in the Galton Vegetation Management Project.

Existing over-snow use and its potential effects on bears is discussed on page 252 of this section under the heading “3) Motorized Over-Snow Vehicles”. This section states that “over-snow motorized use during and after bears have emerged from their dens in the spring (typically after April 1st) has the potential to disturb bears, particularly females with cubs of the year still confined to the den vicinity during spring (Mace and Waller, 1997, Haroldson et al. 2002). It goes on to state that while current over-snow use is limited only by snow conditions, no known grizzly bear mortality has been directly or indirectly attributed to people using snowmobiles anywhere in the NCDE, and that only a percentage of the denning habitat is available to over-snow use. It concludes that although current over-snow use could extend past the April 1st date, increasing grizzly bear population trend in the NCDE indicates that the current over-snow levels area not are not affecting grizzly bears in significant ways. The Ten Lakes Travel Management Project Proposed Action limits over-snow use both spatially and temporally, and spatially limits mechanized use, which would decrease potential affects to bears even further than the existing condition (with an increasing grizzly bear population trend). Therefore, the cumulative effects of the Ten Lakes Travel Management Project in conjunction with past, present, reasonably foreseeable actions would result in fewer effects for grizzly bears due to fewer projected effects from the Ten Lakes Travel Management Project.

Vegetation Management - Timber harvest and associated activities may contribute to the environmental habitat baseline for the grizzly bear as well as possible effects to species ability to utilize a specific area during project implementation. Timber harvest and hauling could cause these animals to temporarily avoid affected areas. The amount of time that species will avoid an area depends upon the individual, but generally, avoidance will last from hours to possibly days. Given that roads used to access timber harvest areas are closed to the general public, there would be little to no increase in the risk of mortality to wildlife, especially with the enforcement of contractual provisions. Additionally, timber harvest can result in areas lacking in hiding or movement cover and increased edge effect for approximately 5 to 15 years, depending on the species. This lack of cover may result in foraging areas greater than 600 feet from cover being less utilized, especially diurnally.

The Little Feet Project, Little Feet Fuels Reduction, and Ant Flat Maintenance Burn are foreseeable projects planned within the boundaries of the analysis area (outside of the BMUs) and are likely to be implemented either before or during implementation of the project. These projects use timber management, slashing, and prescribed fire, and as a result some, but not all, down woody debris and snags may be lost in treated areas These activities may incidentally affect bear use within some areas on a temporary basis, but with the large amount of existing core habitat and cover in other areas, would not have adverse cumulative effects.

The Forestwide Young Growth Vegetation Management project would treat approximately 400 to 600 acres annually, dependent on funding, using precommercial thinning or commercial thinning treatments. Stands proposed for treatment are second growth stands and would be subject to a number of criteria before they were determined eligible for treatment. The Forestwide Young Growth Vegetation Management project would have the same effects on bears as the effects described for precommercial thinning (below), and potential temporary avoidance of the area as described above.

Harvest of blown down or damaged trees associated with future storms is possible in the analysis area. If a salvage project is identified and implemented, the cumulative effects to grizzly bears would be evaluated at that time. These activities may incidentally affect use within some areas on a temporary basis, but would not have adverse cumulative effects because of the small scale and short timeframe required for completion.

Pre-commercial Thinning - The effects to grizzly bears from pre-commercial thinning are similar to those discussed under timber harvesting above except that hiding cover is typically present in most stands, even after treatment.

Pre-commercial thinning on National Forest land occurs when past regenerated timber stands meet certain stand conditions. It is expected that approximately 1000 acres would be treated through pre-commercial thinning within the analysis area during the time period this proposed project is active. Pre-commercial thinning would maintain hiding cover values of the stand for associated species. During thinning operations, there would be short-term localized disturbance to bears and their prey in the area. Mortality risk for associated species is not expected to increase. Pre-commercial thinning on State land is considered a minor activity. With the limited amount of pre-commercial thinning on State lands, potential effects to listed species and their prey would be indiscernible.

Cattle Grazing - Currently, 100 cow/calf pairs are permitted to graze on the Grave Creek allotment from May 15 to September 30. This allotment is located within the Krinklehorn BMU. No past cattle depredations by grizzly bears is known to have occurred in this or any allotment on the KNF. The current level of use is not expected to increase in the next ten years. This activity would not result in a change of grizzly bear habitat. The allotment is located within low elevation habitat. Spring use of this area by grizzly bears would have typically occurred before cattle are turned into this area. There is additional low elevation habitat available in this BMU that has no allotment use. Therefore livestock grazing generally does not affect grizzly habitat within the project area.

Noxious Weed Control - Efforts to treat present infestations of noxious weeds and to eradicate infestations of new invaders are ongoing. All activities will comply with the Kootenai National Forest Invasive plant Management ROD (2007). Weed treatment activities would not lead to any adverse effects on the grizzly bear or its habitat because treatments isolate non-beneficial weed

species and would actually benefit forage species important to many species or their prey (USDA Forest Service 1997, 30).

Fire Suppression - In the event of a wildfire, construction of fire lines, helispots, and safety zones could potentially result in impacts to grizzly bear core habitat or temporarily affect OMRD and TMRD. This could result in temporary displacement of bears. The amount and timing of such an impact cannot be predicted. The existing size of core habitat within the BMUs provides large potential displacement areas.

Road Management Activity - Actions such as road maintenance and administrative use associated with permit administration, data collection, and monitoring of NFS lands are not likely to measurably affect wildlife or specialized habitats (e.g. old growth habitat, snags nor down woody debris) because they generally do not result in vegetation removal or persist for long periods of time. The standing tree and snag component would only be affected if considered a hazard to road users. These activities would not result in any change to grizzly bear habitat, thus no adverse cumulative effects would be expected.

Public Use - Other forest product activities occurring presently and typically on an annual basis are the gathering of pine cones, boughs and commercial gathering of Christmas trees and "character trees." These activities occur throughout the project area and have little-to-no effect on the landscape due to the unspecific nature of the use and the low impact on the resources (foot traffic, hand tools). These activities would be more prominent outside the BMU boundaries in the lower elevation habitat, where there are more open roads. Within the BMU boundaries, the roadless designation of this area limits the roads, and therefore would occur on a minor percentage of the grizzly bear habitat available.

Firewood cutting in the project area will continue to occur. The effect of this would be minor adjustments to movement of bears using the area. This activity would occur next to open roads, which are limited within the BMU boundaries and are more likely to occur at lower elevations.

Ongoing hunting activities are regulated by the MFWP. The Forest Service influences hunter access through road management. Hunting activities within the analysis area will cumulatively contribute to minor short-term effects (during the general hunting season) to habitat security. Effects from hunting vary with activity levels and can include short-term disturbance. Mortality risk to the listed species like the grizzly bear is increased through hunting. The potential increase of early seral habitat creation through proposed prescribed burns may draw hunters to these areas. However these proposed areas are dispersed throughout the mainly unroaded BMUs, and would provide options for areas for bears to use. Hunting levels within the analysis area are not expected to significantly change due to the action alternatives, since no new road construction will occur.

Recreation Maintenance - Routine maintenance of trails and developed and dispersed recreation sites may temporarily displace some wildlife species. Approximately 159 miles of trail are maintained each year within the project area. Recreation maintenance could involve the harvest of trees in mature forest stands that pose a hazard to users. However, the scale of the impact would be negligible as a cumulative effect to bears utilizing the immediate area, or adjacent forest stands.

Special Uses - Operations of outfitter/guides would not result in any change to general and specialized wildlife habitats (e.g. undesignated old growth, snags or down woody debris) that listed species may utilize, as they do not involve the harvest of trees. There would be no cumulative effects to bears and their habitats associated with these activities other than possible

temporary and local avoidance of an area due to the presence of humans. All operations would be subject to the Kootenai Food Storage Order which would be incorporated into all permits and contracts the Forest currently has and authorizes in the future.

Permits associated with access to private homes, right-of-ways for utilities, and outfitter/guides are not expected to contributed to the cumulatively impact on wildlife because they are limited to previously disturbed and hardened sites like trails and roads. The majority of these permits occur outside the BMUs.

Climate Change -Climate change could have effects on the grizzly bear at a forest level and are discussed in the KNF FEIS on page 255: "Climate change can possibly have varied impacts on grizzly bears and their habitats, especially when combined with fire (or fire suppression), insects and disease effects on habitat. Past fire suppression has led to an increase in fuels, denser forests that are more susceptible to insects and disease, and forests that are less resilient and sustainable. Large stand-replacing disturbances will be more likely under current conditions and may be exacerbated as the climate changes. As grizzly bears are generalists and eat a variety of foods, so it is difficult to determine the exact effects of climate change on the availability of different plan foods." Generalized discussions on how climate change can affect wildlife can be found in "The Effects of Climate Change on Mammals" (McKelvey, K.S. et al. 2013).

Private Land - Any cumulative effects to wildlife species will be partially dependent on the duration (seasonal versus year-round) of use of these parcels and homes. Anticipated effects include species displacement, reductions in specialized habitats (e.g. old growth, snags, and down woody debris), habitat alteration and/or habitat loss. Many of the activities that may occur on the private parcels can only be surmised. Based on past years building, it is estimated that approximately two houses/year may be built within the anlaysis area.

Other Agency Activities - On State of Montana lands within the planning area, including the Woods Ranch WMA, no activities are planned at this time. On State of Montana Trust lands, permitted cattle grazing is expected to continue and would have similar effects to those described under cattle grazing above. Additionally, 40 acres of Trust Lands are leased to the Indian Springs Golf Course which has already converted several acres of natural bunch wheat grasses to exotic grasses used by this type of industry. Regardless, these activities would not directly impact wildlife habitat modeled and identified as suitable habitat on NFS lands.

Adjacent to the planning area on State land, two harvest units are proposed within the small portion of the Krinklehorn BMU lying outside the project area. These units are planned for winter harvest and may occur sometime within the next 4 years. Because of winter harvest, these units should not affect core, TMRD or OMRD within this BMU.

Summary of Cumulative Effects

Project scheduling/staging (winter logging) may be required in order to avoid possible cumulative effects from various vegetation management and fuel reduction activities occurring within and adjacent to the AA relative to grizzly bears. Any cumulative effects from wildfire suppression or from the assumed development of adjacent private lands can only be surmised, at this time.

The temporal occurrence of forest uses such as summer activities (camping, hiking, and berry picking) versus fall (hunting and firewood cutting) or winter (skiing and snowmobiling) activities, and the scheduling of management actions to avoid key time periods (spring range and den emergence) when bears may be more sensitive to human disturbances, allow for the avoidance of measurable cumulative impacts to bears. There may be some situations where

isolated or localized cumulative effects may occur, due to an overlap of forest activities, but these situations are typically short in duration, and do not persist through the lifecycle of any one species, either temporally or spatially.

Regulatory Framework Findings

Forest Plan

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 fuel treatments would result in a better approximation of stand patch size and species composition, protection of riparian habitats, and general movement toward the desired vegetative condition based on HRV in the stands for this area. Ecosystem burn treatments in the higher elevations may contribute to improvement in huckleberry production. Proposed whitebark pine planting would result in future potential forage species where they are currently declining. Therefore, the project would contribute to progress toward achieving this goal.*

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. In addition, required winter harvest would reduce impacts to grizzly bears during the active bear year. Therefore, the project would contribute to progress toward achieving this goal.*

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. Prescribed burning of spring range is distributed spatially and temporally over a period of 10 years (see Seasonal Components). Therefore, the project is designed in accordance with this desired condition.*

FW-DC-WL-02: A forest-wide 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 (see "System of Large Remote Areas" covered in detail above). Therefore, the project would contribute to progress toward achieving this desired condition.*

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 providing large blocks of secure habitat for bears in this area. Recovery of the grizzly bear in this area is imminent as supported by recent studies showing 3% annual growth. This project will not reduce long-term core and will provide additional foraging habitat and existing levels of denning and rearing habitat. 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 project would contribute to progress toward achieving this desired condition.

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, and FW-DC-WL-02 above. Therefore, the project would contribute to progress toward achieving this desired condition.*

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. See "Landscape Connectivity and Local Area Movement." Therefore, the project would contribute to progress toward achieving this desired condition.*

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. Whitebark Pine planting also provides native fauna that has been reduced in the project area. See "Managing Habitat to Contribute to Grizzly Bear Recovery." Therefore, the project would contribute to progress toward achieving this desired condition.*

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. Therefore, the project would contribute to progress toward achieving this objective.*

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. *This direction was applied within the Tobacco BORZ area of the project (see Tobacco BORZ Analysis section). Therefore, the project is designed in accordance with this standard.*

FW-STD-WL-03: Within the Kootenai portion of the NCDE Recovery Zone, BMU subunits shall maintain or improve the access and habitat parameters as shown in T & E Species Table 6. Site-specific motorized access densities and security core habitat are developed at the project level in consultation with the USFWS and through appropriate public involvement and NEPA procedures. Core habitat is reduced through harvest activities in the summer in Alternative 1. Habitat would return to existing levels the following year, but because of this, Alternative 1 would only partially contribute to this standard. Informal consultation was initiated on both

alternative and the access and core habitat levels discussed. While Alternative 3 slightly reduces core for a period of two weeks due to road work before and after winter harvest activities, the slight reduction over the entire area would not reduce overall habitat parameters. Therefore, implementation of Alternative 3 would contribute toward achieving this standard.

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, 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 project is designed in accordance with this standard.*

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 project is designed in accordance with this standard.*

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 this project does not propose any exchanges. See "Landscape Connectivity and Local Area Movement." Therefore, the project is designed in accordance with this guideline.*

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 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 project is designed in accordance with this guideline.*

MA3-DC-WL-01: The Northwest Peak and Ten Lakes areas, in combination with MAs1 and 5, contain large remote areas that contribute to movement across the Forest. These areas additionally provide secure habitat, foraging, denning, and nesting.*See FW-DC-WL-02, FW-DC-WL-04. FW-DC-WL-17. See "Landscape Connectivity and Local Movement above." Therefore, the project would contribute to progress toward achieving these desired conditions.*

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. See FW-DC-WL-02, FW-DC-WL-04. FW-DC-WL-17. See "Landscape Connectivity and Local Movement above." Therefore, the project would contribute to progress toward achieving these desired conditions.*

GA-DC-WL-TOB-01: Low levels of human disturbance allows for denning activities of wide ranging carnivores that are sensitive to human disturbance (e.g., grizzly bear), and for summer

use by big game in the Ten Lakes, Thompson Seton, and Marston Face areas. *These areas also provide foraging, security, denning, and nesting habitat for wildlife. See FW-DC-WL-02, FW-DC-WL-04. FW-DC-WL-17. See "Landscape Connectivity and Local Movement above." Therefore, the project would contribute to progress toward achieving these desired conditions.*

GA-DC-WL-TOB-02: Wildlife move between the large blocks of NFS lands across Highway 93 southeast of Murphy and Dickey Lakes. Wildlife also moves from the Lydia and Pinkham mountains vicinity and the Sunday Creek vicinity.*These areas also provide foraging, security, denning, and nesting habitat for wildlife. See FW-DC-WL-02, FW-DC-WL-04. FW-DC-WL-17. See "Landscape Connectivity and Local Movement above." Therefore, the project would contribute to progress toward achieving these desired conditions.*

GA-DC-WL-TOB-05: Wildlife move to and from the border with Canada.*These areas also provide foraging, security, denning, and nesting habitat for wildlife. See FW-DC-WL-02, FW-DC-WL-04. FW-DC-WL-17. See "Landscape Connectivity and Local Movement above." Therefore, the project would contribute to progress toward achieving these desired conditions.*

GA-DC-WL-TOB-03: In the Therriault and Krniklehorn BMUs the current levels of security core habitat, open motorized route densities, and total motorized route densities are also the desired condition. *See "Road Impacts" in the sections above. The Project would contribute to progress toward achieving this desired condition.*

Endangered Species Act

The preferred alternative would be consulted on with USFWS and therefore comply with ESA.

National Forest Management Act

The project complies with NFMA direction to provide for diverse populations of plant and animal communities through compliance with the Forest Plan.

Statement of Findings

The following statements are true for both action alternatives.

1. NCDE grizzly bear population is close to recovery levels and estimated to be growing at a mean annual rate of 3% (Mace, 2011).
2. Grizzly bear range has also expanded over the last 15-20 years, as evidenced by the BORZ areas and sightings/management actions.
3. Security core remains the same after harvest for both sub-BMUs and has currently been in place for 15-20 years. Security core in the Krinklehorn and Therriault sub-BMUs are above the minimum levels (69%) for the sub-BMUs on the adjacent Flathead NF.
4. Current OMRD and TMRD levels within the Therriault and Krinklehorn sub-BMUs have been in place for the past 15-20 years. Harvest impacts to OMRD and TMRD are temporary and road use would return to the existing condition upon completion of activities.
5. Grizzly bears may be disturbed or temporarily displaced due to project activities, however the availability of large Core blocks and maintenance of movement corridors would accommodate potential bear displacement from activity areas.

6. Vegetation management treatments would move stands towards desired vegetative and fire tolerant conditions characteristic of the area. These treatments would encourage increased production of forage species for grizzly bears and other wildlife.
7. Potential prescribed burns in spring habitat are temporally and spatially planned to treat only a small percentage of spring habitat/year over a 10 year period.
8. Helicopter guidelines are used when conducting summer/fall helicopter burns (limited helicopter use within BMU) and are spatially and temporally scheduled over a 10 year period.
9. No expected increase in bear attractants would result from implementing this project.
10. There are long term benefits to spring habitat and early seral habitat (which is lacking especially in the Therriault sub-BMU) within the BMU
11. No increased risk of bear mortality is expected.

Based on the above statements:

Alternative 1 harvest and road management activities result in core reductions for one summer and therefore could result in adverse affects due to avoidance of the affected area. Therefore, Alternative 1 **may affect, is likely to adversely affect grizzly bears**.

Alternative 3 harvest activities near/in core are limited to winter harvest. Short-term (one week period pre-harvest and one week period post-harvest) reduction in core due to pre and post harvest road work slightly reduces core for a short period of time. Limited short-term temporary disturbance or avoidance during roadwork is offset by the statements listed above including large, undisturbed core blocks, and a grizzly population that is effectively in a recovered state and growing at 3%/year. Therefore, Alternative 3 **may affect, is not likely to adversely affect grizzly bears.**

Other Agencies and Individuals Consulted

Katrina Dixon, USFWS Consultation Biologist

Communications have consisted of informal consultation throughout the development of the Galton Project and included providing a description of Galton's proposed actions and discussions regarding potential concerns and expected determinations of effects for grizzly bears.

Kevin Aceituno, USFWS Consultation Biologist

Communications have consisted of informal consultation throughout the development of the Galton Project and included providing a description of Galton's proposed actions and discussions regarding potential concerns and expected determinations of effects for grizzly bears.

Tim Manly, MT Fish, Wildlife and Parks Grizzly Bear Management Specialist

Communications have consisted of information requests regarding grizzly bear use of the project area (denning habitat and locations), and providing a description of the project's proposed actions for discussions of habitat management within the BMU.

Tim Thier, MT Fish, Wildlife and Parks Biologist

Communications have consisted of information requests regarding grizzly bear use of the project area and providing a description of the project's proposed actions for discussions of habitat management within the BMU.

Canada Lynx

Introduction

Canada lynx occupy northern boreal forests 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 multi-storied forests 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. wildfire) and human disturbances such as timber harvest and prescribed fires can affect lynx habitat (USDA, 2007).

Although a variety of habitat and forest types may be found within a lynx home range and used to some level (e.g., non-lynx habitat2 for travelling between patches of boreal forest), in northwestern Montana lynx select forest stands with high horizontal cover primarily consisting of Englemann 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 lynx have a 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 Alternative 2 (no action) and 3 would result in a determination of **may affect, is not likely to adversely affect Canada lynx**. Implementation of Alternative 1 would result in a determination of **may affect, is likely to adversely affect Canada lynx,** based on proposed vegetation treatments within the multi-story mature lynx habitat and therefore does not meet Standard Veg S6 of the NRLMD.

Regulatory Framework

Forest Plan

The 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:

- FW-STD-WL-01

There are other 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 (T&E Species Table 10) 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 located in the project file

T & E Species Table 10. 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	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	Forest Plan FW-STD-WL-01
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	Forest Plan FW-STD-WL-01

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, Englemann 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 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.

Harvest units and most ecosystem burn units in mapped multistory habitat were surveyed (Bertram and Claar 2008 and professional judgment), photographed for the project record, and categorized as either contributing to lynx winter foraging habitat or not. Some of the extremely inaccessible ecosystem burn units were evaluated through the use of stand data, satellite imagery, and photo documentation. 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), and were not multistory habitat in reality. In T&E Species Table 11, which displays the existing lynx habitat conditions, the reviewed acres were changed from the mature multistory forest into the stem exclusion stage. This became the baseline from which to assess the effects of proposed vegetation management.

Connectivity was evaluated by through the use of stand data, satellite imagery, and photo documentation to visually examine lynx habitat, past management activities, as well as the presence of forested cover to determine possible movement areas and potential areas where lynx travel may be hindered. Ridge lines 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. (1999), and Ruediger et al. (2000). Population and habitat status on a national scale is provided in the final lynx listing rule (Clark, 2000) and the most recent lynx distinct population segment status is found in the BO on the effects of the Forest Plan (USFWS 2013b). National population and habitat status descriptions in these documents are incorporated by reference.

Lynx occurrence data comes from District wildlife observation records, Natural Resource Information System (NRIS) wildlife database, and other agencies (Montana Natural Heritage Program (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.

Mapped habitat within the Therriault LAU indicated 2 large polygons of lynx habitat without a known stage (lynx habitat – unknown stage). These polygons occur in remote areas with no

known fire or harvest history and after review of the NAIP and satellite imagery, this was confirmed. Without recent fires or harvest, these stands would fall into either the Stem Exclusion or Potential Multistory Forage stage. To be conservative, these stands were then removed from the unknown category and placed in the stem exclusion category which becomes the new baseline. Any potential burns located in this area found in the chosen action will be surveyed and dropped if they are found to provide multi-story forage (see project file for documentation).

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 LAUs. 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 Therriault, Graves, and Krinklehorn LAUs (Map 24). All LAUs have records of lynx occurrence. Timber harvest is clustered along the lower elevation boundaries of the LAUs in roaded areas. Prescribed burn units located along upper elevation boundaries would not result in the loss of habitat or impede movement to or from adjacent LAUs. Also, ample lynx habitat would remain available within all LAUs for lynx use during and post-project implementation. These three affected LAUs have been chosen as the appropriate scale of analysis for determining direct, indirect, and cumulative effects for the Galton Vegetation 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 (Clark, 2000) with the designation of critical habitat (USFWS 2006). In February 2008, the USFWS issued a proposed rule revising critical lynx habitat (USFWS 2008). Then, in February 2009, the USFWS issued their final rule to revise the critical habitat designation for the lynx in the U.S. (USDI 2009). The final rule delineates lynx critical habitat units and subunits across the lower 48 states from Maine to Washington. Based on this delineation, the Galton Vegetation project falls within the Northern Rocky Mountains (NRM)

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 project still falls within Unit #3 in this updated final rule. Critical habitat is analyzed in the Canada Lynx Critical Habitat section.

The Final EIS for the Northern Rockies Lynx Management Direction (NRLMD) was completed in March 2007 (USDA 2007). This decision has been incorporated into the 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 Galton Vegetation project area includes all of three LAUs: Therriault, Graves, and Krinklehorn LAUs (Map 24).

Canada Lynx Occurrence

The Galton Vegetation Project area includes portions of three LAUs: Therriault, Krinklehorn and Grave. Annual winter track surveys within the project area (conducted until 2012) recorded lynx tracks every year. Since 2012, reports of lynx in this area are reported every year (pers. comm., Thier, 2015). Scattered sightings have been recorded through the years within this area. 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 km, 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 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 most recent landscape fire occurred in 2015 and covered approximately 7,500 acres (see Fire management section). A portion of this wildfire occurred within the Krinklehorn LAU where it was determined that approximately 1,750 acres of lynx habitat within the LAU burned at the high to moderate levels, moving this habitat into an early successional stage that temporarily will not provide the habitat conditions preferred by snowshoes hare. The effects of this fire on lynx habitat were calculated and incorporated into the existing condition acreages (T&E Species Table 11).

Fire suppression since the early 1900s has resulted in fewer and smaller fires with only two wildfires of any size occurring in the last 20 years in 2 of the 3 affected LAUs: the 1000 + acre Kopsi fire in the Grave LAU and the Barnaby Mountain or High One fire (700 acres) in the Therriault LAU. Both these wildfires now provide summer and limited winter lynx habitat and fall into the stand initiation structural stages(young forest) in these LAUs (Map 24). 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 the suitability of the stands for snowshoe hares and, therefore, lynx.

The majority of the Galton Vegetation Project Area lies within Forest Plan Inventoried Roadless Areas (IRA's), or MA's with a non-motorized emphasis (MA's 5a and 1c). The lynx LAUs overlap the majority of this area. Much of these lands lie in unroaded blocks that provided largely natural vegetative conditions. Much of the past timber harvest within the project area occurred below 4000 feet, outside of the lynx LAUs. Because of the management emphasis and inaccessibility of much of the project areas land base, very little timber harvest or road building has occurred in the higher elevations, with much of the existing harvest adjacent to the existing open roads. There are very few acres of recent harvest that have created early stand initiation habitat in the Therriault, Grave, or Krinklehorn LAUs.

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).

Lynx and non-lynx habitats in the affected LAUs were assessed for all ownerships in terms consistent with the NRLMD. There are 213 acres of private land (<1%) in the Therriault LAU, 3 acres in the Grave LAU and no (0) acres in the Krinklehorn LAU. The private land in the Therriault LAU lies mainly in the lower elevations along the foothills of the LAU. T&E Species Table 11 displays the current lynx habitat levels in the project area. The percentages reflect the contribution of each habitat type (e.g., mature multistory forest) to the total lynx habitat available within the LAU (each category of lynx habitat acres divided by the total lynx habitat acres within the LAU). See project file for calculations.

In all three LAUs, the majority of the acres falling into stand initiation habitat (7%, 11% & 3%) of the LAUs, (other than the 2 wildfire areas in Grave and Therriault LAUs) are from regeneration harvest that occurred adjacent to the roads in the mid to late 1960's. 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 young forests provide these preferred conditions 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 a young forest condition.

Very few acres of lynx habitat in 2 of the 3 LAUs are within an early stand initiation structural stage due to regeneration harvest or past wildfire, and considered 'unsuitable' as they do not yet provide winter forage opportunities for snowshoe hares. Zero and seven (harvest) acres fall into this stage in the Grave and Therriault LAUs, while the 2015 Marston fire converted 1970 acres (18%) of the Krinklehorn LAU into this stage (Map 24). No regeneration harvest has occurred in any of the LAUs in the past ten years (T&E Species Table 11). Thirty-six to sixty-six percent of

the lynx habitat acres within the LAUs occur as mature multistory forest. Mature multistory forest is found throughout the LAUs, as a mosaic mainly larger patch size and intermixed with mainly 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 the more recent Marston Fire which occurs along the face of the whitefish range along the southern portion of the project area.

Recent literature (Kosterman, 2014) provides new information with potential to inform changes in Forest Service management of lynx and lynx habitat. The results described in terms of the classification of vegetation do no cross-walk well with the parameters and metric standards provided in the NRLMD (Marten, 2016). A group of multiagency scientists are working together with the author of this study to interpret this thesis as it relates to management of Canada lynx and the NRLMD (Ibid).

Currently, all LAUs within the project area meet the NRLMD standards based on 2014 data (see "Assumptions") for the KNF in T&E Species Table 11 and 12.

T & E Species Table 11. Existing lynx habitat conditions by LAU within the Galton Project Area.

LAU Name(Number)	LAUTotalAcres	Total Lynx HabitatAcres[1](% of Total)	Early Stand Initiation(Summer Forage Only)Acres [2](% of Lynx Habitat)	Stand Initiation (Winter& Summer Forage) Acres[3](% of Lynx Habitat)	MSLS(Winter & Summer Forage)[4] Acres(% of Lynx Habitat)	Stem Exclusion(Non-Forage)Acres[5](% of Lynx Habitat)	Lynx Habitat unknown stage[6] (%of Lynx Habitat)
Therriault 140301	46,747	38,018 (81%)	7 (0.01%)	2,676 (7%)	13,783 (36%)	19,551 (51%)	2001 (5%)
Grave 140302	40,235	38,147 (95%)	0 (0%)	4,283 (11%)	23,307 (61%)	9,813 (26%)	744 (2%)
Krinklehorn 14303	18,644	10,813 (58%)	1970 (18%)	284 (3%)	7149 (66%)	1397 (13%)	13 (0.1%)

[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/Larch stands; non-lynx habitat comprises the remaining 19, 5 and 42 percent of the Therriault, Grave and Krinklehorn LAUs, respectively.
[2] Stand initiation structural stage that provides snowshoe hare foraging in the summer only because the trees have not grown tall enough to protrude above the snow in winter - unsuitable
[3] Stand initiation structural stage that currently provides winter snowshoe hare habitat - suitable
[4] Mature multistory or late successional (MSLS) structural stage; includes many age classes and vegetation layers that provide winter snowshoe hare habitat - suitable
[5] Includes closed canopy forested stands with limited understory vegetation that is currently unsuitable as snowshoe hare foraging habitat.
[6]Includes stands with little data. Data shows it is in lynx habitat. NAIP views show mainly older age stands (*either stem excl. or mature multistory), as well as small areas of shrubs, sod, and bare areas. *

T & E Species Table 12. . Existing Lynx Habitat by LAU as related to NRLMD Standards and Guides (VEG S1 & VEG S2) in the Galton Project Area

LAU Name	Total Lynx Habitat In LAU Acres	(VEG S1) Early Stand Initiation Acres & (%)[1]	(VEG S2) - Habitat Changed to (Early Stand Initiation) over past 10 years by timber management with regeneration harvests. Acres	Number of adjacent LAUsthat exceed 30% lynx habitat in an Early Stand Initiation

			& (%) [2]	
Therriault	38,018	7ac. (0.02%)	0 ac. (0%)	0
Grave	38,147	0 ac. (0%)	0 ac. (0%)	0
Krinklehorn	10,813	1970 ac. (0)	0 ac. (0%)	0

[1]These acres are existing lynx habitat that do not provide sufficient vegetation quantity or quality (height) to be used by snowshoe hare and lynx. No additional regeneration harvest allowed if more than 30% of lynx habitat in an LAU is in a stand initiation structural stage that does not provide winter snowshoe hare habitat.

[2]Percent shown is calculated from the total LAU acres that provide lynx habitat (suitable + unsuitable acres). No more than 15% of lynx habitat on NFS lands in an LAU may be changed by regeneration harvest in a 10 year period.

Connectivity/Linkage

Existing habitat connectivity within the LAUs' provided by forested cover is continuous with the exception of portions of the three past wildfires (Marston, Barnably and Kopsi) as well as natural rocky openings along the ridgetops and high elevation meadows. Past fire suppression, lack of recent harvest activities as well as management area direction has limited management within these three affected LAUs. The majority of the Galton Vegetation Project Area lies within IRA's and MA's with a non-motorized emphasis (MA's 5a, and 1c). The lynx LAUs overlap the majority of this area. Much of these lands lie in unroaded blocks that provided largely natural vegetative conditions. Connectivity in terms of forested cover is highnorth of the Therriault LAU into Canada as well as to the east into the Flathead National Forest and the Stillwater State Forest. All three LAUs are bordered to the south and west by low elevation, Koocanusa Reservoir, Highway 93, and private land within the Tobacco Valley and Fortine Creek (Map 25), making lynx travel through these areas more challenging. The 2015 Marston wild fire burned with varying severities that will result in a mosaic of seral stages and provide both forage and cover conditions. Movement within or through the fire area was not compromised due to the mosaic of cover and openings remaining, as well as the location of the fire relative to open roads.

There are no identified linkage corridors (USDA Forest Service 2004: Figure 1-1; KNF Lynx Taskforce 1997: 6) within any of the three affected LAUs or within the Galton project area. There is one linkage area southeast of the project area which could provide potential linkage habitat outside of identified lynx habitat between the Krinklehorn LAU and the Sunday LAU (located further south). These two LAUs are separated by Highway 93 and low elevation habitat approximately 6 miles wide between the LAUs (Map 25).

Environmental Consequences

Alternative 2 (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 lynx habitat including the project area. 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 periodic mixed severity fires. This natural disturbance regime favors fire tolerant species, including older and larger diameter seral tree species such as western larch and white pine. The exclusion of moderate severity fires through fire suppression has increased 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. 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 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 15-20 years and multistory forage and denning habitat would not be available within these areas for possibly a hundred years or more.

Alternatives 1 and 3: Direct and Indirect Effects to Canada Lynx- Northern Rockies Lynx Management Direction STANDARDS

Northern Rockies Standards Applicable To ALL Management Projects in Lynx Habitat

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 would be met for all three affected LAUs in both action alternatives because the proposed burning and harvest projects would not affect overall connectivity within the LAUs. The regeneration harvest and proposed prescribed burns (to a lesser extent) will maintain and introduce areas of early seral (openings) onto this landscape. Because the existing LAUs are mostly heavily forested, the proposed vegetation management will not affect overall connectivity within or between the LAUs. All proposed vegetation management is well-dispersed geographically across the LAUs (Maps 26 and 27), as well as temporally over a 10+ year time frame, and do not pose any connectivity problems for lynx. The individual units would be avoided by lynx until cover was again provided (15-20 years), however would require only minor travel adjustments by individual animals because of the high percentage of cover provided throughout and between the LAUs. Connectivity is maintained with other lynx habitat to the north, into Canada as well as to the east, onto the Flathead National Forest and the Stillwater State Forest (Map 25).

There are no identified linkage corridors (USDA Forest Service 2004: Figure 1-1; KNF Lynx Taskforce 1997: 6) in the Galton project area or within the affected LAUs. There is one identified linkage corridor (Ibid) southeast of the project area that provides potential linkage habitat between the Krinklehorn LAU and the Sunday LAU located further south. This linkage area is

outside of the project area. Therefore this guideline, as it pertains to the linkage corridor, does not apply. However, the Galton Vegetation project does not propose any activities that would prevent lynx movement to the linkage corridor.

Northern Rockies Standards Applicable To Vegetation Management Projects In Lynx Habitat Within LAUs

Standard VEG S1: If more than 30 percent of the lynx habitat in an LAU are 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. Exception: Fuel treatment projects in the WUI, as defined by HFRA, subject to the following limitation – fuel treatment projects in the WUI that do not meet Standards VEG S1, S2, S5 and S6 shall occur on no more that 6 percent (cumulatively) of lynx habitat on each National Forest. In addition, fuel treatment projects may not result in more than three adjacent LAUs exceeding this standard.

See T & E Species Table 13 for how the impacted LAUs meet and exceed (provide <30%) standard VEG S1. Acres are mapped for all land within the LAU regardless of ownership. There are very few acres of private ownership within the LAUs. There are 213 acres of private land in the Therriault LAU, 3 acres in the Grave LAU and no (0) acres in the Krinklehorn LAU. The 213 acres in the Therriault LAU lie in the lowest elevation of the LAU and fall into either stem exclusion or non-lynx habitat. Alternative 2(No Action) represents the amount of early stand initiation habitat currently found within the LAU as shown in T&E Species Table 13. Alternatives 1 and 3 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). Although this project does include fuel reduction projects in the WUI, these activities occur outside of the lynx analysis units (LAUs). Therefore the exception to VEG S1 – (fuel treatment projects in the WUI) does not apply to this project. This standard is already met for all alternatives, as none of the LAUs currently have more than 30% of the lynx habitat in a stand initiation structural stage.

T & E Species Table 13. Standard Veg. S1 – Percentage of Lynx habitat in an early stand initiation structural stage[1] after Galton Vegetation Project proposed activities

LAU Name	Total Lynx Habitat Acres	Alternative 2 - Existing Condition; lynx habitat in early stand initiation stage Acres (percentage)	Alternative 1Acres(percentage)	Alternative 3 Acres(percentage)
Therriault	38,018	7(0.02%)	81 (<1%)	7 (0.02%)
Grave	38,147	0 (0%)	109 (<1%)	38 (<1%)
Krinklehorn	10,813	1970 (18%)	2137 (20%)	2193 (20%)

[1] Lynx habitat in an stand initiation structural stage that is currently not providing sufficient vegetation, quantity or quality (height), to provide winter snowshoe hare habitat.

This standard is already met for all alternatives, as none of the LAUs currently have more than 30% of the lynx habitat in a stand initiation structural stage. All proposed regeneration harvest activities (except for Alternative 1 in the Therriault LAU) would occur in non-lynx and stem exclusion habitat which currently does not provide foraging opportunities for snowshoe hares at any time of the year. Alternative 1 proposes 27 acres of vistas that would increase early stand

initiation habitat, however the remaining acres would not result in a change in the level of lynx habitat found within early stand initiation habitat. Alternative 1 proposes 351 acres of regeneration harvest across all 3 LAUs while Alternative 3 proposes 262 acres. For both alternatives, regeneration harvest would not result in a change in the level of lynx habitat found within early stand initiation habitat except for the 27 acres of vista cuts in Alternative 1. Alternative 1 proposes burns in lynx habitat where some openings may occur. 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. Realistically, it is expected that because of the large size of the proposed burns and how they lie across the landscape, low to moderate fire behavior could result in some openings approximately five acres up to 100 acres on the drier sites, which would mimic natural fire behavior where portions of the burns would result in a light underburn, or are not burned at all (due to topography, prescriptions, fuels, weather, etc.). Alternative 3 does not propose burns in lynx habitat.

In summary, the majority of the stands proposed for treatment (27 acres in Alternative 1 being the exception) 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 three affected LAUs 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. The same exception described in standard VEG 01 for fuels projects in the WUI applies to this standard.

Although this project does include fuel reduction projects in the WUI, these activities occur outside of the lynx analysis units (LAUs). Therefore the exception to VEG S2 – (fuel treatment projects in the WUI) does not apply to this project.

T&E Species Table 14 provides a comparison, by Alternative, of how the impacted LAU(s) comply with this standard which is specific to NSF lands. Alternative 2, 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 a result of timber management. No (0) acres in any of the three LAUs have been regenerated as a result of timber harvest over the last 10 years. There are currently 1,970 acres of early stand initiation habitat in the Krinklehorn LAU, but that was a result of the Marston Fire. Alternatives 1 and 3 reflect the increase in early stand initiation habitat due to proposed regeneration harvest within the affected LAUs. The percentage is calculated by dividing the early stand initiation habitat acres by the total lynx habitat acres within the LAU (see project file).

T & E Species Table 14. Standard Veg S2 –Lynx habitat changed to early stand initiation structural stage[1] in the last 10 years due to regeneration harvest plus proposed regeneration harvest (acres and percentage) in Lynx Habitat by LAU

LAU Name	Total Lynx Habitat Acres (NFS only)	Alternative 1 Acres/percentage Proposed regeneration harvest Acres/percentage	Alternative 2(No Action) Existing regeneration harvest Acres/percentage	Alternative 3Acres/percentage Proposed regeneration harvestAcres/percentage

Therriault	37,878	74 (0.2%)	0 / (0%)	0 (0%)
Grave	38,147	100/ (0.3%)	0/ (0%)	29/ (0.08%)
Krinklehorn	10,813	102/ (0.9%)	0 / (0%)	102/ (0.9%)

[1] Lynx habitat in an stand initiation structural stage that is currently not providing sufficient vegetation, quantity or quality (height), to provide winter snowshoe hare habitat.

These alternatives propose to regenerate from 0% to 0.9% of the LAUs, (depending on LAU and alternative) – see T&E Species Table 14 above. These percentages are well below (better than) the 15% limit within 10 years by LAU. Therefore, all LAUs in all alternatives meet this standard.

Standard VEG S5: Pre-commercial thinning projects that reduce snowshoe hare habitat may occur from the stand initiation structural stage until the stands no longer provide winter snowshoe hare habitat only:

No pre-commercial thinning is proposed in either action alternative. Therefore this standard does not apply to either alternative.

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). Exceptions 2 and 3 shall only be utilized in LAUs where standard VEG S1 is met.

T&E Species Table 15 provides a comparison, by alternative, of how the affected LAUs comply with this standard. Alternative 2, the No Action alternative, represents the current amount of suitable multistory habitat within the affected LAUs as shown in T&E Species Table 15. Alternatives 1 and 3 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).

T & E Species Table 15. Multi-story mature or late succession forest snowshoe hare habitat impacted by. Vegetation management prescriptions in the Galton Vegetation Project

ALT #	LAU Name	Acres/% of multi-story mature (MSM) late successional forests: remaining acres & remaining % of lynx habitat in LAU after alternative implementation	Acres of vegetation management prescribed in mature successional forests by prescription (harvest; burn;)	Exception(s) applied	Is standard VEG S1 being met(Y/N)
1	Therriault	13,508 (36%)	20 ac; 255 ac.	None	Y

2 (no action)	Therriault	13,783 (36%)	0 ac	None	Y
3	Therriault	13,783 (36%)	0 ac.; 0 ac.	None	Y
1	Grave	21,818 (57%)	0 ac.; 1489 ac.	None	Y
2 (no action)	Grave	23,307 (61%)	0 ac.	None	Y
3	Grave	23,307 (61%)	0 ac.; 0 ac.	None	Y
1	Krinklehorn	6859 (63%)	0 ac.; 290 ac	None	Y
2 (no action)	Krinklehorn	7149 (66%)	0 ac.	None	Y
3	Krinklehorn	7149 (66%)	0 ac.; 0 ac.	None	Y

Harvest

Alternative 1 proposes 20 acres of harvest within multi-story mature successional forest. These acres are proposed within the Therriault LAU (See T&E Species Table 15) for a number of roadside vistas that would include harvest of mature multistory forest as well as other types of habitat in 1-4 acre strips along the open roadside. This proposed harvest would reduce the amount of mature multistory lynx habitat by <1/% in this LAU in Alternative 1 (T&E Species Table 15). While this does reduce a few acres of winter foraging acres for lynx, there is still an abundance of winter foraging habitat available in this LAU, as well as the other two LAU's within the project Area. However, this action in Alternative 1 does not meet Standard Veg S6 and is therefore not consistent with the forest-wide standard FW-STD-WL-01. Therefore, if Alternative 1 is chosen, it would require an amendment to the Forest Plan.

Alternative 3 proposes no harvest in this habitat and was designed in accordance with Standard Veg S-6, therefore is consistent with Forest Plan standard FW-STD-WL-01.

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. 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.

Each of the action alternatives include regeneration or intermediate harvest in all LAUs where harvest units have high canopy closure and contain little to no ground, shrub, or small conifer cover in the understory (mapped multistory forest). 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 T&E Species Table 15 were adjusted to reflect this field validated condition (see project file). Approximately 33, 90, and 102 acres are proposed for regeneration or intermediate harvest under Alternative 1 in the Therriault, Grave and Krinklehorn LAU (respectively) and 0, 29, and 102 acres under Alternative 3 in the respective LAUs. Harvest of these identified acres would have no impacts on mature multistory forest habitat within either LAU under Alternative 1 or 3. This harvest would, however, increase future young forest habitat within each LAU as described below (also see T&E Species Table 18).

Prescribed Burning

Alternative 1 also proposes understory burns acres that fall within multi-story mature successional forest. These burns are located within all three LAUs and were designed to increase the amount of early seral habitat across this landscape. The proposed prescribed burns are designed to result in a variety of stand conditions. In the majority of the sites, stands have young trees encroaching into once open areas. These burns are designed to reduce this encroachment and return these stands to their open state. Other stands have large areas of varied habitat, where the intent is to have fire imitate the mixed severity fires from the past and result in pockets of more complete burned areas within stands of non-burned areas across the landscape. Both situations would initially reduce the amount of mature multistory lynx habitat by reducing the hare foraging habitat provided by the understory. Because of the size of some of the proposed burns, they do not lie exclusively within mature multistory habitat but include a mosaic of lynx habitat and non-lynx habitat including stem exclusion cover types. Much of this habitat lies on steep, sometimes rocky areas adjacent to the ridgetops. This type of habitat is not favored by lynx (Ruggierio et al. 2000). The multistory habitat within this mosaic is often found along the draws and slopes in these areas. Generally, these pockets would remain unburned, however the steepness of slope, weather and site conditions vary within these units which can result in varying effects to the stand. This is also representative of how fire behaved historically and would result in a mosaic of differing successional forest stages across the landscape. Acres of reduction of multistory habitat reduction shown here, represent the maximum acreage that could be affected or worst-case-scenario, as other factors such as weather, fuels and other species requirements could affect when or how many acres could actually be treated (with prescribed burning). These proposed burns would be accomplished over a 10+ year period within the three LAUs. Alternative 3 proposes no prescribed burning acres within multi-story mature forest.

Salvage of incidental mortality from underburning harvested or underburn units may occur in both alternatives on no more than 20 acres/year for no more than 200 acres. This salvage is subject to a number of conditions (page 14 of FEIS) and would occur within or adjacent to treatment areas. One of these conditions includes limiting salvage in LAU only if they were in compliance and met the Northern Rockies Lynx management direction. Effects to lynx would be similar to the effects shown for the original unit this salvage would occur in or adjacent to.

Ecosystem burns for whitebark pine

Alternative1 proposes prescribed burns designed to create areas of whitebark pine regeneration. The proposed stands are also located within steep areas along the ridgelines with many of the stands consisting of a more open overstory state with dead and dying trees in the overstory. These burns also occur within a mosaic of lynx cover types, and although they may reduce some acres of multistory habitat, the majority of the stands do not typify habitat that lynx commonly favor.

Summary

Alternative 1 proposes either harvest or prescribed burning or both within mature multistory lynx habitat and therefore does not meet standard VEG 6. Alternative 3 does not propose to treat any mature multistory lynx habitat. However, as described earlier, these LAUs have a large percentage of lynx cover types within MSM habitat (61, 36, and 66%) for the Grave, Therriault, and Krinklehorn LAUs. Alternative 1 reduces the amount of mature multistory habitat by 0-4% depending on LAU (see T&E Species Table 15 above). Acres shown here, represent the maximum acreage that could be affected or worst-case-scenario, as other factors such as weather, fuels and other species requirements could affect when or how many acres could actually be treated (with prescribed burning). In addition, proposed activities would be planned over a 10+

year time frame within the three LAUs, temporally spacing out the proposed activities. Alternative 3 meets standard VEG 6, by not treating any mature multi-story lynx habitat.

Northern Rockies Lynx Management Direction Objectives and Guidelines
Objective ALL 01: Maintain or restore lynx habitat connectivity in and between LAUs and in linkage areas.

The action alternatives would not reduce connectivity in and between LAUs in the project area. The majority of the Galton Vegetation Project Area (much of which overlap the lynx LAUs), lies within IRA's or MA's with a non-motorized management emphasis (MA 5a and 1c). Much of these lands lie in unroaded blocks that provided largely natural vegetative conditions. Connectivity is good north of the Therriault LAU into Canada as well as to the east into the Flathead National Forest and the Stillwater State Forest. All three LAUs are bordered to the south and west by low elevation, Koocanusa Reservoir, Highway 93, and private land within the Tobacco Valley and Fortine Creek (Map 25), making lynx travel through these areas more challenging. The 2015 Marston fire burned with varying severities that will result in a mosaic of seral stages and provide both forage and cover conditions. Movement within or through the fire area was not compromised due to the mosaic of cover and openings remaining, as well as the location of the fire relative to open roads. Proposed harvest and burn units may temporarily change movement patterns through the LAUs but will not reduce connectivity.

There are no identified linkage corridors (USDA Forest Service 2004: Figure 1-1; KNF Lynx Taskforce 1997: 6) within any of the three affected LAUs or within the project area. There is one linkage area southeast of the project area which could provide potential linkage habitat outside of identified lynx habitat between the Krinklehorn LAU and the Sunday LAU (located further south). These two LAUs are separated by Highway 93 and low elevation habitat approximately 6 miles wide between the LAUs. One burn unit lies north of the identified linkage area. This unit would not affect potential use of this linkage area.

Guideline All G1 is not applicable to this project because highway construction/reconstruction is not a part of this project. **Standard LAU S1** is also not applicable because no LAU boundary changes are proposed with the Galton Vegetation EIS.

Objectives VEG 01, 02, 03, 04:

All action alternatives use vegetation management and prescribed fire to mimic or approximate natural succession and disturbance processes while maintaining habitat components for the conservation of lynx (VEG01) (T&E Species Table 14). The existing condition for lynx provides a large percentage of the winter snowshoe hare habitat in the multi-story mature structural stage with a lower percentage of habitat in the stand initiation structural stage (T&E Species Table 11). Many of the existing acres in the Stand initiation stage are from harvest that occurred in the early to mid1960's, and may soon start to form closed canopies (stem exclusion structural, which will limit the dense horizontal cover that provide lynx foraging habitat. Both action alternatives address VEG 02 by providing a mosaic of habitat conditions through time that support dense horizontal cover in both the mature multistory stage and the SIS stage by the proposed vegetation management and prescribed fire. Objective VEG 03 and 04 are also met with all action alternatives by the proposed prescribed burns that attempt to restore ecological processes into a landscape that has been affected by fire suppression, and is generally lacking (across 2 of the 3 LAUs) early seral stages of vegetation.

Guidelines VEG G1, G4, G5, G10 and G11

All action alternative use vegetation management projects, including prescribed fire, to initiate early seral habitat which will include conifers, hardwoods and shrubs in varying densities depending on the site, thereby meeting VEG G1. The existing lower percentage of stand initiation stage and higher percentage of mature multistory stage limits the applicability of this guideline on the affected LAUs. Prescribed fire will not create permanent travel routes that facilitate snow compaction (VEG G4). There may be some snowmobile use of areas opened up after prescribed burns, however the areas sought by snowmobiles are higher elevation open, steep slopes, and are generally not the same areas considered as ideal lynx habitat. Permanent firebreaks on ridges and saddles are not planned in any alternatives. All action alternatives comply with VEG G5 because a large percentage of habitat is remaining (over 36%, 57% and 63%), depending on LAU) in the LAU as suitable habitat for alternative prey species. Both VEG G10 and G11 are met in all action alternatives because fuel treatment projects in the WUI do not overlap with suitable lynx habitat, and because denning habitat is well-distributed and not lacking within the Grave, Therriault and Krinklehorn LAUs.

Objectives and Guidelines applicable to livestock management projects in lynx habitat within LAUs

Objective GRAZ 01

The project does not include any changes to current livestock management activities, therefore this objective does not apply.

Guidelines GRAZ G1, G2, G3, G4

The project does not include any changes to current livestock management activities, therefore this guideline does not apply.

Objectives and Guidelines applicable to human use projects in lynx habitat within LAUs

Objectives HU 01, 02, 03, 04, 05, and 06

The project does not include any changes to current special uses, recreation management, roads, and mineral and energy development. Therefore these objectives do not apply.

Guidelines HU G1 through G12:

The project does not include any changes to current special uses, recreation management, roads, and mineral and energy development. Therefore these objectives do not apply.

Linkage Areas (Link): The following objective, standard, and guidelines apply to all project within linkage areas in occupied habitat, subject to valid existing rights.

LINK 01, S1, G1 & G2: are applicable only in projects within linkage areas in occupied habitat. This project does not occur within a linkage area and is therefore not applicable.

Cumulative Effects

Introduction

The Existing Condition section describes relevant past and present factors affecting lynx and lynx habitat conditions and trends in the affected LAUs. 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 above, the analysis area for analyzing and monitoring project effects (direct, indirect, and cumulative) to lynx habitat is the affected LAUs. 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.

In addition, areas outside of the impacted LAU were evaluated for potential impacts related to habitat availability and connectivity to adjacent LAUs, Canada and adjacent Forests. Given the location of the project's proposed activities (Maps 26 and 27), 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 LAUs. Therefore, the three LAUs in the project area were chosen as the appropriate scale for cumulative effects analysis.

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.

Summary of the Existing Condition – Past Actions

The existing condition of Canada lynx habitat is summarized in T&E Species Table 11. Specifically, a more detailed description of previous vegetation management activities is found at the beginning of Chapter 3. Lynx habitat within the project area has been cumulatively affected by past management actions and natural occurrences. Vegetation altering events, whether man-caused or naturally occurring have been largely beneficial for lynx in that they have provided cycles of foraging habitat in these LAUs. Because of past Forest Plan MA direction in the project area, very little timber harvest has occurred in the higher elevations, with much of it adjacent to the existing open roadsThe majority of the Galton Project Area lies within IRA's and MA's with a non-motorized management emphasis. The lynx LAUs overlap the majority of those acres that fall above 4000 feet in elevation. There are very few acres of recent harvest that have created early stand initiation habitat in the Therriault, Grave or Krinklehorn LAUs (T&E Species Table 11). Three large wildfires have occurred in the last 20 years: the 1000 + acre Kopsi fire in the Grave LAU, the Barnaby Mountain or High One fire (700 acres) in the Therriault LAU, and most recently the Marston fire in the Krinklehorn LAU. These wildfires now provide a vast majority of the stand initiation and early stand initiation structural stages in these LAUs (Map 24). Based on past experience on the Fortine Ranger District at this high elevation, this may take 15-20+ years for these sites to develop lynx winter foraging habitat. There is a large percentage of multi-story,

mature/ late structural stage habitat – (see T&E Species Table 11) in all LAUs which provide winter and summer lynx foraging habitat.

Effects of Current and Reasonably Foreseeable Actions

Vegetation Management - Timber harvest and associated activities may contribute to the environmental habitat baseline for the lynx as well as possible effects to species ability to utilize a specific area during project implementation. Timber harvest and hauling could cause lynx to temporarily avoid affected areas. The amount of time that species will avoid an area depends both on the species and the individual, but generally, avoidance will last from hours to possibly days. Given that roads used to access timber harvest areas are closed to the general public, there would be little to no increase in the risk of mortality to wildlife, especially with the enforcement of contractual provisions. Additionally, timber harvest can result in areas lacking in hiding or movement cover and increased edge effect for approximately 15-25+ years in this area, depending on the site.

The Little Feet Project, Little Feet Fuels Reduction, and Ant Flat Maintenance Burn are foreseeable projects planned within the boundaries of the analysis area and are likely to be implemented either before or during implementation of the Galton Vegetation Project. These projects lie outside all affected LAUs and therefore do not affect lynx habitat directly. These projects also lie outside of identified lynx linkage areas, but would still be avoided by lynx that may be traveling through the lower elevation valleys between LAUs identified south of the project area.

Harvest of blown down or damaged trees associated with future storms is possible in the analysis area. If a salvage project is identified and implemented, the cumulative effects to specific habitats (e.g. undesignated old growth, snags, wetlands etc.) and associated species would be evaluated at that time. If a salvage project is identified and implemented, the cumulative effects and associated species would be evaluated at that time, including the effects of this project.

The Forestwide Young Growth Vegetation Management project would treat approximately 400 to 600 acres annually, dependent on funding, using precommercial thinning or commercial thinning treatments. Stands proposed for treatment are second growth stands and would be subject to a number of criteria including compliance with the NRLMD and the Forest Plan and lynx critical habitat before they were determined eligible for treatment. The Forestwide Young Growth Vegetation Management project would have the same effects on lynx as the effects described for precommercial thinning (below), and potential temporary avoidance of the area as described above.

The effects to lynx from pre-commercial thinning are a reduction in winter foraging habitat for hare as well as temporary avoidance while activities occurred. No pre-commercial thinning would be proposed in lynx habitat, unless it complied with the standards in the NRLMD.

Pre-commercial thinning on National Forest land occurs when past regenerated timber stands meet certain stand conditions. It is expected that approximately 1000 acres would be treated through pre-commercial thinning within the PSU during the time period this proposed project is active. Because the vast majority of the past regenerated stands are located below 4000 feet, they do not fall within lynx habitat. However, no pre-commercial thinning would be proposed in lynx habitat, unless it complied with the standards in the NRLMD. During thinning operations, there would be short-term localized disturbance to listed species and their prey in the area. Mortality risk for associated species is not expected to increase. Pre-commercial thinning on State land is

considered a minor activity. With the limited amount of pre-commercial thinning on State lands, potential effects to listed species and their prey would be indiscernible.

Ten Lakes Travel Management Project - The Ten Lakes Travel Management Project will address over-snow and mechanized travel planning for the Ten Lakes area. The area affected by the proposal includes the Ten Lakes WSA and areas with common entrance points to the WSA. There are three main over-snow entrance points to the Ten Lakes WSA: the Grave Creek corridor; Clarence and Stahl Creek; and the Burma/Blacktail area. Over-snow travel is currently not limited. Mechanized use (primarily mountain bicycles) is also unrestricted. The alternatives contained in the Ten Lakes Travel Management Draft Environmental Impact Statement contain various amounts of over-snow and mechanized travel for the project area. A final decision has not been made for this project and the cumulative effects analysis utilizes the Proposed Action as the basis for the analysis in the Galton Vegetation Management Project. Existing over-snow effects are discussed on page 291 in reference to guideline VEG G4 and the creation of permanent travel routes that facilitate snow compaction. This states that "There may be some snowmobile use of areas opened up after prescribed burns, however the areas sought by snowmobiles are higher elevation open, steep slopes, and are generally not the same areas considered as ideal lynx habitat." The Ten Lakes Travel Management Project proposed action, as well as all action alternatives limit over-snow use both spatially and temporally from the existing condition, which would decrease both the length of time and area that the existing permanent travel routes would be used and would not increase permanent travel routes. The cumulative effects of the Ten Lakes Travel Management Project in conjunction with past, present, reasonably foreseeable actions would result in fewer effects for lynx and lynx habitat due to limits on over-snow activities in both time and space.

Cattle Grazing - This activity would not result in a change of lynx habitat. The majority of the three LAUs do not overlap the existing allotment, therefore livestock grazing generally does not affect lynx habitat within the project area. The lynx habitat that does exist in the allotment, is mainly either matrix habitat or low elevation habitat and does not provide lynx foraging habitat.

Noxious Weed Control - Weed treatment activities would not lead to any adverse effects on wildlife species or their habitat because treatments isolate non-beneficial weed species and would actually benefit forage species important to many species or their prey (USDA Forest Service 1997, 30).

No loss or change in specific habitats (e.g. undesignated old growth, wetlands), including snags and down woody debris, often used by prey species, would result from this activity because weed treatments primarily focus on the herbaceous layer along roads and in disturbed areas.

Fire Suppression - In the event of a wildfire, construction of fire lines, helispots, and safety zones could potentially result in impacts to specialized habitats (e.g. old growth, snags and down woody debris), or create openings along travel corridors such as ridges or riparian areas. The amount and timing of such an impact cannot be predicted; however, for example, the number of snags created by a wildfire would far exceed those lost during fire suppression efforts. Suppression activities are typically subject to input from District Resource Advisors, and protection of species and specialized habitats is considered. Maintaining travel corridors are considered a priority in these cases.

Road Management Activity - Actions such as road maintenance and administrative use associated with permit administration, data collection, and monitoring of NFS lands are not likely to measurably affect wildlife or specialized habitats (e.g. old growth habitat, snags nor down

woody debris) because they generally do not result in vegetation removal or persist for long periods of time. The standing tree and snag component would only be affected if considered a hazard to road users. These activities would not result in any change to specialized habitats of listed species, thus no adverse cumulative effects would be expected.

Public Use - Other forest product activities occurring presently and typically on an annual basis are the gathering of pine cones, boughs and commercial gathering of Christmas trees and "character trees." These activities occur throughout the analysis area, and have little-to-no effect on the landscape due to the unspecific nature of the use and the low impact on the resources (foot traffic, hand tools). Additionally, Christmas trees are harvested from existing regeneration unit, but the effects of such few trees removed in a stand are indiscernible. These activities would be more prominent outside the LAU boundaries below 4000 feet, where there are more open roads. However within the LAUs the roadless designation of this area limits the roads, and therefore would occur on a minor percentage of the lynx habitat available.

Firewood cutting in the AA will continue to occur. The result of this would be possible reduction of down trees that may be used as potential denning habitat and perhaps a slight displacement for animals using the area. These activities would be more prominent outside the LAU boundaries below 4000 feet, where there are more open roads. However within the LAUs, the roadless designation of this area limits the roads, and therefore would occur on a minor percentage of the lynx habitat available.

Recreation Maintenance - Routine maintenance of trails and developed and dispersed recreation sites may temporarily displace some wildlife species. Recreation maintenance could involve the harvest of trees in mature forest stands that pose a hazard to users. However, the scale of the impact would be negligible as a cumulative effect to those species utilizing the immediate area, nor adjacent forest stands.

Special Uses - Operations of outfitter/guides would not result in any change to general and specialized wildlife habitats (e.g. undesignated old growth, snags or down woody debris) that listed species may utilize, as they do not involve the harvest of trees. There would be no cumulative effects to wildlife and their habitats associated with these activities other than possible temporary and local avoidance of an area due to the presence of humans.

Permits associated with access to private homes, right-of-ways for utilities, and outfitter/guides are not expected to contribute to the cumulatively impact on wildlife because they are limited to previously disturbed and hardened sites like trails and roads. The majority of these occur outside of the affected LAUs.

Climate Change - Climate change could have effects on the lynx at a forest level and are discussed in the KNF FEIS on page 240: "Climate change will have the potential to alter the amount and distribution of lynx habitat on the KNF and adjacent ownerships. Coupled with past fire suppression, climate change can increase the impact of insects and disease and change the amount of habitat available for lynx." Desired Conditions in the Forest Plan will shift vegetation to a more sustainable and resilient condition possibly making lynx habitat more sustainable and resilient in the long term. Maintaining connectivity is important as distributional shifts are one way species respond to climate change (KNF FEIS, 2013). The snowshoe hare is the primary food source for lynx. Likely effects to snow hare from climate change are discussed in "The Effects of Climate Change on Mammals" (McKelvey, K.S. et al. 2013).

Private Land - Any cumulative effects to wildlife species will be partially dependent on the duration (seasonal versus year-round) of use of these parcels and homes. Anticipated effects include species displacement, reductions in specialized habitats (e.g. old growth, snags, and down woody debris), habitat alteration and/or habitat loss. Many of the activities that may occur on the private parcels can only be surmised.

Other Agency Actions - On State of Montana lands including the Woods Ranch WMA, no activities are planned at this time. On State of Montana Trust lands, permitted cattle grazing is expected to continue and would have similar effects to those described under cattle grazing above. Additionally, 40 acres of Trust Lands are leased to the Indian Springs Golf Course which has already converted several acres of natural bunch wheat grasses to exotic grasses used by this type of industry. None of these lands or their activities occur within the affected lynx LAUs. Regardless, these activities would not directly impact wildlife habitat modeled and identified as suitable habitat on NFS lands.

Summary of Cumulative Effects

Project scheduling/staging may be required in order to avoid possible cumulative effects from various vegetation management and fuel reduction activities occurring within and adjacent to the analysis area relative to species displacement. Any cumulative effects from wildfire suppression or from the assumed development of adjacent private lands can only be surmised, at this time.

The temporal occurrence of forest uses such as summer activities (camping, hiking, and berry picking) versus fall (hunting and firewood cutting) or winter (skiing and snowmobiling) activities may result in a temporary displacement of lynx use of that area, however, the majority of these activities occur in existing areas of human use that are already avoided by lynx. There may be some situations where isolated or localized cumulative effects may occur, due to an overlap of forest activities, but these situations are typically short in duration, and do not persist through the lifecycle of any one species, either temporally or spatially.

Forest Plan Biological Opinion (USFWS 2013b) – Terms and Conditions

Terms and Conditions from the Biological Opinion on the effects of the Northern Rockies Lynx Management Direction:

A. Fuels management projects conducted under the exemptions from standards VEG S1, S2, S5, and S6 in occupied habitat shall not occur in greater than 6 percent of lynx habitat on any Forest: *All standards are met and the KNF is currently below the 6 percent standard. No exemptions would be used for proposed activities in LAUs.*

B. Fuels management projects conducted under the exemptions from standards VEG S1, S2, S5, and S6 in occupied 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: *All affected and adjacent LAUs are currently better than the 30 percent standard.*

C. In occupied lynx habitat, pre-commercial thinning and vegetation management projects allowed per the exception listed under VEG S5 and S6 shall not occur in any LAU exceeding VEG S1, except for protection of structure: *All affected LAUs meet VEG S1.*

Regulatory Framework Finding

Endangered Species Act

The preferred alternative would be consulted on with the USFWS and will be in compliance with the ESA. Consultation with FWS is ongoing and will continue with the selection/analysis of an alternative in the Final EIS. Concurrence is anticipated with the completion of the Galton Vegetation Final EIS.

Forest Plan

The 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:

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 prescribed burning would result in a 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. Timber harvest and ecosystem burning would increase future foraging opportunities for snowshoe hares and lynx within approximately 15 years. See "Standard VEG S2." Therefore, the Galton Vegetation project would contribute to progress toward achieving 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.GOAL-WL-01*.

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 denning habitat is abundant within the LAUs (see FW-DC-WL-13 below). Therefore, the Galton Vegetation project would contribute to progress toward achieving FW-DC-WL-01*.

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 be minimally impacted by Alternative 1 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 Galton Vegetation project would contribute to progress toward achieving FW-DC-WL-03.*

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.*Based on the existing fuel loadings of down CWD within the proposed harvest units, surrounding stands of mature forest of similar structural conditions would provide ample denning habitat with the LAUs. All LAUs have large percentages of old forests which will provide many areas for denning. Also, areas that receive limited or no active management (e.g., unroaded areas, IRAs, and old growth stands) within the LAUs would provide varying and potentially high levels of CWD. In addition, project design would leave down CWD*

and snags or recruitment snag levels (refer to the Downed Wood Habitat and Snag sections, respectively) that would continue to provide appropriate levels and size of down CWD for this habitat type and wildlife use. While these stands would not provide denning habitat for lynx in the immediate future, the retained CWD provides a baseline level to which more down CWD would be added as the stand matures and becomes denning habitat. Therefore, the Galton Vegetation project would contribute to progress toward achieving FW-DC-WL-13.

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 within and between the LAUs and activity areas under all alternatives and include unharvested and recovered stands, RHCAs. All three LAUs are bordered to the south and west by low elevation, Koocanusa Reservoir, Highway 93, and private land within the Tobacco Valley and Fortine Creek (Map 24), making lynx travel through these areas more challenging. The 2015 Marston wild fire burned with varying severities that will result in a mosaic of seral stages and provide both forage and cover conditions. Movement within or through the fire area was not compromised due to the mosaic of cover and openings remaining, as well as the location of the fire relative to open roads. Proposed harvest and burn units may temporarily change movement patterns through the LAUs but will not reduce connectivity. 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 Galton Vegetation project would contribute to progress toward achieving FW-DC-WL-17.*

FW-OBJ-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 been applied to actions proposed in the Galton project. While alternative 3 meets all relevant direction and is was designed to be consistent with this standard. Alternative 1 does not meet Standard Veg S6 and is therefore not consistent with the forest-wide standard above. See the "Direct and Indirect" and "Cumulative Effects" discussions as organized by the objectives, standards, and guidelines of the NRLMD. Therefore, if Alternative 1 is chosen and still included items that were not consistent with this standard, it would require an amendment to the Forest Plan.*

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 Galton 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 Galton Vegetation project is designed in accordance with this standard.*

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 Galton does not propose any exchanges. Therefore, the Galton Vegetation project is designed in accordance with this 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.*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 Galton Vegetation project is designed in accordance with this guideline.

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 5b are found within the project area in addition to IRA and wilderness study areas. Proposed burns are scheduled over a ten year period limiting the human disturbance over time. Overall, 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 Galton Vegetation project would contribute to progress toward achieving this desired condition.*

GA-DC-WL-TOB-02: Wildlife move between the large blocks of NFS lands across Highway 93 southeast of Murphy and Dickey Lakes. Wildlife also move from the Lydia and Pinkham mountains vicinity and the Sunday creek vicinity.*See response to GA-DC-WL-TOB-05.*

GA-DC-WL-TOB-05: Wildlife move to and from the border with Canada. *The majority of the Galton Vegetation Project Area lies IRA's or MA's with a non-motorized emphasis (MA's 5a, and 1c). The lynx LAUs overlap the majority of this area. Much of these lands lie in unroaded blocks that provided largely natural vegetative conditions. Connectivity is good north of the Therriault LAU into Canada as well as to the east into the Flathead National Forest and the Stillwater State Forest. All three LAUs are bordered to the south and west by low elevation, Koocanusa Reservoir, Highway 93, and private land within the Tobacco Valley and Fortine Creek,, making lynx travel through these areas more challenging. The action alternatives of harvest and burn acres will not compromise travel through any of these areas. Activities are planned over a 10 year period and may cause temporary avoidance of harvest/burn activities, but will not hinder movement through the area. Therefore, the Galton Vegetation 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 through compliance with the Forest Plan.

Statement of Findings

Alternative 1, **may affect, is likely to adversely affect the Canada lynx**. This determination is based on: the proposed vegetation treatments include treatment within the multi-story mature lynx habitat and do not meet Standard Veg S6, however, proposed activities would move stands towards desired vegetative conditions characteristic of the area, including increased habitat diversity.

Alternative 2 (no action), **may affect, is not likely to adversely affect the 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) no increases in mortality risk; however, 4) active fire suppression would continue the trend towards uncharacteristic vegetative and fuel conditions (except for the Krinklehorn LAU), 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 Therriault and Grave LAUs.

Alternative 3 **may affect, is not likely to adversely affect the 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 activities would move stands towards desired vegetative conditions characteristic of the area, including increased habitat diversity, 3) 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 15-20 years, 4) activities would maintain existing movement within and between LAUs, 5) large areas of the LAU would remain free of activity to accommodate potential lynx displacement from activity areas, and 6) no increase in lynx mortality is expected.

Other Agencies and Individuals Consulted

Katrina Dixon, USFWS Consultation Biologist

Communications have consisted of consultation throughout early on in the development of the Galton project and included providing a description of 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 Galton Vegetation project.

Canada Lynx Critical Habitat

Introduction

Canada lynx occupy northern boreal forests[2] 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 and young regenerating 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 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.

[2]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).

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 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 Constituency Elements (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 (CWD), 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 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 Alternative 3 would result in a determination of **may affect, is not likely to adversely affect** Canada lynx critical habitat. Implementation of Alternative 1 would result in a determination of **may affect, is likely to adversely affect Canada lynx critical habitat**. The may affect determination is a result of harvest and burning within preferred snowshoe hare habitat. Proposed vegetation management would occur in potential and matrix habitats in the Therriault, Grave and Krinklehorn LAUs in both alternatives. Treatments would maintain the existing condition on most treated acres in the short-term; however, timber harvest in mature stands with poorly developed understories would increase the future amount snowshoe hare preferred habitat conditions within critical habitat. Impacts to the primary constituent element (PCE) of lynx critical habitat currently available within the project area would be negligible at the scale of the LAUs.

Regulatory Framework

Forest Plan

The 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 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 T&E Species Table 16 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.

T & E Species Table 16. 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 2013)
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 2013)
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 2013)

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.

Harvest units and most ecosystem burn units in mapped multistory habitat were 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. Some of the extremely inaccessible ecosystem burn units were evaluated through the use of stand data, satellite imagery, and photo documentation. 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 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 T& E Species Table 17, which displays the existing critical habitat PCE conditions, the reviewed acres were removed from the mature multistory forest acres and placed into the stem exclusion stage. 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. (1999), 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.

Mapped habitat within the Therriault LAU indicated two large polygons of lynx habitat without a known stage (lynx habitat – unknown stage). These polygons occur in remote areas with no known fire or harvest history and after review of the NAIP and satellite imagery, this was confirmed. Without recent fires or harvest, these stands would fall into either the Stem Exclusion or Potential Multistory Forage stage. To be conservative, these stands were then removed from the unknown category and placed in the stem exclusion category which becomes the new baseline. Any potential burns located in this area with this project will be surveyed and dropped if they are found to provide lynx habitat (see project file for documentation).

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 LAUs. 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 includes portions of three LAUs: Therriault, Krinklehorn and Grave Map 24). Proposed timber harvest is located mainly along the lower elevation boundaries of the LAUs mainly adjacent to roaded areas. Proposed prescribed burn units are located throughout the LAUs. Proposed burns were designed to mimic natural disturbances both to maintain more open understory in the lower elevation stands as well as to help maintain and enlarge early seral stands where fire suppression has limited this opportunity. Alternatives 1 and 3 would retain a large percentage of lynx habitat in mature multistory habitat, and would not impede movement to or use of adjacent foraging or denning habitats. Also, ample lynx habitat would remain available within all LAUs for lynx use during and post-project implementation. Therefore, the Therriault, Krinklehorn and Grave LAUs have been chosen as the appropriate scale of analysis for determining direct, indirect, and cumulative effects to critical habitat for the Galton Vegetation 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 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 Galton Vegetation project falls within the Northern Rocky Mountains (NRM) 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 project still falls within Unit #3 under this updated final rule.

Condition of PCE within the Therriault, Grave and Krinklehorn LAUs

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 most recent landscape fire occurred in 2015 (Marston fire) and covered approximately 7500 acres (see Fire management section). A portion of this wildfire occurred within the Krinklehorn LAU where it was determined that approximately 1750 acres of critical habitat burned at the high to moderate levels, moving this habitat into an early

successional stage that temporarily will not provide the habitat conditions preferred by snowshoes hare. The effects of this fire on lynx habitat were calculated and incorporated into the existing condition acreages (T& E Species Table 17).

Fire suppression since the early 1900s has resulted in fewer and smaller fires with only two other wildfires of any size occurring in the last 20 years in 2 of the 3 affected LAUs: the 1000 + acre Kopsi fire in the Grave LAU and the Barnaby Mountain or High One fire (700 acres) in the Therriault LAU. Both these wildfires now provide summer and limited winter lynx habitat and fall into the stand initiation structural stages (young forest) in these LAUs. 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 the suitability of the stands for snowshoe hares and, therefore, lynx.

The majority of the Galton Vegetation Project Area lies within Inventoried Roadless Areas or Forest Plan Management Areas (MA's) with a non-motorized management emphasis. The lynx LAUs overlap the majority of this area. Much of these lands lie in unroaded blocks that provided largely natural vegetative conditions. Much of the past timber harvest within the project area occurred below 4000 feet, outside of the lynx LAUs. Because of this management emphasis, and inaccessibility of much of the project area's land base, very little timber harvest has occurred in the higher elevations, with much of the existing harvest adjacent to the existing open roads. There are very few acres of recent harvest that have created early stand initiation habitat in the Therriault, Grave or Krinklehorn LAUs.

In all three LAUs, the majority of the acres that fall into stand initiation habitat (6%, 11% & 2%) (other than the 2 wildfire areas) are from regeneration harvest that occurred adjacent to the roads in the mid to late 1960's. 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, 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 (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 affected LAUs was assessed for all ownerships. There are 213 acres of private land (<1%) in the Therriault LAU, 3 acres in the Grave LAU and no (0) acres in the Krinklehorn LAU. The private land in the Therriault LAU lies mainly in the lower elevations along the foothills of the LAU. T& E Species Table 17 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.

Thirty-six to sixty-nine percent of the acres of NFS lands (depending on LAU) in the three affected LAUs are in a structural condition that can support snowshoe hares and lynx during the critical winter period (see T& E Species Table 17). Thirty to fifty-eight percent of these critical habitat acres within the LAUs occur as mature multistory forest whereas only 2 to 11% are found as young forest. Mature multistory forest is found throughout the LAU, as a mosaic mainly larger patch size and intermixed with mainly 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 the more recent Marston Fire area which occurs along the face of the Whitefish Range along the southern portion of the project area. Matrix habitat comprises 5 to 42% 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.

T & E Species Table 17.Existing critical habitat PCE conditions[1] within the Galton project area LAUs

LAU Name(Number)	LAU Total Acres[1]	Stand Initiation Forage[2]	Multistory Forage[3]	Matrix (Movement)[4]
Therriault (14301)	46,747	2676 (6%)	13,783 (30%)	8729 (19%)
Grave (14302)	40,235	4283 (11%)	23,307 (58%)	2087 (5%)
Krinklehorn (14303)	18,644	284 (2%)	7149 (38%)	7830(42%)

[1] Habitat types presented are only those that contribute to the critical habitat PCE. Other habitat types that have the potential to develop habitat conditions preferred by snowshoe hares, but are currently unsuitable, or have data indicating boreal habitat, but not what type are also found within the project area. These habitats comprise the remaining 45, 26, and 18% (see project file for calculations).
[2] Young stand where the vegetative growth is sufficient to protrude above the snow and provides winter snowshoe hare habitat.
[3] Mature multistory stands that include many vegetation layers that provide winter snowshoe hare habitat.
[4] Habitat types that do not support snowshoe hares but allow for lynx movement between associated patches of boreal forest.

Environmental Consequences

Alternative 2 – Direct and Indirect Effects to Canada Lynx Critical Habitat

A range of fire severity, from non-lethal to stand replacing crown fires, historically played a role in developing the vegetative characteristics in the Galton project area. 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 periodic mixed severity fires. This natural disturbance regime favors fire tolerant species, including older and larger diameter seral tree species such as western larch and white pine. The exclusion of moderate severity fires through fire suppression has increased 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. Fire suppression has not yet resulted in a departure from historic ranges for all stands

within the project area, although they 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, past vegetation management practices that targeted these old, large trees removed the relic seral species further altered tree size and composition and has promoted the development of climax species and conditions. In general, the resultant stand patch sizes, species composition, and fire frequency are departing from historic conditions within the project area. See the Fuels 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 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. 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 Fuels section).

Although this area has seen large wildfires 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, denning, and movement). However, if severe wildfires occur, especially over a large expanse, potentially drastic changes in the availability and distribution of habitats that provide for these requirements 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 1 and 3 – Direct and Indirect Effects to Canada Lynx Critical Habitat

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 activities on the PCE, by sub-element, for designated lynx critical habitat within the Therriault, Krinklehorn and Grave LAUs. T& E Species Table 18 provides a comparison, by alternative, of how the proposed activities impact lynx critical habitat PCE. Alternative 2 represents the existing critical habitat PCE conditions within these LAUs as shown in T& E Species Table 18. Alternatives 1 and 3 reflect the changes in critical habitat PCE acres due to proposed vegetation management within the LAUs. The percentage is calculated by dividing the acres of PCE habitat impacted by the existing PCE habitat acres within the LAU (see project file).

T & E Species Table 18. During project and future effects of vegetation harvest activities to lynx critical habitat PCE conditions within the Galton project LAUs

LAU Name	Habitat Type	Alternative 1	Alternative 2 (No Action)	Alternative 3
Therriault	Mature Multistory	20 acres (0.1%)	13,783	0 acres (0%)
	Young Forest	7 acres (0.3%)	2676	0 acres (0%)
	Young Forest –Future[1]	33 (+1%)	--	0 acres (0%)
	Matrix	0acres (0%)	8729	0 acres (0%)
Grave	Mature Multistory	0 acres (0%)	23,520	0 (0%)
	Young Forest	0 (0%)	4283	0 (0%)
	Young Forest –Future[1]	100 acres +(2%)	--	29 acres+ (0.7%)
	Matrix	10 acres (0.5%)	2087	10 acres (0.5%)
Krinklehorn	Mature Multistory	0 acres (0%)	8963	0 acres (0%)
	Young Forest	0 acres (%)	304	0 acres (0%)
	Young Forest –Future[1]	102 aces (+34%)	-	102 acres (34%)
	Matrix	65 acres (0.8%)	7830	121 acres (2%)

[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.

Alternative 1 would slightly reduce the amount of mature multistory and young forest habitats in lynx critical habitat within the Therriault LAU as shown in T& E Species Table 18. Alternative 3 does not have harvest in mature multistory or young habitat. Alternative 1 includes a few roadside vistas (27 acres total in 4 or 5 units) in the Therriault LAU. This would include treating 7 acres of young forest and 20 acres of mature multistory forest in 1-4 acre strips along the open roadside. These proposed units are located adjacent to the road and are intended to again provide a vista along the road where trees have grown up through the years. These actions result in a reduction of 0.1% and 0.01% of the critical habitat in the mature and young forest (respectively) within this LAU. The proposed vistas are located in long strips adjacent to the road and would remove from 12 to <1 acre with each vista (totaling 20 acres of mature and 7 acres of early seral). Because of the small acreages involved, the small percentage of critical habitat affected, and the roadside location of these actions, it is expected that there would be little affect to the presence of snowshoe hare in the LAU and preferred habitat conditions would remain across the landscape. Treatments proposed within the LAUs were reviewed with respect to the occurrence and potential effects to these habitat types because maintenance of 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.

Harvest units in mapped multistory habitat were 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. 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 with poorly developed understories) would improve snowshoe hare habitat in the future.

Each of the action alternatives include regeneration or intermediate harvest, where harvest units have high canopy closure and contain little to no ground, shrub, or small conifer cover in the understory(potential habitat). Approximately 33, 100, and 102 acres of mapped mature multistory forest habitat are proposed for regeneration or intermediate harvest under Alternative 1 in the Therriault, Grave and Krinklehorn LAU (respectively) and 0, 29, and 102 acres under Alternative 3 in the respective LAUs. Field review determined that these stands have poorly developed understories and do not provide conditions preferred by snowshoe hares. These stands currently contribute to potential habitat within the LAU and existing acres and percent of mature multistory forest habitat presented in T & E Species Table 18 above were adjusted to reflect this condition (see project file). After field review, these harvest units were approved for implementation based on the rationale listed above. Harvest of these identified acres would have no impacts on mature multistory forest habitat within either LAU under Alternative 1 or 3. This harvest would, however, increase future young forest habitat within each LAU as described below (also see T& E Species Table 18).

Alternative 1 proposes minor harvest in existing young forest habitat in the Therriault LAU (see vista discussion from above). Timber harvest is mainly proposed in mature stands; therefore, minimal direct effects are expected to the existing young forest habitat found within the project area LAUs. However, indirectly, the amount of young forest habitat would be increased within the project area in about 15 years as the vegetation in harvest units 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, 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 T& E Species Table 18, Alternative 1 would result in the greatest increase in future snowshoe hare preferred habitat conditions with an increase of approximately 235 acres spread across the 3 LAUs. Alternative 3 has slightly fewer acres with 131 acres. Because young forest is limited across two of the three LAUs these proposed timber harvest acres increase the early successional forest stages which will better support a mosaic of differing successional forest stages across the boreal landscape (physical and biological features of critical habitat).

Prescribed burn units range from approximately 9 to 1,035 acres in Alternative 1 and from 8 to 421 acres in Alternative 3. There are approximately 8,038 acres of prescribed burn units in Alternative 1 and 1,791 acres in Alternative 3. Alternative 3 proposed burn units only in areas without mapped multistory forage or where evaluation of these stands indicated preferred hare habitat did not exist. This reduced or fragmented the size/shape of many prescribed burn units.

Because of the large size of the prescribed burn units in Alternative 1, they occur within a variety of mapped habitats including mature multistory and young forest habitats. The prescribed burn units were also assessed as to whether they provide habitat conditions preferred by snowshoe

hares or not. 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). Areas selected for prescribed fire were typically those in which wildfire was a natural process historically and where low to moderate intensity fire could be applied on the landscape to reach desired vegetative conditions in a safe and controlled manner. Selected areas include areas of conifer encroachment into shrub fields, open timber stands with shrub understory, and high canopy closure timber stands where little to no ground cover exists with the goal to rejuvenate and enhance the ground cover and understory vegetation. 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. The high density of conifer cover in the understory in young and mature multistory forest habitats is not typically the structural conditions targeted for treatment nor is it conducive to using prescribed burning as a type of vegetation management treatment. However, because of the size of these burn units, and how they lie across the landscape, they may include draws and slopes that provide areas of mature multistory habitats. As described above, this condition (cool moist, dense stands with treed cover) does not lend itself to carry low to moderate prescribed ground fires, and it is expected (based on years of observed prescribed fire behavior) that these pockets would generally remain unburned, however the steepness of slope, weather and site conditions vary within these units which can result in varying effects to the stand. This is also representative of how fire behaved historically and would result in a mosaic of differing successional forest stages across the landscape.

Salvage of incidental mortality from underburning harvested or underburn units may occur in both alternatives on no more than 20 acres/year for no more than 200 acres. This salvage is subject to a number of conditions (page 14 of FEIS) and would occur within or adjacent to treatment areas. One of these conditions includes limiting salvage in LAU only if they were in compliance and met the Northern Rockies Lynx management direction and primary constituency elements of lynx critical habitat. Effects to lynx would be similar to the effects shown for the original unit this salvage would occur in or adjacent to.

As described above under “Data Sources, Methods, Assumptions, Bounds of Analysis” mapping of lynx habitat using timber stand data cannot capture all stand variability that results from local growing conditions and/or lack of natural disturbances. Many of the burns are found at high elevation locations and the steep slopes, short growing season and colder temperatures are not conducive to high growth rates and even old stands, such as those found within proposed units, have limited to no understory development and/or sparse overstory structure and do not typically provide habitat conditions preferred by snowshoe hares.

Summary

Mature multistory forests are abundant while young forest stand conditions are generally limited in two of the LAUs to two old fire areas. The 2015 Marston fire will provide future young forest habitat preferred by lynx in the Krinklehorn LAU. Past limited harvest along open roads within the 3 LAUs provide the remaining young forest habitat. Limited treatment (vista enhancement) is proposed in young forests or mature multistory forests (Alternative 1) that provide habitat conditions preferred by snowshoe hares in this project. Proposed harvest and prescribed burn treatments occurring within mapped mature multistory forests were verified as not providing these habitat types or are included in large prescribed burn units polygons and not expected to carry prescribed fire. Depending on the alternative, between 131 to 235 acres of regeneration harvest could contribute early successional habitat to the landscape mosaic and provide preferred snowshoe hare habitat conditions in approximately 15 years. Alternative 1 would result in the

greatest change. Implementation of the prescribed burn units would occur within potential and matrix habitats and have no effect to PCE sub-element (1a) in Alternative 3. Prescribed burn units in Alternative 1 do overlap some mature multistory stands, however it is not expected that low to moderate intensity fire would carry in these conditions and a mosaic of burned and unburned stand conditions throughout the burn polygon would result.

(1b) Winter snow conditions that are generally deep and fluffy for extended periods of time.

This sub-element of the PCE is an environmental 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.

Based on the existing fuel loadings of down CWD within the proposed harvest units, surrounding stands of mature forest of similar structural conditions would provide ample denning habitat with the LAUs. All LAUs have large percentages of old forests which will provide many areas for denning. Also, areas that receive limited or no active management (e.g., unroaded areas, IRAs, and old growth stands) within the LAUs would provide varying and potentially high levels of CWD. In addition, project design would leave down CWD and snags or recruitment snag levels (refer to the Downed Wood Habitat and Snag sections, respectively) that would continue to provide appropriate levels and size of down CWD for this habitat type and wildlife use. While these stands would not provide denning habitat for lynx in the immediate future, the retained CWD provides a baseline level to which more down CWD would be added as the stand matures and 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).

Alternative 1 proposes regeneration and intermediate harvest on approximately 0, 10, and 65 acres of matrix habitat in the Therriault, Grave and Krinklehorn LAUs (respectively). Harvest activities would impact 0, 10, and 121 acres of matrix habitat in Alternative 3. All matrix habitat proposed for harvest is located along the lower elevation boundary of the LAUs and are mostly dry sights on level or south and west slopes. 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. Design criteria for larger units requires leaving areas of cover throughout the units. This is intended to 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 larger scale to introduce fire in areas that would have historically experienced periodic low to moderate severity fire. The goal of these units is to rejuvenate and enhance the ground cover and understory vegetation in areas of conifer encroachment into shrub fields, open timber stands with shrub understory, and high canopy closure timber stands where little to no ground cover exists. The burns are generally not designed to result in a change to the vegetation composition or structure in the treated stands. Prescribed burn units range from approximately 9 to 1,035 acres for a total of approximately 7,929 acres within the LAUs depending on alternative.

Because of the large size of these units they occur within a variety of mapped habitats including matrix habitat. Prescribed burn units would occur throughout the affected LAUs in an effort to restore a mosaic of differing successional stages. Both alternatives prescribed burns would occur in matrix habitat which provides for movement between patches of boreal habitat but does not provide the habitat conditions described under PCE (1a). Fires would be of low to moderate intensity, resulting in 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. Prescribed fires could alter lynx movement and use of specific areas for 2-3 years depending on the location and amount of ground and shrub cover that remains available. However, lynx are very mobile and would be able to continue to use the burn units and adjacent stands immediately following the fire.

Summary

Regeneration harvest would occur on approximately 0, 10, and 65 acres and 0, 10, 121 acres of matrix habitat within the affected LAUs under Alternatives 1 and 3 respectively. All matrix habitat proposed for harvest is located along the lower elevation boundary of the LAUs and mainly found in warm dry habitat types. Due to the location of the proposed treatment units and that only 75 to 131 acres out of 105,626 LAU acres would be treated, 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.

Cumulative Effects

Introduction

The project area falls within designated lynx critical habitat. The KNF received a Biological Opinion (Bush 2013) 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 Affected Environment/Existing Condition section describes relevant past and present factors affecting lynx critical habitat and the existing condition of the PCE in the Therriault, Krinklehorn and Grave LAUs. 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. Please see Chapter 3 for past actions and Lynx T& E Species Table 17 for the existing critical habitat PCE condition. Lynx T& E Species Table 18 describes project effects to the PCE.

As described under the section “Data Sources, Methods, Assumptions, Bounds of Analysis,” the cumulative effects analysis for lynx critical habitat uses the affected LAUs as the magnitude of change to lynx habitat that could then be evaluated against the remaining levels of habitat available for lynx use with their home range. In addition, areas outside of the impacted LAUs were evaluated for potential impacts that may reduce movement to other adjacent LAUs. Given the location of the proposed activities (see Lynx Analysis Unit Map, M-13), the high percentage of mature multistory conditions within the LAUs, 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 Therriault, Grave and Krinklehorn LAUs. Therefore, these LAUs were chosen as the appropriate scale for cumulative effects analysis.

Alternative 2 (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 shapes, species composition, and successional stages. Disturbance processes such as wildfire contribute to the succession process including the transition of potential habitats types into habitats with preferred conditions. Without active management functioning as a source of disturbance, the landscape would likely become a more homogenous landscape of potential habitat that would not provide for lynx life requirements.

Alternatives 1 and 3

Ongoing and Reasonably Foreseeable Actions

Vegetation Management - Timber harvest and associated activities may contribute to the environmental habitat baseline for the lynx as well as possible effects to species ability to utilize a specific area during project implementation. Timber harvest and hauling could cause lynx to temporarily avoid affected areas. The amount of time that species will avoid an area depends both on the species and the individual, but generally, avoidance will last from hours to possibly days. Given that roads used to access timber harvest areas are closed to the general public, there would be little to no increase in the risk of mortality to wildlife, especially with the enforcement of contractual provisions. Additionally, timber harvest can result in areas lacking in hiding or movement cover and increased edge effect for approximately 15-25+ years in this area, depending on the site.

The Little Feet Project, Little Feet Fuels Reduction, and Ant Flat Maintenance Burn are foreseeable projects planned within the boundaries of the analysis area and are likely to be implemented either before or during implementation of the Galton Vegetation Project. These projects lie outside all affected LAUs and therefore do not affect lynx habitat directly. These projects also lie outside of identified lynx linkage areas, but would still be avoided by lynx that may be traveling through the lower elevation valleys between LAUs identified south of the project area.

Harvest of blown down or damaged trees associated with future storms is possible in the analysis area. If a salvage project is identified and implemented, the cumulative effects to specific habitats (e.g. undesignated old growth, snags, wetlands etc.) and associated species would be evaluated at that time. If a salvage project is identified and implemented, the cumulative effects and associated species would be evaluated at that time, including the effects of this project.

The Forestwide Young Growth Vegetation Management project would treat approximately 400 to 600 acres annually, dependent on funding, using precommercial thinning or commercial thinning treatments. Stands proposed for treatment are second growth stands and would be subject to a number of criteria including compliance with the NRLMD and the Forest Plan and lynx critical habitat before they were determined eligible for treatment. The Forestwide Young Growth Vegetation Management project would have the same effects on lynx critical habitat as the effects described for precommercial thinning (below), and potential temporary avoidance of the area as described above.

The effects to lynx from pre-commercial thinning are a reduction in winter foraging habitat for hare as well as temporary avoidance while activities occurred. No pre-commercial thinning would be proposed in lynx habitat, unless it complied with critical lynx habitat requirements.

Pre-commercial thinning on National Forest land occurs when past regenerated timber stands meet certain stand conditions. It is expected that approximately 1000 acres would be treated through pre-commercial thinning within the PSU during the time period this proposed project is active. Because the vast majority of the past regenerated stands are located below 4000 feet, they do not fall within lynx habitat. However, no pre-commercial thinning would be proposed in lynx habitat, unless it complied with the critical lynx habitat requirements. During thinning operations, there would be short-term localized disturbance to listed species and their prey in the area. Mortality risk for associated species is not expected to increase. Pre-commercial thinning on State land is considered a minor activity. With the limited amount of pre-commercial thinning on State lands, potential effects to listed species and their prey would be indiscernible.

Ten Lakes Travel Management Project - The Ten Lakes Travel Management Project will address over-snow and mechanized travel planning for the Ten Lakes area. The area affected by the proposal includes the Ten Lakes WSA and areas with common entrance points to the WSA. There are three main over-snow entrance points to the Ten Lakes WSA: the Grave Creek corridor; Clarence and Stahl Creek; and the Burma/Blacktail area. Over-snow travel is currently not limited. Mechanized use (primarily mountain bicycles) is also unrestricted. The alternatives contained in the Ten Lakes Travel Management Draft Environmental Impact Statement contain various amounts of over-snow and mechanized travel for the project area. A final decision has not been made for this project and the cumulative effects analysis utilizes the Proposed Action as the basis for the analysis in the Galton Vegetation Management Project.

The Ten Lakes Travel Management Project proposed action, as well as all action alternatives limit over-snow use both spatially and temporally from the existing condition, which would decrease both the length of time and area that over-snow use could occur. The cumulative effects of the Ten Lakes Travel Management Project in conjunction with past, present, reasonably foreseeable actions would result in fewer effects to lynx habitat due to limits on over-snow activities in both time and space.

Cattle Grazing - This activity would not result in a change of lynx habitat. The majority of the three LAUs do not overlap the existing allotment, therefore livestock grazing generally does not affect lynx habitat within the project area. The lynx habitat that does exist in the allotment, is mainly either matrix habitat or low elevation habitat and does not provide lynx foraging habitat.

Noxious Weed Control - Weed treatment activities would not lead to any adverse effects on wildlife species or their habitat because treatments isolate non-beneficial weed species and would actually benefit forage species important to many species or their prey (USDA Forest Service 1997, 30).

No loss or change in specific habitats (e.g. undesignated old growth, wetlands), including snags and down woody debris, often used by prey species, would result from this activity because weed treatments primarily focus on the herbaceous layer along roads and in disturbed areas.

Fire Suppression - In the event of a wildfire, construction of fire lines, helispots, and safety zones could potentially result in impacts to specialized habitats (e.g. old growth, snags and down woody debris), or create openings along travel corridors such as ridges or riparian areas. The amount and timing of such an impact cannot be predicted; however, for example, the number of snags created by a wildfire would far exceed those lost during fire suppression efforts. Suppression activities are typically subject to input from District Resource Advisors, and protection of species and specialized habitats is considered. Maintaining travel corridors are considered a priority in these cases.

Road Management Activity - Actions such as road maintenance and administrative use associated with permit administration, data collection, and monitoring of NFS lands are not likely to measurably affect wildlife or specialized habitats (e.g. old growth habitat, snags nor down woody debris) because they generally do not result in vegetation removal or persist for long periods of time. The standing tree and snag component would only be affected if considered a hazard to road users. These activities would not result in any change to specialized habitats of listed species, thus no adverse cumulative effects would be expected.

Public Use - Other forest product activities occurring presently and typically on an annual basis are the gathering of pine cones, boughs and commercial gathering of Christmas trees and "character trees." These activities occur throughout the analysis area, and have little-to-no effect on the landscape due to the unspecific nature of the use and the low impact on the resources (foot traffic, hand tools). Additionally, Christmas trees are harvested from existing regeneration unit, but the effects of such few trees removed in a stand are indiscernible. These activities would be more prominent outside the LAU boundaries below 4000 feet, where there are more open roads. However within the LAUs, the roadless designation of this area limits the roads, and therefore would occur on a minor percentage of the lynx habitat available.

Firewood cutting in the analysis area will continue to occur. The result of this would be possible reduction of down trees that may be used as potential denning habitat and perhaps a slight displacement for animals using the area. These activities would be more prominent outside the LAU boundaries below 4000 feet, where there are more open roads. However within the LAUs, the roadless designation of this area limits the roads, and therefore would occur on a minor percentage of the lynx habitat available.

Ongoing hunting activities are regulated by the MFWP. The Forest Service influences hunter access through road management. Hunting activities within the analysis area will cumulatively contribute to minor short-term effects (during the general hunting season) to habitat security. Effects from hunting vary with activity levels and can include short-term disturbance. Mortality risk to the listed species like the grizzly bear and lynx, is increased through hunting. The level of hunting within the Project Area is not expected to significantly change due to the action alternatives, since no new road construction will occur.

Recreation Maintenance - Routine maintenance of trails and developed and dispersed recreation sites may temporarily displace some wildlife species. Recreation maintenance could involve the harvest of trees in mature forest stands that pose a hazard to users. However, the scale of the impact would be negligible as a cumulative effect to those species utilizing the immediate area, nor adjacent forest stands.

Special Uses - Operations of outfitter/guides would not result in any change to general and specialized wildlife habitats (e.g. old growth, snags or down woody debris) that listed species may utilize, as they do not involve the harvest of trees. There would be no cumulative effects to wildlife and their habitats associated with these activities other than possible temporary and local avoidance of an area due to the presence of humans.

Permits associated with access to private homes, right-of-ways for utilities, and outfitter/guides are not expected to contribute to the cumulatively impact on wildlife because they are limited to previously disturbed and hardened sites like trails and roads. The majority of these occur outside of the affected LAUs.

Climate Change - Climate change could have effects on the lynx at a forest level and are discussed in the KNF FEIS on page 240: "Climate change will have the potential to alter the amount and distribution of lynx habitat on the KNF and adjacent ownerships. Coupled with past fire suppression, climate change can increase the impact of insects and disease and change the amount of habitat available for lynx." Desired Conditions in the revised Forest Plan will shift vegetation to a more sustainable and resilient condition possibly making lynx habitat more sustainable and resilient in the long term. "(KNF FEIS, 2013). One of the primary constituent elements (PCE) of lynx critical habitat is light, deep, snow. Climate change may influence the availability of this PCE in the future, and it is outside of the control of the KNF to dictate the location of this PCE on the landscape. This PCE may be located higher in elevation and patches separated by greater distance in the future if the climate becomes warmer (KNF, FEIS, 2013). The snowshoe hare is the primary food source for lynx. Likely effects to snow hare from climate change are discussed in "The Effects of Climate Change on Mammals" (McKelvey, K.S. et al. 2013).

Private Land - Any cumulative effects to wildlife species will be partially dependent on the duration (seasonal versus year-round) of use of these parcels and homes. Anticipated effects include species displacement, reductions in specialized habitats (e.g. old growth, snags, and down woody debris), habitat alteration and/or habitat loss. Many of the activities that may occur on the private parcels can only be surmised.

Other Agency Actions - On State of Montana lands including the Woods Ranch WMA, no activities are planned at this time. On State of Montana Trust lands, permitted cattle grazing is expected to continue and would have similar effects to those described under cattle grazing above. Additionally, 40 acres of Trust Lands are leased to the Indian Springs Golf Course which has already converted several acres of natural bunch wheat grasses to exotic grasses used by this type of industry. None of these lands or their activities occur within the affected lynx LAUs. Regardless, these activities would not directly impact wildlife habitat modeled and identified as suitable habitat on NFS lands.

Summary of Cumulative Effects

Project scheduling/staging may be required in order to avoid possible cumulative effects from various vegetation management and fuel reduction activities occurring within and adjacent to the analysis area relative to species displacement. Any cumulative effects from wildfire suppression or from the assumed development of adjacent private lands can only be surmised, at this time.

The temporal occurrence of forest uses such as summer activities (camping, hiking, and berry picking) versus fall (hunting and firewood cutting) or winter (skiing and snowmobiling) activities may result in a temporary displacement of lynx use of that area, however, the majority of these

activities occur in existing areas of human use that are already avoided by lynx. There may be some situations where isolated or localized cumulative effects may occur, due to an overlap of forest activities, but these situations are typically short in duration, and do not persist through the lifecycle of any one species, either temporally or spatially.

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 Galton Vegetation Project (Alternative 1) does propose vegetation management activities within mature multistory and young forest habitats (27 acres total) in one of the three LAUs to open up vistas along the open roadsides in small 1-3 acre linear units. These units make up 0.1% and 0.01% of the mature and young (respectively) habitat. Additionally, proposed ecosystem burns may affect small areas of mature multistory habitat, depending on the site and burn conditions. This is a small percentage of critical habitat affected over the affected LAUs and it is expected that there would be little affect to the presence of snowshoe hare in the LAU and preferred habitat conditions would remain across the landscape. Alternative 3 does not propose vegetative management activities in critical habitat.

However, proposed harvest occurring in potential habitats would result in an increase in the amount of young forest habitat found within the project LAUs. Cumulatively, an increase of approximately 131 and 235 acres would occur within the project area LAUs in approximately 15 years which is equivalent to a 2 to 3 percent increase over the existing condition.

(1b)Winter snow conditions that are generally deep and fluffy for extended periods of time.

This sub-element of the PCE is an environmental 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 CWD is found throughout the project area, especially in those areas that receive limited or no active management (e.g. unroaded areas, IRAs, and old growth stands). Coarse woody debris levels would be reduced in proposed regeneration harvest units in Alternative 1, but the limited acres harvested compared to the amount of denning habitat available would be negligible across the LAUs. 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. Pre-commercial thinning and grazing activities occurring within the LAUs would not reduce CWD 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 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 Galton Vegetation project proposes approximately 75 to 131 acres of regeneration harvest out of 105,626 LAU acres within matrix habitat. Effects to the juxtaposition of boreal and matrix habitat would be negligible. The Galton Vegetation Project includes 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 Maps. Cumulative effects to matrix habitat and its ability to support lynx movement would be negligible within the three affected LAUs.

Summary of Cumulative Effects

Minimal harvest would occur within the LAUs in a large homogenous area of potential habitat that would increase 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 Therriault, Grave and Krinklehorn LAUs 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

Forest Plan

The 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:

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 131 to 235 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 T& E Species Table 18. Therefore, the Galton Vegetation project would 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.*

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 three LAU's. Multistory and young forest habitats would not be impacted by proposed activities in Alternative 3, however there is limited harvest in these habitats in Alternative 1. However regeneration harvest of potential habitat (i.e., stem exclusion habitat) in both action alternatives would increase foraging opportunities in approximately 15 years (see "PCE 1a"). There would be negligible impacts to denning habitat (see "PCE 1c"). Therefore the Galton Vegetation project would 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.*

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. *Within harvest units, coarse woody debris levels would be retained as appropriate for the given habitat type. See "PCE 1c." Therefore, the Galton Vegetation project would contribute to progress toward achieving FW-DC-WL-13.*

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 in Alternative 3 would not impact mature multistory or young forest habitats, important for providing critical winter foraging opportunities and contributing to lynx recovery. Alternative 1 proposed small acreages of harvest within these mature and young forest habitats, which result in in changes of 0.1 and 0.3% (respectively) of these habitats. 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 Galton Vegetation project would contribute to attainment of FW-OBJ-WL-01.*

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.

Statements of Findings

Alternative 2 (No Action) **may affect, is 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 Therriault, Grave and Krinklehorn LAUs.

The following statements are true for both action alternatives:

- Management would not impact lynx movement through the area to areas of suitable habitat,
- There will be no impact to winter snow conditions
- There will be negligible reduction of CWD within non-spruce-fir mature forest with abundant denning habitat in surrounding areas,
- Management could include a 2 to 3 percent increase in young forest habitat in approximately 15 years.

Vegetation management would not affect the PCE sub-element "snowshoe hare preferred habitat" or "denning habitat" in Alternative 3 therefore, Alternative 3 **may affect, is not likely to adversely affect Canada lynx critical habitat**.

Vegetation management, both regeneration harvest and prescribed burning, would affect the PCE sub-element 'snowshoe hare preferred habitat and denning habitat; therefore, Alternative 1 **may affect, is likely to adversely affect Canada lynx critical habitat**.

North American Wolverine

Summary of Conclusions

Alternative 2, due to lack of action, would have no impact on the wolverine. Implementation of either of Galton Vegetation project's action alternatives 1 and 3 **will not jeopardize the continued existence of the wolverine**. All land management activities proposed under the project alternatives are consistent with the findings of the proposed federal rule stating that wolverine be listed as a threatened species. Wolverines are not tied to a specific vegetation type and proposed activities would not change the amount of persistent spring snow (activities listed on page 7890 of USDI (2013). 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 (USDI FWS 2013).

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 (USDI FWS 2014). Wolverines travel long distances throughout large home ranges that average between 186 to 310 square miles (USDI FWS 2013) 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 strongly tied 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). 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.

Regulatory Framework

Forest Plan

The 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 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 wolverine. 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 Threatened, Endangered and Proposed Species Table 19): the acres of suitable habitat consisting of areas that are snow covered through May 15 in at least 1 out of 7 years, 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.

T, E, and P Species Table 19. Resource Indicators and Measures for Assessing the Ability of the Analysis 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 analysis area that have snow for an average of 1-7 years	No	Research – referenced through this analysis, also most current was reviewed and summarized in USFWS 2013
Persistent Snow	Availability of persistent snow to provide suitable habitat for wolverine use	Acres of suitable habitat associated with the analysis area that have snow for an average of 6-7 years	No	Research – referenced through this analysis, also most current was reviewed and summarized in USFWS 2013

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

The current knowledge of wolverine population biology, ecology, and habitat descriptions are described in Hornocker and Hash (1981) Banci (1994), Copeland et al. (2007), Schwartz et al. (2009), Copeland et al. 2010, Copeland et al. (2012, 2012b, and 2013) Inman et al. (2013), and USDI, FWS (USDI FWS 2014, and USDI FWS 2013). In addition Ruggiero et al. 1994. Banci (1994) and Butts (1992), Thomas 1995, USDI FWS 2003, IDFG 2005) were also reviewed. These provided information in evaluating potential habitat and effects to wolverine, and are incorporated by reference. Additional information is provided by the Montana Natural Heritage Program, and NatureServe databases.

Information on population numbers, trends, and distribution are based on reported observations/sightings of either the species or tracks recorded in District, Forest or state databases. No research has been conducted for wolverine on the Forest that would estimate population levels. Informal surveys are periodically conducted by Forest personnel during snow surveys, or during aerial flights conducted by the Forest and/or other agencies. Studies or research on wolverine has occurred in the adjacent Flathead NF (Hornocker and Hash 1981), and Glacier National Park (Copeland and Yates 2006) and in Canada (COSEWIC 2003), just north of the Forest as well as winter recreation studies currently being accomplished in central Idaho and the Yellowstone area (Heinmeyer et al., 2015).

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 analysis area, the persistent snow zone is found along the high elevations and encompasses approximately 79,360 acres. The analysis area for wolverines are four of the subunits that make up the Galton Vegetation project area: Ksanka, Wigwam, Grave and Murphy planning subunits. Portions of the Stillwater planning subunit are within the project area, however, no analysis will be conducted on this planning subunit or the suitable wolverine habitat that exists there because no management activities are proposed in this area. This area of persistent snow and wolverine habitat present in the analysis area is larger than the average home range for a female with young in Montana, and is therefore appropriate for the analysis boundary for direct and indirect effects to individuals and their habitat. This analysis area is large enough to assess potential effects in context of wolverine dispersal or resident wolverine use, and it is small enough to be representative of the effects of management in wolverine habitat.

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 (USDI FWS 2013). 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” (USDI FWS 2014). On April 4, 2016, Judge Dana Christiansen vacated the August 13, 2014 USFWS withdrawal of the Proposed Rule to list the distinct population segment of North American wolverine in the contiguous United States as a threatened species under the ESA. The USFWS decided to return the wolverine to its proposed status in May 2016.In the 2013 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 (USDI FWS 2013). 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 (USDI FWS 2013).

Wolverine 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) (USDI FWS 2013). 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 (USDI FWS 2013). USDI FWS (2013) 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) (Heinemeyer 2012 and Heinemeyer and Squires 2012 &2015).

Wolverine Occurrence

The distribution of current wolverine records in the contiguous United States is limited to north-central Washington, northern and central Idaho, western Montana, and northwestern Wyoming (Aubry et al. 2007). Even in the northern U.S. Rockies, very little is known about the extent and status of wolverine populations (Aubry et al. 2007). In Montana, wolverines occur throughout the western one third of the state and are considered fairly well distributed throughout their range in the state. On the Forest observations are concentrated in the Northwest Peaks, Ten Lakes, and Cabinet Mountains portions of the Forest. Johnson (2004) shows wolverine presence confirmed in seven of the eight planning units on the KNF. Fortine District and FWP observation and track monitoring data documents tracks and sightings of wolverines within the analysis area.

Description of the Analysis Area

Wolverine Habitat Condition

Areas of Persistent Spring Snowpack

Wolverines use higher elevation, steep, remote habitat. Wilderness and roadless lands account for much of the areas wolverines are known to use. This is the case in the analysis area, where the Persistent Snow layer indicates that wolverine habitat is found throughout much of the analysis area. The analysis area has approximately 73% of its acreage in inventoried roadless areas, much of which overlaps the persistent snow layer.

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. Within the analysis area, approximately 79,360 acres of persistent snow occurs in the higher elevations. This persistent snow layer is now well-established in literature as the primary indicator of wolverine habitat and is the habitat layer used for this project. The map shows areas with persistent snow as considered by Copeland et al. (2010). The areas in dark blue are those that had persistent spring snow in an average of at least 6 out of 7 years. In other words, those were the area's most likely to have persistent spring snow and the most likely places for wolverine dens (Copeland et al. 2010, p. 239). Areas in light blue had persistent spring snow an average of less than 6 years out of 7.

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). Weaver (2011) mapped wolverine habitat in the Galton area of the forest and was based on work done by Inman (Weaver 2011, p.58). Weaver's map covers a similar land base to Copeland's persistent spring snow cover map.

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 48,337 acres of maternal habitat are found within the four planning subunits (Grave, Ksanka, Murphy, and Wigwam) located within the analysis area. The majority of these acres overlap with the persistent snow layer.

T, E and P Species Table 20. Resource Indicators and Measures for the Existing Condition

Resource Element	Resource Indicator	Measure (Quantify if possible)	Existing Condition (Alternative 2)
Persistent Snow	Availability of persistent snow to provide suitable habitat for wolverine use	Acres of suitable habitat associated with the analysis area that have snow for an average of less than 6 out of 7 years	Yes – 54,699 acres
Persistent Snow	Availability of persistent snow to provide suitable habitat for wolverine use	Acres of suitable habitat associated with the analysis area that have snow for an average of 6 out of 7 years	Yes – 24,661 acres
Total			79,360 acres

2015 Marston Wildfire impacts

The 2015 Marston wildfire burned approximately 2,748 acres in areas with persistent snow. Of that total, only 103 acres occurred in areas having snow for an average of 6 out of 7 years. Of the 48,337 acres of maternal habitat identified by Inman et al 2013, approximately 109 acres within the analysis area were affected by the wildfire. Within all of the Marston fire perimeter, a mosaic of burn intensity and vegetation responses would result in an improvement in foraging habitat for prey species as regrowth occurs.

Persistent Spring Snowpack and Denning Habitat

Wolverines appear to be highly selective in choice of natal denning and kit rearing habitat. Denning habitat may be a factor limiting distribution and abundance (Copeland 1996), and the persistence of a snowpack into late spring is a strong determining factor in wolverine presence due to its importance in denning (Copeland et al. 2010, USDI FWS 2013). There are no known den sites within the analysis area. Based on the persistent spring snow layer, and the literature, it is suspected that the analysis area provides habitat for wolverine denning and enough acreage to support two potential wolverine home ranges.

Persistent Spring Snowpack and Foraging Habitat

Wolverine home range sizes are believed to be closely linked to food availability and are a main factor in determining movements and range of wolverines in the South Fork of the Flathead River drainage (Hornocker and Hash 1981). In Norway, female wolverines were found to forage close to den sites in early summer, progressively ranging further from dens as kits become more independent (May et al. 2010, pg. 941). Inman et al. (2012) found a link between persistent snow and wolverine foraging strategy. Wolverines appear to rely on the cold and snow to cache carrion. The analysis area provides a prey base including deer, elk, moose, and bighorn sheep, as well as other smaller mammals.

Persistent Spring Snowpack and Dispersal/Connectivity Habitat

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). Because wolverine habitat in the Rocky Mountains exists as high elevation “islands” separated by lower elevations, wolverines need linkage zones to move between areas of suitable habitat. “Wolverines prefer to travel in habitat that is most similar to habitat they use for home-range establishment, i.e., alpine habitats that maintain snow cover well into the spring (Schwartz et al. 2009)” (USDI FWS 2013). “Wolverine populations in the northern Rocky Mountains appear to be

connected to each other at the present time through dispersal routes that correspond to habitat suitability (Schwartz et al. 2009, Figures 4, 5) (USDI FWS 2013). The wolverine habitat in the analysis area is connected to the persistent snow layer in Canada, to the north, and to the southeast along the Whitefish range. No existing potential barriers exist to movement throughout this area, or within a 10 mile buffer outside of the analysis area within the persistent snow layer to the north in Canada, or to the southeast along the Whitefish range. This corresponds to movement areas identified in the Forest Plan where the desired conditions are to maintain movement between the United States and Canada (GA-DC-WL-TOB-05). No highways bisect this large block of persistent snow within the analysis area. South and west of the analysis area and the Whitefish range, the persistent snow layer is found only in isolated patches, and these areas would be used as dispersal habitat only for wolverine. 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 project area including along the pathways identified by Schwartz et al. (2009). Mapping of female dispersal habitat by Inman et al (2013) was a little more restrictive in that it does not include lower elevation valleys. Although female wolverine are capable of traveling the distance between the patches of suitable habitat with persistent snow adjacent to the analysis area, and there is no evidence that human development/activities or transportation corridors prevent wolverine movement in these areas (USDI FWS 2014), certain habitat characteristics of these low lying areas may deter some females from attempting to move through them.

Recent management actions have been limited in the majority (higher elevations) of the analysis area because of Forest Plan non-motorized/wilderness study area designations and grizzly bear motorized standards. These designations and standards have limited road building and harvest activities in these areas. See the grizzly bear analyses for more detail.

The analysis area contains MAs 1b, 1c, 3, 5a, 5b, and 6. MAs 1b includes the Ten Lakes Recommended Wilderness, MA1c includes the Ten Lakes Wilderness Study Area, MA3 are Special Areas, along with MA 5a non-motorized year-round backcountry, and MA 5b, motorized year-round backcountry, and MA 6 or general forest which consists of large areas with roads, trails and past and ongoing activities designed to actively manage the forest. The backcountry management areas are large and remote and contribute to secure habitat for wildlife (MA5a,b-DC-WL-01). Motor vehicle use does not occur within MA5a and it contributes to the effectiveness of security habitat within that management area.

Trapping

A temporary restraining order was placed on wolverine trapping for the State of Montana for the 2012/2013 trapping season, as a result of the proposed listing of wolverine. As of the 2015/2016 trapping period, wolverine trapping in MT still remains closed. There are currently no open trapping seasons for wolverine in Region 1 (FWP). The regulation of trapping activities is the responsibility of the State of Montana, and is beyond the authority of the Forest Service to control.

Environmental Consequences

Wolverines are not thought to be dependent on vegetation or habitat features that may be manipulated by land management activities. They have been documented using both recently logged areas and burned areas (USDI FWS 2013 p. 7879). It is unlikely that wolverine avoid the type of low-use roads that generally occur in wolverine habitat (Ibid p. 7878). 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 (USDI FWS 2013). These activities are not likely to disturb wolverines or habitat to an extent that threatens the viability of the population or species (Ibid).

Alternative 2 (No Action)

The topography and climate in the higher elevation peaks and ridgelines in the analysis 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 1 and 3 – Direct and Indirect Effects

Wolverines and wolverine habitat exist in the analysis area, as evidenced by sightings and snow tracking surveys (MFWP) as well as the persistent spring snow layer (Copeland et al. 2010). The project includes proposed timber harvest and prescribed burning. The two listed components proposed under the action alternatives fall under activities that were identified in the proposed rule that were found not to pose a threat to the Distinct Population Segment (DPS) (USDI FWS 2013). These actions are proposed on a small portion of the total available wolverine habitat in the Continental U.S. and do not occur at a scale that pose a threat to wolverine populations. In the proposed ruling, the USFWS thought that global climate change was the primary threat to the species and that legal and incidental trapping of wolverines were substantial threats, in concert with climate change.

Effects on Areas with Persistent Spring Snowpack, including denning and foraging

Proposed timber harvest would remove cover in the persistent spring snowpack zone, but once harvest units become revegetated with grasses, forbs and shrubs they would provide foraging habitat for mammals that wolverines are known to feed upon (for more detail on effects of project activities upon animals that could provide carrion for wolverines see the elk and deer sections of chapter 3). Prescribed burning acres within the persistent snowpack zone may also remove some tree cover in some areas, but would result in a mosaic of burned and unburned areas that were designed to provide early seral conditions that are currently lacking in this area (see the big game section of chapter 3).

Alternative 1 proposes the larger number of harvest and prescribed burning acres located in the area that has persistent spring snowpack (T, E & P Table 20). For both action alternatives, harvest would overlap with between 0.04% and 0.2% of the persistent spring snowpack area in the Galton analysis area, and prescribed burning would overlap with between 0.8% and 6.0% of the total persistent spring snowpack area. With any of the action alternatives, the effects would be minor, because wolverines are not known to avoid managed areas, and proposed activities are dispersed throughout the area of persistent snowpack both in time (10 years) and space (over 79,360 acres of existing persistent snowpack) and proposed activities make up a small percentage of this habitat.

Salvage of incidental mortality from underburning harvested or underburn units may occur in both alternatives on no more than 20 acres/year for no more than 200 acres. This salvage is

subject to a number of conditions (page 14 of FEIS) and would occur within or adjacent to treatment areas. Effects to wolverine would be similar to the effects describedabove and below.

This is consistent with the findings of the proposed rule which 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 species. The available scientific and commercial information does not indicate that potential stressors such as land management, recreation, infrastructure development, and transportation corridors pose a threat to the DPS."

Threatened, Endangered and Proposed Species Table 20. Resource Indicators and Measures for the Alternatives in the Galton Analysis Area

Resource Element	Resource Indicator	Measure	Alt. 2	Alt 1	Alt 3
Persistent Snow	Acres that have snow for an average of less than 6 out of 7 years 54,699 acres	Acres harvested Acres burned	0 0	36 (0.06%) 3,720 (6.8%)	29 (0.05%) 437 (0.7%)
Persistent Snow	Acres that have snow for an average of 6 to 7 years 24,661 acres	Acres harvested Acres burned	0 0	138 (0.5%) 1,190 (4.8%)	0 168 (0.7%)
Total Persistent Snow	Acres that have snow for average of 1 to 7 years 79,360 acres	Acres harvested Acres Burned	0 0	174 (0.2%) 4,910 (6.0%)	29 (0.04%) 605 (0.8%)

Effects on Persistent Spring Snowpack and Dispersal/Connectivity Habitat

The proposed harvest/burn sites are dispersed throughout the analysis area and persistent snowpack zone. The analysis area retains high cover levels and maintains large unroaded areas that provide areas with minimal human disturbance. This would allow for any movement disruptions to occur into secure habitat. Project activities would not affect wolverine dispersal because, as stated above, wolverines do not appear to avoid 2-lane roads and there are no new proposed highways in the analysis area, so activities would not create barriers to wolverine movement. There is no evidence that wolverine dispersal is affected by infrastructure development (Schwartz et al. 2009, p. 3227 in USDI FWS 2013 pg 7878). Wolverines are habitat generalists and changes to the vegetative condition of its home range do not appear to negatively impact the species (USDI FWS 2013). 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 Tobacco's Geographic Area's desired condition for providing for wildlife movement GA-DC-WL-TOB-05 between Canada and the USA. Implementation of the prescribed burn units would not change the characteristics of dispersal habitat found within the backcountry management areas or the management area's allocation or its potential use of dispersal habitat by wolverine and would be consistent with MA5a,b-DC-WL-01. 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, USDI FWS 2014). Proposed activities would not affect the persistent spring snow that provides connectivity for wolverine populations.

Vegetation management activities proposed within wolverine habitat fall under activities that were identified in the proposed rule that were found not to pose a threat to the Distinct Population Segment (DPS) (USDI FWS 2013). The 2013 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 species (USDI FWS 2013)." 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.

Effects on Trapping

The trapping season for wolverines is currently closed, but trapping for other species does occur and incidental wolverine mortality is a possibility. The project would have minor effects on the risk of incidental trapping because: 1) temporary roads constructed for the project, as well as roads opened for the project, will be closed and/or rehabilitated after use and will remain closed to the public during and following project activities; 2) None of the action alternatives propose any new permanent roads which could lead to increase of incidental trapping. This project does not propose any changes in existing over-snow access and would therefore not change existing trapping opportunity.

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 analysis area for wolverines is the four subunits that make up the Galton Vegetation Project Area: Ksanka, Wigwam, Grave and Murphy planning subunits. Portions of the Stillwater planning subunit are within the project area, however, no analysis will be conducted on this planning subunit or the suitable wolverine habitat that exists there because no management activities are proposed in this area. This area of persistent snow and wolverine habitat present in the analysis area is larger than the average home range for a female with young in Montana, and is therefore appropriate for the analysis boundary for cumulative effects to individuals and their habitat. This analysis area is large enough to assess potential effects in context of wolverine dispersal or resident wolverine use, and it is small enough to be representative of the effects of management in wolverine habitat.

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 distinct population segment (USDI FWS 2014). 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. Detailed descriptions of previous vegetation management activities are found at the beginning of Chapter 3 in this document.

Alternatives 1 and 3 – 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 3, 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. 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.

The Forestwide Young Growth Vegetation Management project would treat approximately 400 to 600 acres annually, dependent on funding, using precommercial thinning or commercial thinning treatments. Stands proposed for treatment are second growth stands and would be subject to a number of criteria before they were determined eligible for treatment. The Forestwide Young Growth Vegetation Management project includes activities addressed (land management) and found not to pose a direct threat to the DPS, as discussed above.

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 Ten Lakes Travel Management Project will address over-snow and mechanized travel planning for the Ten Lakes area. The area affected by the proposal includes the Ten Lakes WSA and areas with common entrance points to the WSA. There are three main over-snow entrance points to the Ten Lakes WSA: the Grave Creek corridor; Clarence and Stahl Creek; and the Burma/Blacktail area. Over-snow travel is currently not limited. Mechanized use (primarily mountain bicycles) is also unrestricted. The alternatives contained in the Ten Lakes Travel Management Draft Environmental Impact Statement contain various amounts of over-snow and mechanized travel for the project area. A final decision has not been made for this project and the cumulative effects analysis utilizes the Proposed Action as the basis for the analysis in the Galton Vegetation Management Project.

As described on page 326, 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 (USDI FWS 2013). Additionally, the Ten Lakes Travel Management Project proposed

action, as well as all action alternatives limit over-snow use both spatially and temporally from the existing condition, which would decrease both the length of time and area that over-snow use could occur. The cumulative effects of the Ten Lakes Travel Management Project in conjunction with past, present, reasonably foreseeable actions would result in less over-snow and mechanized use than the existing condition, thereby reducing activities in wolverine habitat. Currently the trapping season on wolverine is closed, so determinations on how the proposed Ten Lakes project may affect possible future trapping (under state management, and not controlled by USFS) is only speculation.

"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]" (USDI FWS 2014). 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 not 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.

Wolverine habitat is projected to decrease in area and become more fragmented in the future as a result of climate changes that result in increasing temperatures, earlier spring snowmelt, and loss of deep, persistent, spring snowpack. These climate change impacts are expected to have direct and indirect effects to wolverine populations in the contiguous United States (78 FR7877). The best scientific and commercial information available indicates that only the projected decrease and fragmentation of wolverine habitat or range due to future climate change is a threat to the species now and in the future. The available scientific and commercial information does not indicate that other potential stressors such as land management (similar to what the Galton alternatives propose), recreation, infrastructure development, and transportation corridors pose a threat to the DPS (78 FR7880).

Regulatory Framework Findings

Forest Plan

TheForest Plan provides desired conditions, objectives, standards, and guidelines for wolverine within the Wildlife Resource. The following are applicable to the actions in this project and the Goals, desired conditions, objectives, standards, and guidelines can be found on the noted pages in the Forest Plan.

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 timber harvest and prescribed burning would occur within the Galton analysis areas persistent snow area. Implementation of these activities would occur during the spring or summer months, outside of the persistent snow period, and outside of the denning period. No impact to the persistent snow condition would occur. Prescribed burning would improve habitat conditions for prey species. Implementation of the proposed activities in dispersal habitat outside of the persistent snow period would not be expected to impact wolverines as it is unlikely to encounter a wolverine. See the "Direct and Indirect Effects" discussion. Therefore the project would contribute towards meeting GOAL-WL-02.

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). *The proposed activities would occur during the spring or summer months, outside of the persistent snow period, and outside of the denning period. No impact to the persistent snow condition would occur. See the "Direct and Indirect Effects" discussion. The project would contribute towards meeting FW-DC-WL-02.*

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.

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 analysis area, but suitable habitat exits. It is probable the area supports up to two females with young. No proposed harvest or prescribed burning activity within the persistent snow area would occur during the wolverine denning period. See "Existing Condition" and "Direct and Indirect Effects." Therefore the Galton project maintains or makes progress toward FW-DC-WL-01 and the project was designed in accordance with FW-GDL-WL-21.

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.

Implementation of the proposed activities are not expected to impact wolverine movement within the analysis area or connectivity to adjacent patches suitable habitat. Vegetation management activities occurring within dispersal habitat that trend toward the desired conditions that would improve scavenging and other foraging opportunities during wolverine's use of the area. See the "Direct and Indirect Effects" discussion. Therefore, the project would contribute progress toward FW-DC-WL-17.

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.

Both alternatives contribute towards this objective with the proposed harvest and especially high elevation burns in this area. Wolverine are dependent on prey species that require early, mid and late seral habitat. Currently, early seral habitat is lacking, and implementation of either action alternative will increase this habitat.

MA 1b, and 1c (Wilderness) 5a, b-DC-WL-01 (Backcountry): Large remote areas with little human disturbance such as those found in these MAs 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.

MA's 1b, 1c, and 5a and 5b are found within the project area. These MAs are associated with persistent snow areas found within the analysis area. 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." See the "Direct and Indirect Effects" discussion. Therefore, the project would contribute progress toward DC-WL-01 for these MAs.

GA-DC-WL-TOB-01: Low levels of human disturbance allows for denning activities of wide-ranging carnivores that are sensitive to human disturbance (e.g. grizzly bear), and for summer use by big game.

GA-DC-WL-TOB-02: Wildlife move between the large blocks of NFS lands across Highway 93 southeast of Murphy and Dickey Lakes. Wildlife also moves from the Lydia and Pinkham mountains vicinity and the Sunday Creek vicinity.

GA-DC-WL-TOB-05: Wildlife move to and from the border with Canada.

Known linkage areas do not occur within the analysis area and the action alternatives would not affect areas adjacent to known linkage areas located just outside of the analysis area. Movement of prey species between and within National Forest parcels is maintained as hiding cover remains high within the analysis area with both alternatives. Potential disturbance levels from Forest Service activities would remain small compared to the average wolverine home range.

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 Forest Plan.

Statement of Findings

Alternative 2, due to its lack of action, would have no impact on individuals or their habitat.

Action alternatives 1 and 3 **will not jeopardize the continued existence of the wolverine or its habitat** for the following reasons:

- "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."
- It was determined that proposed activities would not impact the availability or condition of persistent snow found within the project area that wolverine could use as potential denning habitat, or for movement and connectivity through the area.
- Trapping is no longer considered a secondary threat to the wolverine at the population level (FR 79 47522). The trapping season for wolverine is currently closed but trapping for other species does occur and incidental wolverine mortality is a possibility. There are no changes to the level of existing access proposed and therefor would not change the existing trapping opportunity.
- Land management activities occurring as part of the Galton Vegetation Project are actions that do no pose a threat to wolverines a t a population level (FR 79 47539). Additionally these activities, though they may affect individuals are of little consequence due to the flexibility of habitat use shown by wolverines and their large home range size. Any effects to individual wolverines caused by this project would not be elevated directly, indirectly, or cumulatively to a level that would represent a loss of viability. The Galton Project will not jeopardize the existence of the species

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 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 (USDA FS 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 Forest Plan also has an objective (FS-OBJ-WL-01) 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 Forest Plan (p. 207-208) 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 (Sensitive Species Sensitive Species Table 1) shows the Regional Forester's terrestrial sensitive species designations for the KNF (USDA FS 2011d). Four of the designated sensitive species in Sensitive Species Table 1 will not be discussed further because either there is no suitable habitat available for the species in the analysis area, and therefore they are not suspected to be present in the analysis area, or activities would not occur within the identified suitable habitat. The Galton analysis area for sensitive species consists of four (Ksanka, Wigwam, Grave and Murphy) of the five planning subunits located within the Galton Vegetation Project Area. As no activity is proposed in the Stillwater PSU, this area was not generally discussed.

Detailed information is provided below for those species that are suspected to be present in the analysis area.

Sensitive Species Table 1. Sensitive Wildlife Species on the KNF and Status in the Galton Analysis Area

Sensitive Species	Status*	Determination**	Comments
American Peregrine Falcon (*Falco peregrinus anatum*)	NS	No Impact	Suitable nesting habitat limited to cliffs or rock substrates along main river corridors, including areas above Koocanusa Reservoir located outside and west of the analysis area. No proposed activities would occur in 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 analysis area, including five documented nests and territories. Suitable habitat available.
Bighorn Sheep (*Ovis canadensis*)	K	May Impact	Native Ten Lakes "Trench" bighorn sheep herd, with approximately 21,900 acres of the herds home range located in the United States, predominately within the analysis area. Suitable habitat available.
Black-backed Woodpecker (*Picoides arcticus*)	S	May Impact	A total of four wildfires occurred in the analysis area during 2015. High quality habitat, consisting of early post-fire forests, in addition to general forest habitat exists.
Coeur d'Alene Salamander (*Plethodon vandykei idahoensis*)	NS	No Impact	Suitable habitat does not occur within the analysis area. Documentation located within the Aquatics Habitat and Species Specialist's Report.
Common loon (*Gavia immer*)	K	May Impact	Ten lakes located within the analysis area provide suitable habitat. Nesting was recently attempted in 4 of these lakes.
Fisher (*Pekania pinnanti*)	S	May Impact	Unconfirmed observation and potential tracks from the late 1990's within the analysis area. Modeling shows low potential for suitable habitat.
Flammulated Owl (*Otus flammeolus*)	K	May Impact	Surveys in 2005 documented the species in the analysis area Suitable and potential available habitat.
Gray Wolf (*Canus lupus*)	K	May Impact	Documentated use of the analysis area by two packs. Big game winter range for multiple ungulate species provides year-round foraging opportunties.

Harlequin Duck (*Histrionicus histrionicus*)	K	May Impact	Observations and monitoring data indicate Wigwam and Grave Creeks in the analysis area provide suitable habitat and additional potential habitat.
Northern Bog Lemming (*Synaptomys borealis*)	NS	No Impact	No suitable habitat within or adjacent to the analysis area. Species is not suspected. Therefore, project activities are not expected to affect habitat, individuals, or the species.
Northern Leopard Frog (*Rana pipiens*)	NS	No Impact	All known locations on the Fortine Ranger District are west of the analysis area. Species not suspected. Therefore, project activities are not expected to affect habitat, individuals, or the species.
Townsend's Big-Eared Bat (*Corynorhinus townsendii*)	S	May Impact	Foraging habitat abundant; hibernating and roosting habitat in the forms of abandoned mines limited to two recorded mines within the analysis area.
Western Toad (*Bufo boreas*)	K	May Impact	Observations and suitable breeding and upland habitat located within the analysis area. Analysis located within the Aquatics Habitat and Species Specialist's Report.

S = Species is suspected to occur within the analysis area because suitable habitat exists or area is within range of species occurrence.
NS = Species is not suspected to occur within the analysis area due to lack of suitable habitat or analysis 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 analysis 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.

Sensitive Species Analysis Assumptions or Limitations

For each of the following sensitive species, if any assumptions and limitations are known, they will be described, otherwise, there are no assumptions or limitation associated with the analysis.

Bald Eagle

Summary of Conclusions

Implementation of either of the 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. In summary, there are limited planned activities within Zones 1 or 2 of any known bald eagle territory and those activities include the implementation of timing restrictions to avoid disturbance during the nesting and fledging period. The activities in Zone 3 are not expected to impact bald eagle foraging or the nesting or roosting capabilities of the habitat. In addition, three of the five known nests are on private lands and not under any jurisdiction of the Forest Service.

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, USDI FWS 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.

Regulatory Framework

Introduction

The bald eagle was officially removed from the threatened species list on August 8, 2007 (USDI, FWS 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.

Forest Plan

The 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. 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 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 (MBEMP) (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 (USDI, FWS 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 Sensitive Species Sensitive Species Table 2).

The Montana Bald Eagle Management Plan (MBEWG 1994) guidelines identify four general habitat categories and management concerns for bald eagles. They are 1) nesting habitat, 2) foraging habitat (including perch sites), 3) winter habitat (including roost sites), and 4) mortality risks.

1. 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. Nesting habitat includes three management zones based on activity type and guidelines for avoiding disturbance to eagles. Zone 1 or the Nest Site Area is within a ¼ mile radius of the existing and alternative nests and is where eagles are most sensitive to activities and changes. Zone 2 or the Primary Use Area is within a ½ mile radius of the nest, and is where much of the 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. Zone 3 or the Home Range Foraging Area is within a 2.5 mile radius of the nest site. 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 more thorough description of each zone and associated management objectives and guidelines are found in the MPEMP (MBEWG 1994) and are included by reference

2. Foraging habitat consists of lakes, rivers, wetlands, and meadows that provide open flight paths, perches, and adequate prey. It also includes highway and railroad corridors (especially in the winter) due to dead animals found in these areas.

3. Winter habitat is generally dictated by the presence and abundance of food, open water, and secure night roost sites (MBEWG 1994).

4. The MBEMP (1994) identifies bald eagle mortality risks as shooting, accidental trapping, poisoning, diseases, and electrocution.

The wildlife specialist report (Anderson 2014) for the Forest Plan identifies potential stressors (risks and threats) to the bald eagle. These are activities that might impact bald eagles if not managed or mitigated and some are outside of Forest Service Control, such as activities that occur on adjacent private land. Activities on NFS lands within bald eagle nest territories have the potential to impact eagles during the nesting period, and depend upon the type of activity and the distance of activity from the nesting site. The period in which activities occur (greatest influence on nesting and rearing activities) generally occur between February 1 and July 15.

Therefore, for the bald eagle analysis, the resource indicators will be the occurrence of proposed vegetation management or development activities (measured qualitatively by acres), and associated disturbance (measured qualitatively by mortality risk) within the three nesting habitat zones (Zone 1 nest site, Zone 2 primary use area, and Zone 3 home range foraging area; and all activities within any remaining potential bald eagle habitat (Sensitive Species Sensitive Species Table 2). 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.

Sensitive Species Table 2. Resource Indicators and Measures for Assessing Effects

Resource Element	Resource Indicator	Measure	Used to Address: P/N, or Key Issue?	Source
Nest Site Area Zone 1 - ¼mile radius of nest	Vegetation management or development occurring within Zone 1	Acres treated resulting in the maintenance or promotion of important structural characteristics; impacts to the nest or associated roost trees?	No	Bald and Golden Eagle Protection Act; Migratory Bird Treaty Act; State Management Guidelines; Forest Plan FW-GDL-WL-03; Forest Plan FW-GDL-WL-04
Primary Use Area Zone 2 - ½ mile radius of nest site	Vegetation management or development occurring within Zone 2	Acres treated resulting in the maintenance or promotion of important structural characteristics; impacts to the nest or associated roost trees?	No	Same as for Zone 1

Resource Element	Resource Indicator	Measure	Used to Address: P/N, or Key Issue?	Source
Home Range Foraging Area Zone 3 – 2.5 mile radius of nest site	Vegetation management or development occurring within Zone 3	Acres treated resulting in the maintenance or promotion of important structural characteristics for roosting and foraging; impacts to known roost trees?	No	Same as for Zone 1
Bald Eagle Potential Habitat	Vegetation management or development occurring within potential bald eagle habitat	Acres treated resulting in the maintenance or promotion of important structural characteristics; impacts to existing foraging habitat? or impacts to existing winter habitat?	N	Bald and Golden Eagle Protection Act, Migratory Bird Treaty Act, State Management Guidelines, Forest Plan FW-DC-WL-06 Forest Plan FW-GDL-WL-02 Forest Plan FW-GDL-WL-03
Nest Site Zone 1 and Zone 2	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, Forest Plan FW-GDL-WL-02

Methodology

Potential bald eagle habitat is expected to occur within approximately 1 mile of large water bodies such as lakes and large streams or rivers. For the Galton Vegetation analysis area, water bodies that eagles are known and expected to use include the Tobacco River that borders the analysis area as well as known nest areas (Sinclair nest, Glen Lake Nest, Lick Nest, Black Lake Nest and Murphy Lake Nest). The Forest, in concurrence with the FWS have mapped potential eagle habitat based on bald eagle nesting locations, the areas within one mile of all major streams and lakes, and other known eagle use areas from USFS and other agency records. Based on this information, through the use of GIS spatial data, the acres of potential habitat area were calculated.

Data Sources

Eagle population ecology, biology, habitat description and relationships identified by research are described in USDI U.S. Fish and Wildlife Service (USDI, FWS 1995), USDI, FWS 1999, Montana Bald Eagle Working Group (MBEWG) 1991, 1994, & 2010 and USDI, FWS 2007a. These provided guidance in evaluating 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, Forest historical data (NRIS Wildlife), and other agency records (USDI, FWS, 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. The identification of potential habitat was restricted to the mapped habitat based on bald eagle nesting locations, the areas within one mile of all major streams and lakes, and other known eagle use areas from USFS and other agency records.

Affected Environment

Spatial and Temporal Context for Direct and Indirect Effects Analysis

The analysis boundary for direct and indirect project impacts to individuals and their habitat and making the effects determination is all lands within the Galton Vegetation analysis area that fall within the potential bald eagle habitat area, as mapped by the KNF in concurrence with the USFWS (see project file). As noted previously, identification of potential habitat within the analysis area was based on known bald eagle nesting locations, the areas within one mile of all major streams and lakes, and other known eagle use areas from USFS and other agency records. The primary potential effect of activities to bald eagles is impacts to nesting success. Five known nests lie within this area boundary, therefore project impacts to each nest site were analyzed within the 3 zones of use around these nest sites (known home range). These home range areas are located within the potential bald eagle habitat area boundaries mentioned above; encompass existing nesting sites, primary foraging habitat, as well as potential habitat located near lakes, and waterways; and are therefore appropriate boundaries for the analysis of this project's effects on bald eagles. 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. Long-term effects are those that are 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

Bald eagles occur as both seasonal migrants and year-round residents within the boundaries of the Kootenai National Forest. Nesting on the KNF has increased significantly over the last two decades. Only one active nest was known to occur in 1978, whereas 35 nests (15 on NFS 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, USDA, FS 2008a). Nest success for active nests over the last twenty-year period is about 83%, with an average of 1.2 fledglings per active nest (KNF bald eagle monitoring records).

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

verses 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).

Bald Eagle Occurrence

The analysis area is bounded to the west and south by the Tobacco River and Fortine Creek corridors and the area is known to support several bald eagle nests and territories. There are five bald eagle nest sites in the analysis area; three of the nest sites are on private land and two nests are located on NFS lands; however, portions of the home range for all nests extend into the analysis area.

Description of the Analysis Area

The KNF, in concurrence with the FWS have previously mapped potential bald eagle habitat and the forest supports about 564,558 acres (242,965 acres on NFS land, 275,470 acres on private land, and 46,123 acres of water). About 67,908 acres of the KNF potential bald eagle habitat occurs within the analysis area (25,092 acres on NFS land, 41,366 acres on private, and 1,450 acres of MT, FWP.

Foraging habitat exists in the analysis area in the form of small to medium size lakes, rivers, wetlands, and meadows. Foraging habitat also includes the U.S. Highway 93 corridor which provides road-killed ungulates in the winter.

Eagles are known to winter in the lower elevations in the analysis area. U.S. Highway 93 runs directly through white-tailed deer winter range within the Murphy Planning Area. Road-killed deer are common within this area and supply carrion for foraging all winter. Therefore food for wintering eagles is provided until the area lakes thaw. This occurs mainly in the low elevations in the Murphy and Grave Planning Areas. Eagles have been observed roosting along the Tobacco River on private lands immediately adjacent to the analysis area.

Existing Sources of Bald Eagle Mortality

In addition to the mortality risks identified in the Montana Bald Eagle Management Plan bald eagles have also died from collisions with motor vehicles and trains The BNSF rail line is located near the southern-most tip of the analysis area, with a segment just outside the Murphy Lake Eagle nest home range area (within a 2.5 mile radius of the nest site). U.S. Highway 93 is located through all of the five known nesting areas within the analysis area. High speed routes have the potential to result in the mortality of eagles. Motor vehicle or train collisions represent the highest risk for mortality mostly during the winter carrion feeding months.

Environmental Consequences

Alternative 2 – No Action

During 2015 the Marston and Barnaby fires burned within the project area. The Marston Fire burned approximately 7,557 acres, with 7,367 acres located on NFS lands (6,410 acres within the Murphy PSU, 958 acres in the Stillwater PSU), and 189 acres located on the adjacent Stillwater State Forest. The Barnaby fire reached 56 acres in size on NFS lands, with all acreage located in the Murphy PSU. Fire history in this area shows fires of similar scale. Between 1910 and 1920 there were multiple fires in the vicinity that ranged from 600-5000 acres. Another large fire burned on both the Stillwater State Forest and the Kootenai National Forest between 1920 and 1930. The Marston fire burned into several of these historic fires. 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. The lower elevations within the 2015 Marston Fire boundary burned with low severity. These areas have fire regimes adapted to periodic low intensity fires and this habitat overlaps with the eastern edges of the Black Lake and Murphy Lake eagle nest home range (area within 2.5 mile radius of the nest).

For Alternative 2 (No Action), no active management would occur on NFS lands within any of the five known nest territories or identified potential bald eagle habitat located within the Galton analysis area. Therefore, no direct effects to nesting, roosting, or foraging habitat would occur from proposed federal actions. Alternative 2 would also not add to bald eagle mortality risk.

Alternatives 1 and 3 - 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. 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.

Salvage of incidental mortality from underburning harvested or underburn units may occur in both alternatives on no more than 20 acres/year for no more than 200 acres. This salvage is subject to a number of conditions (page 14 of FEIS) and would occur within or adjacent to treatment areas. One of these conditions includes limiting salvage in areas of known nest trees, den sites or other specialized habitats as determined by the projects's wildlife biologist. Effects of this potential salvage to bald eagle would be similar to the effects shown for the original unit this salvage would occur in or adjacent to.

Project Design Features and Mitigation Measures

There are two design features identified to minimize potential effects to bald eagles. A six acre commercial thin harvest located within Zone 1 of the Murphy Lake nesting territory would employ timing restrictions to avoid disturbance during the nesting and fledging period.

There are 82 acres of activity (either prescribed burning or timber harvest) proposed within Zone 2 of the Glen Lake and Murphy Lake bald eagle territories, see Sensitive Species Table 3 below, and Chapter 2 Design Features. The design features would include timing and or seasonal restrictions. These design features will be discussed in more detail in the following effects discussion.

Vegetation Management and Development – Changes to Potential Habitat and Assessment of Potential for Disturbance to Nesting or Roosting Eagles

Nesting Habitat Zone 1

As demonstrated in Sensitive Species Table 3, below, all proposed management activities for Alternatives 1 and 3 are outside of Zone 1 nest site area except for 6 acres of a commercial thin harvest in the Murphy Lake nesting territory. The Murphy Lake nest is located on the edge of Murphy Lake in an old growth stand. The commercial thin is located on the other side of the Highway 93 corridor from the nest site in a stand of second growth larch. Even though six acres of this unit are located within .25 miles of the nest, the nest site area most used by the eagles includes the linear old growth stand adjacent to the lake and bounded by the highway corridor. No activities that would change this stand, or trees within this stand are proposed. The proposed commercial thin unit across the highway from the lake does not contain large or tall perching trees compared to the nest stand, and therefore use of this stand by eagles is minimal. Activities within Zone 1 of the Murphy Lake nesting territory would have no effect to the suitability of the nest stand, the existing nest trees, or established roost sites and the project would be consistent with the guidelines FW-GDL-WL-03 and FW-GDL-WL-O4.

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.

Timing restrictions would be employed for activities within this commercial thinning unit to avoid disturbance during the nesting and fledging period and activities within Zone 1 of the Murphy Lake nesting territory would be consistent with the guideline FW-GDL-WL-02.

Nesting Habitat Zone 2

Both Alternative 1 and Alternative 3 propose prescribed burning or timber harvest located within Zone 2 of the Glen Lake and Murphy Lake bald eagle territories (see Sensitive Species Table 3 below) totaling 82 acres. Approximately 42 acres of timber harvest (commercial thin) and 14 acres of prescribed burning are proposed in the Murphy Lake territory, while 26 acres of understory thinning/fuel reduction are proposed in the Glen Lake territory.

As described under Zone 1, the proposed commercial thin unit is located across the US Highway 93 corridor from the Murphy Lake nest and does not contain large or tall perching trees compared to the nest stand, and therefore use of this stand by eagles is minimal. Activities associated with the commercial thin unit within Zone 2 of the Murphy Lake nesting territory have the same effects as described for Zone 1 and would have no effect to the suitability of the nest stand, the existing nest trees, or established roost sites and the project would be consistent with the guidelines FW-GDL-WL-03 and FW-GDL-WL-O4.

The design features for both Alternatives would include timing restrictions for timber activities within Zone 2 to avoid disturbance during the nesting and fledging period. Timing restrictions would be employed for those burn acres visible from the Glen Lake nest site to mitigate any potential effects within Zone 2 of the Glen Lake bald eagle territory. The proposed prescribed

burns within Zone 2 of the Murphy Lake bald eagle nest are not visible from the nest and would not require any timing restrictions. Activities within Zone 2 of either the Glen Lake or Murphy Lake bald eagle territories would avoid disturbance during the nesting and fledging period by incorporating timing restrictions, or would avoid disturbance due to existing vegetative cover shielding the activity from the nest site, and would be consistent with the guideline FW-GDL-WL-02.

Home Range Foraging Zone 3

The action alternatives propose a combination of vegetation management/prescribed burning activities, activities within Zone 3 of local bald eagle territories (1,739 acres in Alternative 1, and 1,803 acres in Alternative 3. Four of the five nesting territories (Sinclair, Glen Lake, Lick Nest, and Black Lake Nest) include foraging habitat that consists of small lakes and a river which are primarily located on private land, and no activities are proposed adjacent to these lakes/river. Therefore, eagles are not likely to be displaced from this foraging habitat during project activities.

The Murphy Lake nesting territory foraging habitat includes Murphy, Martin and Dickey lakes located on both public and private lands. Recommendations regarding foraging habitat include minimizing potentially disruptive activities and development in the eagles' direct flight path between … important foraging areas (National Bald Eagle Management Guidelines 2007 (USDI, FWS 2007a). No proposed activities are located near Martin Lake, however there is proposed harvest activities near both Dickey and Murphy lakes but these activities do not occur directly adjacent to either of these lakes. These activities are proposed across Highway 93 or a major road from either lake and are in areas that eagles do not use as perch sites while hunting. Perch sites used while eagles are foraging for fish occur directly adjacent to both lakes. Both these lakes are large so if eagles are disturbed by activity on one portion of the lake, they can move to another portion of the lake, or to Martin Lake for foraging. These proposed harvest units are not within the direct flight path for foraging eagles, and these lakes provide large areas available for foraging, therefore harvest activities at these sites are not likely to displace foraging eagles.

Potential Bald Eagle Habitat

Likewise these alternatives have proposed activities within identified potential bald eagle habitat, also disclosed in Sensitive Species Table 3, below. While not expected to measurably affect bald eagle habitat within the potential habitat area, these activities may result in eagles temporarily avoiding the proposed unit areas until activities cease. There are no known communal roost sites present in the Galton analysis area or any associated PSU. Known roost sites directly outside the analysis area do occur on private land adjacent to the analysis area. This site is located on a large block of private land along the Tobacco River and adjacent to the highway. Proposed activities are not near this area and will have no effect on this habitat or the birds using this area.

Sensitive Species Table 3. Impacts to Bald Eagle Habitat by Alternative (Acres) in the Galton Analysis Area

Resource Element	Measure	Treatment Type	Alt 1 (acres & Nest)	Alt 3 (acres & Nest)	Comment	Design Criteria

Resource Element	Measure	Treatment Type	Alt 1 (acres & Nest)	Alt 3 (acres & Nest)	Comment	Design Criteria
Nest Site AreaZone 1¼ mile radius from nest site	Acres treated; impacts nest or roost trees?	Timber harvest	6 MLN	6 MLN	The proposed unit is located across the U.S 93 corridor from the nest site in a second growth larch stand; does not contain large or tall perching trees; use of stand by eagles is minimal.	Yes, timing restrictions in this unit to avoid disturbance during nesting and fledging period.
Nest habitat Primary Use AreaZone 2½ mile radius from nest site	Acres treated; impacts nest or roost trees?	Timber harvest	42 MLN	42 MLN	See Zone 1 comment	Yes, see Zone 1
		Understory thinning/fuel reduction	26 GLN	26 GLN	Timing restrictions for prescribed burning in the spring for acres visible from nest site	Yes, if needed
		Prescribed Burn	14 MLN	14 MLN	Burn unit not visible from nest	No
		Zone 2 Total Ac	82	82		
Nest habitat Home rangeZone 32.5 mile radius from nest site	Acres treated; impacts roost trees?	Timber Harvest	92 LN790 BLN586 MLN	92 LN846 BLN586 MLN	No measurable effect to bald eagle habitat expected, may temporarily displace individuals; no known roosts in Zone 3	No
		Understory thinning/fuelreduction	101 GLN & LN	101 GLN & LN	Same effects expected as described for timber harvest in Zone 3	No
		Precribed Burn	170 MLN	170 MLN8 BLN	Same effects expected as described fortimber harvest in Zone 3	No
		Total ac. Zone 3	1,739	1,803		

Resource Element	Measure	Treatment Type	Alt 1 (acres & Nest)	Alt 3 (acres & Nest)	Comment	Design Criteria
Potential bald eagle habitat	Acres treated; impacts roost trees?	Timber harvest Understory thinPrescribed burnAll Treatments	1,577 185 743 2,505	1,799 195 666 2,660	No measurable effect to potential bald eagle habitat, may temporarily displace. No known roosts	No

Alt. = Alternative; SN = Sinclair nest; GLN = Glen Lake Nest; LN = Lick Nest; BLN = Black Lake Nest; MLN = Murphy Lake Nest. Timber harvest: treatments include intermediate, intermediate variable density, regeneration, and commercial thin). Prescribed burn treatment includes ecosystem burn, slash/underburn, and prescribed burn with mechanical pre-treatment.

Acres are not cumulative – Acres of activity within Zone 1 are included in Zone 2 and so on.

The potential for either Alternative 1 or 3 to disturb bald eagles or their habitat during the winter would be minimal because the majority of the foraging occurs on highway or railway road kills. There is a small chance that an ungulate winter kill could occur within a proposed unit while logging activities are ongoing, but this is unlikely, and this type of disturbance is common for eagles while foraging on highway killed ungulates.

Increased Risk of Mortality

Alternatives 1 and 3 would not add to bald eagle mortality risks as no power lines would be installed, nor would motorized access (e.g. road construction, speed limits) change with implementation of either action alternative. However the action alternatives may disturb bald eagles foraging on carrion or areas along portions of the lakes if project activities are active nearby.

Cumulative Effects

Introduction

The Affected Environment/Existing Condition section describes the existing suitable habitat adjacent to exiting nest areas within the analysis area. This includes primarily nesting habitat within close proximity to rivers or 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 nest sites or suitable 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 lands within the analysis area that fall in the agreed boundary of potential and suitable habitat (mainly within one mile of the numerous lakes and rivers in the analysis area) as the appropriate scale for bald eagle cumulative effects analysis. Because the primary effect of activities to bald eagle is nest success a cumulative effects area that encompasses the nesting habitat is appropriate. In addition, habitat throughout the analysis 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 analysis 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 for bald eagle habitat suitability are activities on NFS lands within bald eagle nest territories that have the potential to impact eagles during the nesting period. Maintaining large diameter trees within these nesting territories will provide future nesting habitat in case existing nest trees blow down. The no action alternative does not have planned management within these areas. Harvest has occurred in some of these area since the 1950s 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 Fortine Creek and the Tobacco River would have contributed to the loss of habitat in the Galton analysis area. Detailed description of previous vegetation management activities are found at the beginning of Chapter 3 of this document. In unharvested areas, natural disturbances such as wildfire would have contributed to a mosaic of habitat. Likewise, since the 1990's application of Forest Plan standards has resulted in the retention of snags and protection of riparian habitats outside of established recreation areas. Similarly, direction provided in the 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. Additionally, wildfire suppression near area lakes and rivers has contributed to protecting large diameter trees suitable for perching, roosting, and nesting. The majority of these areas are located in moist habitats that, over time, would not experience frequent fires. In upland drier habitats, prescribed fire that maintains open conditions and development of large trees has improved nesting and foraging opportunities in those areas.

Climate change could have effects on the bald eagle at a forest level and are discussed in the KNF FEIS on page 267. "Climate change could impact bald eagles. It could change the duration and average temperature in winter. That could change how long ice lasts on some waterbodies. Therefore access to water for foraging may change (e.g. a shift in seasonally available food sources, p. 90 in USDA 2010). On the other hand, less severe winters in terms of cold and snow may lead to better survival for ungulates. That would reduce the number of carcasses available for eagles. Improvement or maintenance of ungulate habitat, including increased resiliency to large-scale disturbance processes, would be accomplished through FW-DC-VEG-01 through 05, FW-DC-VEG-10 and 11, FW-DC-FIRE-03, FW-DC-WL-16, FW-GDL-WL-08 through 11, GA-DC-WL-CLK-01 and 02, GA-DC-WL-FSH-02 and 03, GA-DC-WL-KOO-01 and 04, GA-DC-WL-LIB-02 and 03. Direction that would improve/maintain the resiliency of nesting habitat to climate change includes FW-DC-VEG-01 through 07, FW-DC-VEG-11, FW-DC-FIRE-03, FW-DC-WL-06, FW-DC-WL-11 and 12, and much of the Watershed, Soils, Riparian, and Aquatic resources section of the revised Plan."

It is likely that windstorms have had, and will continue to have, the greatest impact on suitable bald eagle habitat on the Fortine Ranger District. Application of management guidelines that limit

activities around known 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.

Alternative 2 – No Action

The No Action Alternative does not directly contribute any cumulative effects to bald eagles or their habitat. The majority of the key habitat areas are located in moist habitats adjacent to rivers and lakes that, over time, would not experience frequent fires. It is likely that windstorms have had, and will continue to have, the greatest impact on suitable bald eagle habitat on the Fortine Ranger District.

Alternatives 1 and 3 – 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. Those current and foreseeable actions in the project area that were determined to be appropriate for inclusion in the analysis of environmental effects are listed at the beginning of Chapter 3.

Ongoing federal actions have been considered and included when establishing the existing condition of this project area. These ongoing federal actions include approximately 40 acres of prescribed burns per year, approximately 90 acres of pile burning with the Little Feet project, approximately 200 acres/year of precommercial thinning, and approximately 50 acres/year of tree planting. Prescribed fire would reduce conifer encroachment in some areas and increase browse within the winter range. All listed ongoing federal activities would retain the large diameter trees that could provide future nesting or roosting areas for bald eagles. Future prescribed burning, precommercial thinning, site preparation (pile burning) and tree planting would be analyzed for bald eagles and their habitat to insure that potential effects are not increased. Design criteria could be used for future underburns, precommercial thinning and tree planting if necessary to protect known nest site areas, however it is not anticipated that these future federal actions would occur within Zone 1 of any existing nest sites.

The Forestwide Young Growth Vegetation Management project would treat approximately 400 to 600 acres annually, dependent on funding, using precommercial thinning or commercial thinning treatments and would be subject to a number of criteria before they were determined eligible for treatment. The Forestwide Young Growth Vegetation Management project would have the same effects on eagles as the effects described for precommercial thinning (above), and subject to similar design criteria as described above.

The Ten Lakes Travel Management Project will address over-snow and mechanized travel planning for the Ten Lakes area. The area affected by the proposal includes the Ten Lakes WSA and areas with common entrance points to the WSA. There are three main over-snow entrance points to the Ten Lakes WSA: the Grave Creek corridor; Clarence and Stahl Creek; and the Burma/Blacktail area. Over-snow travel is currently not limited. Mechanized use (primarily mountain bicycles) is also unrestricted. The alternatives contained in the Ten Lakes Travel Management Draft Environmental Impact Statement contain various amounts of over-snow and mechanized travel for the project area. A final decision has not been made for this project and the cumulative effects analysis utilizes the Proposed Action as the basis for the analysis in the Galton Vegetation Management Project. This project does not propose any harvest or activities that would affect bald eagle habitat (see “Resource Indicators and Measures” section) and existing over-snow and mechanized use are not currently affecting bald eagle nest sites. The cumulative

effects of the Ten Lakes Travel Management Project in conjunction with past, present, reasonably foreseeable actions would result in less over-snow and mechanized use than the existing condition, thereby reducing activities across the project area and potential affects to bald eagles.

Approximately seventy percent (41,266 acres) of the potential bald eagle habitat (67,908 acres) within the analysis area is privately owned. 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 along the Tobacco River, Glen Lake, as well as other private lakes in this area. Based on past building trends, it is assumed that 2 new residences could be built per year per planning area. No subdivisions are formally proposed at this time. Depending on the location of these residences, and activity levels associated with the residences, this could result in fewer potential nest sites, and future roost sites on the private land for the next 10 years. Cumulative effects to nesting habitat and success, from the development on private lands, is hard to predict because location of future building sites is unknown. These are factors the NFS has no control over.

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

Forest Plan

The 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, and the goals, desired conditions, objectives, standards, and guidelines can be found on the specific pages noted.

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 both timing and activity restrictions for proposed activities in the Murphy Lake Nest site Zone 1 and Zone 2 that would limit the timing of harvest activities to the non-nesting, and non-fledging period. In addition, timing restrictions would be included for prescribed burning in the spring for acres visible from the nest site within Zone 2 of the Glen Lake Nest. Prescribed burning activities within Zone 2 of the Murphy Lake Nest are not visible from the nest site, and no restrictions are needed. See the "Direct and Indirect Effects" discussion. By incorporating timing and activity restrictions where needed, the Galton Vegetation Project would comply and contribute to the progress toward achieving Goal-WL-02.*

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 five known nest territories in the analysis area, while four of the nest territories (Glen Lake, Lick, Black Lake, and Murphy Lake) have proposed activities within them. Both action alternatives enact timing and activity restrictions that would limit the timing of harvest activities to the non-nesting and non-fledging period within Zone 1 and 2 of the Murphy Lake nest, and would include timing restrictions for prescribed burning in the spring on acres visible from the nest site where needed for the Glen Lake nest. See "Direct and Indirect Effects" and Chapter 2, Design Features. By incorporating timing and activity restrictions where needed, the Galton Vegetation Project would comply and contribute to the progress toward achieving FW-DC-WL-01.*

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. *Both action alternatives help to meet this desired condition by maintaining the large tree component adjacent to the lakes and rivers on NFS lands. In addition 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 eagle, such as the commercial thinning unit proposed within the Murphy Lake Nest Zone 1 and Zone 2. See the "Direct and Indirect Effects" discussion. Therefore the Galton Vegetation Project would contribute progress toward achieving FW-DC-WL-06.*

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. *Both action alternatives with activities occurring within Zone 1 (a ¼ mile radius from the nest site) and Zone 2 (a ½ mile radius from the nest site) of the Murphy Lake Nest or Glen Lake nests were considered for timing and activity restrictions. Timber harvest activities within Zone 1 and Zone 2 of the Murphy Lake nest territory would occur outside of the nesting and fledging period. See "Direct and Indirect Effects" and Chapter 2, Design Features. Therefore, the Galton Vegetation Project would comply and contribute to the progress toward achieving FW-GDL-WL-02.*

FW-GDL-WL-03: Bald Eagle: Management activities should not result in the loss of existing nest trees or established roost trees. *Both action alternatives meet this guideline by maintaining the large tree component adjacent to the lakes and rivers on NFS lands. No management is proposed that would affect nest trees or future nest trees or known roost sites. See "Direct and Indirect Effects." Therefore, the Galton Vegetation Project was designed in accordance with this guideline.*

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). *Nest site habitat suitability is maintained with both action alternatives. Proposed vegetation management treatments occurring within nesting habitat and primary home range, and potential bald eagle habitat would promote structural characteristics that would provide current and /or future nesting and roosting opportunities. No management is proposed that would affect nest trees or render existing territories unsuitable in any way. See "Direct and Indirect Effects." The Galton project was designed in accordance with this guideline.*

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 Forest Plan.

Bald and Golden Eagle Protection Act of 1940 (16 U.S.C. 668-668C 1978)

As stated in the act, "without being permitted, it is illegal to possess (and related activities) any bald or golden eagle, their nest, or egg". Also, the term "take" comprises a range of actions including but not limited to collection, injury or death, or disturbance.

Both action alternatives enact timing and activity restrictions that would limit the timing of harvest activities to the non-nesting and non-fledging period, and would include timing

restrictions for prescribed burning in the spring on acres visible from the nest site. Proposed activities would not impact known nest sites and would not result in the possession of an individual, feathers, nest, or egg. See the “Direct and Indirect Effects” discussion.

Migratory Bird Treaty Act of 1918 (16 U.S.C. 703-712), as Amended

The Act makes it without being permitted, 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 occurring within known nest territories would enact timing and activity restrictions and would not 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, Executive Order 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 such as bald eagles as part of the NEPA process and promoting conservation of and minimizing adverse impacts to the species. For all migratory birds (see Migratory Bird analysis).

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, no activities would result in the possession of an individual, feathers or other parts, nest, or egg of a bald eagle. Activities occurring within known nest territories would enact timing and activity restrictions.

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 2 (No Action), due to its lack of proposed federal action, would have no impact on individuals or their habitat. The majority of the key habitat areas are located in moist habitats adjacent to rivers and lakes that, over time, would not experience frequent fires. It is likely that windstorms have had, and will continue to have, the greatest impact on suitable bald eagle habitat on the Fortine Ranger District.

Action Alternatives 1 and 3 may impact individual eagles or their habitat but will not likely contribute to a trend toward federal listing or loss of species viability to the population or species for bald eagles. This determination is based on: 1) there are limited planned activities within Zones 1 or 2 of any known bald eagle territory and timing restrictions would be employed for all harvest acres and those burn acres visible from the nest site to mitigate any potential effects within Zone 2 of the Glen and Murphy Lake bald eagle territories; 2) activities in Zone 3 are not expected to impact bald eagle foraging or the nesting or roosting capabilities of the habitat; 3) three of the five known nests are on private lands and not under any jurisdiction of the Forest Service; 4) The proposed vegetation management treatments are designed to trend the existing condition towards desired conditions for the analysis area, and this would increase the availability of forage for potential prey species such as deer and small mammals, increasing upland foraging and scavenging opportunities for bald eagles; and 5) these alternatives adhere to the Forest Plan and the Montana Bald Eagle Working Group guidelines.

Bighorn Sheep

Summary of Conclusions

Implementation of either of Galton Vegetation Project’s two 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 bighorn sheep. In summary, there are a limited amount of activities within the Ten Lakes sheep herd home range, and current vegetation management would benefit the herd. Implementation of proposed vegetation management treatments, including prescribed burning that trend toward the desired vegetative conditions would result in the increase of these open habitats and would improve bighorn sheep habitat within the analysis area. Alternative 2, due to its lack of action, would have no impact on individual sheep or their habitat.

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 groups of mature males only or females, lambs, and immature males for most of the year. 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. Steep, rocky terrain is necessary for them to escape from predators. This type of escape terrain must be found in all of their seasonal ranges in order for the habitat to be usable by bighorn sheep. Their rut begins in early November and lasts for approximately two months. Mature females produce one lamb in late May.

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 Galton Vegetation Project Purpose and Need to "provide areas of seral species for wildlife species (FW-DC-WL-19) and "provide openings and areas of young-aged trees and shrubs for wildlife species (FW-DC-WL-18).

The greatest threat to bighorn populations is from disease. The animals are susceptible to pneumonia and a population involved in a pneumonia outbreak will see a significant number of animals die and reproduction and recruitment will 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 (MDFWP 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.

Regulatory Framework

Forest Plan

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-TOB-06

There are other 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 Measure

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 Forest Plan. The analysis area includes areas within the Ten Lakes bighorn sheep herd home range. Specific habitat management strategies for the Ten Lakes herd are summarized in the draft Montana Sheep Conservation Strategy (MFWP 2010) and include cooperative work with USFS in habitat

needs/improvements, cooperative relationships with domestic sheep owners including double fencing, aggressive management of weeds and grazing on Woods Ranch WMA, continuance of cooperative relations with land trust organizations to assist in protecting private lands adjacent to USFS sheep habitat. This analysis will evaluate how well the Galton Vegetation Project assists in meeting or meets these habitat management strategies and objectives specific to the Ten Lake's herd. Meeting these overall habitat management strategies and objectives are related to the Forest Plan Tobacco Plains Geographic Area desired conditions to retain or enhance habitat conditions for the Ten Lakes herd (GA-DC-WL-TOB-06).

A primary problem associated with habitat management of bighorn sheep in northwest Montana is the reduction of open habitat conditions. The draft Montana Bighorn Sheep Conservation Strategy (MWFWP 2010) also identified three essential elements of managing bighorn sheep habitat that are subject to degradation by humans and plant succession. These elements in brief are: 1) escape cover or terrain in all seasons, 2) high visibility to detect predators and access to forage; and 3) low elevation winter range near escape cover receiving no more than 10 inches of snow cover. Forest activities and treatments that can assist in maintaining or enhancing these habitat needs will assist in perpetuating this species. The project will evaluate how proposed vegetative treatments change habitat quality of winter range, escape cover, and foraging habitat in bighorn sheep habitat. These resource elements address changes to the suitability and availability of habitat within the sheep range and increased foraging opportunities, and are related to the 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 will be the measures for effects to compare alternatives.

The Forest Plan specialist report (Anderson 2014) identified key stressors on NFS land, and those applicable to NFS land within the analysis area include non-sheep livestock allotments; noxious weeds, fire/fire exclusion; placing treatments that will attract bighorns between bighorns and domestic sheep or goats on non-NFS ownership; human disturbance (and associated dogs) in lambing and wintering habitat; and motorized or non-motorized routes in key habitat areas. These stressors can lead to habitat alteration, disturbance/displacement of individual sheep, or even mortality. Stressors evaluated as resource elements for the project are presence of domestic sheep/goats on non-NFS lands, cattle grazing allotments on NFS lands, noxious weeds on NFS, and human disturbance in lambing and wintering habitat.

Sensitive Species Table 4. Resource Indicators and Measures for Assessing Effects

Resource Element	Resource Indicator	Measure	Used to Address: P/N, or Key Issue?	Source
Habitat management strategies specific to Ten Lakes herd	Ability of Galton Project to meet strategies and objectives, including noxious weed management	Qualitative discussion	No	GA-DC-WL-TOB-06 and Montana Sheep Conservation Strategy (MFWP 2010)

Resource Element	Resource Indicator	Measure	Used to Address: P/N, or Key Issue?	Source
Change in habitat quality due to vegetation management -	Increased foraging, improved escape visibility, decrease encroachment of trees on winter range resulting from timber harvest	Acres treated	Purpose and need	Forest Plan FW-DC-WL-16; FW-DC-WL-19; and GA-DC-WL-TOB-06 Montana Sheep Conservation Strategy (MFWP 2010)
Change in Habitat quality due to prescribed burning	Improved winter range foraging, improved summer range foraging, improved visibility adjacent to escape cover	Acres treated	Purpose and need	Forest Plan FW-DC-WL-16; FW-DC-WL-19; and GA-DC-WL-TOB-06 Montana Sheep Conservation Strategy (MFWP 2010)
Presence of domestic sheep/goats on non-NFS lands	Presence of domestic sheep or goats within the herd range or potential habitat	Changes to the potential for interaction with domestic sheep or goats?	No	Montana Sheep Conservation Strategy (MFWP 2010)
Cattle grazing allotments on NFS lands,	Presence of cattle grazing on NFS land within the herd range or potential habitat	Changes to cattle grazing allotments?	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; ; FW-GDL-WL-09; FW-GDL-WL-11,

Methodology

Bighorn sheep ranges for each of the herds found on the KNF have been identified for the 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 are areas that provide for yearlong sheep use, and 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 Ten Lakes known herd range and mapped potential sheep range within the analysis area 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 Geist (1971), Buechner (1960), and Couey (1950). That information is incorporated by reference. Bighorn occurrence data comes from recent District wildlife observation records and Forest historical data (NRIS Wildlife). Additional data comes from Montana FWP records.

Affected Environment

Spatial and Temporal Context for Effects Analysis

The analysis boundary for direct and indirect project impacts and effects to individuals and their habitat are discussed within the Ten Lakes herd home range as well as the entire analysis area, as activities could result in habitat alteration, disturbance and displacement to bighorn sheep. The contribution toward viability is assessed at the Kootenai National Forest.

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

Forest-wide there are 90,880 acres of bighorn sheep habitat (Hunting Districts 100, 101, 102, 123). It is found in widely distributed pockets that include steep, rocky terrain. The total number of bighorn sheep on the Kootenai National Forest is 248, statewide the total number of sheep is 5,694 animals in 49 herds (MFWP 2010).

There are 4 herds of bighorn sheep within the boundaries of the Kootenai National Forest. Two of the herds (Ural-Tweed, Ten Lakes) are native herds, totaling 125 individuals based on reported observations (personal communication, Tim Thier, 2015). The Kootenai Falls and Cabinet (Berray Mtn.) herds are both transplanted herds, herds that have been reestablished or established by the relocation of sheep from other populations.

Bighorn Sheep Occurrence

The analysis area includes the Ten Lakes “Trench” bighorn sheep herd. The herd is estimated at 100 individuals with 61 actually observed via aircraft (MFWP 2010). The area used by the herd includes Ten Lakes Scenic Area, Woods Ranch Wildlife Management Area (WMA), and adjacent borderlands of Canada. Approximately 21,900 acres of the Ten Lakes herd home range is located in the U.S. predominantly within the analysis area (Johnsen 1993).

Habitat Quality and winter range/lambing habitat

This analysis modeled primary bighorn sheep potential habitat within the entire analysis area based on parameters from the Montana Bighorn Sheep Conservation Strategy (MFWP 2010). Briefly, the results indicated that there are approximately 7,138 acres of potential bighorn sheep escape habitat, 41,647 acres of potential foraging habitat, and 5,230 acres of potential winter range within the analysis area. These acres come from modeled habitat across the Galton Analysis Area, as described above, and do not necessarily represent the area that bighorn sheep actually use. The acres of habitat (including winter range) that are known to be used by the Ten Lakes bighorn sheep herd is a subset of the acres listed above and include a smaller 21,906 acre home range as described by Johnsen, 1993 and depicted on the associated Project File map. On this map, areas of winter range located outside of the home range polygon, are not known to have bighorn sheep use now or in the past, based on sighting information. It is generally thought that the lack of use outside of the home range area can likely be attributed to the limited amount of quality bunch grass winter range which is only available in the Tobacco Plains area and includes the heavily- used state-owned and managed Woods Ranch Wildlife Management Area (WMA).

Within the Ten Lakes sheep herd home range (see project file map), approximately 883 acres were modeled as escape habitat, 4,406 acres were modeled as foraging habitat, and nearly the entire Woods Ranch Wildlife WMA is used as their primary winter range and possible lambing habitat. This WMA is outside but adjacent to the project area and under the ownership and management of MT Fish Wildlife and Parks. Because of the known, concentrated, winter-time use of this WMA by this sheep herd, it is believed that there is minimal winter time use of National Forest lands even adjacent to the WMA. A small area of lambing habitat was located in past years near Therriault Pass.

Human disturbance is limited on the known winter range area (state-owned WMA) used by the Ten Lakes sheep herd. The state does not allow any public winter time use (motorized or non-motorized) on the majority of this WMA. There is limited over-snow motorized use on NFS lands within the Ten Lakes sheep home range, due to steep terrain and better motorized access outside of this home range area (see project file map), however the area on NFS lands is currently open to over-snow motorized use. The majority of the over-snow use occurs in the Grave creek drainage and Ten lakes area, when the sheep are on their winter range (WMA described above), and would therefore not affect bighorn sheep during this timeframe. The lambing habitat located near Therriault pass receives limited human disturbance from over-snow users or hikers because the receding snow during this time-frame would hinder skiers, snowmobilers and hikers.

Presence of domestic sheep/goats on non-NFS lands

The primary risk factor for bighorns is all-age epizootic die-offs, generally associated with interactions with domestic sheep (although domestic goats may also be carriers). This risk is greatly exacerbated by the fact that domestic and wild sheep are attracted to each other, and can actively seek each other out over great distances. A single bighorn visiting a domestic herd (including rams being drawn in by females in season) can then return to a wild herd and initiate an epizootic die-off. A single domestic sheep seeking out a wild herd can bring about the same end. This contact could occur from domestic sheep on private lands, on trailing routes, from domestic sheep or goats being used for noxious weed treatment, or from pack goats (Tomasik 2011). No active or vacant domestic sheep or goat allotments occur on the KNF, nor are there any allotments adjacent to the KNF (see the map produced by the Forest Service and Bureau of Land Management, USDA FS and USDI BLM 2012, Weldon 2012).

Although no allotments for sheep or goats occur on the KNF, there are domestic sheep and goats on private land within one air mile of the state-managed Woods Ranch Wildlife Management Area (WMA) that pose a risk to the Ten Lakes bighorn Sheep herd via transfer of epizootic diseases such as pneumonia.

Cattle grazing allotments on NFS lands

Within the analysis area, there are Forest Service cattle grazing allotments in the Grave creek area. There is no past or current bighorn sheep use of these areas,

Habitat management strategies specific to Ten Lakes herd

Currently the Forest Service and State of Montana have worked cooperatively on habitat enhancement burns and noxious weed control on the Wood Ranch WMA in the past.

Environmental Consequences

Alternative 2 – No Action

Alternative 2 would maintain/allow the natural successional processes to continue. 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. Open foraging areas would continue to decrease in size and productivity as conifers encroached upon the openings on all seasonal ranges. No cooperative habitat improvements outside of weed management along area roads would occur under this alternative. Human recreational use of the area would remain at or near current levels growing closely with population increase of the general area. No new recreation facilities that may enhance human use of the area would occur.

Alternatives 1 and 3 – 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 cover or terrain, maintain visibility to detect predators and access to forage would benefit bighorn sheep (MFWP 2010). Forest activities and treatments that can assist in maintaining or enhancing these habitat needs will assist in perpetuating this species (see Sensitive Species Table 5 below).

Project Design Features and Mitigation Measures

A design feature would be incorporated into Alternative 1 to minimize disturbance from prescribed burning from unit 71 to lambing habitat located on Therriault Pass. This timing restriction would require summer/fall burning to ensure protection of the lambing area during the spring (see Design Features in Chapter 2). Therefore Alternative 1 would be consistent with FW-GDL-WL-11 which describes minimizing or avoiding disturbance to native ungulates during the birthing/parturition period, and GA-DC-WL-TOB-06 which describes habitat conditions for bighorn sheep (Ten Lakes herd) are retained or enhanced.

Habitat Quality and winter range/lambing habitat

Proposed activities for Action Alternatives 1 and 3 have the potential to expand or improve foraging opportunities both on summer and winter range as well as to improve visibility near escape cover. Timber harvest (regeneration or thinning) and burning have the potential to improve

bighorn sheep foraging habitat (Sensitive Species Table 5). Opening the canopy and burning decadent grasses and shrubs improves conditions for grasses and forbs. It also helps to address the fire/fire exclusion stressor addressed above.

Sensitive Species Table 5. Resource Indicators and Measures for indirect and direct effects to Bighorn Sheep Habitat

Resource Element	Resource Indicator	Measure	ExistingCon ditionAlt. 2 No Action	Alt. 1	Alt. 3
Change in habitat quality due to vegetation management timber harvest[1]	Increased foraging, improved escape visibility, decreased encroachment of trees on winter range	Acres (Ac) treated on: Winter Range Escape Cover Foraging[2]	5,230 ac 7,138 ac 41,647 ac	+ 582 ac (11%) 0 ac + 46 ac (0.1%)	+ 582 ac (11%) 0 ac + 46 ac (0.1%)
Change in Habitat quality due to prescribed burning	Improved winter range andsummer range foraging, improved visibility adjacent to escape cover	Acres (Ac) treated on: winter range Escape Cover Foraging[2]	5,230 ac 7,138 ac 41,647 ac	+ 198 ac (4%) + 1417 ac (21%) + 4491 ac (12%)	+ 126 ac (2%) + 284 ac (4%) + 980 ac (2%)
Presence of domestic sheep/goats on non-NFS lands	Presence of domestic sheep or goats within the herd range or in Galton potential habitat	Changes to the potential for interaction with domestic sheep or goats?	No change to the existing condition	No change to existing condition	No change to existing condition
Cattle grazing allotments on NFS lands	Existing cattle grazing allotments in potential habitat	Changes to existing cattle grazing?	No change to exiting cattle allotments	No change to exiting condition	No change to exiting condition
Winter Range and Lambing Habitat	Activities occurring on winter range or lambing habitat during their period of use	Potential for disturbance & displacement of sheep during these periods?	No change to existing winter or lambing habitat located on Woods Ranch or Therrialt Pass	Design criteria would minimize disturbance to lambing habitat on Therriault Pass by restricting burn unit 71 to a summer\ fall burn	No affect to winter or lambing habitat on Woods Ranch

Resource Element	Resource Indicator	Measure	ExistingCon ditionAlt. 2 No Action	Alt. 1	Alt. 3
Habitat management strategies specific to Ten Lakes herd	Habitat improvovent or maintinance	Acres treated	No change to current strategies	Yes, prescribed burning and continuation of noxious weed program	Yes, prescribed burning and continuation of noxious weed program

[1] – not all harvested or thinned forested acres may be suitable for sheep due to lack of escape habitat as in steep rocky slopes, however these areas do provide foraging habitat for other ungulates therefore decreasing foraging competition on steeper habitats.
[2]Foraging = foraging habitat within 300 meters of escape habitat.

As described under measurement indicators above, agency management practices that may have impacts (both negative and positive) to bighorn sheep and are applicable to this analysis area include: cattle allotments; noxious weed management or lack thereof; fire exclusion; prescribed fire; thinning of conifers; management of conifer encroachment; placing treatments that will attract bighorns between bighorns and domestic sheep or goats on non-NFS ownership; human disturbance (and associated dogs) in lambing and wintering habitats; and motorized or non-motorized routes in key habitat areas (Tomasik 2011).

As can be seen in Table 5, Alternatives 1 and 3 would both create forest openings with various harvest prescriptions on 11 % of the potential bighorn sheep winter range in the analysis area, no new openings in escape habitat and 0.1 percent on general foraging habitat. These two action alternatives would burn approximately 4% and 2% (Alt. 1 and Alt. 3 respectively) of the potential bighorn sheep winter range in the analysis area, 21% and 4% on escape habitat and 12% and 3% on general foraging habitat. Five acres of harvest and 1622 acres of burning are proposed within the known Ten Lakes herd home range in Alternative 1, and fewer acres (0 acres of harvest/421 acres of burning) in Alternative 3. On a Forest-wide level, the maximum alternative (Alternative 1) to known bighorn sheep habitat (90,880 ac) would result in 2% of the forest-wide habitat being altered to benefit sheep. These treatments to the Ten Lakes sheep habitat help move the habitat in a positive trend and address the stressor of fire/fire exclusion in a positive way.

Salvage of incidental mortality from underburning harvested or underburn units may occur in both alternatives on no more than 20 acres/year for no more than 200 acres. This salvage is subject to a number of conditions (page 14 of FEIS) and would occur within or adjacent to treatment areas. Effects to sheep would be similar to the effects shown for the original unit this salvage would occur in or adjacent to, as described above.

Although activity on proposed harvest units could occur during the winter months, no harvest is proposed on the Woods Ranch WMA where the Ten Lakes herd's primary winter range is found. There is low potential to disturb bighorn sheep on the remaining mapped winter habitat as these areas are outside of the known Ten Lakes herd home range, and therefore any winter harvest located on these areas would be consistent with FW-GDL-WL-08 and FW-GDL-WL-09. The prescribed burns in both alternatives are expected to occur in the spring of the year. Alternative 1 would propose a prescribed burn located in lambing habitat on Therriault Pass, with incorporated design criteria that requires summer/fall burning to avoid disturbance during the spring lambing period. There is the potential for a short term disturbance to the isolated burn units to sheep using

this area during the burn and shortly after, however the long term benefits to the habitat outweigh the short-term disturbance in these small areas. No proposed harvest or burns are located between the bighorn home range area and private land. No bighorn sheep use has been reported in the lower elevations on FS lands that are not adjacent to the Woods Ranch. The harvest and burns adjacent to private land are not expected to attract bighorn sheep because of the distance from the areas they currently use.

Domestic sheep/goats on non-NFS lands

The Galton Vegetation project does not propose any range allotments for domestic sheep or goats on NFS lands. No change to the existing condition would occur. Therefore, the Galton Vegetation Project would have no direct or indirect effects related to the increased potential for the interaction of bighorn sheep and domestic sheep or goats or risk of transfer of epizootic diseases such as pneumonia. Potential interaction between bighorn sheep located on the state owned Woods Ranch and domestic sheep/goats located on private land within one air mile of the Woods ranch is possible. However the Woods Ranch WMA is adjacent to but outside of the analysis area and is outside of Forest Service jurisdiction and therefore would be addressed by State of MT personnel.

Cattle grazing allotments on NFS lands

The project would have no direct or indirect to the existing management of the Graves Creek cattle allotment.

Habitat management strategies specific to Ten Lakes herd

Under the project, there are several proposed prescribed burn treatments within the Ten Lakes herd home range and within the vicinity of the Woods Ranch WMA. Additionally this project would allow for continued management of noxious weeds on NFS lands adjacent to the WMA. The Galton Vegetation Project would contribute to the specific objectives and management strategies for the Ten Lakes herd as specified by MFWP 2010. This project does not include any new trails, recreation facilities or new motorized or non-motorized routes that would increase or lead to the disturbance or displacement of sheep.

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 Ten Lakes herd home range area located within the analysis area, which is the same as described for the indirect and direct effects analysis under the section “Affected Environment”. Although only a portion of the home range of the Ten Lakes herd is located within the analysis area, effects to sheep or their habitat in one part of their range may influence habitat suitability and use throughout their range. Therefore, cumulative effects are discussed at both the portion of the herd’s home range located within the analysis area, and the entire analysis area. Similarly, temporal boundaries for the cumulative effects analysis would be the same as for the direct and indirect effects.

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

Past Actions

Past management actions, in the general area, especially within or adjacent to the known home range of the Ten Lakes bighorn sheep herd have been both beneficial and harmful to bighorn sheep. While past trail construction has exposed the sheep to humans and any accompanying dogs, vegetation management has increased foraging opportunities for sheep. Conversely, years of active fire suppression have not benefited the sheep by allowing conifers to encroach, not only on winter range, but also on to escape habitat, in general degrading the habitat. Likely the greatest benefits to the local herd were the acquisition of the Woods Ranch (which serves as the main winter range) by the State of Montana and years of noxious weed control.

Alternative 2 – No Action

The No Action Alternative does not directly contribute any cumulative effects to bighorn sheep or their habitat based on the lack of action. The majority of the key habitat areas are located outside the Galton analysis area. The primary risk factor for bighorns is all-age epizootic dieoffs, generally associated with interactions with domestic sheep. Existing forest activities would not change the level of exposure to the bighorn sheep herds. Although effective fire suppression has contributed to the reduction of foraging habitat for bighorn sheep; the 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.

Alternatives 1 and 3 – 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. Those current and foreseeable actions in the project area that were determined to be appropriate for inclusion in the analysis of environmental effects are listed at the beginning of Chapter 3.

Effects on the existing condition anticipated from implementing Alternatives 1 and 3 would be low to moderate due to the limited amount of treatment units actually within the Ten Lakes bighorn sheep home range (please see previously disclosed calculations).The proposed harvest and burn treatments on or adjacent to known bighorn sheep habitat will be largely beneficial and assist in maintaining the Ten Lakes herd. Additionally, the remaining vegetation treatments outside of the home range may serve to shift other foraging ungulates into other areas and decrease foraging competition in the immediate area.

Ongoing federal actions have been included as part of the existing condition of this project area. They include approximately 40 acres of prescribed burns per year, approximately 90 acres of pile burning with the Little Feet project, approximately 200 acres/year of pre-commercial thinning, and approximately 50 acres/year of tree planting.

The Forestwide Young Growth Vegetation Management project would treat approximately 400 to 600 acres annually, dependent on funding, using precommercial thinning or commercial thinning treatments. Stands proposed for treatment are second growth stands and would be subject to a number of criteria before they were determined eligible for treatment. The Forestwide Young Growth Vegetation Management project would be expected to increase potential foraging opportunities for bighorn sheep if projects occurred within their home range. It is unlikely that these projects would occur at the elevations where sheep are most likely to occur within the project area.

The Ten Lakes Travel Management Project will address over-snow and mechanized travel planning for the Ten Lakes area. The area affected by the proposal includes the Ten Lakes WSA and areas with common entrance points to the WSA. There are three main over-snow entrance points to the Ten Lakes WSA: the Grave Creek corridor; Clarence and Stahl Creek; and the Burma/Blacktail area. Over-snow travel is currently not limited. Mechanized use (primarily mountain bicycles) is also unrestricted. The alternatives contained in the Ten Lakes Travel Management Draft Environmental Impact Statement contain various amounts of over-snow and mechanized travel for the project area. A final decision has not been made for this project and the cumulative effects analysis utilizes the Proposed Action as the basis for the analysis in the Galton Vegetation Management Project.

The Ten Lakes Travel Management Project proposed action limits over-snow use both spatially and temporally from the existing condition, and spatially limits mechanized use, which would decrease potential affects to sheep even further from the existing condition. The proposed action limits over snow use in the spring, which could further reduce any potential affects to lambing habitat. The Forest Service does not control over-snow activities on the state-owned Woods Ranch, which is the current winter range used for bighorn sheep. As the proposed 10 Lakes project reduces over-snow use, any future bighorn sheep use of USFS lands adjacent to the Woods Ranch, would benefit from the spatial and temporal limits of proposed over-snow use in this area. Therefore, the cumulative effects of the Ten Lakes Travel Management Project in conjunction with past, present, reasonably foreseeable actions would result in fewer effects to bighorn sheep due to fewer projected effects from the Ten Lakes Travel Management Project.

The district has a large noxious weed program that will continue to operate within the project area. Efforts to treat present infestations of noxious weeds and to eradicate infestations of new invaders are ongoing. Most herbicide treatments are conducted along existing roads; a few treatments occur in timber harvest units. All activities will comply with the Kootenai National Forest Invasive Plant Management ROD (2007). This noxious weed management program will help to maintain habitat in the planning area.

Past timber harvest, fuels reduction, and fire suppression have potentially impacted the pattern of bighorn habitat on the Forest. Fire suppression in particular may have led to encroachment of conifers into bighorn foraging habitat or caused increased tree densities in previously open-canopied stands. Vegetative conditions, under both action alternatives, would be maintained or improved for bighorn sheep in the long-term. Weed treatment activities would not lead to any adverse effects on bighorn sheep or its habitat because treatments isolate non-beneficial weed species and would actually benefit forage (USDA Forest Service 1997, 30).

The cattle grazing allotment located in Graves Creek is located in an area that has no past or current bighorn sheep use, and therefore this cattle grazing would not affect or displace the Ten Lakes bighorn sheep herd. Approximately 100 cow/calf pairs are currently permitted to graze on the Grave Creek Allotment from May 15 to September 30. This allotment lies in lower elevations and is outside known use areas of this sheep herd, and is not expected to affect sheep habitat. This level of use is not expected to increase within the next ten years.

Routine road maintenance will continue to occur in the project area. Administrative use in the project area will be ongoing. Use is associated with road maintenance, permit administration, noxious weed control, data collection, monitoring, and general administration of public lands. Road use will follow Forest and/or District policies. Approximately 159 miles of trail are maintained each year within the project area. Routine trail maintenance activities may include brushing; removing blowdown, debris, and hazard trees; repairing or adding waterbars, repairing

treads; and repairing or replacing signs. These activities are spread across the district spatially and do not occur frequently within the Ten Lakes sheep herd home range.

There are 26 special use permits including road access to private property. In addition, general public recreational use of the project area is expected to include but is not limited to hiking, camping, fishing, hunting, photography, berry picking, other forest product gathering, Christmas tree cutting, firewood gathering, driving for pleasure, mountain biking, sightseeing, wildlife viewing, cross country skiing, snowshoeing, trapping and snowmobiling. Recreation is likely to increase on all land ownership types, if for no other reason than human population growth. This would increase human disturbance and potentially impact bighorn sheep on all ownerships.

Climate change could have effects on bighorn sheep at a forest level and are discussed in the KNF FEIS on page 272: "If the climate becomes warmer, it will favor the vegetation conditions that bighorn prefer (open or dry forest habitats). Unfortunately, fire suppression has led to increased stand densities and ladder fuels. Active restoration may be useful to move towards the desired conditions for vegetation and historic conditions, making these stands more resilient and able to handle disturbance. The use of fire for restoration is the most useful tool rather than mechanical treatments due to the large acreages that can be improved or maintained with fire relatively cheaply. Changes in the snowpack may cause a change in bighorn use of winter range (USDA, 2010b in KNF FEIS,2013).

The ability of the Galton Vegetation Project to meet or contribute to the specific management strategies for the Ten Lakes bighorn sheep herd are paraphrased below:

1. Cooperative work between USFS and MFWP in habitat needs/improvements (Obj., Strategy): The Forest Service and State of Montana have worked cooperatively on habitat enhancement burns on the Woods Ranch WMA in the past. Under the two action alternatives, there are several proposed prescribe burn treatment units within the Ten Lakes herd home range and within the vicinity of the WMA. Additionally, this project would allow for continued management of noxious weeds on NFS lands adjacent to the WMA. Any additional habitat enhancements within the Woods Ranch WMA would require some type of cooperative agreement between the two agencies.

2. Maintain/develop cooperative relationships with domestic sheep owners including double fencing (Obj., Strategy): Direct management of bighorn sheep and potential risk from domestic sheep or goats beyond NFS grazing allotments are outside of Forest Service jurisdiction and must be addressed by State of Montana personnel. However, fencing opportunities on NFS lands that may contribute to the control of domestic sheep and goats may exist and could be explored via a cooperative agreement if the need and opportunity were to exist.

3. Maintain high quality habitat (winter range) on Woods Ranch WMA (aggressive management of weeds and grazing) (Obj., Strategy): These opportunities may exists and were addressed under element 1, above.

4. Continuance of cooperative relations with land trust organizations to assist in protecting private lands adjacent to USFS sheep habitat (Strategy): While this strategy is outside the scope of the Galton Project, there may be areas adjacent to the Ten Lakes sheep home range that have this need and could be identified as such.

Regulatory Framework Findings

Forest Plan

The 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, and goals, desired conditions, objectives, standards, and guidelines can be found on the noted pages in the Forest Plan.

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 better approximation of stand patch size and species composition, 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. 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 "Habitat Quality and winter range/lambing habitat". The project would contribute toward GOAL-WL-02.*

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 on the Woods Ranch WMA where winter and lambing habitat for the Ten Lakes herd is located. Although timber harvest units are located in modeled winter range outside of this area, no bighorn sheep occur in these areas and potential to disturb sheep if harvest occurred in the winter is low. Design criteria in the form of timing restriction was incorporated into Unit 71 of Alternative 1 which proposes prescribed burning on lambing habitat located near Therriault Pass. No other timing restrictions were necessary and the project would be designed in accordance with FW-DC-WL-01*

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 Tobacco Valley 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 analysis 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 project would contribute to progress toward FW-DC-WL-16.*

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 Ten Lake herd range on NFS lands, as well as on other model identified potential bighorn sheep habitat in the analysis area. See "Improved Forage Opportunities." Therefore, the project would contribute to progress toward FW-DC-WL-17.*

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 timber harvest would trend stands towards desired vegetative conditions and would result in the creation of early seral or more open habitat on approximately 582 acres of winter range and 46 acres of foraging habitat in both Alternative 1 and Alternative 3, while prescribed fire would be used to return fire's role to the landscape on approximately 6,106 acres to 1,390 acres on mapped sheep habitat within the analysis area. 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 Ten Lakes herd range and across mapped potential habitat in the analysis area. Therefore, the project would contribute to progress toward FW-DC-WL-19.*

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. *Both action alternatives help meet this objective with proposed prescribed burn acres within theTen Lakes bighorn sheep home range and across potential mapped habitat within the analysis area. The project is consistent with FW-OBJ-WL-01.*

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. *No disturbance to the bighorn sheep winter range on the Woods Ranch WMA is planned with the action alternatives. Winter range for this herd is found only on state land on the Woods Ranch WMA, and no activities are planned in this area. Timber harvest on other mapped winter ranges may occur during the winter, but as these areas are outside of the Ten Lake herd home range disturbance is not expected. Please see "Existing Condition" and "Direct and Indirect Effects" discussion. The project would be designed in exact accordance with FW-GDL-WL-08.*

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. *See FW-GDL-WL-08 above and "Habitat Quality and Winter Range/Lambing Habitat." The project is designed in accordance with this guideline.*

FW-GDL-WL-11: Big Game: Management activities should avoid or minimize disturbance to native ungulates during the birthing/parturition period. *No activities are planned in known winter/lambing habitat located on the Woods Ranch WMA. See FW-GDL-WL-08. Alternative 1 incorporates a timing restriction to avoid prescribed burning in lambing habitat located near Therriault Pass. See "Design Criteria" discussion. The project is designed in accordance with with FW-GDL-WL-11.*

GA-DC-WL-TOB-01: Low levels of human disturbance allows …..and for summer use by big game in the Ten Lakes, Thompson Seton, and Marston Face areas. *Timber harvest and prescribed burning activities within the Ten Lakes bighorn sheep herd home range would not inhibit summer use by sheep or other big game species. Prescribed burning would occur in the spring while silvicultural treatment would consist of vista enhancement along an open existing road. The project contributes to meeting GA-DC-WL-TOB-01.*

GA-DC-WL-TOB-05: Wildlife move to and from the border with Canada. *The prescribed burning proposed within the Ten Lakes bighorn sheep herd home range would create or maintain*

early seral, open habitat conditions and bighorn sheep movement would be facilitated within the Ten Lake herd range on NFS lands adjacent to the border with Canada. The project contributes towards meeting GA-DC-WL-TOB-05.

GA-DC-WL-TOB-06: Habitat conditions for bighorn sheep (Ten Lakes herd) are retained or enhanced. *The proposed prescribed burn activities within the Ten Lake bighorn herd home range enhance and maintain early seral open habitat conditions, improving both foraging habitat and escape habitat. The project contributes towards GA-DC-WL-TOB-06.*

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 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. The project contributes or is neutral towards meeting identified management strategies and objectives for the Ten Lakes bighorn sheep herd. Please see the "Environmental Consequences" and "Cumulative Effects" discussions.

Statement of Findings

Alternative 2 (No Action), due to its lack of action, will have no impact on individual sheep or their habitat. The No Action Alternative would not impact sheep on winter range or lambing habitats and would maintain the existing condition of foraging habitat.

Action Alternatives 1 and 3 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 bighorn sheep. This determination is based on: 1) the limited amount of prescribed burning within the Ten Lakes sheep herd home range may cause short-term disturbance to animals using the area; 2) the beneficial effects of vegetation management both within the home range and the Galton Analysis Area; 3) prescribed burning would improve connectivity to other open habitat within the sheep range; 4) no activities or potential for disturbance to sheep on winter range located on the Woods Ranch WMA within the known home range of the Ten Lakes herd, 5) no increased potential for interaction with domestic sheep or goats that could introduce zoonotic diseases, 6) continued monitoring and control of noxious weeds in the area; and 7) implementation, as applicable to NFS, of the management strategies for the Ten Lakes herd.

Other Agencies and Individuals Consulted

Communication occurred with Tim Their, MFWP wildlife biologist to discuss type of proposed activities within the Ten Lakes herd home range.

Black-Backed Woodpecker

Summary of Conclusions

Implementation of the Galton Vegetation Project proposed 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 of black-backed woodpecker. This determination is based on the fact that: 1) the project would not involve the removal of high-quality habitat as defined in the following analysis; 2) and both high quality habitat due to recent wildfires and general forest habitat would be available to maintain the black-backed woodpecker populations; and 3) associated prescribed burn activities may produce small isolated pockets of high quality habitat for this species; and 4) a low potential for disturbance during activities within general forest habitat.

Introduction

Wisdom et al. (2000) identify source habitats for black-backed woodpeckers as late-seral multi and single layered stages of the subalpine, montane, and lower montane communities. They have a preference for dead and decaying trees for perching and foraging, and are highly associated with recent burns. Stand replacing large burns and other beetle infested stands provide high concentrations of prey (wood boring beetles) for black-backed woodpeckers (Wisdom et al. 2000).

Black-backed woodpecker populations are highly responsive to forest fire and other processes, such as spruce budworm outbreaks, that result in high concentrations of wood boring insects invading dead trees. Local and regional irruptions and range extensions have been observed in response to burns and wood borer outbreaks (Yunick 1985). In Montana, habitat includes early successional, burned forest of mixed conifer, lodgepole pine, Douglas-fir and spruce-fir (Hutto 1995) although they are more numerous in lower elevation Douglas-fir and pine forest habitats than in higher subalpine spruce forest habitats (Bock and Bock 1974). Two post-fire factors appear to be necessary for the black-backed woodpecker; nests found were in snags that had evidence of decay before the fire and a healthy number of snags before a fire is important. Black-backed woodpeckers nest in live and dead trees of various species and often excavate a nest in sapwood, which decays more quickly than heartwood (Dixon and Saab 2000).

The bulk of the diet of black-backed woodpeckers is wood-boring beetle larvae (including Monochamus spp. and Engelmann spruce beetle, Dendroctonus englamanni), but they also feed on other insects (e.g., weevils, beetles, spiders, ants) (Cherry 1997). To provide plenty of wood-boring beetle grubs to feed their young dead trees have to be plentiful and clumped close together. When suitable burned trees are not available, black-backed woodpeckers disperse and must rely on stands of insect ridden trees for survival generally in late seral forests and riparian woodlands (Wisdom et al. 2000).

Regulatory Framework

Forest Plan

The 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 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 two to three years following the fire then begins to decline as tree moisture content decreases and wood borer larvae decline (Bonn et al. 2007). Cherry (2007) found black-backed woodpeckers remained for several years (3 to 5) before leaving due to prey source decline. Fire-killed trees generally do not provide insect food sources beyond five to seven 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. More recent research indicates that natal dispersal is the primary means by which black-backed woodpeckers colonize recently burned areas in western forests, and that decline of populations six to ten years after fire likely reflects the lifespan of individual birds that colonized the burned area, or of offspring that they produced in the early post-fire years as breeding dispersal is uncommon (Siegel et al. 2016). 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 Sensitive Species T & E Species Table 6). 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.

Sensitive Species Table 6. 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	Forest Plan FW-DC-WL-14 and FW-GDL-WL-05

Methodology

Black-backed woodpecker habitat was identified using GIS layers on past fire events, forest type, stand age/size, and Forest fire history summaries (including those from the NRCC 2007-2015, see project file). High quality habitat was considered to occur for the first eight years post-fire (mixed lethal or stand replacement where an abundance of snags are available (as documented by research and discussed under Resource Measures and Indicator' section above). 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 approximately 175 acres whereas territories found within low quality habitat could be as large as 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), Dixon and Saab (2000), 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 occurrence data comes from recent District wildlife observation records and Forest historical data (NRIS Wildlife).

Affected Environment

Spatial and Temporal Context for Effects Analysis

The analysis boundary for direct effects to individuals and their habitat is the Galton Vegetation Project 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 analysis area. The analysis area is an appropriate effects analysis area because it is large enough to be representative of the effects of natural and prescribed fire, natural tree mortality, timber harvest, thinning, roads and road management across the landscape. The availability of high quality habitat here would influence black-backed woodpecker occurrence and population level, and as such, 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.

Existing Condition

Introduction

Across the Forest Service Northern Region, the black-backed woodpecker is considered secure in terms of persistence (Samson 2006, 2006a). 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 with the creation of high quality burned habitat. 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 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 analysis area are limited to two known observations, one from 2001 of a single individual feeding on burnt trees just west of Rattlebone Lake, and another observation in 2008 of a single transient individual on the northwest shore of Dickey Lake. These limited observations of the species in the analysis area likely reflect not only the availability of burned areas, and those areas accessible by humans, but also the ability to identify the species in the field. No active black-backed woodpecker nest sites have documented within the analysis area. Other recent (past 6 years) sightings of the black-backed woodpecker within primary habitat occurred in the Camp 32 Wildfire area of 2005, which is outside the analysis area.

Description of the Analysis Area

Burned Forest Habitat

Up until the summer of 2015, the most recent fire within the analysis area was the Gibralter Ridge fire in 2005 consisting of 23 acres. Over ten years has passed since this fire created high quality habitat sought after by the woodpeckers. During 2015, the Marston and Barnaby fires burned within the project area (comprised of all five planning subunits Ksanka, Wigwam, Grave, Murphy, and a portion of the Stillwater). The Marston Fire burned approximately 7,557 acres with 7,367 acres located on NFS lands (6,410 acres in the Murphy PSU, 958 acres in the Stillwater PSU), and 189 acres are located on the adjacent Stillwater State Forest. The Barnaby fire reached 56 acres in size on NFS lands, with all acreage located in the Murphy PSU. The biophysical setting varies dramatically due to the size of the fire. Low to mid elevation areas on the Marston face are composed of warm/dry forest types, consisting primarily of ponderosa pine and Douglas-fir. North aspects in the Deep creek, Laughing Water, and Sink creek drainages are composed of warm/moist western larch, western red cedar, grand fir, and Douglas-fir stands. Higher elevation stands transition to subalpine fir, lodge pole, spruce, and whitebark pine.

Fire history in this area shows fires of similar scale. Between 1910 and 1920 there were multiple fires in the vicinity that ranged from 600-5000 acres. Another large fire burned on both the Stillwater State Forest and the Kootenai National Forest between 1920 and 1930. The Marston fire burned into several of these historic fires.

No salvage is planned on the NFS lands burned by the Marston Fire or the Barnaby Fire. The acres that experienced high mortality are inaccessible due to either grizzly bear core, Inventoried Roadless Areas, or not accessible by existing road, and the high quality habitat for black-backed woodpeckers would remain. See the Forest Vegetation and Fire section for discussion of fire severity within the Marston and Barnaby fires.

General Forest Habitat

In the analysis area, black-backed woodpecker habitat consists primarily of lower quality general forest habitat with small scattered patches of snags produced by insects, disease, and blowdown. Of the 127,380 acres of NFS administered lands within the analysis area, there are approximately 126,545 acres of general forested habitat. This forested habitat has been classified into biophysical settings, with 20,319 acres of warm/dry, 5,296 acres of warm/moist, and 100,933 acres of subalpine. Out of this total there are 19,065 acres of old growth. 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. Old growth also provides habitat for endemic populations. See the Forest Vegetation analysis for more details regarding the existing vegetative condition of the analysis 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.

Sensitive Species Table 7. Resource Indicators and Measures for the Existing Condition

Resource Element	Resource Indicator	Measure	Existing Condition and the No Action, Alternative 2
Burned Forest Habitat	Reduction of early post-fire, burned forest habitat	Acres removed	7,342 NFS acres available, none removed

Environmental Consequences

Alternative 2 – No Action

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 snags produced by disturbances. Effective old growth stands would continue to provide low quality foraging. The 7,342 acres of burned habitat created by the Marston Fire and Barnaby Fires would continue to provide high quality foraging habitat for black-backed woodpeckers. Local populations would experience an immediate increase as bark beetles increased, lasting three to five years, until beetle populations decline. Depending on secondary mortality, foraging opportunities could continue for up to eight years. In other areas, the potential for stand-replacing fires escaping initial attack would continue to increase as fuel levels increased. If additional wildfires were to occur, high quality black-backed woodpecker habitat would be created, and conditions would benefit this species. 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 analysis area while burned areas recovered.

Alternatives 1 and 3 – 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

No salvage or harvest of high quality habitat created by 2015 wildfires is proposed. Salvage of incidental mortality from prescribed underburning may occur on some units located outside of the Wilderness Study Area or any Inventoried Roadless Area or old growth designations, but design criteria would ensure adequate levels and distribution of snags and coarse woody debris would remain in the analysis 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 during the proposed harvest and vegetation management activities would be low. Also, there are no known active nests within the analysis 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

No harvest would occur within the high quality burned habitats (see Sensitive Species Table 8) created by the Marston or Barnaby fires in 2015 under 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.

Sensitive Species Table 8. Resource Indicators and Measures for Action Alternatives 1 and 3

Resource Element	Measure	Alt 1	Alt 3	Comments
Burned Forest Habitat	Acres removed (% of total)	0	0	No activities would occur within high quality habitat created by the Marston and Barnaby fires within the analysis area.

As discussed under the existing condition, wildfires occurred in the analysis area in 2015, as well as across the KNF where a total of approximately 32,724 acres were burned. This is about 24,917 acres more than what was reported in the previous 8 years combined. This increase in fire activity is consistent with the activity expected in Bonn et al. 2007 and the ERG Report 2012, and would result in habitat conditions benefiting black-backed woodpeckers across the KNF.

General Forest Habitat

This species demonstrates a high preference for early post-fire forests which are available and which are not affected by the proposed activities by either action alternative. Outside of these high quality burned areas, black-backed woodpeckers will utilize a variety of forested habitats if it provides snags and areas of large coarse woody debris for nesting and/or foraging (see Cavity Habitat and Down Wood Habitat sections).

Proposed activities for Alternatives 1 and 3 have the potential to remove or reduce low quality habitat foraging opportunities, and at the same time, create foraging habitat during post-harvest burning activities. Regeneration harvest would remove general opportunities, leaving a minimum number of wildlife trees available for foraging. Regeneration harvest almost always includes underburning, and with heavier slash, has potential to kill trees left on site. Overall, a larger amount of low-quality habitat would be replaced with a smaller amount of higher-quality habitat. Commercial thinning would leave a number of trees on site for general foraging opportunities. Underburning in these stands would create more potential for black-backed woodpecker foraging habitat than regeneration harvest. Commercial thinning with underburning and stands with underburning-only would be most similar to historical conditions created by mixed-severity fires, and could provide high-quality black-backed habitat for 2-3 years, then declining and rarely providing insect food sources beyond 5-7 years (Murphy and Lehnhausen 1998).

Proposed harvest would occur on approximately 1,778 (Alternative 1) acres to 1,850 acres (Alternative 3). In addition, implementation of prescribed fire (post-harvest underburns or ecosystem burns with no harvest) would create habitat with some potential for use by black-backed woodpeckers. Approximately 8,231 acres to 1,996 acres of fuel treatments are proposed, depending upon the alternative. Sensitive Species Table 9 displays the acres of harvest, post-harvest underburning, and prescribed fire occurring within old growth and 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 analysis area.

Sensitive Species Table 9. Proposed treatment in low quality foraging habitat (Old growth/General Forest

Treatment	Alternative 1(acres)OG acres/Total Acres	Alternative 2(acres)	Alternative 3(acres) OG acres/Total Acres
Regeneration Harvest	0/359	0	0/334
Intermediate Harvest Acres (i.e. Improvement Cut/Commercial Thin)	0/1,419	0	11/1,516
Fuel Treatment (i.e. Mechanical Pretreatment/ Understory Thin) Acres	74/302	0	71/314
Prescribed Fire Ecosystem burn	969/7,929	0	422/1,682

Mechanical pretreatment in low quality foraging habitat (old growth) is prescribed in 74 and 71 acres in Alternatives 1 and 3 (respectively). Except for the commercial thin unit proposed in Alternative 3 (11 acres), the focus of these harvest treatments is within the dry site cover types and south and west facing slopes and are designed to thin the understory and favor large diameter trees and to retain the old growth characteristics of snags and down woody habitat within these stands. The 11 acres of commercial thin proposed however is within a subalpine biophysical setting that would not enhance the old growth characteristics (please see the Old Growth section). All of the 19,065 acres of lower-quality black-backed woodpecker foraging habitat (old growth) are expected to remain following implementation of all action alternatives, although there is an inherent risk to using prescribed fire. Any pockets of mortality resulting from the prescribed burning in old growth (969 acres in Alternative 1 and 422 acres in Alternative 3) would improve foraging habitat potential for black-backed woodpeckers. When all proposed fuel treatments are considered in both old growth and general forest habitat, Alternative 1 would treat a total of 8,231 acres, and Alternative 3 would treat a total of 1,996 acres that may create isolated, small pockets of high quality black-backed woodpecker foraging habitat if tree stress or mortality occurred during or following the prescribed burns. As discussed above, salvage of incidental mortality from underburning may occur on a limited basis, but salvaging would not occur within old growth stands. On a Forest-wide level, there would be no reduction in the quantity of either lower-quality foraging habitat in the form of old growth or high-quality foraging habitat in the form of the recent 2015 wildfires. No effects on distribution of habitat needed for viable populations of black-backed woodpeckers in the analysis area or the Forest would occur.

Salvage of incidental mortality from prescribed underburning may occur on some units, but design criteria would ensure adequate levels and distribution of snags and coarse woody debris would remain in the analysis area. The Forestwide desired condition (FW-DC-VEG-07) and guidelines (FW-GDL-VEG-04 and FW-GDL-VEG-05) provide guidance for snag retention. Any snags felled for safety reasons would be left on site (C2.303#). No more than 20 acres a year would be salvaged, for a total of 200 acres for the planning period. Please see Chapter 3, and the Cavity Habitat and Down Wood Habitat sections).

Cumulative Effects

The Existing Condition section describes the potential black-backed woodpecker habitat within the analysis 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 analysis 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. Due to recent wildfires in 2015, high quality burned habitat for black-backed woodpeckers exists within the analysis area and across the KNF. In addition 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 analysis 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 analysis area that would cumulatively contribute negative effects to black-backed woodpecker habitat or use within the analysis 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.

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

Past Actions

Past and present actions, including wildfire suppression, have resulted in measurable cumulative impacts to black-backed woodpeckers and their habitat. These impacts have largely been in the form of either removal of prime nesting/foraging habitat via fire salvage, harvesting of old growth forest considered low-quality habitat, or unintentionally affecting potential habitat via wildfire suppression.

Of the total 6,489 acres of burned forest habitat located on NFS lands within the analysis area no salvage harvest is proposed, and no salvage is proposed on the 958 acres of burned forest on NFS lands located in the adjacent Stillwater planning subunit. Salvage potentially could occur on the 189 acres burned by the Marston Fire located on the Stillwater State Forest. Suitable high quality foraging habitat would remain on NFS lands. For discussion of lower quality foraging habitat in the form of old growth stands, please refer to the Old Growth resource section for further discussion of potential cumulative effects on black-backed woodpeckers.

Detailed descriptions of previous vegetation management activities are found at the beginning of Chapter 3. 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 the Forest Plan provides desired conditions and guidelines to maintained burned forest habitat for associated species.

Alternatives 1 and 3 – On-going and Reasonably Foreseeable Actions

Implementation of Alternatives 1 or 3 would not alter the amount of mature forest stands within the analysis area that may contain diseased trees suitable for black-backed woodpecker foraging and nesting. The stands proposed for treatment with timber harvest are not expected to change the level of snags or down woody habitat available within the analysis area. Proposed prescribed burning would likely result in small isolated pockets of high-quality habitat as a direct result from site preparation activities, with a limited amount of salvage of incidental mortality expected. No salvage would occur in old growth stands

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. Those current and foreseeable actions in the project area that were determined to be appropriate for inclusion in the analysis of environmental effects are listed at the beginning of Chapter 3.

Ongoing federal actions have been included as part of the existing condition of this project area. They include approximately 40 acres of prescribed burns per year, approximately 90 acres of pile burning with the Little Feet project, approximately 200 acres/year of pre-commercial thinning, and approximately 50 acres/year of tree planting. Vegetative conditions, under both action alternatives, would be maintained or improved for black-backed woodpecker in the long-term. Prescribed burns would be expected to create isolated pockets of high quality habitat.

The Forestwide Young Growth Vegetation Management project would treat approximately 400 to 600 acres annually, dependent on funding, using precommercial thinning or commercial thinning treatments. Stands proposed for treatment are second growth stands and would be subject to a number of criteria before they were determined eligible for treatment. The Forestwide Young Growth Vegetation Management project would have the same effects on black-backed woodpeckers as the effects described for precommercial thinning (above), and are not expected to change the level of snags or down woody habitat available within the analysis area.

The Ten Lakes Travel Management Project will address over-snow and mechanized travel planning for the Ten Lakes area. The area affected by the proposal includes the Ten Lakes WSA and areas with common entrance points to the WSA. There are three main over-snow entrance points to the Ten Lakes WSA: the Grave Creek corridor; Clarence and Stahl Creek; and the Burma/Blacktail area. Over-snow travel is currently not limited. Mechanized use (primarily mountain bicycles) is also unrestricted. The alternatives contained in the Ten Lakes Travel Management Draft Environmental Impact Statement contain various amounts of over-snow and mechanized travel for the project area. A final decision has not been made for this project and the cumulative effects analysis utilizes the Proposed Action as the basis for the analysis in the Galton Vegetation Management Project. This project does not propose any harvest or activities that would affect black-backed woodpecker habitat (see “Resource Indicators and Measures” section) and existing over-snow and mechanized use are not currently affecting this habitat. The cumulative effects of the Ten Lakes Travel Management Project in conjunction with past, present, reasonably foreseeable actions would not result in further effects to the black-backed woodpecker or its habitat.

There are 26 special use permits including road access to private property. In addition, general public recreational use of the analysis area is expected to include but is not limited to hiking, camping, fishing, hunting, photography, berry picking, other forest product gathering, Christmas tree cutting, firewood gathering, driving for pleasure, mountain biking, sightseeing, wildlife viewing. Of these activities, firewood harvesting would affect the black-backed woodpecker by

reducing snags adjacent to 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 analysis area.

Climate change could have effects on black-backed woodpecker at a forest level and are discussed in the KNF FEIS on page 280: "Climate change could impact the amount and distribution of black-backed woodpecker habitat on the Forest. Combined with past fire suppression, climate change may lead to an increase in black-backed woodpecker habitat. This is because of the increased susceptibility to large-scale disturbance as more of the forest moves outside of historic conditions." The black-backed woodpecker is a highly mobile species, and as such are able to respond better to climate change (page 91 in USDA 2010, in KNF FEIS, 2013). Where necessary, habitat resilience can be increased through active management, which can maintain robust growth and reproduction of native plants to mitigate the impacts of drought, heat stress and other climate-related effects (King and Finch, 2013). This supports KNF FEIS vegetation management desired conditions calling for treating stands to restore them nearer to historic conditions. An overall discussion on how climate change can affect birds can be found in "The Effects of Climate Change on Terrestrial Birds of North America"

The existing condition provides abundant general forest habitat for black-backed woodpeckers, along with the high-quality burned habitat created by wildfires in 2015. Proposed vegetation management activities would not reduce the availability of this existing wildfire burned forest habitat. Based on the nature and magnitude of potential cumulative effects to black-backed woodpecker independent of this project, there are no cumulative effects anticipated that would change the effects determination to the black-backed woodpecker from implementation of the action alternatives.

Regulatory Framework Findings

Forest Plan

The 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, and goals, desired conditions, objectives, standards, and guidelines can be found on the noted pages in the Forest Plan.

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. *No activities would occur within high quality burned forest habitat created by 2015 wildfires 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). Due to the large size of a pair's home range within general forest habitat the potential to encounter a black-backed woodpecker at any given time during the proposed action alternative activities would be low. 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 and Mitigation Measures." Therefore, the Galton Vegetation project would contribute to progress toward achieving GOAL-WL-02.*

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 analysis 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. See "Black-Backed Woodpecker Occurrence" and "Project Design Features and Mitigation Measures." Therefore, the Galton Vegetation project would be neutral with regard to progress toward achieving FW-DC-WL-01.*

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. *High quality burned forest habitat created in 2015 is found within the analysis 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 Galton Vegetation project would contribute to progress toward achieving FW-DC-WL-14.*

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.). *High quality burned habitat created by wildfires during 2105 is found within the analysis area and these acres would not be impacted by proposed activities. See "Burned Forest Habitat." Therefore, the Galton Vegetation project would contribute to progress toward achieving FW-GDL-WL-05.*

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. *No activity is proposed in high quality burned habitat created by wildfires in 2015, and potential to disturb an individual woodpecker in general forest habitat is low. There are no known active nests within the analysis 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. See "Black-Backed Woodpecker Occurrence" and "Project Design Features and Mitigation Measures." Therefore, the Galton Vegetation project was designed in accordance with this guideline.*

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 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 2 would have no impact on black-backed woodpeckers or their habitat. This determination is based on the lack of action.

Alternatives 1 and 3 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. This determination is based on the fact that: 1) no high quality habitat as previously defined would be reduced; 2) the small amount of general forest or old growth habitat treated, including the potential reduction of individual nest trees or localized patches of disease and; 3) the potential for disturbance during activities is low; 4) associated prescribed burn activities may produce small isolated pockets of high-quality habitat; 5) wildfires have and would continue to occur over-time and provide areas of high quality habitat despite fire suppression activities, and 6) potential disturbance effects would be to individuals or pairs and would not be expected to adversely affect the black-backed woodpecker population within the analysis area.

Common Loon

Summary of Conclusions

Alternative 2 would have no impact on common loons or their habitat. This determination is based on the lack of action.

The proposed action Alternatives 1 and 3 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 common loon. In summary, the proposed activities are not near known or historical nesting habitat so there would be no degradation of habitat. In addition, education and closure areas which mitigate for human activity have allowed resident loons to nest successfully despite human activity.

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 10 hectares (about 25 acres) and at least 6 meters (about 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 are extremely sensitive to disturbances, particularly during the nesting season.

Key stressors (risks and threats) that may cause mortality, nest abandonment, or displacement affecting Common Loons are habitat loss and/or degradation on both breeding and wintering grounds. Major threats to loons are disturbances to nesting pairs caused by recreational activities, habitat loss due to shoreline development, and water pollution (Evers 2004, NatureServe 2011, PIF 2000). Human recreational use of nesting and nursery sites may force loons into marginal, less protected nesting sites where chicks are more susceptible to predation when forced to separate from their parents by boats, jet skis, or any human intrusion; chicks are also killed by direct impact from outboard propellers and more often jet skis (Evers et al. 2010).

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.

Regulatory Framework

Forest Plan

The 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 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 Sensitive Species Table 10 for the resource indicators and measures used for assessing effects.

Sensitive Species Table 10. 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 500 feet of the shoreline; application of recommended BMPs to minimize potential disturbance	No	Forest Plan FW-DC-GDL-20; Conservation Plan for the Common Loon in Montana
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	No	Forest Plan FW-DC-GDL-20; Conservation Plan for the Common Loon in Montana

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. Management recommendations of lakes with availability of suitable habitat and consistency of nesting attempts 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, any proposed activity located within 500 feet of a lake shoreline 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 habitat and potential effects to loons, and are incorporated by reference. Skaar (1990) developed a Montana Common Loon Management Plan that recommended management guidelines. Most of these recommendations were associated with protection of the nest territory and nursery areas from human disturbance during the nesting season. These recommendations rarely apply to the normal activities authorized by the Forest Service. Evers (2004) prepared a Status Assessment and Conservation Plan for the common loon that identifies current threats to loons as well as management recommendations. Those associated with NFS land management are also related to protection of breeding habitat during the nesting season, specifically, minimizing disturbance to nesting territories.

Skaar (1990) and Dolan (1994) establish interim goals and strategies for maintaining nesting habitat and stable population levels and describe the ecology, biology, habitat use, status and conservation of the common loon. 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).

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, which in the Galton analysis area are Murphy and Dickey Lakes. This is appropriate because any direct or indirect effects to loons or their habitat would be limited to these lakes and their lakeshores. 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 2005). 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). Montana now supports the largest breeding population of common loons in the western continental United States with a 10 year average summer count of 216 individuals (Hammond 2009). This population consists of an average of 62 territorial pairs, 52 non-breeding "single" adults, and 41 chicks. Since surveys began in the late 1980s, the population has remained remarkably stable. Fecundity in Montana appears to be above average in comparison to many other states ranging between 0.66 and 0.70 chicks fledged per territorial pair (Hammond 2009).

Common Loon Occurrence

The analysis area contains a total of ten lakes (see associated map; Project File) that are greater than 25 acres in size that provide suitable foraging and/or nesting habitat. In 2014, lakes on the Fortine and Rexford Ranger Districts produced 8 chicks (8 surviving or 100% survival rate) from 5 pairs. A total of 30 adult loons were counted locally in 2014 (district records).

Nesting has been recently attempted in 4 of these lakes within the analysis area. The names of these lakes and the 2015 status of use are listed below in Sensitive Species Table 11. A detailed history of loon occupancy and nesting success records (by lake) are on file at the Rexford District office.

Sensitive Species Table 11. Loon habitat and Status in the Galton Vegetation Analysis Area

Lake	Acres	# Years Loons Surveyed	Last Year of Reproduction/or attempted reproduction
Dickey (partially private)	585	25+	2015
Lick (private)	20	25+	2015
Martin	35	25+	2015
Murphy	145	25+	2015

Description of the Analysis Areas

As shown in Sensitive Species Table 11, loon reproduction has been recently attempted at four of the ten lakes located in the analysis area. Factors affecting loons and loon nesting on these lakes include fishing, hiking, boating, skiing (including jet skis), swimming, home construction/reconstruction for those lakes with private lands, recreation activities especially those with private lands, etc. Natural occurrences such as a fluctuating water level (flooding and drought) either covering nesting vegetation or resulting in lack of nesting vegetation and high wave producing winds that may swamp a loon nest are always factors in loon breeding success. These existing activities are suspected to affect loon nesting attempts/success on these lakes as disclosed in Sensitive Species Table 11.

A no-disturbance zone between 50-150 feet from the nest(s), depending on size and shape of the lake, is used to restrict the area to human access (boats, jet skis, swimming, etc.) during the breeding/nesting season (from April 15 to July 15) (Roderick & Milner, 1991, Dolan 1994). This strategy has been used annually on both Murphy and Dickey Lakes due to the amount of recreational use they receive. This strategy has proven to be successful on these lakes.

Potential for Human Related Disturbances: Developments along the lakeshore do occur on Dickey and Lick Lakes where private land is present. The amount of this type of disturbance varies from year to year dependent upon the residents and can range from domestic animals to boating to home construction and or reconstruction. Boating, fishing, water skiing, and jet skiing are popular activities on Dickey lake, while small boat fishing is popular on Murphy Lake. The no-disturbance zone has been an important tool on these lakes due to the amount of human activities they receive. Dickey Lake also has both a public camping area and picnic area that add to the disturbance level.

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 2 – No Action

Alternative 2 - The No Action Alternative would not alter any suitable loon habitat, and would not cause any disturbance near nest locations that would impact loons or their habitat. Existing nesting and/or foraging habitat would continue to be available on the Forest Service portions of the shorelines. Portions of the lakes adjacent to private land could be developed or promote activities that could impact individual loons or their habitat. The No Action Alternative would not change the current level of recreation activities that may affect loons and/or loon nesting.

Alternatives 1 and 3 – 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

No project design features are required or needed as all proposed activities, including timber harvest, would occur further than 500 feet from any loon nest site.

Potential Disturbance and Habitat Alteration at Territorial or Critical Foraging Lakes

No activities are proposed near Lick or Martin Lake, and therefore there is no potential for effects to loon or their habitat and these lakes will not be discussed further. The activities associated with Alternatives 1 and 3 would not affect the suitable nesting habitat on either Dickey or Murphy Lake. No activities would occur inside the 150 foot no-disturbance water zone. Proposed activities along the shoreline would not occur within 500 feet of any nest. The closest activity to any lake with loon use is Unit 107 (timber harvest) that is approximately 725 feet from the west bank of Murphy Lake. This unit occurs across Highway 93 from Murphy Lake and is not within view of nesting loons. Loons on both Dickey and Murphy lakes may hear harvest activities from the units located near these lakes, but activities would not occur in view of the lake. Shorelines are also protected by a 150-foot riparian INFSH buffer. The proposed activities would not affect maintenance of suitable nesting/rearing habitat.

Effects of Alternative 1 and 3 are limited to those described in the previous section. This proposal does not include any recreation proposals, road construction, trail maintenance or construction or other human-related disturbances.

No proposed development or human activity, and no proposed vegetation management would occur on or within 500 feet of any of the common loon territorial or critical foraging lakes within the analysis area by either Alternative 1 or 3. All activities would occur 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. No timing restrictions or application of BMP's as identified by Hammond (2009) would be required or necessary.

Cumulative Effects

Introduction

The Existing Condition section describes the potential common loon habitat, including existing human sources and levels of disturbance, within the analysis 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 boundary for analysis of cumulative effects will be the Galton Vegetation analysis area lakes because suitable habitat is limited biologically to area lakes greater than 25 acres with a fishery capable of supporting breeding loons. Currently, there are no apparent conditions within the analysis area that would cumulatively contribute effects to loon use of occupied lakes within the analysis area. Temporal boundaries for the cumulative effects analysis would be the same as for the direct and indirect effects.

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

Past Actions

Timber harvest has occurred in the project area since the 1950s 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. 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.

Alternative 2 – No Action

The No Action Alternative does not directly contribute any cumulative effects to common loons or their habitat based on the lack of action. While natural occurrences such as drought and floods, and even wildfires have temporarily impacted loon habitat in the past and will likely again in the future, it is human development along area lakes that has had the greatest impact on this species. Many area lakes are on private lands where humans have built homes near the shorelines directly affecting available habitat for loons. Human activities along and on these lakes have displaced loons, limiting nesting habitat to fewer lakes on public lands. Similarly, human use has increased on public waters because of limited access to lakes on private lands, which, in turn has increased disturbances to loons utilizing these waters.

Alternatives 1 and 3 – 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. Those current and foreseeable actions in the project area that were determined to be appropriate for inclusion in the analysis of environmental effects are listed at the beginning of Chapter 3.

Both action alternatives protect the habitat of the common loon from vegetation management practices. Both action alternatives allow for existing levels of human disturbance on either one or two lakes known to serve as habitat for loons. Continued monitoring of these lakes for loon activity and use will play an important role in determining, if any, indirect effects on loons as a result of the proposed actions.

The development of homes, construction of roads, and increased recreational use has reduced the suitability of nesting and foraging habitat in Dickey Lake, as well as other private lakes in the Galton project area. Based on past building trends, it is assumed that two new residences could be built per year per planning area. No subdivisions are formally proposed at this time. Depending on the location of these residences, and activity levels associated with the residences, this could result in fewer potential nest sites on the private land for the next 10 years. Cumulative effects to nesting habitat and success, from the development on private lands, is hard to predict because location of future building sites is unknown. These are factors the NFS has no control over.

Climate change could have effects on the common loon at a forest level and are discussed in the KNF FEIS on page 284: Climate change could affect loons through changes in water levels, temperatures, and vegetation. If climate change alters precipitation and spring melt, water levels may fluctuate more in the spring during nesting that they may have previously. This may impact nesting if nests become submerged or become elevated as the water level decreases. Water

temperatures may impact the suitability of lakes for different fish species, thereby changing prey abundance. Aquatic vegetation, important for nests, may change locations in a lake due to water level fluctuations, and this may change nest site availability. This changing phenology is one of the consequences of climate change for migratory birds (p. 90 in USDA 2010)".

The Ten Lakes Travel Management Project will address over-snow and mechanized travel planning for the Ten Lakes area. The area affected by the proposal includes the Ten Lakes WSA and areas with common entrance points to the WSA. There are three main over-snow entrance points to the Ten Lakes WSA: the Grave Creek corridor; Clarence and Stahl Creek; and the Burma/Blacktail area. Over-snow travel is currently not limited. Mechanized use (primarily mountain bicycles) is also unrestricted. The alternatives contained in the Ten Lakes Travel Management Draft Environmental Impact Statement contain various amounts of over-snow and mechanized travel for the project area. A final decision has not been made for this project and the cumulative effects analysis utilizes the Proposed Action as the basis for the analysis in the Galton Vegetation Management Project. This project does not propose any harvest or activities that would affect common loons or their habitat (see "Resource Indicators and Measures" section) and existing over-snow and mechanized use are not currently affecting this habitat. The cumulative effects of the Ten Lakes Travel Management Project in conjunction with past, present, reasonably foreseeable actions would not result in further effects to the common loon or its habitat.

Recreational use of the project area is expected to include but is not limited to hiking, camping, boating and other water craft, fishing, hunting, photography, sightseeing, and wildlife viewing. Human recreational use of nesting and nursery sites may force loons into marginal, less protected nesting sites where chicks are more susceptible to predation when forced to separate from their parents by boats, jet skis, or any human intrusion; chicks are also killed by direct impact from outboard propellers and more often jet skis. These effects are partially mitigated though the practice of having a no-disturbance zone around nesting sites.

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 the common loons from implementation of the proposed action alternatives.

Regulatory Framework Findings

Forest Plan

The 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 and the goals, desired conditions, objectives, standards and guidelines can be found on the noted pages within the Plan.

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 activities would maintain the existing suitability of Murphy and Dickey Lake for loon occupancy. No project design features are needed or required as all proposed activity is greater than 500 feet away from the shoreline and any known nest. See the "Direct and Indirect Effects". Therefore, the project would contribute progress toward achieving GOAL-WL-02.*

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. *See response to Goal-WL-02 and see the "Direct*

and Indirect Effects" discussion. The project would contribute progress toward achieving FW-DC-WL-01.

FW-DC-WL-10: A mosaic of aquatic and riparian habitats, with a low level of disturbance, is available for associated species. *This design criteria is met with the 150 foot riparian buffer that is a required by INFSH. The project would contribute progress towards achieving FW-DC-WL-10.*

FW-GDL-WL-20: Common Loon: Management activities should avoid or minimize disturbance near known active nests based on the best available information. *No application of recommended BMPS based on lake classification as described in Conservation Plan for the Common Loon in Montana (Hammond 2009) was required. Please see response to FW-Goal-WL-02, and see "Methodology," "Data Sources," "Existing Condition," and "Direct and Indirect Effect" discussions. The action alternatives meet these components by having harvest activities occur further than 500 feet from nest sites, and the project contributes towards FW-GDL-WL-20.*

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 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. Proposed activities would occur more than 500 feet away from any known nesting habitat, or historical use area by loons. Potential effects would be incidental to the implementation of the activities and would have very limited potential to impact individuals, 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 2 (No Action) would have no impact on common loons or their habitat. This determination is based on the lack of action.

Alternatives 1 and 3 may impact individuals or their habitat but would not likely contribute to a trend toward federal listing or loss of viability to the population or species for common loons. This determination is based on: 1) harvest/burning activities would occur more than 500 feet away from any known nesting habitat, or historical use area by loons; 2) the proposed activities would not result in the destruction or degrading of suitable loon habitat; 3) continued monitoring and education would be conducted to inform and educate recreationists about loon nesting and human-related disturbances that may affect loons; 4) the success of mitigating closure areas to humans that have allowed resident loons to nest successfully on area lakes even with human use (boating, fishing, swimming etc.); 5) the number of loons in MT has remained stable over the last 30 years of monitoring.

Fisher

Summary of Conclusions

Alternative 2 would have no impact on the fisher or its habitat based on lack of action.

Alternatives 1 and 3 may impact individuals and/or their habitat, but will not likely contribute to a trend towards federal listing or cause a loss of species viability to the population or species for the fisher. This determination is based on: 1) the analysis area provides low/no probability habitat and was assessed primarily as dispersal habitat; 2) the action alternatives affect a small percentage of the available dispersal/travel habitat; 3) alternative actions may cause short-term displacement of fisher using the travel/dispersal habitat in or near the proposed units; 4) RHCA guidelines protect the highest-quality fisher habitat along major stream courses in the analysis area. 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 providing for potential habitat within the analysis area.

Introduction

Fishers are similar in body form to weasels, but larger. Their fur color varies from very dark brown to blackish brown. Young are born in cavities in either live or dead trees. Mature moist forest habitats with continuous overhead cover and riparian zones are frequently utilized (Vinkey 2003) and stream courses are often used as travel corridors.

In January 2016, the US Fish and Wildlife Service determined that listing the fisher as a threatened or endangered species may be warranted due to new information (USDI FWS, 2016, Federal Register, 1-12-2016). They will now conduct a status review where all potential threats to the species are evaluated. This evaluation will take into consideration any information that has become available since its 2011 finding concluding that listing the fisher as endangered or threatened was not warranted(Ibid).

Fisher numbers in the U.S. Northern Rocky Mountains have increased in numbers and distribution since their perceived extirpation in the 1920’s (USDI, FWS 2011). However there is no information on the historical numbers or density of fisher populations in the region, and little

is known of regional population numbers today (ibid). What little is known of fisher population numbers is primarily derived from harvest data (from legal and incidental trapping) and from recent survey efforts using non-invasive sampling for DNA. Fishers are thought to be one of the lowest-density carnivores in Montana (Vinkey 2003), although densities appear to vary throughout the Northern Rockies. Considered secure at a global level, fishers are a Sensitive Species in Region One of the Forest Service. They are considered a Species of Concern in Montana, but are managed as a furbearer with annual trapping quotas.

Regulatory Framework

Forest Plan

The 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. 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:

- FW-DC-WL-10
- FW-DC-WL-11
- FW-DC-WL-12
- FW-DC-WL-13

Also, there are other 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

Fisher habitat for the analysis area was analyzed based on modeled and mapped habitat for the National Forests in Northern Idaho and Montana, which have the potential capability of providing fisher habitat (Olsen et al. 2014, and Sauder, 2014). The analysis area was assessed as a low to non-habitat probability area for fisher based on these assessments (Ibid). Therefore, this analysis considered the area as primarily providing fisher dispersal habitat and analyzed project affects to existing old growth habitat and riparian areas. Fisher are associated with late seral stands with complex structure such as large live and dead trees and down wood. Generally, these types of structures in the analysis area would be expected to occur more abundantly in old growth stands as well as riparian stands than other types of stands. In addition, stream courses are known to provide travel corridors for fisher (Vinkey, 2003). Heinemeyer (1993) found that 65% of all fisher locations within the Cabinet Mountains were within 200 meters of water. Therefore, project effects will be assessed on riparian corridors that occur within 200 meters of perennial streams as well as existing old growth habitat in the analysis area.

Sensitive Species Table 12. Resource Indicators and Measures for Assessing Effects

Resource Element	Resource Indicator	Measure	Used to Address: P/N, or Key Issue?	Source
Riparian Dispersal habitat	Vegetation management occurring in riparian dispersal/travel habitat	Acres of riparian habitat located within 200 meters of perennial stream (percent composition)	No	Forest Plan FW-DC-WL-11, FW-DC-WL-12, and FW-DC-WL-13, FW-DC-WL-17
Old growth dispersal habitat	Vegetation management occurring in old growth dispersal/travel habitat	Acres of old growth habitat (percent composition)	No	Forest Plan FW-DC-WL-17;
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	Forest Plan FW-DC-WL-10, FW-DC-WL-11, FW-DC-WL-12, and FW-DC-WL-13

Key Stressors (risks and threats) Affecting the Fisher:

The following Forest Service management activities may have direct or indirect effects on forested and riparian habitats (as listed in the wildlife specialist report (Anderson 2014) for the Forest Plan.

- Timber harvest – changes in mature and late-successional forest stand composition and structure affecting canopy cover and the amount and availability of large down wood; and
- Fire (both planned ignitions and natural, unplanned ignitions) – removal of standing snags and down wood, reduction of canopy coverage, or direct mortality.

Timber harvest and fire were both incorporated into the resource indicators as measures of disturbance that could affect the riparian and old growth dispersal habitat in the analysis area. Acres of planned harvest and burn (by alternative) within these areas were compared to the existing condition.

Stressors to this species group that are outside the control of the Forest Service management and which may cause loss of habitat, displacement, or mortality may include (cumulative effects):

- Global warming (climate change) – increased and prolonged summer temperatures and/or drought conditions, and/or the increased risk of fire that may impact forest cover and down wood. This could reduce the extent of dense, closed canopy forest. Those stands may be more susceptible to large scale, stand replacing disturbances like fire or insects;
- Private land development – developments to support increased human populations that may impact suitable forest cover on non-public lands, and impact connectivity between public lands;

- Over-harvesting by trappers – both allowable and incidental trapping with marten traps may be an important source of mortality, particularly where populations are small and fragmented (cumulative effect);
- Habitat loss and degradation on non-NFS lands – loss of forested habitat, particularly late-successional forests, to fire and timber harvest results in the reduction and fragmentation of suitable habitat. Loss of habitat cover and structure near streams, loss of down and woody material near streams; and
- Small, isolated populations – may lose genetic diversity and have a higher probability of extinction. It is unknown if a sufficient number of individuals exist to sustain the populations across the full range of environmental and demographic stochasticity (Vinkey, 2003) (cumulative effect).

Methodology

Based on recent fisher habitat models, the analysis area was identified as low probability/nonhabitat (Olson et.al. (2014), and Sauder (2014). Therefore, this analysis considered the Galton Vegetation analysis area as primarily providing fisher travel habitat as potential dispersers move through the area to higher quality habitat. Potential fisher travel and dispersal habitat was identified as all habitat located within a 200 meter buffer from a perennial stream, as well as old growth habitat within the analysis area. Effects to these areas were calculated by overlaying harvest and burn units from both alternatives and calculating areas of overlay. GIS was used for all calculations.

Data Sources

Fisher population ecology, biology, habitat description and relationships identified by research are described in Powell and Zielinski (1994) and Heinemeyer and Jones (1994), Rugierro et al. (1994), Vinkey (2003), Lofroth et al. (2010), Olson et al (2014), Sauder and Rachlow (2014), Sauder and Rachlow (2105), Schwartz et al. (2013). That information is incorporated by reference. Fisher occurrence data comes from District wildlife observation records and Forest historical data (NRIS Wildlife) and other agencies (MFWP).

Affected Environment

Spatial and Temporal Context for Effects Analysis

As described above, the analysis area was considered as primarily providing fisher dispersal habitat. Fisher are associated with late seral stands with complex structure such as large live and dead trees and down wood. Old growth stands more commonly contain this complex structure as compared to younger stands. Therefore, old growth stands were evaluated as potential habitat fisher may use while dispersing through the area. Studies from the Cabinet Mountains (Heinmeyer, 1993) found that the majority of all fisher locations were within 200 meters of water, and as riparian areas are also known to function as travel corridors for many wildlife species, this area (200 meters from perennial streams) was also analyzed as potential dispersal and travel areas within the analysis area. Therefore, old growth and riparian areas will be evaluated as the area that could be affected by the proposed action alternatives and where changes may affect fisher traveling through the area.

Temporal boundaries for the fisher analysis include both short-term and long-term effects. While research does not show fisher to be highly sensitive to human activity, the presence of people and machines during vegetation management implementation may displace fisher using the dispersal habitat in or near the proposed units. This displacement would be short-term and would last until

the machines are turned off or leave the area and the people are gone. Long-term effects are those that are expected to last longer than a season or two. For example, regeneration harvest that results in the removal of the majority of the overstory canopy would create open conditions generally not used by fisher.

Existing Condition

Habitat analysis

Two recent habitat assessments for the fisher looked at potential habitat across the north Idaho and western Montana landscape. Olson et al. (2014) is a coarse-scale land cover-based approach to determine the amounts and distribution of probable fisher habitat in based on current vegetation and certain biophysical conditions. Sauder (2014) used a multi-scale product model to characterize both the configuration and composition aspects of forest patterns selected by fisher based on the monitoring of habitat use by individual animals. While these models came up with varying amounts of habitat, they both indicated similar patterns as to where fisher habitat has the highest probability to occur. The analysis area lies within the eastern portion of the Kootenai NF, where predicted/modeled habitat is sparse and highly fragmented (Olson et al 2104, Sauder 2014).

The Idaho Panhandle NF has experienced extensive fisher surveys and research and have detected fisher across the forest. The Cabinet-Yaak areas of the Kootenai are geographically connected to the Idaho Panhandle and is also an area that has had repeated fisher detections (USDA FS, 2012). The analysis area lies east of the Yaak river drainage and east of Koocanusa Resevoir. Sauder (2014) discusses the Kootenai River Valley (Lake Koocanusa) reportedly acts as a barrier to dispersal by many wildlife species, including martens, and suspects that it also acts as barrier to movements of fisher (east and west). This factor, along with the lack of high quality predicted habitat in the analysis area, may explain the lack of fisher sightings in this area.

Forest-wide, fisher habitat is abundant at about 703,423 acres (over 32% of the Forest) and exceeds the upper range of historic variation of approximately 671,150 acres, and there is no indication that fisher viability is at risk (ERG 2012).

Fisher Occurrence

There is one record of a potential fisher sighting in the late 1990's within the analysis area. This report was not confirmed. Potential fisher tracks were also observed during MFWP's 1996/1997 snow track surveys in the Wigwam PSU within the project area. There are a few more recent sighting/track of fisher in the North Fork of the Flathead River drainage, located adjacent to the analysis area as reported by MFWP. Over the last 2 decades, there have been very few sightings or tracks of fisher reported in the analysis area. This lack of sightings support the habitat modeling discussed above which show this area primarily providing low capabilities for supporting fisher habitat.

Environmental Consequences

Alternative 2 – No Action

Alternative 2 (No Action) would have no direct or indirect effects on fisher dispersal habitat within the analysis area. No activities are proposed within 200 meters of perennial streams or within old growth stands. Natural occurring events such as blowdown or wind events would continue to provide large woody trees in this habitat, while the exclusion of fire would increase the risk for future stand-replacement fires.

Alternatives 1 and 3 – Direct and Indirect Effects

Riparian corridors are protected by Forest Plan direction and generally remain un-fragmented and available as habitat for fishers. By adhering to 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. 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. See Sensitive Species Table 13 below for the type and amount of vegetation management proposed within riparian and old growth dispersal habitat.

Sensitive Species Table 13. Measures for Assessing Effects to Fisher riparian habitat (within 200 meters of perennial stream) in the Analysis Area

Resource Measure	**Alternative 2** **No Action** (Total ac. Riparian Buffer **(% of total)**	**Alternative 1** Acres of harvest or burn **(% of total)**	**Alternative 3** Acres of harvest or burn **(% of total)**
Riparian Dispersal/Travel Habitat within 200 meters of perennial stream (% decrease)	31,412 ac (0%)	1075 (3%)	405 (1%)
Old Growth Dispersal/Travel Habitat (% decrease)	19,065 (0%)	74 (0.4%)	82 (0.4%)

Project Design Features and Mitigation Measures

The analysis area has been assessed as a low to non-habitat habitat probability (see "Existing Condition" discussion. Records of fisher occurrences in the analysis area are limited and support the habitat modeling which show low capabilities for supporting fisher habitat. The Galton Vegetation project does include a general wildlife design criteria that would protect known dens or nests of sensitive species. Although fishers are not expected, the Galton Vegetation project would protect a den site if found. The project would contribute to progress toward FW-DC-WL-01 and FW-GDL-WL-21.

Riparian habitat

The vegetation management activities include both harvest and understory burns located within the fisher dispersal/travel habitat 200 meter buffer from perennial streams. Both action alternatives propose vegetation management activities that would slightly reduce (from 1 to 3% of the potential habitat) the amount of fisher travel habitat in the project area within the 200 meter buffer of perennial stream (Sensitive Species Table 13). The vegetation management activities include both harvest and understory burns and the majority of the harvests included thinning the understories in drier site habitats. There are twice as many acres of prescribed burns compared to harvest in both alternatives within this zone. Burning would likely remove and reduce snags and down woody debris which serves as habitat for many fisher prey species. It would also result in the creation of more woody debris as a result burnt trees falling over, as well as improving the vigor and availability of grasses, forbs and shrubs which provide forage for fisher prey species.Salvage of incidental mortality from prescribed underburning may occur on some units, but design criteria would ensure adequate levels and distribution of snags and coarse woody debris would remain in the analysis area. The Forestwide desired condition (FW-DC-VEG-07) and guidelines (FW-GDL-VEG-04 and FW-GDL-VEG-05) provide guidance for snag retention.

Any snags felled for safety reasons would be left on site (C2.303#). No more than 20 acres a year would be salvaged, for a total of 200 acres for the planning period. Please see Chapter 3, and the Cavity Habitat and Down Wood Habitat sections).

Both actions could reduce the amount of snags and down wood in these areas that may provide potential resting areas.

The existing dispersal/travel habitat in the riparian areas and old growth areas are well distributed across the analysis area (See project file). Because these areas would primarily function as travel/dispersal habitat, and activities would affect a small percentage of this habitat, movement through these areas would not expect to be impeded.

The Forest Plan GOAL-RIP-01 is to maintain or improve riparian areas in order to support the ecological functions. The action alternatives are consistent with the Forest Plan through designation of RHCA's and application of BMPS to all timber harvest and under-burning activities, and would contribute to progress toward FW-DC-RIP-02. Please see the water resources section.

Old Growth Habitat

Both action alternatives also include 82 acres of understory thinning and between 969 and 422 acres of underburns within the dry site old growth habitat (Alternative 1 and 3 respectively). These burns are designed to help restore more open growing stands which was more representative of historic conditions. Burning will likely remove and reduce down woody debris which serves as habitat for many fisher prey species. It will also result in the creation of more woody debris as a result burnt trees falling over, as well as improving the vigor and availability of grasses, forbs and shrubs which provide forage for fisher prey species. These actions may reduce the amount of snags and down wood in these areas that may provide potential resting areas, however 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. The action alternatives are designed to increase the resiliency of drier type old growth stands and retain integrity and function, and FW-DC-VEG-03, FW-STD-VEG-01, FW-GDL-VEG-01 would be met. Please see the Old Growth Section for additional discussion.

General Forest Structure

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. This would be 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. 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.

As for snags, the 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. 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. The analysis area provides a diversity of stands with a wide-range of availability of down woody, depending on the stand characteristics.

None of the action alternatives propose any new permanent roads which could lead to increased trapping pressure of fisher.

Cumulative Effects

The Existing Condition section describes relevant past and present factors affecting fisher habitat conditions in the analysis 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

The spatial boundary for the cumulative effects analysis is the analysis area and is based on the low to non-probability of the species occurring. The analysis area is the extent of the area that could be affected by the proposed action would assess the effects of fisher traveling through the area.

Temporal boundaries for the fisher cumulative effects analysis are the same as for those described for the direct and indirect effects analysis.

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

Past Actions

Timber harvests, salvage of blowdown, road construction, and wildfire occurrences, especially those occurring within the past 75 to 100 years, are some activities that have contributed to the reduction of suitable fisher habitat. These occurrences, whether man-caused or natural have altered numerous acres of mature and late succession forest stands and their associated elements, including large woody debris. This statement is especially true when these types of stand

alterations occur within 200 meters of riparian areas known to provide dispersal/travel habitat for the fisher. Forest Plan direction and other laws/regulations applicable to forest management in or near streams assist in protecting fisher habitat for perpetuation of this species.

Alternatives 1, and 3 – 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. Those current and foreseeable actions in the project area that were determined to be appropriate for inclusion in the analysis of environmental effects are listed at the beginning of Chapter 3.

Ongoing federal actions have been included as part of the existing condition of this project area. Pertinent actions include approximately 40 acres of prescribed burns per year, approximately 90 acres of pile burning with the Little Feet project, approximately 200 acres/year of pre-commercial thinning, continued cattle grazing on the existing Graves Creek allotment, continued road management, continued public recreation, and new residences built on private land. Prescribed fire would reduce conifer encroachment in some areas, and reduce the chances for large wildfires in the future. The effects of pile burning and pre-commercial thinning would be minimal as the majority of these projects take place outside of the riparian area.

The Forestwide Young Growth Vegetation Management project would treat approximately 400 to 600 acres annually, dependent on funding, using precommercial thinning or commercial thinning treatments. Stands proposed for treatment are second growth stands and would be subject to a number of criteria before they were determined eligible for treatment. The Forestwide Young Growth Vegetation Management project would be minimal as the majority of these projects take place outside of the riparian area and are not expected to change the level of snags or down woody habitat available within the analysis area.

The Ten Lakes Travel Management Project will address over-snow and mechanized travel planning for the Ten Lakes area. The area affected by the proposal includes the Ten Lakes WSA and areas with common entrance points to the WSA. There are three main over-snow entrance points to the Ten Lakes WSA: the Grave Creek corridor; Clarence and Stahl Creek; and the Burma/Blacktail area. Over-snow travel is currently not limited. Mechanized use (primarily mountain bicycles) is also unrestricted. The alternatives contained in the Ten Lakes Travel Management Draft Environmental Impact Statement contain various amounts of over-snow and mechanized travel for the project area. A final decision has not been made for this project and the cumulative effects analysis utilizes the Proposed Action as the basis for the analysis in the Galton Vegetation Management Project.

The Ten Lakes Travel Management Project proposed action limits over-snow use both spatially and temporally from the existing condition, and spatially limits mechanized use, which would decrease both the length of time and area that over-snow use could occur. The cumulative effects of the Ten Lakes Travel Management Project in conjunction with past, present, reasonably foreseeable actions would result in less over-snow and mechanized use than the existing condition, thereby reducing activities in fisher habitat. Currently the quota for trapping fisher is zero for this area, so determinations on how the proposed Ten Lakes project may affect possible future trapping (under state management, and not controlled by USFS) is only speculation.

Climate change could have effects on the fisher at a forest level and are discussed in the KNF FEIS on page 289. “Climate change is likely to alter the distribution and extent of fisher habitat. A warmer climate would reduce the extent of dense, closed canopy forest. Those stands would be more susceptible to large-scale, stand replacing disturbance like fire or insects. Both may at least

temporarily increase the amount of snags and downed wood until the next fire, but there would be an open canopy and the stands would not be suitable for fisher. Distributional shifts are one way species respond to climate change (p. 90 in USDA 2010)".

Private land development may impact suitable forest cover on non-public lands, and impact connectivity between public lands. Over-harvesting by trappers – both allowable and incidental trapping with marten traps may be an important source of mortality, particularly where populations are small and fragmented. This can contribute to population declines or prevent a population from increasing.

Regulatory Framework Findings

Forest Plan

The 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, and Goals, desired conditions, objectives, standards, and guidelines can be found on the noted pages in the Forest Plan.

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. The analysis area is considered to have low to non-probability of habitat suitability for fisher. Fishers could use the area for travel or dispersal. No project design features specific to fishers have been identified. Potential for disturbance to an individual using the area for travel or dispersal habitat would be short –term with undisturbed habitat remaining in the area. Characteristics suitable for travel habitat would remain in the treated stands. The project contributes toward Goal-WL-02.*

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. *See response to FW-GDL-WL-21*.

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. *The analysis area has been assessed as a low to non-habitat habitat probability (see "Existing Condition" discussion. Records of fisher occurrences if the analysis area are limited and support the habitat modeling which show low capabilities for supporting fisher habitat. The project does include a general wildlife design criteria that would protect known dens or nests of sensitive species. Although fishers are not expected, the project would protect a den site if found. The project is designed in accordance with FW-DC-WL-01 and FW-GDL-WL-21.*

FW-DC-WL-10: A mosaic of aquatic and riparian habitats, with a low level of disturbance, is available for associated species. *Proposed activities would occur within riparian habitat. Those activities would occur on a limited amount of acres compared to the amount available, and the activity would be short-term and movement through the available travel/dispersal habitat would not be expected to be impeded. The project would be contribute towards FW-DC-WL-10.*

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 activities would occur within drier old growth types, and both snags and down woody would be affected. 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 section. The project would contribute towards meeting FW-DC-WL-11.*

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.*See response to FW-DC-WL-13.*

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. *The silvicultural prescriptions would incorporate the desired size and levels of snags and coarse woody debris for wildlife use based on a biophysical setting. Retention of this material would depend on the existing availability. Please see the "Trees and Snags" and "Down wood" discussions above, as well as the Forest Vegetation analysis. The project would contribute towards meeting FW-DC-WL-12 and FW-DC-WL-13.*

GA-DC-WL-TOB-05: Wildlife move to and from the border with Canada. *The proposed treatment units would improve and maintain connectivity within the analysis area. Please see the "Potential disturbance and connectivity" discussion above. The project would contribute towards GA-DC-WL-TOB-05.*

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

Alternative 2 (No Action) would have no impact on the fisher or its habitat.

Alternatives 1and 3 may impact individuals and/or their habitat, but will not likely contribute to a trend towards federal listing or cause a loss of viability to the population or species for the fisher. This determination is based on: 1) the analysis area provides low/no probability habitat (based on literature) and was assessed primarily as dispersal habitat; 2) the action alternatives affect a small percentage of the available dispersal/travel habitat; 3) alternative actions may cause short-term displacement of fisher using the travel/dispersal habitat in or near the proposed units; 4) RHCA guidelines protect the highest-quality fisher habitat along major stream courses in the analysis area. 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 providing for potential habitat within the analysis area.

Flammulated Owl

Summary of Conclusions

Implementation of the action Alternatives 1 and 3 may impact individuals and/or their habitat, but would 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 the project providing

an opportunity to improve flammulated owl habitat by trending the existing vegetation towards desired conditions for the warmer/dry habitat types. Proposed vegetation management including prescribed fire, understory thinning and intermediate harvest prescriptions that would move potential habitat into a more suitable habitat category which would help maintain and improve the suitability of flammulated owl habitat within the analysis area. In addition, potential for disturbance from project activities is minimal.

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 are strongly dependent on large-diameter trees (generally 18 inches DBH or more), especially for nesting habitat, and prefer open stands with understory grass species for hunting moths and other insects. Pockets 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 would not be considered for analysis.

Regulatory Framework

Forest Plan

The 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 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

Key stressors are activities that might impact flammulated owls if not managed or mitigated. Stressors that are outside of USFS control include those activities that occur on non-NFS lands. Some, such as climate change, may have impacts on NFS lands but are not completely within the Forest's ability to stop or reduce all the impacts. Forest Service management activities that may have direct or indirect effects on snags and cavity habitat (McCallum 1994a, 1994b, Groves et al., 1997, IDFG 2005) that are considered for this project include:

- Fire (both planned ignitions and natural unplanned ignitions) – removal of standing snags and down wood or direct mortality.

- Fire suppression - the main effect has been to decrease ponderosa pine regeneration (decreased breeding habitat for owls) but increase Douglas-fir thickets (which provide security cover from predators).
- Human disturbance during breeding, nesting and rearing periods (COSEWIC 2001, Yasuda 2001) (May through July)
- Loss of mature and late successional dry pine forest and the reduced numbers of snags, particularly large snags.
- Decline in availability of large snags and trees for foraging and nesting.
- Declines in shrub understories of montane and lower montane forests.
- Fragmentation of late successional forest habitat.
- Loss of down wood.

These stressors may result in habitat loss, displacement, nest failure, or mortality.

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 (Sensitive SpeciesTable 14). 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.

Sensitive Species Table 14. 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	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 important structural conditions of the stand	Acres treated	Purpose and Need	Forest Plan FW-DC-WL-12, and FW-DC-WL-19

Methodology

Potential habitat was mapped by querying stand data for the analysis area for warm and dry habitat types, forest types (ponderosa pine and Douglas-fir), stand age (mature to old), and visual estimation of low canopy cover.

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 and Forest historical data (NRIS Wildlife).

Affected Environment

Spatial and Temporal Context for Effects Analysis

The analysis boundary for direct effects is the Galton Vegetation project activity areas within suitable and potential habitat, since activities in this area could result in habitat alteration, disturbance, and displacement to flammulated owls. The boundary for indirect effects to individuals and their habitat is the analysis 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.

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 addition, there is 72,265 acres of potential habitat in the form of ponderosa pine/Douglas-fir habitat types that currently have a higher canopy cover than preferred by flammulated owl on the Forest (ibid). These 72,265 acres may be providing for some flammulated owl use currently, but could be improved for future use 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

The flammulated owl has been documented to occur in the analysis area, more specifically, the Ksanka and Grave PSUs (2005). Based on these documentations and the availability of suitable habitat, flammulated owl surveys were conducted in these same areas and in potential habitat in the spring of 2007, 2010, and 2011. Survey efforts were hampered by access, weather, and seasonal conditions (e.g., high stream levels contributing to background noise levels); no flammulated owl responses were recorded in these years (see project file).

Description of the Analysis Area

Recent habitat analysis of forest-wide habitat (ERG 2012), shows an increase in actual and potential flammulated owl habitat over the next 5 decades.

Mapped habitat using TSMRS / FACTS database indicated that there is approximately 14,645 acres of potential flammulated owl habitat on NFS lands within the analysis area. The 2015 Marston wildfire burned approximately 120 acres of flammulated owl habitat with enough severity to remove current suitable characteristics. The remaining potential habitat acres represent stands with Douglas fir/Ponderosa Pine forest types and older stand age. Based on visual estimates of canopy cover (satellite imagery), none of these stands have overall low canopy coverages. Small pockets of suitable habitat may occur across the analysis area, however the general lack of ponderosa pine habitat, and lack of open-canopied Douglas fir/larch stands indicate that existing flammulated owl habitat is generally lacking in the analysis area. Although flammulated owls are frequently found within stands denser than 40% crown closure (Hayward and Vernor 1994), the literature (Wright 2000) also suggests that they may not be able to forage successfully within dense stands. It is assumed that the potential habitat could be converted to “suitable habitat” with light disturbance such as low severity wildfire or restoration thinning.

Environmental Consequences

Alternative 2 - 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 analysis area. Although the type and frequency of fire experienced varies within a given area and vegetation type, all vegetation types within the analysis area have historically experienced periodic mixed severity fires. This natural disturbance regime favors fire tolerant species, including older and larger diameter seral tree species such as western larch. Pure ponderosa pine stands are extremely rare in the analysis area. Stands of Douglas fir and larch are more prevalent in this area. The exclusion of moderate severity fires through fire suppression has increased 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. Fire suppression has not yet resulted in a departure from historic ranges for all stands within the analysis area, although the lower elevation, dry site stands are trending towards a departure. Resulting stand replacing fires in these stands often kill many of the overstory trees which historically survived mixed-severity wildfires. In addition, past vegetation management practices that targeted these old, large trees removed the relic seral species further altered tree size and composition and has promoted the development of climax species and conditions. In general, the resultant stand patch sizes, species composition, and fire frequency are departing from historic

conditions within the analysis area. In particular, the stand structure of the dry forest types has changed from an open park-like stand of large trees to a two or three-storied sand composed of a large widely scattered overstory with a dense understory of smaller Douglas-fir. See the Fuels and Vegetation sections for more detail.

Under Alternative 2, no active management would occur within mapped potential 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 analysis area (see the Vegetation and Hazardous Fuels sections).

Existing flammulated owl habitat would continue to be available within warm/dry habitat ponderosa pine and ponderosa pine/Douglas-fir habitats on the KNF. However, continued fire suppression would result in higher canopy cover, increasing density of understory conifers, and stand conversion away from ponderosa pine habitat 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 a habitat type that generally experienced more frequent, low to moderate severity fires historically. This could result in the loss of suitable habitat within the analysis area for many years.

For flammulated owl, as with wildlife on the Forest in general, it is wildfire, insects/disease, in-growth, and stand succession that largely determines the amount and pattern of habitat on the Forest for this species rather than management activities (p. ES-1 and ES-2 in ERG 2012).

Alternatives 1 and 3 – 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 analysis 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 increase 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 been documented within the analysis area, and it is likely nesting has occurred, however no locations of nest sites are known. A specific design feature for intermediate harvest units would minimize potential for short-term reduction in foraging habitat by requiring retention of existing thickets of young conifer in the understory to maintain foraging habitat post-treatment (see Chapter 2, Design Features). 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). Timing restrictions would be enacted (during breeding, nesting and rearing periods – May through July) (Taylor and Knight 2003) on activities if flammulated nests were found in proposed units.

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 and/or Prescribed burns

Proposed timber harvest in the action alternatives may alter the potential flammulated owl habitat in the analysis area. Some research has suggested that flammulated owls are not likely to forage further than 300 feet from forest cover (Goggans 1985). In this analysis, regeneration and commercial thin harvest prescriptions creating areas greater than 300 feet from cover will likely receive minimal use. This equates to a harvest unit of about eight acres in size, or a relatively square unit 600 feet on each side. Those proposed regeneration/commercial harvest units within potential habitat that are greater than eight acres in size will likely receive little or no foraging use until understory and mid-story canopies develop (approximately 20-50 years). Alternatives 1 and 3 propose 262 and 338 acres (respectively) of harvest that fall into this category (Sensitive Species Table 15).

Intermediate harvest prescriptions, thins from below and understory burn prescriptions that reduce the canopy cover in the potential flammulated owl habitat, would open up the dense stands and could provide suitable flammulated owl habitat. Prescribed burning with low to moderate fire in unharvested stands would be similar to historical conditions created by mixed-severity fir. Implementation of these burns is intended to restore fire into the natural process and maintain and restore the open timbered conditions and improve the ecological function of a site. This would benefit flammulated owls that are adapted to these sites. These prescriptions could have short-term (2-3 years) negative effects on the availability of habitat for prey species depending on the amount of understory vegetation that is reduced. In the long-term habitat for prey species would be maintained and/or increased due to the vigorous shrub/forb layer that would result from the fire. These activities would benefit flammulated owls (Illg and Illg 1994). To minimize this potential short-term reduction in foraging habitat, a design feature for these prescriptions is to retain the existing thickets of young conifer in the understory to maintain foraging habitat post-treatment (see Chapter 2, Design Features). Snags and down woody habitat would also be left to meet Forest Plan standards for cavity-dependent species in the intermediate harvest prescriptions as well. Action Alternatives 1 and 3 would propose a total of 2,454 and 1,986 acres (respectively) that fall into this category. Overall, both action alternatives improve flammulated owl habitat over the existing condition, by moving potential habitat into a more suitable habitat category by removing areas of dense understory and ingrowth due to long-term fire suppression activities. Both the proposed harvest activities and prescribed burns with the incorporated design criteria would be consistent with FW-DC-WL-09, FW-DC-WL-12, and FW-DC-WL-19.

The intent of the timber harvest in these dry site areas is to favor ponderosa pine (where available) and larch by removing smaller Douglas-fir trees that are competing for growing space, to return stands to a more open state more reflective of historic conditions. These stands are expected to retain the larger and older Douglas-fir (and where available, ponderosa pine) trees in the overstory, while exhibiting a more open understory. Retaining large trees and snags in the overstory would preserve abandoned flicker and pileated woodpecker cavities, which are the primary nesting sites for flammulated owls. 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). Limited disturbance to nesting or rearing flammulated owls is expected based

on the limited amount of disturbance expected as well as the lack of reports of flammulated owls in the last 10 years. Surveys of potential habitat will continue over the next few years. Timing restrictions would be enacted (during breeding, nesting and rearing periods – May through July) (Taylor and Knight 2003) on activities if flammulated nests were found in proposed units.

Changes in potential flammulated owl habitat caused by the various activities in the proposed project are shown in the table below.

Sensitive Species Table 15. Acre Changes in Potential Flammulated Owl Habitat on NFS Lands in the Analysis Area

Activity Type	Alt. 2 No Action	Alt.1	Alt.3	Notes
Total potential habitat	14,645			
Regeneration[1] Commercial thin[2] Subtotal	 0	222 40 262	287 51 338	Regeneration units and a commercial thin unit harvest potential habitat and would limit suitable habitat development for 20 to 50 years
Intermediate and Understory thinning[3]	0	1,047	1,050	Treatments would move potential habitat into suitable habitat conditions with design criteria
All Harvest Acres Total	0	1,309	1,388	
Prescribed Burn units[4]	0	1,407	936	Treatments would move potential habitat into suitable habitat conditions with design criteria
Total Activity In Potential Habitat	0	2,716	2,324	

Old Growth

The direction in the 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 that could kill the old growth trees, should be considered for treatments (FS-GDL-VEG-01). The focus of the proposed old growth treatments is within the dry site cover types and south and west facing slopes with the purpose to lessen the threat of stand removal by wildfire and insects, maintain the integrity of the stand by lessening understory competition, and favor large diameter trees. See the Old Growth section for more detail. Maintenance and improvement of old growth would be consistent with FW-DC-WL-11. Not all of the old growth acres shown in Sensitive Species Table 16 are identified as potential flammulated owl habitat, but the proposed treatments would improve conditions for those species such as the flammulated owl that are adapted to open forests with large trees. Therefore, the proposed treatments would also be consistent with FW-DC-WL-19.

Sensitive Species Table 16. Proposed Vegetation Management in Old Growth stands located in the Warm/Dry Biophysical Setting.

Unit	Activity Type	Alternative 1 OG Acres in Unit	Alternative 3 OG Acres in Unit	VRU	Biophysical Setting of Old Growth	Dominant Cover Type
12	Understory Thin	69	69	2s	Warm/Dry	PP/DF
16	Underburn	352	133	3	Warm/Dry	PP/DF/WL
50	Underburn	274	274	2s	Warm/Dry	PP/DF/WL

81	Underburn	14	0	3s/7s	Warm/Dry	PP/DF
93	Underburn	42	0	2s	Warm/Dry	PP/DF
105	Understorythin	3	0	3	Warm/Dry	DF/WL
	Total	754	476			

Summary of proposed treatments in general forest and old growth

All action alternatives would result in a trend towards Forest Plan desired conditions for the drier habitats. 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, although regeneration and commercial thin would delay development of suitable characteristics.

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. Design criteria for timber harvest would minimize potential impacts to flammulated owls. No flammulated owl nests are known to occur within the analysis 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. A general wildlife design criteria would protect known flammulated owl nests. 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.

Spring burning in the drier habitat types would occur when conditions are suitable. 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 analysis 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 analysis 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. In addition, this is where the effects of the proposed activities would occur and could have effects to the species. 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 analysis area. However, there are no apparent conditions adjacent to the analysis area that would cumulatively contribute negative effects to flammulated owl habitat or use within the analysis 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.

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

Past Actions

Over the past 75 to 100 years, low-elevation timber harvesting has contributed cumulatively to the reduction or alteration of flammulated owl nesting and foraging habitat. These timber harvests typically removed or reduced the large diameter ponderosa pine and often thinned the understory affecting nesting, roosting, and foraging habitats. Stands thinned too much also allowed for increased predation on this small owl by larger owls, such as the great horned.

Another forest management activity that has contributed both positively and negatively to flammulated owl habitat is fuels reduction in the urban interface where much of the low-elevation ponderosa pine forests grow. While the reduction of ladder fuels assist in maintaining the mature canopy trees and nesting snags, it also reduces thickets of young Douglas-fir that provide roosting and escape cover for fledgling owls. Conversely, these same activities can have beneficial effects to the owl's foraging habitat. Given the current direction of the agency related to the protection of the urban interface, it is anticipated that fuels management in the urban interface will continue to have both positive and negative cumulative impacts on flammulated owl habitat where suitable habitat is present.

Alternatives 1 and 3 when considered in association with the planned activities on both public and private lands are expected to have no adverse cumulative effects that would impact the viability of the flammulated owl. Current forest management will result in an increase of stands in the large / very large size class and abundance of snags in the next 50 years. There is an increase in the amount of actual and potential flammulated owl habitat over time. Potential habitat is within the Historic Range of Variability (HRV) and remains there over the next five decades, although at the low end of the range of variability (p. 87 in ERG 2012). The proposed regeneration/commercial thin harvest would potentially set back potential habitat for 20-50 years. Those acres treated with improvement harvest, understory thinning or burning activities that occur in potential flammulated owl habitat are expected to improve the potential flammulated owl habitat. As Sensitive Species Table 15 displays, sufficient habitat within the analysis area and across the Kootenai National Forest would remain.

Alternatives 1 and 3 – 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. Those current

and foreseeable actions in the project area that were determined to be appropriate for inclusion in the analysis of environmental effects are listed at the beginning of Chapter 3.

Ongoing federal actions have been included as part of the existing condition of this project area. They include approximately 40 acres of prescribed burns per year, approximately 90 acres of pile burning with the Little Feet project, approximately 200 acres/year of pre-commercial thinning, and approximately 50 acres/year of tree planting. Prescribed fire would reduce conifer encroachment in some areas and increase the amount of open understory needed by the owl as foraging areas. All listed activities would retain the large diameter trees that could provide future nesting or roosting areas for flammulated owls. Future prescribed burning, pre-commercial thinning, site preparation (pile burning) and tree planting would be analyzed for flammulated owls and their habitat to insure that potential effects are not increased. Design criteria could be used for future underburns, pre-commercial thinning and tree planting if necessary to protect the nest site area.

The Forestwide Young Growth Vegetation Management project would treat approximately 400 to 600 acres annually, dependent on funding, using precommercial thinning or commercial thinning treatments. Stands proposed for treatment are second growth stands and would be subject to a number of criteria before they were determined eligible for treatment. The Forestwide Young Growth Vegetation Management project would have similar effects to owls as described above (retaining the large diameter trees) and are not expected to change the level of snags or down woody habitat available within the analysis area.

The Ten Lakes Travel Management Project will address over-snow and mechanized travel planning for the Ten Lakes area. The area affected by the proposal includes the Ten Lakes WSA and areas with common entrance points to the WSA. There are three main over-snow entrance points to the Ten Lakes WSA: the Grave Creek corridor; Clarence and Stahl Creek; and the Burma/Blacktail area. Over-snow travel is currently not limited. Mechanized use (primarily mountain bicycles) is also unrestricted. The alternatives contained in the Ten Lakes Travel Management Draft Environmental Impact Statement contain various amounts of over-snow and mechanized travel for the project area. A final decision has not been made for this project and the cumulative effects analysis utilizes the Proposed Action as the basis for the analysis in the Galton Vegetation Management Project. This project does not propose any harvest or activities that would affect flammulated owl habitat (see “Resource Indicators and Measures” section) and existing over-snow and mechanized use are not currently affecting this habitat. The cumulative effects of the Ten Lakes Travel Management Project in conjunction with past, present, reasonably foreseeable actions would not result in further effects to the flammulated owl or its habitat.

Approximately 100 cow/calf pairs are currently permitted to graze on the Grave Creek Allotment from May 15 to September 30. Cattle grazing can potentially affect the understory forb and shrub layers needed by the insects flammulated owls prey upon. The majority of cattle grazing occurs along the roadside corridors and harvest units. This level of grazing use is not expected to increase within the next ten years.

Climate change could have effects on the flammulated owl at a forest level and are discussed in the KNF FEIS on page 298. “If the climate becomes warmer, it would favor the vegetative conditions that flammulated owls prefer (open, ponderosa pine or dry forest habitats). Unfortunately, fire suppression has led to increased stand densities and ladder fuels. Those stands that contain larger ponderosa pine may be at a higher risk of stand replacing disturbance (fire/insects) which would reduce flammulated owl habitat. Active restoration may be useful to move towards the Desired Conditions for vegetation and historic conditions, making these stands

more resilient and able to handle disturbance. The use of fire for restoration would be the most useful tool rather than mechanical treatments due to the large acreages that can be improved/maintained with fire relatively cheaply. Changes in the timing of prey availability may also affect flammulated owls (p. 90 in USDA 1990)".

There are 26 special use permits including road access to private property. In addition, general public recreational use of the Project Area is expected to include but is not limited to hiking, camping, fishing, hunting, photography, berry picking, other forest product gathering, Christmas tree cutting, firewood gathering, driving for pleasure, mountain biking, sightseeing, wildlife viewing. Recreation is likely to increase on all land ownership types, if for no other reason than human population growth. This would increase human disturbance and potentially impact owls on all ownerships. 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, Galton'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. 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

Forest Plan

The 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 and the goals, desired conditions, objectives, standards and guidelines can be found on the noted pages in the Forest Plan.

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 analysis 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 analysis area and flammulated owls are considered to be tolerant of human activities. However design features are*

incorporated that would ensure protections for active flammulated owl nests discovered during planning or project implementation, and would ensure protection of Douglas-fir thickets in the understory for habitat. See "Project Design Features and Mitigation Measures" and "Potential Risk of Disturbance." Therefore, the project would contribute to progress toward achieving GOAL-WL-02.

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 analysis 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 project would be neutral with regard to progress toward achieving FW-DC-WL-01.*

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. *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 project would contribute to progress toward achieving FW-DC-WL-09.*

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 project would contribute to progress toward achieving FW-DC-WL-11.*

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. See response to FW-DC-WL-12.

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. *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. Both action alternatives meet this desired condition by moving the forest toward more historical conditions and maintains snag habitat. Current management promotes an increase of stands in the large/very large size class and an abundance of snags in the next 50 years. See "Potential Risk of Disturbance" and the "Direct and Indirect Effects" discussions above, also the Forest Vegetation section. Therefore, the project would contribute to progress toward achieving FW-DC-WL-12 and FW-DC-VEG-07.*

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. *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 project would contribute to progress toward achieving FW-DC-WL-19.*

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. In all, timber harvest would occur on approximately 1,309 to 1,388 acres with additional prescribed burning treatments occurring on 1,407 to 936 acres on potential flammulated owl habitat within the analysis area. See GOAL-WL-02 and FW-DC-WL-19 above, as well as the "Direct and Indirect Effects" discussion. Therefore, the project would contribute to the attainment of FW-OBJ-WL-02.*

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 analysis 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 project was designed in accordance with this guideline.*

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 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

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 to flammulated owls as part of the NEPA process and promoting conservation of and minimizing adverse impacts the species.

Statement of Findings

Alternative 2 (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 reduce suitable or potential habitat, lack of site appropriate management would continue the trend towards uncharacteristic vegetation conditions and an increased potential for high severity fires. Potential habitat for flammulated owls is available within the analysis area, however without the understory management, this habitat will continue to trend away from habitat suitable for owl use in the future in the analysis area.

Alternatives 1 and 3 may impact individuals and/or their habitat, but would not 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 the fact that: 1) prescribed fire, understory thinning and intermediate harvest prescriptions would trend towards desired conditions for the warm/dry habitat type, including an increase in the amount of ponderosa pine within the analysis 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 into a more suitable habitat category; 3) minimal potential for displacement and disturbance during implementation of project activities; and 4) potential effects would be to individuals that would not be expected to negatively impact breeding or nesting success within the analysis area.

Harlequin Duck

Summary of Conclusions

Implementation of either of Galton Vegetation 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 harlequin duck. In summary, there are very few acres of planned activities within suitable harlequin duck habitat. These limited activities will be restricted to a timeframe when outside critical use periods. It is unlikely that proposed activities would result in any increase in human related disturbance within the disturbance zone buffer.

Introduction

The harlequin duck is small sea duck that travels inland to breed in fast mountain streams on the KNF. Breeding habitat consists of 2nd-order or larger streams with high water quality and reaches with 2-7% gradients. Habitat characteristics include riffle habitat, gravel to boulder-sized substrate, forested or shrubby banks with overhanging bank vegetation, logs, rocks, islands and gravel bars. Harlequin ducks are very sensitive to human presence and disturbance, especially during the nesting season.

Regulatory Framework

Forest Plan

The 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 harlequin duck resource direction relevant to this project includes:

- FW-GDL-WL-19.

There are other Forest Plan components that provide resource direction for a range of wildlife species or habitat conditions that are not specific to harlequin ducks, but still are applicable to harlequin duck management. The full list of the plan components applicable to management of this species are found in the "Regulatory Framework Findings" section of this analysis.

Resource Indicators and Measures

Cassirer et al. (1996) completed a Conservation Assessment and Strategy for the U.S. Rocky Mountains that provides management recommendations for harlequin ducks. The overall strategy is to maintain riparian and instream habitat. Timber management recommendations include timing restrictions (from April 15 to September 5) near active areas, overstory and understory cover maintenance in the riparian area, provisions for structural components such as logs and snags, and maintenance of high water quality (sediment and bedload movement, peak flows). Road management recommendations include avoidance of new road construction near streams, minimizing stream crossings, eliminating existing pullouts or parking areas that increase access to streams, obliterating and stabilizing unnecessary roads, and eliminating road maintenance impacts to water quality and habitat. Potential threats to harlequin ducks include activities that affect riparian habitats, water yield and water quality, and that increase human disturbance during the breeding season.

Similar or additional threats were identified and incorporated into the Forest Plan analysis as key stressors (risks and threats). The key stressors identified from activities on NFS lands included: loss or degradation of habitat; disturbance at the nest site or of nesting colonies; water level fluctuation; and wetland contamination/pesticide reduction of favored insect foods. These stressors can result in habitat loss, displacement, nest abandonment, or mortality.

The Conservation Assessment (Cassirer et al. 1996) identified activities within two sight distances [a sight distance is the distance at which the riparian area is obscured from view prior to leaf out or 300 feet] of activity sites as a disturbance factor to harlequin ducks. Therefore, indicators to assess effects of proposed management activities to harlequin ducks will be 1) the number of miles and percent of suitable habitat potentially affected by proposed activities at the analysis area/planning subunit scale, and 2) number of miles and percent of suitable habitat potentially affected at the Forest level.

Sensitive Species Table 17. Resource Indicators and Measures for Assessing Effects

Resource Element	Resource Indicator	Measure	Used to Address: P/N, or Key Issue?	Source
Suitable habitat	Suitable habitat affected by proposed activity in analysis area and at Forest Level	Miles and Percent affected	No	Forest Plan FW-GDL-WL-19 harlequin duck; Conservation Plan for the Harlequin Duck in Montana
Suitable habitat	Disturbance within 300 feet of occupied streams	Treatment (acres) and activity within 300 foot disturbance zone	No	Forest Plan FW-GDL-WL-19 harlequin duck; Conservation Plan for the Harlequin Duck in Montana

Methodology

Potential harlequin duck habitat has been identified along Graves Creek and Wigwam Creek. Management activities, including road use or road management, have the potential to create disturbance if they occur near (within 300 feet) suitable streams with active harlequin duck use. Based on this information, through the use of GIS spatial data, all proposed treatment units that would occur within this disturbance zone were mapped.

Data Sources

Harlequin duck population biology, ecology, habitat description and relationships identified by research are described in Cassirer et al. (1996), Cassirier and Groves (1991), Carlson (2004), Hendricks (2000), Hendricks and Reichel (1998) Reichel and Genter (1995), and USDI, FWS (1998) and incorporated by reference. These provided guidance in evaluating potential habitat and potential effects to harlequin ducks, and are incorporated by reference.

Sources of ecological and occurrence information is available from state agencies such as Montana and Idaho Partners in Flight, and Federal agencies that have developed shorebird and waterbird conservation plans. Harlequin duck observation data and use information comes from Montana Natural Heritage Program surveys conducted on the Forest, State (MFWP) surveys conducted locally, District wildlife observation records, Forest historical data (NRIS Wildlife Database) and other agencies (MFWP).

Affected Environment

Spatial and Temporal Context for Effects Analysis

The analysis boundary for direct project impacts to individuals and their habitat includes project activities that may affect suitable habitat. For the Galton Vegetation project, suitable habitat includes portions of Grave creek and the Wigwam River (Johnson 2004). Temporal boundaries for the harlequin duck include both short-term and long-term effects. Short-term effects are those with an expected duration of a few days and are related to potential increases in human activity during implementation of the proposed activities. Long-term effects are those with an expected duration longer than a breeding season or two, and potentially for years. Examples of long-term

effects include removal of stream-side overstory stands or removal of large-downed wood from streams.

Existing Condition

Introduction

In Montana, harlequin ducks breed locally on mountain streams in the western part of the state (Reichel and Genter 1995), including the Kootenai, Flathead, Clark Fork, and Blackfoot river drainages. Scattered breeding also occurs along the Rocky Mountain front and the north edge of Yellowstone National Park (Ibid). Suitable breeding streams are somewhat uncommon but are fairly well distributed across the KNF (Anderson 2014).

Harlequin Duck Occurrence

Johnson (2004) summarizes available harlequin duck habitat across the KNF and harlequin ducks have been observed in seven of the eight planning units, including the Tobacco Planning unit. The wildlife specialist report for the Forest Plan specified that Harlequins are known or suspected to use eight streams for breeding across the KNF found in the Yaak, Kootenai, and Clark Fork river Basins. They are also suspected of breeding in a number of additional streams. In addition to breeding streams, there are several staging areas where harlequin ducks have been observed gathering prior to moving into breeding habitat.

In Montana, estimates for the number of breeding pairs range from 110 to 150-200 (Reichel and Genter 1995). The wildlife specialist report (Anderson 2014) for the Forest Plan summarizes that the current breeding pair population on the KNF is approximately 30 pairs. Single adult birds are also part of the total population, but their numbers are not known.

Description of the Analysis Area

Harlequin duck observation and monitoring data indicates that about 11.7 miles in portions of two streams (Wigwam and Grave Creek) in the analysis area provide suitable harlequin duck habitat (see project file). Another two miles of these creeks are considered probable breeding habitat with an additional 2.9 miles as potential habitat. The Fortine District has records of harlequin duck sightings on Grave Creek dating back to 1990 and as recently as 2015. Likewise, surveys conducted in Montana (Reichel et al 1997) documented successfully breeding harlequins on Grave Creek in 1996. Sightings of family groups on Grave creek since that time to the present continue to indicate successful breeding.

Environmental Consequences

Management activities, including road use or road management, have the potential to create disturbance if they occur near (within 300 feet) suitable streams with active harlequin duck use, and could result in abandonment of nest sites. Because they exhibit a strong fidelity to breeding streams (Cassirer et al. 1996), sustained disturbance (multiple seasons) has the potential to cause a permanent abandonment of the stream site.

Alternative 2 – No Action

This alternative maintains the existing condition and does not propose any activities within harlequin duck habitat. Therefore, Alternative 2 would not affect any known harlequin duck territory or habitat. No effects to harlequin ducks would be expected.

Alternatives 1 and 3 – Direct and Indirect Effects

Because harlequin ducks are tied to specific streams for breeding and susceptible to disturbance, management activities (recreation or vegetation management) that change the type or level of human access have the potential to result in habitat loss, displacement, nest abandonment or mortality. Potential stressors (risks and threats) on NFS lands include loss or degradation of habitat, disturbance at the nest site or nesting colonies, water level fluctuation, or wetland contamination

Project Design Features and Mitigation Measures

One design feature has been identified to minimize potential disturbance to harlequin ducks on lower Graves Creek, see Chapter 2 Design Features. Implementation of an understory thinning unit proposed within the 300 foot disturbance zone on lower Grave Creek would require that the thinning activity take place outside the nesting/breeding season between April 15 and September 5 to minimize disturbance during the time birds are active in this habitat. This design feature is consistent with FW-DC-WL-01 and FW-GDL-WL-19 and will be described in more detail in following effects discussion.

Potential Disturbance and Habitat Alteration

Sensitive Species Table 18 summarizes the percent of total habitat affected within the 300 foot buffer surrounding harlequin duck habitat in the analysis area by alternative. It also shows the miles of suitable habitat available in the analysis area by alternative. Alternative 2, No Action, represents the existing condition.

Sensitive Species Table 18. Miles of Harlequin Duck Habitat affected and available by Alternative

Area and Resource Indicator	Alternative 2- No Action (Existing Condition) Acres and % area affected/ miles available	Alternatives 1 and 3; Acres and % area affected/ miles available	Notes
Galton Vegetation Analysis Area Miles of Suitable habitat	0 acres 0% / 11.2 mi.	<1% / 11.2 mi.	Alts 1 and 3 include a design criteria
Forest-wide Miles of Suitable habitat	71 mi.	71 mi.	

Alternatives 1 and 3 currently propose three acres of understory thinning within the 300 foot disturbance zone of duck habitat on lower Grave Creek. This thinning is adjacent to private land and is designed to help reduce fuels on NFS lands directly adjacent to private lands. This activity would consist of slashing non-merchantable small understory trees. This effect to the habitat would be virtually un-measureable given it would equate to less than one percent of this disturbance zone, and although some understory cover would be removed, cover would still be retained in the overall stand. However timing restrictions on the activity would require that the thinning take place outside the nesting/breeding timeframe (from April 15 – September 5) to avoid disturbance during the time the birds are active in this habitat. Neither action alternative proposes prescribed burning within 300 feet of harlequin duck habitat.

The four key stressors identified in the wildlife specialist report for the Forest Plan (Anderson 2014) are affected in the following way:

1. Loss or degradation of habitat; no proposed activities will result in streambank or channel alteration that would eliminate cover or food supply. Although three acres of understory thinning is planned within the 300 feet identified as harlequin duck habitat, this thinning is less than one percent of this zone, only small understory trees would be removed and cover would still be retained in the overall stand. This activity would not be expected to affect the food supply to the stream.

2. Disturbance at the nest site or of nesting colonies; No nesting colonies or specific nest sites have been located within the known harlequin habitat. The three acres of understory thinning proposed within the 300 foot buffer along Grave Creek will not occur during the breeding season. A timing restriction will be imposed on this activity during the timeframe harlequins may use this area (see above).

3. Water level fluctuation; proposed activities are not expected to increase or decrease water levels over the natural levels seen in the harlequin habitat discussed above.

4. Wetland contamination/pesticide reduction of favored insect foods; proposed activities will not contribute to sedimentation or other types of activities that may affect the insect food base harlequins use. The 3 acres of proposed thinning will not include mechanized equipment or any ground disturbing activities that may result in sediment reaching the stream. Pesticide application is not part of this project.

Both action alternatives propose the construction of temporary roads to access timber harvest units. None of these temporary roads are within the disturbance zone of known harlequin duck habitat.

Proposed activities, including timber harvest and prescribed fire near streams that do not provide suitable habitat would have no effect to harlequin ducks.

Cumulative Effects

Introduction

The Existing Condition section describes the potential harlequin duck habitat, including existing human sources and levels of disturbance, within the analysis area. This Cumulative Effects section summarizes the past actions as well as further describes ongoing and other reasonably foreseeable contributions potentially impacting harlequin duck habitat.

Spatial and Temporal Context for Cumulative Effects Analysis

The Existing Condition section describes the existing suitable habitat for harlequin ducks within the analysis area. This includes approximately 11.7 miles of stream along portions of Grave Creek and the Wigwam River. This cumulative effects section summarizes the past actions as well as further describes ongoing and other reasonably foreseeable contributions potentially impacting harlequin duck habitat.

The boundary for cumulative effects is the planning subunits that encompass the suitable habitat found in Grave Creek and the Wigwam River (Grave and Wigwam Planning Subunits). This area would cover those activities that are likely to disturb nesting ducks along the river, as well as potential habitat impacts to nesting habitat or have impacts to favored insect foods. Currently,

there are no apparent conditions within the analysis area that would cumulatively contribute effects to harlequin duck habitat within the analysis area.

Temporal boundaries for the cumulative effects analysis would be the same as for the direct and indirect effects.

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

Past Actions

Several factors have contributed to the existing condition of harlequin duck habitat since the introduction of Europeans into the area. The elevations and therefore stream gradients most suitable for these ducks were also the most suitable for farming, cattle grazing, and associated homesteads. Past timber harvesting, cattle grazing, and associated roads have directly and indirectly degraded physical habitat elements of the duck habitat. These activities have resulted in reduction of vegetation along stretches of duck habitat, altering of streambeds, increases in fine sediment, and unnatural stream crossing that facilitate human access. Human disturbance, including recreation activities, has impacted the security values typically required for this species resulting in species avoidance and even displacement in some historical nesting reaches. The 1990's application of Forest Plan standards has resulted in management guidelines that limit harvest activities within riparian areas through RHCA protections, therefore reducing some of the habitat disturbance, especially on NFS lands. Detailed descriptions of previous vegetation management activities are found at the beginning of Chapter 3.

Alternative 2 – No Action

The No Action Alternative does not directly contribute any cumulative effects to harlequin ducks or their habitat.

Alternatives 1 and 3– 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. Those current and foreseeable actions in the project area that were determined to be appropriate for inclusion in the analysis of environmental effects are listed at the beginning of Chapter 3.

Climate change could have effects on the harlequin duck at a forest level and are discussed in the KNF FEIS on page 308: "The effects of climate change on water flows could impact harlequin habitat. Water levels could make nesting and foraging habitat unsuitable at times when they historically would have been suitable. Changes in water temperatures could alter the availability of aquatic prey species. It is difficult to predict the exact effects of climate change for harlequin ducks. It could mean a loss of suitable habitat in some areas while newly suitable habitat becomes available elsewhere. This may result in a change in harlequin distribution or abundance on the Forest. Distributional shifts are one way species respond to climate change (p. 90 in USDA 2010)".

Ongoing federal actions have been included as part of the existing condition of this project area. Pertinent actions include approximately 40 acres of prescribed burns per year, approximately 90 acres of pile burning with the Little Feet project, approximately 200 acres/year of pre-commercial thinning, continued cattle grazing on the existing Graves Creek allotment, continued road management, continued public recreation, and new residences built on private land. Prescribed fire would reduce conifer encroachment in some areas, and reduce the chances for large wildfires in the future. The effects of pile burning and precommercial thinning would be minimal as the

majority of these projects take place outside of the riparian area. The effects of cattle grazing in the Graves Creek allotment would be minimal, as the existing fencing keeps cattle out of Graves Creek. The effects of road management typically involves making sure drainage from roads is creating the least possible sediment into associated streams. Public recreation is likely to increase, as the population grows. This may increase human disturbance and potentially impact harlequin ducks. Also increased housing on private lands, especially adjacent to Grave creek, has the potential to increase disturbance and reduce habitat. Over the life of this project, these potential projects would not have the magnitude to change the effects determination to harlequin ducks from implementation of the action alternatives.

The Forestwide Young Growth Vegetation Management project would treat approximately 400 to 600 acres annually, dependent on funding, using precommercial thinning or commercial thinning treatments. Stands proposed for treatment are second growth stands and would be subject to a number of criteria before they were determined eligible for treatment. The Forestwide Young Growth Vegetation Management project would be minimal as the majority of these projects take place outside of the riparian area.

The Ten Lakes Travel Management Project will address over-snow and mechanized travel planning for the Ten Lakes area. The area affected by the proposal includes the Ten Lakes WSA and areas with common entrance points to the WSA. There are three main over-snow entrance points to the Ten Lakes WSA: the Grave Creek corridor; Clarence and Stahl Creek; and the Burma/Blacktail area. Over-snow travel is currently not limited. Mechanized use (primarily mountain bicycles) is also unrestricted. The alternatives contained in the Ten Lakes Travel Management Draft Environmental Impact Statement contain various amounts of over-snow and mechanized travel for the project area. A final decision has not been made for this project and the cumulative effects analysis utilizes the Proposed Action as the basis for the analysis in the Galton Vegetation Management Project. This project does not propose any harvest or activities that would affect harlequin duck habitat (see “Resource Indicators and Measures” section) and existing over-snow and mechanized use are not currently affecting this habitat. The cumulative effects of the Ten Lakes Travel Management Project in conjunction with past, present, reasonably foreseeable actions would not result in further effects to the harlequin duck or its habitat.

Regulatory Framework Findings

Forest Plan

The 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; and goals, desired conditions, objectives, standards, and guidelines can be found on the noted pages in the Forest Plan.

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. *Both action alternatives meet this goal by enacting timing restrictions that would limit the timing of harvest activities in key habitats to timeframes outside the major use periods of the harlequin. See “Project Design Features and Mitigation Measures”. The project would contribute towards achieving Goal-WL-02.*

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. *Both action alternatives enact timing restrictions*

that would limit the timing of harvest activities in key habitats to timeframes outside the major use periods of the harlequin. See "Project Design Features and Mitigation Measures". Therefore, the project would be neutral with regard to progress toward achieving FW-DC-WL-01.

FW-DC-WL-10: A mosaic of aquatic and riparian habitats, with a low level of disturbance is available for associated species. *Both action alternatives identified a design feature that would ensure protection for harlequin ducks. It would limit the timing of harvest activities within the 300 foot disturbance zone adjacent to Graves Creek to timeframes outside of the major use period for the harlequin duck. Therefore, the project would be neutral with regard to progress toward achieving FW-DC-WL-10.*

FW-GDL-WL-19: Harlequin Duck. Management activities should avoid or minimize disturbance near known nests based on the best available information. *A design feature was identified to avoid and minimize potential disturbance associated with proposed activities. Both action alternatives meet this goal by enacting timing restrictions that would limit the timing of harvest activities in key habitats to timeframes outside the major use periods of the harlequin duck. This was based on District records and known use of Graves Creek by harlequin ducks. See "Methodology", Data Sources". Existing Condition", and Direct and Indirect Effects" discussions. Therefore the project was designed in accordance with this guideline.*

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 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 potentially impact individuals, 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 KNF has been managing habitat for harlequin ducks for a number of years as a sensitive species. The principle mechanism to protect harlequin duck would be through implementation of riparian buffers (riparian habitat conservation areas), with a timing and distance restriction during the nesting and brood rearing timeframes. The Forest Plan requires riparian buffers on all perennial streams (generally for a distance of 300 feet or more on fish bearing streams and 150 feet or more on non-fish bearing) (See Water Resources Section). In the absence of annual surveys to determine if harlequin duck activity is occurring, these standard buffer restrictions are implemented on all streams that provide known and potential breeding habitat for harlequin ducks. The 1987 Forest Plan direction, including incorporation of Inland Native Fish Strategy (INFISH) guidelines, appears to be adequate to protect habitat for this species. As described in the wildlife specialist report (Anderson 2014) for the Forest Plan, the direction provided in the Plan would aid in maintaining or improving habitat conditions for harlequin ducks. In addition to the Forest Plan Goal-WL-02, FW-DC-WL-01, FW-DC-WL-10, and FW-GDL-WL-19 described above under "Forest Plan Findings", FW-DC-GRZ-01 states grazing will be done sustainably and vulnerable resources, such as riparian areas would be protected. In addition FW-DC-AR-07 states that the desired condition would be for a transportation system that would be environmentally compatible, and would have minimal impacts on resources such as sensitive species. Consequently, road impacts on harlequin ducks and riparian/stream habitat would be minimized.

Statement of Findings

Alternative 2 (No Action) would have no impact on harlequin ducks or their habitat. This determination is based on the lack of action.

Alternatives 1 and 3 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 harlequin ducks. This determination is based on: 1) the enacting of timing restrictions which would avoid or minimize the potential for project related disturbance, 2) the unlikelihood for any increase in human related disturbance within the disturbance zone buffer resulting from proposed activities, and 3) the very limited amount of habitat that may be influenced by the proposed activities.

Townsend's Big-Eared Bat

Summary of Conclusions

Alternative 2 (No Action), due to its lack of action, would have no impact on bats or their habitat.

Alternatives 1 and 3 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 bat. Activities would maintain the characteristics of riparian and old growth habitats as well as encourage the trend towards the desired vegetative conditions within the analysis area. The creation of openings and edge habitat would improve foraging opportunities in treated areas for Townsend's big-eared bats. Activities would have no impact to key roosting or hibernacula associated with caves, mines or buildings, however displacement from potential summer roosting sites in snags may occur.

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.

Regulatory Framework

Forest Plan

The 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 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

There are many stressors (risks and threats) affecting bats, however many of these are outside of USFS control including those activities that occur on non-NFS lands (see the wildlife specialist report for the Forest Plan, Anderson 2014). Some, such as climate change, may have impacts on NFS lands but are not completely within the Forest's ability to stop or reduce all the impacts. The wildlife specialist report for the Forest Plan (Ibid) described the main threats to bats, however only those applicable to this projects were analyzed in the following section. The main Forest Service management activities focus around activities that could cause disturbance or habitat changes to day roosts, nursery colonies, or hibernacula (caves, mines, old buildings).

Methodology

Old growth stands, which can be used for summer roosting, were identified using the Kootenai National Forest Old Growth Inventory.

Data Sources

Townsend’s big-eared bat population ecology, biology, habitat description and relationships identified by research are described in the following: Christy and West (1993), Thomas and West (1991), Reel et al (1989), Perkins and Schommer (1991), Kunz and Martin (1982), Montana Natural Heritage Program (1993), Ross (1967), Whitaker et al (1977), and 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.

Bat occurrence data comes from recent District wildlife survey records and Forest historical data (NRIS Wildlife) and other agencies (MNHP).

Affected Environment

Spatial and Temporal Context for Effects Analysis

The analysis boundary for direct effects to individuals and their habitat is the Galton Vegetation 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 bats located in temporary summer roosts. The boundary for indirect effects is the analysis 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 the Northern Region bat survey program (Lenard et al. 2009) have documented the species on the Kootenai National Forest, and within all planning units (Johnson 2004).

In addition to forest-wide acoustic surveys and mist-netting efforts, the KNF mineral's program to install bat-compatible grates on abandoned mines for human safety has also documented individuals. A survey conducted by the Libby Ranger District in 2007 in late September documented a single Townsend's big-eared bat utilizing a mine adit as a hibernaculum. Another suspected hibernaculum was documented on the Cabinet Ranger District during late season installation of a bat gate due to the presence of three Townsend big-eared bats.

No large populations utilizing 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

MNHP acoustic surveys and monitoring data on the Forest indicate the Townsend's big-eared bat occurs on the Fortine Ranger District, but no roosting, hibernacula or maternity sites have been documented in the analysis area.

Description of the Analysis Area

After reviewing Fortine District records and mineral maps, two inactive mine adits were identified (Project File). Bat gates have been installed on both of these inactive mine adits, as much for human safety concerns as to maintain potential bat habitat. It is suspected that the use of these sites would be limited to summer roost sites because visual inspections of the entrances show they've collapsed just past the entrances. 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 analysis area

As these bats have the potential to roost in tree cavities (Perkins and Schommer 1991, MNHP 1993), the larger-diameter snags or trees with cavities in the area could be used for summer roosting. 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 (Fellers and Pierson 2002). As discussed in the Old Growth section of this document, approximately 19,065 acres of the forest habitat within the analysis area is old growth but biophysical settings in the warm/moist range and within VRU 5 where western red cedar has potential to occur have limited distribution in the analysis area (see Old Growth section). However, old growth stands and the remaining timbered habitat provide potential for roosting habitat in the form of large snags with cavities, as well as abundant foraging habitat across the forest landscape.

Big-eared bats are known to feed along forest edges, and can be associated with either dry or wet type coniferous forests. The species show a preference for old growth forest for roosting habitat

(Thomas and West 1991) but 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). Young and mature forests are used for feeding (Ibid), with primary foraging areas near lakes (Grindal 1996). Based on this information, these species could occur in the analysis area, and more specifically, within the larger drainage bottoms such as Clarence and Grave Creeks (Hendricks et al 1995; 1996).

Environmental Consequences

Alternative 2 – No Action

Under Alternative 2, no activities are proposed, and no bats would be directly disturbed by any timber harvest or associated slashing and/or under burning. No direct effects to Townsend's big-eared bats would be expected. Plant succession would continue, with increasing canopy closure and increasing density of understory conifers. This plant succession may have an indirect effect on bats since they forage in open areas within forests and the increasing density of understory conifers may decrease the available habitat for prey species. It may also impede flight maneuvers needed for foraging. If a wildland fire was to occur, potential roosting in the form of snags could be both lost and created. No direct effect on key roosting habitat such as caves, mines, would occur in the analysis area. There would be no expected change in the existing condition with implementation of Alternative 2 in the short-term. On NFS lands, no direct effect to cavity habitat would occur.

Alternatives 1 and 3– 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

Project design criteria in Chapter 2 includes maintaining snag habitat in harvest units.

Preferred Hibernacula or Roost Sites

There are no caves, mines, or tunnels present in the analysis area that would provide the most suitable habitat for a winter hibernacula or maternity roost. As described previously, it is suspected any use of the two inactive gated adits would be limited to summer roosting due to internal collapse of the adits. Some old buildings are likely present on private land within the analysis area that may provide summer roost opportunities; however, buildings found on private lands would not be affected by proposed activities. Forest Service management activities that may impact bats or their habitat, and the effects of these activities are discussed below:

- Disturbance of roosting sites, especially hibernacula and maternity sites, primarily by recreational activities in or near caves but also from mining, road construction and any other activities near roosts (Idaho conservation effort 1995 in Wisdom et al. 2000, page 310).

- Habitat degradation: alterations and disturbances of any structures used for day roosts, nursery colonies, or hibernacula (caves, mines, old buildings) could affect the persistence of individual colonies (Wisdom et al. 2000).

No activities are proposed near the abandoned mine adits. Bat gates have been established on these openings. Potential roosting habitat within these areas would not be disturbed. Any potential roosting habitat provided by rock outcrops (crevices) could be affected by the smoke from prescribed burns, which could cause temporary displacement. This displacement would be temporary and would be site specific, only potentially affecting individuals. No long or short-term effect to this habitat is expected. 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

The following Forest Service management activities included as part of this alternative, may impact bats or their habitat (indirect effects) and cause disturbance, roost abandonment, or mortality. The effects of these activities are discussed below:

- Timber harvest directly reduces the availability of roost sites (snags) and indirectly reduces prey populations due to changes in forest composition and structure.
- Fire (both planned ignitions and natural unplanned ignitions) also reduces roost site availability, but in turn can produce additional roosting sites, or direct mortality; long-term fire suppression may alter the vegetative community, interrupt snag recruitment and increase fire severity.
- Road and right-of-way construction could result in the direct removal of snag or cliff habitat, as well as the additional loss over time of snags along open roads due to fuel wood cutting.

Under Alternatives 1 and 3 regeneration and improvement harvest activities have the potential to disturb or reduce day roosting habitat (trees and snags with cavities or thick bark). The potential for reduction in snags was disclosed in the Snag and Down Woody resource section. Improvement harvests that open up suitable habitat or edge habitat created, may improve foraging opportunities for bats that use the area. Underburning could both reduce and create snag habitat. Disturbance or mortality of bats could occur if bats were using a snag that was cut down. Displacement could occur during prescribed burning. No new roads or right-of-ways would be built in either Alternative. Affects would be site-specific, affecting individuals rather than colonies, and are not likely to affect the viability of sensitive bat species.

The maintenance of old growth habitat would provide large-diameter tree and snag habitat through time. Proposed vegetation management within old growth are designed to maintain the integrity of the stands by lessening understory competition and favor large diameter trees. 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. The open habitat conditions, corridors, and edge provided through the proposed treatments 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.

Foraging habitat

Townsend's big-eared bats are considered to be terrestrial foraging habitat generalists, but they do appear to prefer riparian and forest edges for foraging as these habitats provide more prey opportunities and greater maneuverability. One unit of fuel reduction is found adjacent to private land and the riparian area in Grave Creek. This activity would retain riparian site characteristics where found in this unit. This would be consistent with the 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).

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 in 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 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 are designed to maintain the integrity of the stand by lessening understory competition and favor large diameter trees (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 and a mosaic of habitat types within the larger landscape which would provide more forage and movement opportunities for Townsend's big-eared bats.

Cumulative Effects

Introduction

The "Existing Condition" section describes the existing suitable habitat within the analysis 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 analysis 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).

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.

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

Past Actions

Past and present activities and natural occurrences that have contributed to the cumulative effects on sensitive bat species or their habitats include timber harvest, wildfires, wildfire suppression, and the sealing of caves or mines. 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 are found in the project area, but two semi-collapsed gated non-active mine adits are present. These are suspected to only support summer roosting. By gating the adits, indiscriminate human access has been prevented thereby providing for both human safety and potential bat use. Harvest has occurred in the project area since the 1950s. 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. The variety of past timber harvests and wildfires have both reduced potential bat roosting habitat but also likely provided additional foraging areas for this species. Wildfires have also created snags suitable for roosting, even nesting for some bat species, as the suppression of wildfires has hampered this process. In general, the combination of these activities and processes are thought to have both created and reduced bat habitat and have had negligible cumulative effects on sensitive bats except those that have affected old growth or late-successional forest stands, where an abundance of summer roosting habitat is typically available. For more information on the cumulative effects to the old growth and snag resources, please refer to those sections. Detailed description of previous vegetation activities are found at the beginning of Chapter 3.

Alternatives 1 and 3 – 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. Those current and foreseeable actions in the project area that were determined to be appropriate for inclusion in the analysis of environmental effects are identified at the beginning of Chapter 3.

Ongoing federal actions have been included as part of the existing condition of this project area. They include approximately 40 acres of prescribed burns per year, approximately 90 acres of pile burning with the Little Feet project, approximately 200 acres/year of pre-commercial thinning, and approximately 50 acres/year of tree planting. Vegetative conditions, under both action alternatives, would be maintained or improved for bats in the long-term. Improvement harvests that open up suitable habitat or edge habitat created, may improve foraging opportunities for bats that use the area. It is expected that some avoidance and temporary displacement could occur when prescribed burns are completed. This disturbance would be temporary in nature, with the prescribed burns planned to occur over a 10+ year time frame and would have many acres of undisturbed habitat that would be available adjacent to activities during that time.

The Forestwide Young Growth Vegetation Management project would treat approximately 400 to 600 acres annually, dependent on funding, using precommercial thinning or commercial thinning treatments. Stands proposed for treatment are second growth stands and would be subject to a number of criteria before they were determined eligible for treatment. The Forestwide Young Growth Vegetation Management project would have similar effects to bats as described above for precommercial thinning and are not expected to change the level of snags or down woody habitat available within the analysis area.

The Ten Lakes Travel Management Project will address over-snow and mechanized travel planning for the Ten Lakes area. The area affected by the proposal includes the Ten Lakes WSA and areas with common entrance points to the WSA. There are three main over-snow entrance points to the Ten Lakes WSA: the Grave Creek corridor; Clarence and Stahl Creek; and the Burma/Blacktail area. Over-snow travel is currently not limited. Mechanized use (primarily mountain bicycles) is also unrestricted. The alternatives contained in the Ten Lakes Travel Management Draft Environmental Impact Statement contain various amounts of over-snow and mechanized travel for the project area. A final decision has not been made for this project and the cumulative effects analysis utilizes the Proposed Action as the basis for the analysis in the Galton Vegetation Management Project. This project does not propose any harvest or activities that would affect any known bat hibernacula habitat (see "Resource Indicators and Measures" section) and existing over-snow and mechanized use are not currently affecting this habitat. The cumulative effects of the Ten Lakes Travel Management Project in conjunction with past, present, reasonably foreseeable actions would not result in further effects to the Townsend's big-eared bat or its habitat.

Approximately 100 cow/calf pairs are currently permitted to graze on the Grave Creek Allotment from May 15 to September 30. Overgrazing could alter vegetation, which in turn could alter the invertebrate population (insects that bats eat). The current number of cows currently allowed is based on a formula that takes into account the available forage of the area and is designed to maintain vegetation levels in a healthy state. The majority of the forage in this allotment is provided along roadsides, which leaves much of the area in an ungrazed state. This level of use is not expected to increase within the next ten years.

Climate change could have effects on the Townsend's Big-eared Bat at a forest level and are discussed in the KNF FEIS on page 321: "A changing climate may impact the suitability of habitat and alter prey abundance. As temperatures and moisture regimes change, the peak abundance of insects may shift (p. 90 in USDA 2010). This may affect the abundance of prey during key periods such as when female bats are caring for their young. Surface temperature changes may change the interior temperatures of caves and abandoned mines due to airflow into the caves. As bats are selective in the microclimates in which they will roost, this may cause bats to shift their use elsewhere inside caves/mines or abandon them altogether. Riparian areas host an abundance of insects, in addition to water for bats, and climate change could alter the quantity/quality of this kind of habitat."

There are 26 special use permits including road access to private property. In addition, general public recreational use of the project area is expected to include but is not limited to hiking, camping, fishing, hunting, photography, berry picking, other forest product gathering, Christmas tree cutting, firewood gathering, driving for pleasure, mountain biking, sightseeing, wildlife viewing. Recreation is likely to increase on all land ownership types, if for no other reason than human population growth. This would increase human disturbance and potentially impact bats on all ownerships.

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 action alternatives.

Regulatory Framework Findings

Forest Plan

The 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, with the goals, desired conditions, objectives, standards, and guidelines found on the noted pages in the Forest Plan.

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). *Action Alternatives 1 and 3 would harvest in old growth stands but would not modify characteristics of the stand to the extent that the stand would no longer meet the definition of old growth. Availability and amount (acreages) of old growth within the analysis area would not be affected with implementation of either action alternative. The project would comply with FW-STD-VEG-01.*

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 Townsend's big-eared bats through the creation of open and edge habitats. Potential summer roosting sites in the gated inactive mine adits would not be impacted by project activities, and therefore no design features have been currently identified to minimize disturbance to bats. See the "Direct and Indirect Effects" discussion. The project would contribute to progress toward achieving GOAL-WL-02 by perpetuating and promoting habitat suitable for Townsend's big-eared bat.*

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 would be no impact to the gated mine adits located within the analysis area. Project activities would not be expected to result in disturbance to individuals at these sites. See "Preferred Hibernacula or Roost Sites." Therefore, the project would contribute to progress toward achieving FW-DC-WL-01.*

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 project would contribute to progress toward achieving FW-DC-WL-10.*

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 is designed to maintain current old growth attributes. The outcome would be the maintenance of all old growth tree structure, function and health in the treated areas which would continue to provide both roosting and foraging opportunities for the Townsend big-eared bat. Potential*

disturbance would be limited to short-term displacement during activity, with only a limited amount of old growth affected compared to the total amount available within the analysis area (see Old Growth section, and "Old Growth Habitat and Other Potential Roost Sites." Therefore, the project would contribute to progress toward achieving FW-DC-WL-11.

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 project would contribute to progress toward achieving FW-DC-WL-12.*

FW-DC-WL-15: Caves, mines, and snags with loose bark provide areas for roosting, hibernation, or maternity sites for various species of bats (refer to FW-DC-VEG-07, FW-GDL-VEG-04, and FW-GDL-VEG-05). *Both action alternatives meet this guideline by moving the forest toward more historical conditions for cover and natural disturbance processes. No management is proposed that would affect known maternity or hibernacula sites. No activities are proposed near the abandoned mine adits. There would be no impacts to the potential summer roosting sites located at the two gated inactive mine adits. See "Preferred Hibernacula or Roost Sites." Snags would be retained within treatment units for wildlife use, where available and not a safety hazard to the loggers. Both action alternatives meet this guideline by moving the forest toward more historical conditions for cover and natural disturbance processes. See "Old Growth Habitat and Other Potential Roost Sites" Therefore, the project would contribute to progress toward achieving FW-DC-WL-15.*

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 project would contribute to progress toward achieving FW-DC-WL-19.*

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. *The two inactive mine adits have been previously gated. The sites are suspected summer roosts. The project would not impact these adits or potential suitability for bat use. See "Preferred Hibernacula or Roost Sites." Therefore, the project would be neutral with regard to progress toward achieving FW-DC-WL-01.*

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."*

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. *The proposed project would not impact the two existing inactive gated adits. Any potential roosting habitat within crevices provided by rock outcrops could be affected by the smoke from prescribed burns, which could cause potential displacement. The displacement would be temporary and site specific. See "Preferred Hibernacula or Roost Sites." The project was designed in accordance with this guideline.*

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 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 2 would have no impact to Townsend's big-eared bats or their habitats. This determination is based on: 1) no direct change in the current availability of roosting and hibernacular habitat would occur, and 2) foraging habitat and potential roosting habitat would remain distributed across the analysis area and across the Kootenai National Forest.

Alternatives 1 and 3 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 action alternatives would not affect key roosting or hibernation habitat associated with caves and mines, or any buildings and no impacts to the species natality or mortality rates are expected; 2) a wide diversity of vegetation and habitat characteristics would result from the proposed actions improving foraging opportunities in the drier habitat types; 3) a forested environment providing potential snag habitat and suitable for foraging would remain distributed across the analysis area and Forest-wide; 4) the potential for mortality is low, and 5) the potential effects would be to individuals rather than colonies.

Gray Wolf

Summary of Conclusions

Alternative 2, due to lack of action, will have no impact on the gray wolf or its habitat.

Alternatives 1 and 3 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. In summary, wolf populations are at sustainable levels, prey habitat is improved with the implementation of these alternatives and habitat security would not change with the implementation of timing restrictions if necessary.

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.

Regulatory Framework

Forest Plan

The 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:

- FW-DC-WL-08
- FW-DC-WL-18
- FW-GDL-WL-18

There are other 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 (USDI, FWS 1987), and also within the wildlife specialist report (Anderson 2014) for the Forest Plan which identified them as key stressors (risks and threats) for the gray wolf:

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). FS management actions that affect habitat conditions for big game

(prey base) including timber harvest, prescribed fire, and fire suppression. 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 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 (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 (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 denning and rendezvous sites are unoccupied would protect these locations from activity caused disturbance during their period of use. USFS activities in the past that may have had direct or indirect impacts on wolves causing abandonment of dens and/or young was enabling human access to dens and rendezvous sites during critical life history periods. 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 specifically associated with road access and 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 Forest Plan direction. Specifically where wolf use overlaps with grizzly bears and Forest objectives 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., MA1b,c-DC-WL-01 and MA5a,b-DC-WL-01).

Sensitive Species Sensitive Species Table19 below summarizes the resource indicators and measures for the gray wolf analysis.

Sensitive Species Table 19. 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 or improve big game habitat	No	Forest Plan FW-DC-WL-08
Denning and Rendezvous Sites	Human Access and Activities occurring at/ near known den and rendezvous sites	Potential for disturbance and displacement of wolves during sites period of use?	No	Forest Plan FW-DC-WL-18 and FW-GDL-WL-18

Resource Element	Resource Indicator	Measure	Used to Address: P/N, or Key Issue?	Source
Secure Habitat	Human Access/Motorized Management	Changes in human access as influenced by motorized access?	No	Contributed by Forest Plan FW-OBJ-WL-02, FW-STD-WL-02, FW-GDL-WL-10

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. 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 USDI, FWS (1987), MFWP (2003, 2004), Hanauska-Brown et al. (2012) and USDI FWS (2011b). Also, information for the northwest Montana recovery area is provided by the Montana Gray Wolf Conservation and Management Annual Reports. The most current information for this recovery area is provided by the Montana Gray Wolf Conservation and Management 2014 Annual Report (Bradley et al 2015) and is incorporated here by reference. These provided guidance in evaluating potential habitat and potential effects to wolves, and are incorporated by reference.

Wolf use and occurrence data comes from recent Fortine District wildlife observation records, Kootenai National Forest historical data (NRIS Wildlife), and other agency records and monitoring reports (USFWS, MFWP).

Affected Environment

Spatial and Temporal Context for Effects Analysis

The gray wolf is territorial in most areas. Territories are defended by howling, scent-marking, and physical defense against wolf interlopers. Wolf packs occupy rather specific territories. Montana wolf pack territories average around 200 square miles in size (Bradley et al., 2015). The number of individuals in a pack and the availability of prey determine territory size; packs dependent on migratory prey tend to have the largest territories (USDI et al 2001). Daily pack movements vary and distances traveled are greater in winter than in summer. Lone wolves cover larger areas than packs and their use areas may overlap two or three pack territories (Mech 1973, Fritts and Mech 1981). Because wolves can occupy large territories, cover more ground in the winter, than summer, and because the Galton Vegetation project has proposed activities in four different planning subunits with two known wolf packs, the analysis area boundary for direct and indirect effects to gray wolves and their habitat will be these four subunits within the Galton Vegetation Project area are: Ksanka, Wigwam, Grave and Murphy planning subunits. The Stillwater planning subunit is also located within the project area but no analysis will be conducted on the planning

subunit or the suitable wolf habitat that exists there because no management activities are proposed in this area. Contribution toward viability is assessed at the Forest 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. 2012); 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 (USDI FWS 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.

At the end of 2014 there were at least 134 wolf packs in all of Montana, with at least 34 meeting breeding pair criteria. These packs contained a minimum estimate of 554 wolves (Bradley, et al. 2015). In northwest MT, the 2014 minimum wolf count decreased to 428 from 476 in 2013. This area includes the Kootenai National Forest. There are currently 27 packs (5 breeding packs) using the KNF for all or part of their territories. These packs had a total of 72 known wolves at the end of 2014 (Ibid) with no count numbers on several packs. There were 65 known mortalities in the KNF packs this past year from various causes including human caused harvest and control efforts. Due to the hunting and trapping success of 2013, wolf packs were difficult to monitor in 2014 (Personal communication with Kent Laudon, 2014). Pack members, sizes, and territories were significantly different than in previous years. Because of increased wolf numbers resulting in an increase in workload, breeding pair status in existing packs, and new pack verification are listed as the minimum number known or may be listed as a suspected pack, but could not be verified for many packs (Ibid).

Gray Wolf Occurrence

There are two packs known to use the Galton Vegetation analysis area. The Ksanka pack (Ksanka planning subunit) produced pups in 2014, using the historic den site in 2014 (Pers. Communication with Kent Laudon, 2015). The Murphy Lake pack has historically used the southern end of the project area within the Murphy subunit. At least 4 pups were confirmed from this pack (Pers. Communication with Kent Laudon, 2015). There was also use documented in the Grave planning subunit in 2014. But because neither of these packs is collared, there is no way to confirm whether this use is from a new pack, or is one of the existing packs (Pers. Communication with Kent Laudon, 2015). The Wigwam subunit does not have a pack that is known to den in the area. However there are sightings and sign reported every year. Without radio collars, there is no way to confirm whether use in the Wigwam subunit is the Ksanka pack, a new pack, or a Canadian-based pack with a home range that includes the Wigwam area in the U.S and Canada. It is expected that lone wolves travel throughout the analysis area.

Description of the Analysis Area

The existing condition and affects to resource measurement indicators (key stressors) are summarized below:

Factors affecting habitat conditions for big game (Year-Round Prey Base)

The analysis area supports both summer and winter habitat for most big game species. The Wigwam subunit occurs at high elevations and is the only subunit in the analysis area that supports only summer habitat. Whitetail and mule deer are the most abundant big game species found in the Wigwam subunit, however elk, moose, and bighorn sheep are also found. The lower elevations of the Murphy, Grave, and Ksanka subunits provide important whitetail habitat while the upper elevations of these subunits provide mule deer winter range areas. Together, this mix of species and distribution of habitat provide a good year-round prey base for wolves. The whitetail deer is one of the key prey items for the gray wolf on the Fortine district. Cover levels are very high in all subunits and range from 93% cover up to 97% cover. Recent management actions have been limited in the majority (higher elevations) of the analysis area because of Forest Plan non-motorized/wilderness study area designations and grizzly bear motorized standards. These designations and standards have limited road building and harvest activities in these areas.

Human access to dens and rendezvous sites during critical life history periods

Sensitivity to disturbance at den sites and subsequent abandonment varies greatly among individual wolves. One incident of human disturbance at the den may cause abandonment for some wolves, while other wolves will tolerate some human disturbance (Thiel et al 1998) and may not abandon dens unless there are repeated or severe incidents of disturbance (Claar et al 1999). One recommendation for protection of den sites from human disturbance includes restricting human access within a 1.5 mile radius of an occupied den from 4 weeks prior to whelping to the end of denning activity. Rendezvous sites should be similarly protected (Frederick 1991). Den and rendezvous sites can also be protected by enacting timing restrictions on proposed activities within the denning/rendezvous site areas. These restrictions would limit operating periods to the fall or winter seasons when these sites are unoccupied. There are known den sites within the Galton analysis area. The Ksanka pack has a den site known from past years within the Ksanka subunit, and was used in 2014. The Murphy Lake pack has a den site within the Murphy subunit. There is one known rendezvous site for the Ksanka pack and it is located on private land. The Murphy Lake pack has no known rendezvous sites within the Murphy subunit. Rendezvous sites for this pack are located outside the analysis area. Currently, secure denning and rendezvous sites do not seem to be a limiting factor for these packs.

Secure Habitat and Road Access

Human disturbance and accessibility of wolf habitats (i.e. road densities) are the principle factors limiting wolf recovery in most areas (Leirfallom 1970; US Fish and Wildlife Service 1978; and 1987; all in Frederick 1991 and Thiel 1978). 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. The elk security analysis during hunting season, is a good indicator of how secure the habitat is for elk as well as wolves. Elk security was evaluated for the planning subunits that are found within the analysis area. High levels of security habitat are provided in the Wigwam and Grave planning subunits. The Murphy planning subunit was impacted by wildfires in 2015 which led to a reduction in generally forested secure habitat from moderate to low levels. However, the area impacted by the fire is primarily not accessible by open roads and much of the area will continue to provide security. Overall these three planning units providing moderate to high security levels meet the desired conditions for security habitat in the Forest Plan. Recent management actions have been limited in the majority (higher elevations) of the analysis area because of Forest Plan non-motorized/wilderness study area designations and grizzly bear motorized standards. These designations and standards have limited road building and harvest activities in these areas. The Ksanka planning subunit provides a very limited amount of security habitat due to the amount of private land and open roads. See the Grizzly Bear and Elk analyses for more detail.

The analysis area contains Mas 1b, 1c, 3, 5a, 5b, and 6. MAs 1b includes the Ten Lakes Recommended Wilderness, 1c includes the Ten Lakes Wilderness Study area, MA3 are Special Areas, along with MA 5a non-motorized year-round backcountry, and MA 5b, motorized year-round backcountry, and MA 6 or general forest which consists of large areas with roads, trails and past and ongoing activities designed to actively manage the forest. The backcountry management areas are large and remote and contribute to secure habitat for wildlife (MA5a,b-DC-WL-01). Motor vehicle use does not occur within MA5a and it contributes to the effectiveness of security habitat within that management area.

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, 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 2 – No Action/ Existing Condition

No timber harvest or prescribed burns are proposed in this alternative. No high elevation openings from prescribed burns would occur with this alternative. As a consequence, no new forage would be created for deer within summer range, also limiting the successional stages available to species. This alternative would maintain current conditions for prey habitat and human access within the planning subunits, therefore maintaining the existing level of habitat security. It also does not affect the existing denning or rendezvous sites in the analysis area.

Alternatives 1 and 3 – 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). This design feature would enact timing restrictions that would limit the timing of harvest and burning activities to the non-denning and non-pup rearing periods within 1.5 miles of active den or rendezvous sites. 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.

Potential affects to measurement indicators (known stressors) due to implementation of either Alternative 1 or 3 are summarized below:

Factors affecting habitat conditions for big game (Year-Round Prey Base)

Both action alternatives would increase the amount of forage levels through harvest and burning activities across all subunits making up the analysis area. This would improve summer range for mule deer and other ungulates especially in higher elevations. Both action alternatives would result in an improvement of habitat conditions for summer range for deer, with Alternative 1 increasing early seral areas (summer deer and elk forage) more than Alternative 3. Deer provide the main prey base for wolves within the Galton analysis area. Therefore, prey conditions for wolves would be maintained and improved with implementation of either action alternative.

Human access to dens and rendezvous sites during critical life history periods

Both action alternatives propose harvest activities and prescribed burns within 1.5 miles of past den sites. A design feature, as discussed above would be included that would enact timing restrictions within 1.5 mile radius of an occupied den from 4 weeks prior to whelping to the end of denning activity. This would limit activities (timing restrictions) within this area to late summer, fall or winter. Because the same den sites/ rendezvous sites are not always used every year, use of these areas would be confirmed in the spring prior to any proposed actions occurring within these areas. If new den sites or rendezvous sites were located prior to or during planned activities, activities would be temporarily suspended and if necessary, timing restrictions enacted for the remaining activities. Suitable habitat for existing or additional denning or rendezvous sites would remain available following implementation of both action alternatives.

Secure Habitat and Road access

The elk security habitat during hunting season would also affect wolves. Three of the planning subunits within the analysis area meet the desired conditions for elk security habitat in the KNF Forest Plan, while the third is unable to do so due to large amount of private land and open roads. See Elk Security section. No changes to open motorized routes are proposed and the level of elk security habitat as defined by the Forest Plan would not change. Vegetation management within the security areas consists mainly of underburning. Underburning would result in small openings scattered throughout the blocks of cover located within the elk security areas. Although implementation would result in some reduction of understory vegetation in the short-term, it would occur in a mosaic fashion that would retain areas of existing cover. Topography and lack of open roads would also mitigate for the loss of cover in the security blocks. Implementation of the prescribed ecosystem burns is intended to restore fire’s role as a natural process used to maintain

the open timbered conditions and improve the ecological function. This would benefit big game species which are adapted to these open forest types and would be consistent with FW-DC-WL-19. Effects to wolves would be limited to avoidance of activity areas and transient use could still occur. It is also expected that some avoidance and temporary displacement could occur when harvest or prescribed burns are completed. This disturbance would be temporary in nature, with the prescribed burns planned to occur over a 10+ year time frame and would have many acres of undisturbed habitat that would be available adjacent to activities during that time.

In summary, both action alternatives would result in sufficient, year-round prey base of big game or alternate prey. Both action alternatives would increase summer forage in higher elevations, although Alternative 1 creates more summer forage than Alternative 3. Existing denning and rendezvous sites would be monitored, and management activities implemented to control human use in these areas during critical time periods. Although there is an increased risk of human-caused wolf mortality with both action alternatives, these management actions (discussed above) would help decrease this risk. Three of the four planning subunits within the Galton analysis area meet the Forest Plan desired condition for elk security habitat, which also provide secure areas for wolves. Proposed vegetation management 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 (see Vegetation Resources Section). 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 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. The Montana wolf population and breeding pairs are well above sustainable levels. In addition, northwest Montana accounts for the majority of the wolves in the state of Montana (Bradley et al. 2015). In consideration of the factors listed above, the implementation of Alternatives 1 or 3 would not contribute toward a trend for federal listing of the gray wolf.

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. As described for indirect effects, the Galton Vegetation Project has activities proposed in four different planning subunits with two known wolf packs, and therefore the analysis boundary for cumulative effects are these four planning subunits. This boundary includes 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” for direct and indirect effects.

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 1950s 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. 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.

Alternative 2 – No Action

The No Action Alternative does not directly contribute any cumulative effects to gray wolves or their habitat based on the lack of action. The combination of past management activities including timber harvests, trail and road construction, prescribed burning as well as natural forest disturbances have resulted in good habitat conditions for wolves as described above. The cumulative effects on the existing forest cover and prey base have largely been beneficial to the gray wolf, while the associated road/trail construction has likely contributed, at least inadvertently (vehicle collision), to a heightened risk of wolf mortality by facilitating human access. Generally, however, habitat for the gray wolf in the Galton Vegetation project area remains highly suitable, regardless of human use, as is evident by their successful recovery in the area.

Alternatives 1 and 3– 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.Those current and foreseeable actions in the project area that were determined to be appropriate for inclusion in the analysis of environmental effects are listed at the beginning of Chapter 3.

Ongoing federal actions have been included as part of the existing condition of this project area. They include approximately 40 acres of prescribed burns per year, approximately 90 acres of pile burning with the Little Feet project, approximately 200 acres/year of pre-commercial thinning, and approximately 50 acres/year of tree planting. Efforts to treat present infestations of noxious weeds and to eradicate infestations of new invaders are ongoing. Alternatives 1 and 3 incorporate design criteria to control the spread of noxious weeds (See Chapter 2, Design Criteria, and Vegetation Resource Section). Vegetative conditions, under both action alternatives, would be improved for wolves and their prey in the long-term. It is expected that some avoidance and temporary displacement could occur when prescribed burns are completed. This disturbance would be temporary in nature, with the prescribed burns planned to occur over a 10+ year time frame and would have many acres of undisturbed habitat that would be available adjacent to activities during that time.

The Forestwide Young Growth Vegetation Management project would treat approximately 400 to 600 acres annually, dependent on funding, using precommercial thinning or commercial thinning

treatments. Stands proposed for treatment are second growth stands and would be subject to a number of criteria before they were determined eligible for treatment. The Forestwide Young Growth Vegetation Management project would have the same effects on wolves as the effects described for vegetative actions (above), and potential temporary avoidance of the area as described above.

The Ten Lakes Travel Management Project will address over-snow and mechanized travel planning for the Ten Lakes area. The area affected by the proposal includes the Ten Lakes WSA and areas with common entrance points to the WSA. There are three main over-snow entrance points to the Ten Lakes WSA: the Grave Creek corridor; Clarence and Stahl Creek; and the Burma/Blacktail area. Over-snow travel is currently not limited. Mechanized use (primarily mountain bicycles) is also unrestricted. The alternatives contained in the Ten Lakes Travel Management Draft Environmental Impact Statement contain various amounts of over-snow and mechanized travel for the project area. A final decision has not been made for this project and the cumulative effects analysis utilizes the Proposed Action as the basis for the analysis in the Galton Vegetation Management Project. The Ten Lakes Travel Management Project proposed action limits over-snow use both spatially and temporally, and spatially limits mechanized use, which would decrease potential affects to wolves even further than the existing condition. Therefore, the cumulative effects of the Ten Lakes Travel Management Project in conjunction with past, present, reasonably foreseeable actions would result in fewer potential effects to wolves due to fewer projected effects from the Ten Lakes Travel Management Project.

Control of wildfires will follow Forest Plan standards for the affected Management Areas. Activities may include construction of fire lines, safety zones and helispots by hand and equipment. Past fuels reduction, and fire suppression, along with timber harvest, have likely altered the pattern and availability of ungulate habitat on NFS lands, and therefore the distribution and availability of prey for wolves. Fire suppression in particular may have altered the pattern and availability of forage habitat for ungulates due to increased tree density, the closure of formerly open-canopied stands, and the encroachment of conifers into natural openings.

It is also expected that some avoidance and temporary displacement could occur during wildfire suppression activities. This disturbance would be temporary in nature. Also, the current forest Forest Plan direction in certain MAs allows for fire to play a more natural role in the ecosystem which would improve habitat conditions for ungulates, restore/maintain it towards historic conditions, and increase its resilience.

Approximately 100 cow/calf pairs are currently permitted to graze on the Grave Creek Allotment from May 15 to September 30. This level of use is not expected to increase within the next ten years. Human-wolf conflicts can occur when wolves prey upon livestock, sometimes leading to removal of individual wolves or packs. As the number of wolves have increased so have the number of depredations and the number of wolves removed as a result. However, there have not been confirmed wolf depredations within the Grave Creek allotment in the last 10 years.

Routine road maintenance will continue to occur in the project area. Administrative use in the project area will be ongoing. Use is associated with road maintenance, permit administration, noxious weed control, data collection, monitoring, and general administration of public lands. Road use will follow Forest and/or District policies. Approximately 159 miles of trail are maintained each year within the project area. Routine trail maintenance activities may include brushing; removing blowdown, debris, and hazard trees; repairing or adding waterbars, repairing treads; repairing or replacing signs; and improving vistas. Individual wolves may avoid these areas of activity. This effect would be usually temporary in duration, and generally occurs near

travel routes where recreationists are likely to be anyway. These Forest Service activities can be adjusted based on wolf activity.

Climate change could have effects on the gray wolf at a forest level and are discussed in the KNF FEIS on page 303: "Wolves are habitat generalists, so the greatest effect on climate change on wolves would not be on the species directly, but on their prey species. A trend towards the Desired Conditions for vegetation (FW-DC-VEG-01 and 02, FW-DC-VEG-04 and 05, FW-DC-VEG-10 and 11) in the Forest Plan would make ungulate habitat more sustainable and resilient to disturbance than it is currently. The vegetative components are outside of historic conditions on the KNF, making them more susceptible to large-scale disturbance (fire, insects, disease). Winter range for ungulates has been lost or altered due to subdivisions, Libby Dam, and other human developments. As climates change, the winter range may shift, possibly higher in elevation away from human developments, and the timing of winter range use may shift as well (p. 92 in USDA 2010). The extent of the change and the extent of the effects (positive or negative) are hard to predict. Trending towards historic conditions would allow landscapes to be more resilient and sustainable in the face of climate change. Use of FW-DC-FIRE-03 to let fire play a more natural role in the ecosystem would improve habitat conditions for ungulates, restore/maintain it towards historic conditions, and increase its resilience".

There are 26 special use permits including road access to private property. In addition, general public recreational use of the Project Area is expected to include but is not limited to hiking, camping, fishing, hunting, photography, berry picking, other forest product gathering, Christmas tree cutting, firewood gathering, driving for pleasure, mountain biking, sightseeing, wildlife viewing, cross country skiing, snowshoeing, trapping and snowmobiling. Increased human presence in an area due to a special use permit may cause wolves to avoid that area. The impact of disturbance due to special uses would likely be small compared to the general recreating public's use. Special uses are more likely to be tied to a smaller location, whereas the general recreating public could be anywhere. Most human disturbance would be located near roads and motorized trails. This effect would be usually temporary in duration, and generally occurs near travel routes where recreationists are likely to be anyway. However, the 2011 Access Amendment, although it was primarily designed to reduce road-related impacts on grizzly bears, also benefits other species such as wolves. A reduction in the amount of open road and an increase in the amount of security habitat would reduce the extent of public recreation and forest product collection related disturbance. Restrictions or closures may be enacted (see denning and rendezvous site discussion above) to help limit this risk if sites are known to be active. Suitable habitat for denning or rendezvous sites would remain available following both action alternatives.

Based on the nature and magnitude of potential cumulative effects to gray wolves independent of this project, there are no cumulative effects anticipated that would change the effects determination to the wolves from implementation of the action alternatives.

Regulatory Framework Findings

Forest Plan

The Forest Plan provides desired conditions, objectives, standards, and guidelines for gray wolf within the Wildlife Resource. The following are applicable to the actions in this project, and the goals, desired conditions, objectives, standards, and guidelines can be found on the specific pages noted.

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.

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.

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).

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.

GA-DC-WL-TOB-01: Low levels of human disturbance allows for denning activities of wide-ranging carnivores that are sensitive to human disturbance (e.g., grizzly bear), and for summer use by big game in the Ten Lakes, Thompson Seton, and Marston Face areas .

Both action alternatives propose harvest and fuels treatments that would trend vegetation towards the desired conditions. This would improve foraging opportunities for big game and therefore promote a year-round prey base for wolves. Although there are no known denning and rendezvous sites affected by the proposed activities, both action alternatives include a general design feature that would enact timing restrictions that would limit the timing of harvest and burning activities to the non-denning and non-pup rearing periods within 1.5 miles of active den or rendezvous sites. Therefore, the project would contribute to progress toward achieving Goal-WL-02, FW-DC-WL-02; FW-DC-WL-18; is designed in accordance with FW-GDL-WL-18; and would contribute toward achieving GA-DC-WL-TOB-01.

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 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 would continue to maintain secure habitat within the project area for wolf use. See the "Direct and Indirect Effects" discussion. Therefore, the project would contribute to progress toward achieving FW-DC-WL-02.

FW-DC-WL-08: Habitat for native ungulates is available and well-distributed across the landscape to provide prey for carnivores.

GA-DC-WL-TOB-04: Habitat conditions for cover/forage and low levels of disturbance are maintained for big game on key low elevation winter ranges in the Murphy, Meadow, and Deep Divide areas. Cover/forage conditions may be improved through restoration activities such as vegetative treatments or reduction of noxious weeds.

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 wolf use of this area. See the "Direct and Indirect

Effects" discussion. Therefore, the project would contribute towards achieving FW-DC-WL-08and GA-DC-WL-TOB-04.

GA-DC-WL-TOB-02: Wildlife move between the large blocks of NFS lands across Highway 93 southeast of Murphy and Dickey Lakes.

GA-DC-WL-TOB-05: Wildlife move to and from the border with Canada.

Neither action alternative would measurably affect movement of wildlife within the project area or between the analysis area and Canada. Proposed ecosystem burns may result in temporary displacement during implementation, but this would be short term. The proposed vegetation management treatments would move the area toward the desired condition and result in 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. The project is therefore neutral toward achieving GA-DC-WL-TOB-02 and GA-DC-WL-TOB-05.

MA5a,b-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.

MA's 5a and 5b are found within the analysis area. 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 the "Direct and Indirect Effects" discussion. Therefore, the project would contribute toward achievingMA5a,b-DC-WL-01

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 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

Alternative 2, due to lack of action, would have no impact on the gray wolf or its habitat.

Alternatives 1 and 3 may impact individuals or their habitat, but would not likely contribute to a trend toward federal listing or cause a loss of viability to the population or species for the gray wolf. This determination is based on: 1) wolves may be disturbed and avoid activity areas during project implementation; however, transient use could still continue, and the majority of the project area would remain undisturbed on NFS lands 2) mortality risk to wolves is not expected to measurably increase during or post-implementation of proposed activities and a design criteria would protect any active den or rendezvous sites, 3) the action alternatives would continue to provide a sufficient level of secure habitat for gray wolves during and post-project 4) Suitable habitat for existing or additional denning or rendezvous sites would remain available following implementation of all alternatives; 5) improved forage and habitat conditions would benefit prey

species population numbers; 6)) the Montana wolf population and breeding pairs are well above sustainable levels, and northwest Montana accounts for the majority of the wolves in the state of Montana (Bradley et al. 2015).

Other Species of Interest

Migratory Birds

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 Galton analysis area.

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.

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 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 (USDA FS 2013). The 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.

Forest Plan

The 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 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 1). 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.

Other Species Table 1. 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	Acres treated that result in open forest	Purpose and Need	Forest Plan FW-DC-WL-19

Resource Element	Resource Indicator	Measure	Used to Address: P/N, or Key Issue?	Source
	maintenance of open forest conditions resulting from timber harvest and fuels treatments	conditions or early seral habitats		
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

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.

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 Galton analysis 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 (USDI FWS 2008). That report helps focus conservation effort on the species that need it. The KNF lies within BCR 10 (Northern Rockies). Listed below in Table 2 are the species of concern for BCR 10, not all of which are found on the KNF.

Other Species Table 2. 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
Swainson's Hawk	*Buteo swainsoni*	Y

Common Name	Scientific Name	Is the KNF w/in the Species' Range?*
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 listed in Table 2 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 2000). 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 3.

Other Species Table 3. 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
Intermountain Grasslands	Columbian Sharp-Tailed Grouse	II	Y
Shrubland			

Habitat	Species	Priority Level	Is the Forest w/in the Range of Species?*
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
	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

Habitat	Species	Priority Level	Is the Forest w/in the Range of Species?*
	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
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

Habitat	Species	Priority Level	Is the Forest w/in the Range of Species?*
	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
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 in Table 3 are additionally addressed and/or analyzed elsewhere in the document: bald eagle, black-backed woodpecker, common loon, flammulated owl, harlequin duck, and peregrine falcon.

Other Species Table 4 displays the dominant vegetation types on NFS lands (which total 127,380 acres) within the Galton analysis 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 Other Species Table 4, the predominant habitat type within the Galton analysis 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, due to the 2015 Marston wildfire there is burned forest habitat available. Except for waters, other non-timbered or non-vegetation habitat types have a low occurrence within the project area.

Other Species Table 4. Dominant Vegetation Type for NFS Lands in the Galton Analysis Area

Dominant Vegetation Type[1]	Estimated Acres of the Analysis Area	Estimated Percent of Analysis Area
Dry Forest (Ponderosa Pine / Douglas-Fir)	48,996	38
Lodgepole Pine	9,960	8
Cedar / Western Hemlock	1,359	1
Subalpine Fir (Spruce/Fir)	80,128	63
Moist Grand Fir	161	<1
Aspen/Birch/Cottonwood	327	<1
Miscellaneous Forest (Alpine Larch, Mountain Hemlock, Western Larch, White Pine, Moist Douglas-Fir, Intolerant Mix)	4,188	3
Whitebark Pine	0	0
Waterbodies (Lakes, Ponds, Reservoirs, Marsh, Swamp, River, Stream)	1,626	1
Riparian (default INFISH buffers) (overlaps with all vegetation types)	24,201	19
Grassland	0	0
Shrubland[2]	104	<1
Burned Forest[3]	6,489	5
Non-Vegetated	715	<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. The 6,489 acres is comprised of the Gibralter Ridge (23 acres), Barnaby (56 acres) and the Marston Fire (6,410 acres). The Marston Fire burned an additional 957 acres on NFS lands in the adjacent Stillwater PSU, just outside of the Galton analysis area. An additional 189 acres was burned by the Marston Fire on the Stillwater State Forest.

Environmental Consequences

Alternative 2 – No Action

The forests in the Galton analysis area have developed in close relationship with wildfires (see Forest Vegetation). Many of the plants and animals found rely on fire to change the structure, composition and pattern of vegetation. Fire is important for maintaining seral species, creating openings in the forest, reducing tree competition, regeneration of lodgepole pine, and recycling nutrients to the soil. The exclusion of fire in the landscape since the early 1900s has had a strong influence on these fire-dependent ecosystems. Controlling low-to-moderate intensity fires creates an environment conducive to high-intensity stand-replacement fire and alters the natural fire regimes in the analysis area. This assumes that fire suppression would continue and active forest management continues on its current trend. Exclusion of surface fires during the last 90 years, has allowed accumulations of dead and down fuels and vigorous undergrowth of small tree thickets, which now provide ladder fuels that could accelerate initiation of major crown fires in forest stands. This combination of surface and aerial fuels could greatly increase the risk of stand-replacement fires in dry years (see Forest Vegetation for more detail)

Under Alternative 2 no active management would occur within the project area. Therefore, no direct effects from proposed federal actions would occur. Only natural processes would occur within these stands and continue to affect forest succession and health. The condition of untreated forest areas would change over time, with continuing mortality, declining growth, and wood decay as a result of insect mortality, in high-risk stands. For some species, this will create available growing space and increased growth. In many areas, this change will continue a trend whereby shade-tolerant species that are more prone to insects and diseases and are less fire-adapted replace shade-intolerant species that have adapted to the influences of fire and are generally less susceptible to insects and diseases. Although these conditions may favor some species of migratory birds, it would not favor others that prefer more open or edge habitats that would have been more likely historically with periodic wildfires. Flammulated owls are an example of a species that would have had more suitable habitat historically (see Flammulated owl analysis). Compared to historic conditions, succession would continue within all stands. A higher risk of wildfire would continue (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 the black-backed woodpecker.

Alternatives 1 and 3 – Direct and Indirect Effects

Introduction

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) (ranging from 8,231 acres in Alternative 1 to 1,996 acres in Alternative 3) 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.

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 Sierrian 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 3 above. All proposed vegetation management would occur within the forest habitat type; treated acres are displayed by activity type for each alternative in Table 5 below. The analysis also discusses structural attributes that are beneficial to migratory birds which can be found within the variety of forest vegetation types.

Other Species Table 5. Resource Indicators and Measures for Alternatives 1 and 3 by Treatment Type

Resource Element	Measure	Treatment Type	Alt 1 (acres)	Alt 3 (acres)
Forest Structure	Treatment acres resulting in open forest conditions or early seral habitats	Regeneration Harvest	359	334
		Commercial Thin	46	97
		Intermediate Harvest	1,023	1,112
		Intermediate Variable Density	307	307
		Vista	43	0
		Understory Thinning / Fuel Reduction	193	204
		Ecosystem Burn	7,929	1,682
		Prescribed burn with Mechanical Pre-treatment	109	110
		Total treatment Acres	10,009	3,846[1]
Infrastructure Development	Acres developed; potential impacts to habitat use?	0	0	0

[1]Alternative 3 proposes 835 acres of whitebark pine planting post Marston Fire, but this does not result in a more open forest condition or seral habitat, so this activity is not included here.

Forest Habitat

Proposed vegetation management would occur within the forest habitat type. This broad habitat type includes a range of dominant vegetation types from the dry forest – warm-dry biophysical setting (i.e., ponderosa pine and Douglas-fir), to the warm/moist biophysical setting (various mixtures of western larch, lodgepole pine, Douglas-fir, subalpine fire, and Engelmann spruce, with western white pine, western red cedar, and western hemlock also occurring in a few areas) to the cold forest subalpine biophysical setting (various mixes of lodgepole pine, subalpine fir, and Engelmann spruce, western larch and Douglas-fir were a minor component in some stands with whitebark pine and subalpine larch occurring at elevations typically above 6,200 feet, 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 in Forest Habitat

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. To reduce stocking density of Douglas-fir, intermediate harvesting would be the primary method of density reduction. In addition, fuel treatments (another form of intermediate harvesting) and occasionally regeneration harvesting would be used to reduce conifer densities. Intermediate harvesting would result in a fully stocked stand after harvesting. Depending on the VRU and aspect, densities would be reduced to target levels ranging from 60-120 square feet/acre. The

hotter, drier sites would generally leave the lower end of the basal area range, while more moist sites would be left nearer the higher end of the range.

The two action alternatives propose three different forms of treatment to help ensure the shade intolerant species are conserved and perpetuated. These treatments include intermediate and regeneration harvests. Intermediate harvest would be used to reduce high densities of trees and reduce ladder fuels. Shade tolerant conifers such as subalpine fir and Engelmann spruce would be targeted for removal. 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.

Regeneration harvest would be used to help create two-storied stands. In regeneration harvests, 10-20 of the largest, healthiest western larch, Douglas-fir, and/or ponderosa pine trees per acre would be retained where available. This would result in an early seral community, both in structure and species composition. The reserve trees would provide seed, shelter for regeneration, and wildlife benefits, in addition to leaving large diameter trees on site for aesthetics. These reserve trees will become snags and down woody debris sometime in the future. Understory Thinning/Fuel Reduction and Prescribed Burn with Mechanical Pre-treatment would also be used to favor shade-intolerant species in those stands with a healthy component of western larch, western white pine, and ponderosa pine.

The action alternatives were designed to more accurately represent historical disturbance regimes and reduce fuels and proposed harvest units that would create openings greater than 40 acres in size, either on their own or in combination with an adjacent unit. Regeneration units proposed in Alternative 1 (units# 97, 110, 111, 114) and Alternative 3 (units# 110, 111, 114 and 133) would be greater than 40 acres in size. (See Vegetation section for more detail). The opening size of the proposed units reflects the current situation for insect, disease and stocking considerations, and restoration of wildlife habitat. These regeneration harvest openings larger-than-40-acres would emulate natural processes associated with a mixed severity/stand-replacement fire occurrence and be closer to desired conditions in size and effects. Shade-intolerant species, primarily western larch, would have sufficient light and other resources to grow vigorously. This would lead to more resilient forest stands with a trend toward maintaining forest health. These large openings 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.

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 in Forest Habitat

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 ecosystem burning range from 7,929 acres in Alternative 1 to a total of 1,682 acres in Alternative 3 (see Table 5).

Non-harvest Fuels Treatment in Forest Habitat

Prescribed burning with mechanical pre-treatment and understory thinning/fuels reduction are proposed where stand densities, topography, proximity to private land, or visual concerns preclude the use of prescribed burning without pre-treatment. Mechanical pre-treatment would slash small diameter trees using chainsaws, with underburning generally occurring within 1 to 5 years after initial treatment on a large scale. Understory thinning treatment generally would consist of thinning understory trees and hand or machine piling natural and activity fuels. Piles would subsequently be burned. Shrubs and understory vegetation would not be mechanically treated. As displayed in Table 5 proposed non-harvest fuels treatment acres are similar between alternatives, ranging from 302 acres in Alternative 1 to 314 acres in Alternative 3.

Summary

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 (see Vegetation section). 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.

While prescribed burning is designed to minimize the risk of mortality in leave trees or adjacent stands, incidental mortality to individual trees and small patches of trees within, or adjacent to, prescribed burns, could occur. Mortality could be salvaged from either units that were harvested and underburned, or from units that were underburned without harvest. Salvage would likely

occur 1-2 years following burning to reduce merchantability loss. Design criteria would ensure adequate levels and distribution of snags and coarse woody debris would remain in the analysis area. The Forestwide desired condition (FW-DC-VEG-07) and guidelines (FW-GDL-VEG-04 and FW-GDL-VEG-05) provide guidance for snag retention. Please see the Snag and Coarse Woody Debris section for more detail.

Wetland and Riparian Habitats

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 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 Habitats

There are 6,489 acres of recently burned forest habitat within the Galton analysis area. No salvage harvest would occur within the burned habitats and the existing structure and quality for migratory species that use this habitat would be maintained. Under the proposed action alternatives, 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.

Structural Attributes

Trees and Snags

Intermediate harvesting would result in a fully stocked stand after harvesting, while in regeneration harvest, 10-20 of the largest, healthiest western larch, Douglas-fir, and/or ponderosa pine trees per acre would be retained where available. Retaining the larger diameter trees where possible contributes to both current and future structural diversity within the stand as standing live trees and future coarse woody debris.

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. See the Forest Vegetation Section Snag discussion 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

As for snags, the 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. See the Forest Vegetation Downed Wood 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. In units known to be deficient in coarse woody debris, the standing dead snags that are left on site will contribute toward coarse woody recruitment. Through silvicultural prescriptions, implementation, and future recruitment the stands with proposed treatments 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

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 (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. 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 in the warm and dry biophysical setting old growth would be consistent with FW-DC-WL-11.

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 2000). 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 analysis 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.

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 1950s 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. 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. Under the Forest Plan, 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 1and 3 – 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 3 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.

Harvest has occurred in some of these area since the 1950s and included regeneration harvest and loss of snags, large old trees, and reductions in vegetation in both upland and riparian habitats. Recently completed and ongoing federal projects with treatments occurring within and/or adjacent to the Galton analysis area include approximately 40 acres of prescribed burns per year, approximately 90 acres of pile burning with the Little Feet Project, approximately 200 acres/year of precommercial thinning, and approximately 50 acres/year of tree planting. Prescribed fire would reduce conifer encroachment in some areas and increase browse within the winter range. . 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.

The Forestwide Young Growth Vegetation Management project would treat approximately 400 to 600 acres annually, dependent on funding, using precommercial thinning or commercial thinning treatments. Stands proposed for treatment are second growth stands and would be subject to a number of criteria before they were determined eligible for treatment. The Forestwide Young Growth Vegetation Management project would have similar effects to bats as described above for precommercial thinning and are not expected to change the level of snags or down woody habitat available within the analysis area.

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 Galton project does not propose any changes in the amount of roads accessible to public motorized use. 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. 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.

Routine road maintenance will continue to occur in the project area. Administrative use in the project area will be ongoing. Use is associated with road maintenance, permit administration, noxious weed control, data collection, monitoring, and general administration of public lands. Road use will follow Forest and/or District policies. Approximately 159 miles of trail are maintained each year within the project area. Routine trail maintenance activities may include brushing; removing blowdown, debris, and hazard trees; repairing or adding waterbars, repairing treads; and repairing or replacing signs.

Climate change could have effects on Migratory Birds at a forest level and are discussed in the KNF FEIS on page 355: "Climate change would have the potential to alter the quantity, quality, and distribution of migratory bird habitats across the Forest. Changes in temperature and

precipitation patterns would likely influence vegetation and natural disturbance processes. Combined with past fire suppression and timber management, which has led to less resiliency, there could be an increased risk of large-scale disturbance impacting migratory bird habitat. Active and passive restoration, including utilizing timber harvest and fuels reduction, that trends habitats towards historic conditions and the Desired Conditions for vegetation would make habitats more resilient to change. This would not only restore/maintain habitats nearer to what was present under natural disturbance processes which migratory birds evolved with, but would make them more resilient and sustainable. Climate change may cause a change in timing of the life-cycle of some insects, consequently altering when prey would be available for migratory birds (p. 90 in USDA 2010)."

The Ten Lakes Travel Management Project will address over-snow and mechanized travel planning for the Ten Lakes area. The area affected by the proposal includes the Ten Lakes WSA and areas with common entrance points to the WSA. There are three main over-snow entrance points to the Ten Lakes WSA: the Grave Creek corridor; Clarence and Stahl Creek; and the Burma/Blacktail area. Over-snow travel is currently not limited. Mechanized use (primarily mountain bicycles) is also unrestricted. The alternatives contained in the Ten Lakes Travel Management Draft Environmental Impact Statement contain various amounts of over-snow and mechanized travel for the project area. A final decision has not been made for this project and the cumulative effects analysis utilizes the Proposed Action as the basis for the analysis in the Galton Vegetation Management Project. This project does not propose any harvest or activities that would affect Migratory Birds or their habitat (see "Resource Indicators and Measures" section) and existing over-snow and mechanized use are not currently affecting this habitat. The cumulative effects of the Ten Lakes Travel Management Project in conjunction with past, present, reasonably foreseeable actions would not result in further effects to migratory birds or their habitat.

There are 26 special use permits including road access to private property. In addition, general public recreational use of the Project Area is expected to include but is not limited to hiking, camping, fishing, hunting, photography, berry picking, other forest product gathering, Christmas tree cutting, firewood gathering, driving for pleasure, mountain biking, sightseeing, wildlife viewing, cross country skiing, snowshoeing, trapping and snowmobiling. Recreation is likely to increase on all land ownership types, if for no other reason than human population growth.

Private land development may impact suitable forest cover on non-public lands, and impact connectivity between public lands. 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

Forest Plan

The 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.

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. Harvest would also result in the creation of edge habitat that is preferred by some bird species. See "Forest Habitat." Therefore, the Galton 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 Galton 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 Galton 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 Galton 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 Galton 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 Galton 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.

The Marston and Barnaby wildfires occurred in 2015 within the Galton analysis area. High quality burned habitat is available. 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 Galton 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 Galton 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 Galton 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).

The Galton projects'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 Galton project would contribute to the attainment of this objective.

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 Forest Plan.

Bald and Golden Eagle Protection Act of 1949 (16 U.S.C. 688-688c)

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 2 (No Action) **would not be expected to result in a measurable change to a species’ population** for migratory birds within the analysis 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 Galton analysis area.

Alternatives 1 and 3: 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.

Elk Security Habitat

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 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.

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, Galton's proposed alternatives would maintain effective security habitat for elk in the project's PSUs.

Regulatory Framework

Forest Plan

The 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:

- FW-OBJ-WL-02

- FW-GDL-WL-10

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 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 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 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 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 Other Species Table 6 to compare alternatives as well as meeting the 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.

Other Species Table 6. Resource Indicators and Measures for Assessing Effects

Resource Element	Resource Indicator	Measure (Quantify if possible)	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	No – addresses Forest-wide objective and guideline	Forest Plan, FW-OBJ-WL-02 and FW-GDL-WL-10

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 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 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.

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 was used to 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.

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 (see assumptions and limitations above).

Existing Condition

The Galton project area includes four entire PSU's: Ksanka, Wigwam, Grave and Murphy PSU's. All four PSU's have a medium emphasis rating, however 2 of the 4 PSU's have elk security at 50% or better. These PSUs are located in elk hunting district #109 (Whitefish Elk Management Unit). The population in the hunting district has decreased over the last 10 years based on the reported bull harvest over this timeframe (pers. Comm., Their, 2016). This may be partially due to the lack of vegetative openings that provide forage across this landscape (ibid). In this hunting district, the most recent count effort took place in 2014 within an estimated 211 elk (MFWP 2015).

See Table 7 for the security habitat emphasis rating, 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's 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 one large fire in 2015 and 2 smaller fires in the last 20 years. Calculation of security habitat for the 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. It also counted all security areas 250 acres and larger regardless of their shape. This provided the Forest Plan baseline percent displayed in Table 7 below. Project area analysis use more refined data using NAIP data and visuals of some stands to look at younger stands that may provide cover. Through project level analysis, a piece of potential security habitat found Deep Divide area was removed from the existing condition because of its long and narrow shape, the rolling topography of the area, and hunter accessibility from both sides of the area via barriered road systems. 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 Forest Plan baseline condition for future monitoring.

A majority of the Galton Analysis Area lies within Forest Plan Management Areas (MA's) that do not allow motorized travel and have had little past timber harvest or road building. Because of this direction in the Galton Analysis Area, very little harvest has occurred in the higher elevations, with much of it adjacent to the existing open roads in lower elevations. The past low level of forest management has resulted in large blocks of these PSU's providing high levels of security habitat with few forage openings in two of the four planning subunits making up the Galton Analysis Area.

Other Species Table 7. Reference and Existing Elk Security Habitat Levels within the Galton PSU's.

PSU	Emphasis Rating	Minimum Desired Security Habitat (%)	Forest Plan Baseline Security Habitat (%)	Existing Security Habitat (%)
Ksanka	Medium	30	43	45
Wigwam	Medium	30	56	60
Grave	Medium	30	56	59
Murphy	Medium	30	44	42

Resource Indicator and Measure 1

Ksanka PSU

One large block (8931 acres) of elk security habitat is found in the planning subunit and provides approximately 45% security habitat for elk. This is better than the minimum desired 30 percent level for PSUs with a medium emphasis area rating. A large portion of this security habitat block coincides with both MA5a (Backcountry non-motorized) and 1c (the 10 Lakes Wilderness Study Area). The lower elevations of this PSU are primarily private land with many open roads, and do not provide elk security. The higher elevations of the PSU lie within NFS lands with minimal roads due to the topography and Management Area designations. Motor vehicle use does not occur within this block of MA5a or MA1c and, therefore, contributes to the effectiveness of security habitat within those management areas. These management areas contribute to elk 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. Due to the steep nature of the terrain in this area along with the management designations, future road construction would be limited in the majority of this large block of security habitat.

Wigwam PSU

Three blocks of elk security habitat are found in the planning subunit and provide approximately 60% security habitat for elk. This is better than the minimum desired 30 percent level for PSUs with a medium emphasis area rating. Large portions of these security habitat blocks coincides with both MA5b (backcountry-motorized in summer only on designated routes) and 1c (the 10 Lakes Wilderness Study Area). Motor vehicle use is limited within this block of MA5b and does not occur in MA1c. This, therefore, contributes to the effectiveness of security habitat within those management areas. These management areas contribute to elk 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. Due to the steep nature of the terrain in this area along with the management designations, future road construction would be limited in the majority of this large block of security habitat.

Grave PSU

Two blocks of elk security habitat are found in the planning subunit and provide approximately 59% security habitat for elk. This is better than the minimum desired 30 percent level for PSUs with a medium emphasis area rating. The Grave PSU security blocks are divided by the main Grave creek road. Which is open yearlong. Large portions of these security habitat blocks coincides with MA1b (Recommended Wilderness), MA5b (backcountry-motorized in summer only on designated routes) and 1c (the 10 Lakes Wilderness Study Area). Motor vehicle use is limited within MA5b and does not occur in MA1c or MA1b. This, therefore, contributes to the effectiveness of security habitat within those management areas. The western portion of the Grave PSU security block is part of a contiguous security block found in both the Wigwam and

Ksanka PSU's. These management areas contribute to elk 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. Due to the steep nature of the terrain in this area along with the management designations, future road construction would be limited in the majority of this large block of security habitat.

Murphy PSU

One block of elk security habitat is found in the planning subunit and provides approximately 42% security habitat for elk. This is better than the minimum desired 30 percent level for PSUs with a medium emphasis area rating. A large portion of this security habitat block coincides with MA5a (Backcountry non-motorized). Lower elevations in this area fall into MA6, however these areas are limited to the current level of roads miles to meet wildlife standard FW-STD-WL-02. These factors contribute to the effectiveness of security habitat within those management areas. The Murphy Planning Subunit experienced a large wildfire in the higher elevations of this Planning Subunit in 2015 which will result in a mosaic of cover and forage areas. The area impacted by the fire consists mainly of higher elevation steep terrain (MA5a) that is not accessible by open roads and few areas burnt down to open roads. The rugged steep terrain limits visibility even within burnt areas in the higher elevations. 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. This describes the post-fire landscape in the Murphy Planning subunit where the mosaic of burnt areas further than .5 mile from a road were considered to retain cover. These management areas contribute to elk 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.

Environmental Consequences

Alternative 2 – No Action

Management Area designations and steep topography have resulted in limited road building and motorized use of much of the Galton Project Area. 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 49, 60, 59 and 42 percent in the Ksanka, Wigwam, Grave and Murphy PSUs, respectively. Re-barriered roads or prisms used for harvest that may currently provide non-motorized access into more remote areas would become vegetated and provide cover while reducing access within approximately 15-20 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. This would reduce the effectiveness of these areas as

security with a key component of open foraging areas limiting potential use of these areas. 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.

Action Alternatives 1 and 3

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 8 displays the percent elk security habitat, by PSU, for the existing, during project, and post-project levels.

Other Species Table 8. Resource Indicators and Measures for Action Alternatives 1 and 3

Alternative	Resource Element	Resource Indicator	Measure (Percent Security Habitat by PSU)	Change to Percent Security Habitat
1, and 3	Security Habitat	Changes in the percent of NFS lands providing security habitat in the respective PSU	Wigwam – 60% Ksanka – 45% Grave – 59% Murphy – 42%	No

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, 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 retain existing shrub and hardwood species found within the stand. Harvest unit 110 is the only harvest unit located within elk security habitat within the Galton project. This unit is located in both alternatives 1 and 3 and would reduce cover in the Murphy PSU on approximately 18 acres on the edge of this elk security block. This unit would provide a small block of foraging habitat adjacent to the large block of cover provide by the north end of the Murphy PSU and the south end of the Grave PSU. 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 this proposed harvest.

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. Ecosystem burns totaling approximately 4893 acres in alternative 1 and 620 acres in alternative 3 are proposed within elk security areas across all PSU's. These burns will result in small openings scattered throughout the blocks of elk security cover. Although these burns would result in some reduction of understory vegetation in the short-term, it would occur in a mosaic fashion that would retain overall areas of existing cover. The majority of these burns are located further than ½ mile away from open roads away from roads because of the steep topography. The goal of the mixed severity fire would be reduce tree encroachment and encourage forage production. These burns would also improve the palatability and enhance the quality of the forage produced on these acres.

Implementation of the prescribed ecosystem burns is intended to restore fire's role as a natural process used to maintain the open timbered conditions and improve ecological function. This would benefit big game species which are adapted to these open forest types and would be consistent with FW-DC-WL-19. In addition there is the long term benefit of reducing the potential for high intensity wildfires which meets the intent of long term maintenance of elk security in the Galton Analysis Area.

Non-Motorized Access and Activities

All proposed harvest is located along roads gated or bermed during the hunting season. These roads could facilitate non-motorized access of the area, however these roads have been available for non-motorized access for many years. An increase in hunting pressure due to road hunting within the project PSUs along open roads adjacent to recently harvested units is not expected. Design criteria for regeneration type harvest unit prescriptions adjacent to open or seasonally

open roads require leaving a vegetative barrier where available to provide a visual barrier between the roadside and proposed units. This would help provide a visual barrier along the road. Within harvest units, small conifer and shrubs would be expected to grow up within 5 years and provide cover within 15-20 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. These areas would function as security habitat for elk as well. Prescribed fire makes up the majority of the treatments in the Galton Project Area. 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 Forest Plan (FW-STD-WL-02) and implementation of this standard would maintain or 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 all Alternatives 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 Galton project purpose and need to “Provide forage opportunities while maintaining wildlife security . . . through access management” within the Galton project’s PSUs.

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 Effects Analysis

As described for indirect effects under the section “Spatial and Temporal Context for Effects Analysis,” the PSU was chosen as the appropriate spatial scale for the cumulative effects 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 15-20 years.

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

Cumulative impacts result from the incremental impact of the action when added to other past, present and reasonably foreseeable future actions. The measure of effects associated with

cumulative effects will be the percent of elk security habitat in the PSU. Table 6 summarizes the existing security habitat conditions within the PSU's.

Summary of Direct/Indirect Effects of Action Alternatives on Existing Condition
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 1 and 3 do not propose changes in access management.

Timber harvest and associated activities

The Little Feet Project, Little Feet Fuels Reduction, and Ant Flat Maintenance Burn are foreseeable projects planned within the boundaries of the Galton AA and are likely to be implemented either before or during implementation of the Galton Project. These projects do not occur within or adjacent to elk security areas and will therefore not cumulatively affect elk security.

Harvest of blown down or damaged trees associated with future storms is possible in the Analysis Area. If a salvage project is identified and implemented, the cumulative effects to elk/elk security would be evaluated at that time. These activities would be accessed via open or restricted roads and would not exceed administrative levels. There would be no effect to elk security from a change in access management.

Precommercial thinning may occur within areas of elk security. Pre-commercial thinning on National Forest land occurs when past regenerated timber stands meet certain stand conditions. It is expected that approximately 1000 acres would be treated through pre-commercial thinning within the project area during the time period this proposed project is active. These units typically provide cover when proposed for thinning and would still provide cover after thinning based on the stems per acre. 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 Forestwide Young Growth Vegetation Management project would treat approximately 400 to 600 acres annually, dependent on funding, using precommercial thinning or commercial thinning treatments. Stands proposed for treatment are second growth stands and would be subject to a number of criteria before they were determined eligible for treatment. The Forestwide Young Growth Vegetation Management project would have the same effects on elk as the effects described for vegetative actions including precommercial thins (above).

The Ten Lakes Travel Management Project will address over-snow and mechanized travel planning for the Ten Lakes area. The area affected by the proposal includes the Ten Lakes WSA and areas with common entrance points to the WSA. There are three main over-snow entrance points to the Ten Lakes WSA: the Grave Creek corridor; Clarence and Stahl Creek; and the Burma/Blacktail area. Over-snow travel is currently not limited. Mechanized use (primarily mountain bicycles) is also unrestricted. The alternatives contained in the Ten Lakes Travel Management Draft Environmental Impact Statement contain various amounts of over-snow and mechanized travel for the project area. A final decision has not been made for this project and the

cumulative effects analysis utilizes the Proposed Action as the basis for the analysis in the Galton Vegetation Management Project. The Ten Lakes Travel Management Project proposed action limits over-snow use both spatially and temporally, and spatially limits mechanized use which would decrease potential affects to elk security (especially later in the hunting season) even further than the existing condition. Therefore, the cumulative effects of the Ten Lakes Travel Management Project in conjunction with past, present, reasonably foreseeable actions would result in fewer potential effects to elk security due to fewer projected effects from the Ten Lakes Travel Management Project.

Efforts to treat present infestations of noxious weeds and to eradicate infestations of new invaders are ongoing. All activities will comply with the Kootenai National Forest Invasive plant Management ROD (2007). Weed treatment activities would not lead to any adverse effects on elk security or foraging habitat because treatments isolate non-beneficial weed species and would actually benefit forage species important to many species (USDA Forest Service 1997, 30). These activities would be accessed via open or restricted roads and would not exceed administrative levels. There would be no effect to elk security from a change in access management.

Climate change could have effects on elk security habitat at a forest level and are discussed in the KNF FEIS on page 332: "Climate change would likely have little impact on the motorized route aspect of elk security habitat. However, it may have an impact on vegetation and therefore the timber stand component of security habitat. Past fire suppression has increased stand densities and decreased the resiliency of some stands to large-scale disturbance (fire, insects, disease). Climate change may increase the likelihood of large-scale disturbance. However, moving stand conditions towards historic conditions and the Desired Conditions for vegetation would decrease stand densities and increase their resiliency to large-scale disturbance. Habitat conditions would be nearer to what would be present under natural disturbance processes. The timbered stand component of security habitat for elk would be nearer to what was present historically, and would be more resilient to large-scale disturbance and the impacts of climate change. Climate change may impact the timing of elk use of particular areas (e.g. change the timing of movement between seasonal ranges, p. 92 in USDA 2010)."

Ongoing hunting activities are regulated by the MFWP. The Forest Service influences hunter access through road management. As discussed above, motorized access management will not change within this area. The majority of the area is accessed by non-motorized means and no new trails are proposed. The topography limits access to the area to just a few trail systems, and individuals that utilize a trail system for hunting are in the minority. Therefore impacts to elk security area 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's. Hunting levels within the Analysis Area are not expected to significantly change due to the action alternatives, since no new road construction will occur.

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

Forest Plan

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

- 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 to FW-DC-VEG-01, FW-DC-VEG-02, FW-DC-VEG-04, FW-DC-VEG-05, and FW-DC-VEG-11 (RFP 2015).

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 native ungulates means the maintenance of security habitat while creating some additional foraging opportunities.

- FW-OBJ-WL-02: Over the life of the Plan, increase by 1 the number of planning subunits that provide at least 30 percent elk security (see glossary) and increase by 1 number of high emphasis planning subunits (determined in cooperation with Montana Fish, Wildlife, and Parks; see FW-DC-WL-16) that provide at least 50 percent elk security (RFP 2015).

The existing security habitat levels for each PSU would be maintained throughout the project (see Other Species Table 8).Therefore, the Galton project would not prevent the attainment of FW-OBJ-WL-02.

- FW-GDL-WL-10: Management activities in planning subunits should maintain existing levels of elk security. Where possible, management activities in high and medium emphasis planning subunits (determined in cooperation with Montana Fish, Wildlife, and Parks; see FW-DC-WL-16) should improve elk security (RFP 2015).

All alternatives would maintain the existing level of elk security habitat with the affected PSUs (see Table 8) which are better than the minimum desired level. Therefore, the Galton project was designed in accordance to this guideline.

- **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 Galton 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 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 of Findings

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 1 and 3, 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), Galton'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 Ksanka, Wigwam, Grave and Murphy PSUs.

Other Agencies and Individuals Consulted

Tim Thier, MFWP Eureka Area Biologist

Communications consisted of discussing the Forest Plan elements to consider when evaluating the effectiveness of elk security habitat in areas with limited cover (e.g., Marston fire area), but farther than 0.5 mile from an open road and discussed the use of topographical features that can influence non-motorized accessibility.

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.

The Galton Project Area contains habitat, both (summer and winter), for white-tailed deer, mule deer, elk, bighorn sheep, and moose. Mountain goats do not generally occur within the Galton Planning Area. White-tailed deer and their habitat were part of a 10 year study in the late 1980's looking at winter range habitat. There are currently proposals to study mule deer in the Galton range to learn more about their habitat, especially areas used in the winter. Part of the purpose and need for the Galton project included the creation of openings to provide browse for big game, focusing on mule deer winter range. Winter range habitats for elk and moose were taken from the Forest Plan from FWP maps of best known habitats. However, no recent studies of elk or moose habitats have occurred within the Galton Project area, so exact winter range boundaries for these species is unclear (Pers. Comm. T.Thier). White-tail deer winter ranges occur in the lower elevations of the Galton Project Area while mapped mule deer winter range occurs on the steeper slopes at the higher elevations in portions of the Galton Project Area. Because of the past information known about white-tailed deer in this area, the interest in mule deer in this area, and because mapped elk and moose winter and summer ranges generally overlap the deer winter ranges, analysis of vegetative effects will focus on known deer winter ranges for the Galton Project area. Bighorn sheep were analyzed with the sensitive species section and will not be covered here. Elk security was also analyzed in its own section and covers effects to this species from motorized use, especially during hunting season.

Mule deer and whitetail deer are sympatric over much of western North America. Several studies have shown an overlap in food habits (Kramer 1973). However, most researchers have determined that there is relatively little competition between mule deer and whitetails in both summer and winter habitat, because of habitat selection. Whereas white-tailed deer select mesic riparian sites for summer habitat, mule deer habitat consists of more xeric, open areas or high mountain spruce-fir types. In both species, winter ranges occupy smaller areas than summer ranges for these animals.

As the brief description of white-tail and mule deer general habitat demonstrates, a range of habitat use exists from open environments (e.g. meadows), to a variety of structural stages within forested habitat types. Winter habitat requirements vary between the two species however, both 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 these species 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 this 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.

Analysis of this resource is directly related to the project Purpose and Need to "create openings to provide browse for big game, especially in mule deer habitat.

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 of 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 historic conditions.

Regulatory Framework

Forest Plan

The 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-11 GA-DC-WL-TOB-04 GA-DC-WL-TOB-06

There are other Forest Plan components that provide resource direction for a range of wildlife species or habitat conditions that are not specific to the deer species or other big game, but still are applicable to the management of their habitat. The full list of the plan components applicable to whitetail and mule deer habitat management are found in the "Regulatory Framework Findings" section of this analysis.

Resource Indicators and Measures

For this analysis, the primary resource indicator will be the acres of vegetation management that trend vegetation towards the desired conditions (FW-DC-WL-16) while maintaining winter range characteristics (GA-DC-WL-TOB-04) (see Table 9 below). 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 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.

Other Species Table 9. 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	Forest Plan FW-DC-WL-16 FW-DC-WL-19

Resource Element	Resource Indicator	Measure	Used to Address: P/N, or Key Issue?	Source
Winter Range and Birthing/Partuition Period (Important Habitats or Seasons of Activity)	Activities occurring on winter range during its period of use; or activities occurring duirng the birthing/partuition period	Potential for disturbance and displacement of big game during these periods?	No	Forest FW-GDL-WL-08; FW-GDL-WL-09; GA-DC-WL-TOB-04, 05
Secure Habitat	Changes in Human Access/Motorized Management	Increased human access as influenced by motorized access,	No	Contributed by Forest Plan FW-STD-WL-02, and

Methodology

Biological winter range areas on the Fortine Ranger District were identified by past Fortine District biologists and Montana Department of Fish, Wildlife and Parks (MDFWP) personnel. These white-tailed and mule deer subherd boundaries were established based on knowledge of how deer use the district in the winter and topographical features. White-tailed deer winter range was further developed based on a 10 year winter range study using radio-collared deer as well as more recent discussions with FWP biologists. GIS spatial data and NAIP data were used to determine areas of forage, cover and key habitat components across the Galton A.A. Vegetation management ecosystem burn areas were developed with the local state biologist. Design criteria for harvest units in whitetail deer winter range were developed based on the definitions found in Montana Fish, Wildlife and Parks research plans, Fortine District vegetation layers, INFRA roads layers, and field surveys by Fortine District biologists and data collection crews. 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

MFWP 1998 and MFWP 2006 describe mule and white-tailed deer habitat and relationships in Montana, as well as in Baty (1995), Mundinger (1981), Morgan (1993), Lyon (1966), Thomas (1979), and Mackie et al. (1998). More detailed descriptions of these big game species and their habitats are available through research. 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

The effects to mapped deer winter ranges are generally similar to the effects on elk and moose winter range based on the overlap of winter range habitats based on FWP mapped winter range habitat for elk and moose.

Affected Environment

Spatial and Temporal Context for Effects Analysis

The analysis boundary for direct project impacts to deer habitat in terms of cover and forage will occur on whitetail and mule deer winter range boundaries as well as the summer range used by both species. Effects to winter ranges are more specific to each species as the winter can be the most challenging timeframe in terms of survival for many ungulate species. Disturbance of key

habitats such as winter range would occur on these habitats as they are affected by proposed action areas, as activities and alteration of the habitat would affect its suitability for each 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 Galton project area as the alteration of habitat could influence big game use of available habitats within the surrounding areas.

Temporal boundaries for this 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). Whitetail deer on this district are also known to forage on harvested trees while harvest activities are ongoing, especially in the winter. 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 the type of treatment. Following regeneration harvest, it is expected that hiding cover would return within approximately 15 years. Thermal cover sufficient to moderate snow fall and temperatures in harsh winters, may take as long as 60 years to recover. Similarly, vegetation treatments can result in long-term foraging opportunities for mule deer 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

The Analysis Area is comprised of NFS lands within the Murphy, Grave, Wigwam and Ksanka Subunits and includes summer and winter ranges for both white-tailed and mule deer. Lower elevations within most of the Murphy, Grave, and Ksanka Subunits lie within whitetail deer winter range – one of two major winter ranges known within northwest Montana. Mule deer winter range generally includes the areas adjacent to whitetail winter range but within the upper elevations including south and west-facing slopes where the aspect and slope result in reduced snow depths and areas of forage. In summer both species can use the winter range areas as well as the rest of the Analysis Area (See project file).

Forage and Cover

Deer 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.

Numerous researchers have found that deer select areas with good cover more often than those with greater food availability when winter conditions are severe (Berner etal, 1988, Swenson, et al.1983, Dusek, pers. comm.1992). Thermal cover is a key component of winter range because it provides snow interception which reduces stress to animals during cold weather extremes (Baty

1995). Snow intercept becomes critical during severe winters such as in winter of 1996-97 where snow depths limited white-tail deer movement in many areas.

Forest-wide as well as generally within the Project Area, decades of fire suppression has enabled increased development of understory trees into the general forest canopy. This has been especially true in the drier VRU's where historically low to moderate understory fires occurred approximately every 15-30 years (see Galton Vegetation section). This has resulted in a more open park-like stand of large trees moving to a two or three-storied stand composed of a large widely scattered overstory with a dense understory of smaller Douglas-fir in some areas. A number of areas have experienced moderate-to-heavy Douglas-fir beetle mortality during the last 10 years. This is largely due to high densities of mature Douglas-fir that predispose these stands to high levels of beetle attack coupled with extended drought (see Galton Vegetation section). These dry-site, low elevation VRU's are also the same areas providing white-tail deer winter range. The multi-story Douglas fir stands also provide the vegetative conditions that provide snow intercept in portions of this white-tail winter range. Currently, cover (including snow intercept conditions) on whitetail winter range in these dry site VRU's is high throughout this range. Management of this type of habitat centers largely around providing a mix of conditions over time that produces an interspersion of open growing sites with the cover necessary for the severe winters of the future (FW-DC-WL-16, GA-DC-WL-TOB-04).

Fire suppression within the more moist and cold forest VRU's has resulted in a shift from the mixed severity fires towards stand replacing fires (see Galton Vegetation section). In the Galton Project Area, sixty-five percent of the land base lies within Forest Plan MA's that are non-suitable to manage for timber production or road building. This lack of management, along with active fire suppression, has resulted in very few openings across this landscape. These VRU's primarily provide winter range for mule deer as well as summer range for both deer species. What this means for mule deer especially is that with there is also a departure from the relative abundance and quality of forage in relation to the amount of cover. 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/saplings stands move into a larger size class and the encroachment of conifers continues into openings and the understories of forested stands. This is likely to influence areas of mule deer 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 lower elevations within most of the Murphy, Grave, and Ksanka Subunits lie within whitetail deer winter range. This includes riparian areas along Fortine and lower Grave creek (mostly private), as well as the FS land surrounding Murphy, Martin, and to a lesser degree Dickey lake. This is similar to mapped moose winter range. Mule deer winter range generally includes the areas adjacent to whitetail winter range but within the upper elevations including south and west-facing slopes where the aspect and slope result in reduced snow depths and areas of forage. Although the boundaries of identified winter ranges should 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 71 and 75% of both of the sub-BMUs which make up a large portion of the project area, except the lower elevations adjacent to private land. This means there is no motorized access in blocks of 2500 acres or larger. Elk security habitat was evaluated for each of the four subunits that are found within the project area. The existing level of security habitat within all four subunits are better than the 30 percent minimum desired level and 2 of them provide high levels of security. See the Grizzly Bear and Elk analyses for more detail.

Portions of these secure areas also coincide with backcountry management areas (MA5a), recommended wilderness (MA1b), and wilderness study area (MA1c) 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 MA5a and, therefore, it contributes to the effectiveness of security habitat within that management area. These areas 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. Due to the steep nature of the terrain within parts of these MA's and wilderness study and recommended wilderness designations, 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 immediately adjacent to private land. Also, because of the occurrence of steep country and more remote areas within the backcountry MAs, 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 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. 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. See the 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. Existing forage would eventually develop into hiding cover, and the level of forage would continue to decline over time unless natural events, such as a wildfire or windstorm created openings. As discussed before, these created openings at higher elevations would result in greater vegetative and structural diversity, providing high elevation summer forage areas. On winter range, Alternative 2 would not decrease thermal or hiding cover levels due to prescribed harvest or burns, however, insect and disease will continue to kill some of the mature Douglas-fir trees in thermal cover stands, which will compromise or eliminate some existing thermal cover stands. Forbs, grasses, and other forage species, where present, may be less vigorous and productive in shaded rather than more open environments and 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, 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).

Alternatives 1 and 3 - Direct and Indirect Effects

Project Design Features and Mitigation Measures

There are several design features developed for other species that will also serve as mitigation measures for deer species as well as other ungulates. These are discussed in context below.

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 the moist forests. 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 diversity of habitat conditions required for big game. Table 10 below displays the acres of vegetation management proposed, by treatment, for each action alternative over the entire Galton Project Area, which can provide summer habitat for whitetail and mule deer.

Other Species Table 10. Resource Indicators and Measures for Forage and Cover by Treatment Type

Resource Indicator	Measure	Treatment Type	Alt 1 (acres)	Alt 3 (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 & Intermediate Harvest w/ variable density	1330	1419
		Regeneration Harvest & Commercial Thin	405	431
		Ecosystem Burn	7929	1682
		Non-Harvest Fuels Treatments	193	204
		Prescribed Burn w/ Mech. pretreatment	109	109
		All Treatments Total	9966	3845

Forage and Cover

Summer Range

All action alternatives increase the amount of potential forage within summer range primarily by some type of prescribed burn (83 to 52% of total treatment acres depending on alternative). Alternative 1 would result in the highest increase in forage availability on summer range (refer to Table 10 above for details) within the area.

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 large 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.

Although some of the proposed burns are large, it is not expected that the entire acreage within the polygons will provide forage. Realistically, the majority of the underburns, except the prescribed burn with mechanical pre-treatment prescriptions, would result in openings approximately 5-100 acres on approximately 50% of the underburn acres by unit. This would result in fewer forage acres and openings than shown in these tables. Because of constraints on funding, helicopter flight restrictions in grizzly bear habitat, and weather conditions conducive to

burning, it is estimated that 10% of the burn prescription acres may be accomplished every year over the ten year planning period.

Many of these prescribed burn units were designed to provide the currently-missing younger age class across the landscape, and are expected to result in a mosaic of openings and cover within the unit boundary that would result in greater utilization from big game and other animals. When implemented, both action alternatives are expected to result in a more diverse summer range landscape that better resembles past conditions that included openings created by wildfire and other natural processes. With implementation of the action alternatives, the resulting distribution and availability of summer forage would be improved from the existing conditions, for deer and other ungulates and wildlife in the Galton area and be sufficient to maintain/increase populations.

The majority of the harvest proposed occurs in the winter range areas, and therefore harvest effects will be discussed under the heading found below.

Winter Range

Both action alternatives propose harvest and burn units that are designed to address FW-DC-WL-19 that would affect cover conditions on both whitetail and mule deer winter ranges. While important to both species, cover is more limiting than forage in the winter time for whitetail deer, in this area than for mule deer. Winter foraging habitat in terms of open brush fields on south and west facing slopes for mule deer has been reduced over time because of fire exclusion.

Within the whitetail winter range, proposed harvestfor both alternatives included intermediate harvest, as well as intermediate variable density (IVD) harvest. The IVD harvest unit was specifically prescribed to retain more cover patches in the understory, and retain species that would provide thermal cover through time where they occur. While the regular intermediate harvest prescription in most cases would not provide hiding cover or thermal cover, it is more likely to be used by whitetail deer for foraging and movement in most winter conditions. The main concern with this harvest prescription in winter range would be the loss of thermal cover in the stand in those heavy snow years (see cover discussion above). Limited harvest is prescribed in the key whitetail winter range areas around Murphy Lake. While cover is reduced in both action alternatives, the reduction occurs over a small amount of the total winter habitat (10%) and therefore meets GA-DC-WL_TOB-04.

Mule deer winter range within the Deep Divide area includes both regeneration and intermediate harvest in the drier habitat types. While regeneration harvest will result in openings that may not be fully utilized due to their size, it is expected that intermediate harvest units are more likely to be used for foraging and movement than units with a regeneration harvest prescription. However, the regeneration harvest units in this area include design criteria requiring unharvested patches to be maintained within the larger units to provide site specific travel areas, or between proposed harvest units and unrecovered existing harvest units. This area is a lower elevation site with much less aspect (level, rolling) compared the majority of the mapped mule deer winter areas, and is typically used in the fall and spring seasons with occasional use in the winter. The effects of these harvest prescriptions in this area would be more likely to create forage available in the spring and fall for this species.

Prescribed burn with Mechanical pretreatment prescriptions 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. All of these units involve the slashing of understory trees with 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 reduce the existing level of existing forbs, grass, or shrubs currently found within the stand.

All action alternatives propose understory burns within the winter range areas. Some of these burns were designed to provide forage openings adjacent to cover for mule deer. Because of the overlap in summer and winter habitat for mule deer, some burns within the winter range areas occur on aspects that will increase the amount of summer forage, but are not areas typically used by deer in the winter. Within the whitetail winter range, these understory burns are expected to rejuvenate browse species such as serviceberry that are abundant in these areas.

Movement

One linkage or movement area was identified within the project area. The linkage zone runs southeast of Trego to north of Olney and runs in a northeast to southwest configuration, across U.S. Highway 93 (See grizzly bear section). In addition, movement is desired between the project area and Canada, which is north of the project area (GA-DC-WL-TOB-05). The existing high percentage of cover in the northern portion of the project area, as well as MA direction in that area, is anticipated to maintain these levels of cover. Proposed ecosystem burns do not limit movement in these areas. The linkage zone across Highway 93, provides mainly high cover ratios. The 7500 acre Marston fire of 2015 (located to the north of the highway) resulted in a mosaic of seral stages that will provide both forage and cover conditions, and provide more potential use of the area, than in its pre-fire heavily vegetated condition. This wildfire did not generally burn down to open roads, so avoidance of open roads should not affect the use of this Marston fire area. Movement within or through the fire area was not compromised for the wildlife due to the mosaic of cover and openings remaining, as well as the location of the fire relative to open roads, and a proposed burn south of would not preclude movement as prescribed.

The overall ability of big game to move through the landscape would not be affected by either action alternative. Individual animals may have to adjust their localized movement patterns with recent harvest or burns, but no movement barriers would result. The existing cover for the planning subunits within the Galton Analysis Area, would be decreased with implementation of the action alternatives, but would still maintain a high percentage of cover. The proposed openings are mostly well-distributed in both action 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, especially in the higher elevation stands, is becoming a homogenous with high stand densities and canopy cover with reduced availability of quality of forage species in the understory. Road densities over the majority of the area are very low, resulting in secure movement areas. Lower elevations within the Murphy Planning area, and specifically in the Deep Divide area between Grave and Deep Creeks, have a higher number of roads with scattered units proposed in both action alternatives. The resulting lack of cover after timber harvest, combined with the access roads, gentle ground and easy human access may result in an area where animals would need to adjust their movement patterns. There are some prescribed burns that may burn to the tops of the ridge, and possibly back down the other side. Many of these areas, because of the high elevation, are currently rock or areas with no vegetation (or cover), and would not change ridgeline travel significantly. Riparian buffers would be placed on all prescribed burns and vegetation removal prescriptions, therefore movement along the riparian areas would not be compromised. Site specific adjustments in size and shape of

units would be made during unit layout per identified design criteria to ensure that movement corridors are provided throughout the larger units.

Conclusion for Forage and Cover

The project area is currently 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 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 1 and 3 propose a similar amount of harvest, however alternative 1 would provide for a greater diversity of summer range habitat compared to alternative 3. Both alternatives have limited harvest in important whitetail winter range areas with prescriptions designed to retain characteristic for snow intercept where available. Harvest in mule deer winter range in the Deep Divide area include design criteria developed to provide areas of cover within the larger units. This area is also known to be used more in the fall and spring timeframes and is not typical of the rest of the mule deer habitat in the Galton project area. These harvest areas would likely create forage in the spring and fall for this species. This would be consistent with GA desired conditions GA-DC-WL-TOB-04 which describe the desire to improve or maintain cover conditions in these areas.

Important Habitats or Seasons of Activity

Winter Range

Approximately 87% and 66% (Alternatives 1 and 3, respectively) of proposed harvest is located within big game winter range. In both action alternative. Approximately 8-13 percent of that total is required to be harvested during the winter due to grizzly bear concerns. Winter harvest in this case would occur between December and March 31st of the year. This generally correlates to the timeframe that big game are expected to be on winter range.

The 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 GW-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. In this case 135 acres (3 units) were required to be winter logged on mule deer winter range, and 1 unit (88 acres) on white-tail winter range due to grizzly bear requirements.

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, deer 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 case of white-tail deer, it has been noted in past winter-logged units within the Murphy Analysis Area that whitetail deer foraged on harvested trees while harvest operations

commenced. In addition, the mule deer winter units proposed for harvest included units that were typically used more commonly in the late fall and spring, than in the winter.

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 generally 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. Both alternatives propose the same units for winter harvest, therefore, the effects of these alternatives would be expected to be similar.

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 requiring winter harvest for some units, as well as the likelihood of all units being active at the same time during this period is highly unlikely. In addition, the majority of the ecosystem burn units in both alternatives would occur in the fall. Therefore, potential affects due to the project would be limited during this timeframe.

Secure Habitat

Management direction for grizzly bears, elk, backcountry areas, and applicable MA's would continue to maintain secure habitat within the project area for big game use. For example, roads utilized for proposed harvest 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 up to 7929 acres in the project area are proposed for helicopter burning. These helicopter burns were designed to increase early seral habitat within the project area and provide a diverse landscape that provides both forage and cover for movement across the landscape. These projects may result in short-term disruption of movement by wildlife while the burns are being completed, but will increase use over the entire landscape in the long term by introducing some early seral patches that will provide forage for wildlife species. Given the lack of early seral habitat within much of the project area's higher elevation, these proposed actions would increase/improve the habitat suitability. These actions help create a variety of successional stages that are spread across the landscape which provide a range of habitats (FW-DC-VEG-02, FW-DC-VEG-03, FW-DC-VEG-04, FW-DC-VEG-05).

An increase in hunting pressure due to road hunting along open roads adjacent to recently harvested units is not expected. Design criteria includes leaving a vegetative strip where available along regeneration and intermediate harvest units 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 be on site 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. The potential for increased hunting success

along open motorized roads is minimal and there would be no expected change to the deer populations within the project area.

The effects of increased activity due to timber harvest and prescribed fire (including helicopter ignition), could result in temporary disturbance and possible avoidance of the activity area. However, roads currently not open to public motorized use would remain so 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 species 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 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.

Summary of Direct/Indirect Effects of Action Alternatives on Existing Condition

Anticipated effects from implementing Alternatives 1and 3 include: an increase in openings in the summer range would increase the diversity of the habitat for deer and all wildlife by providing early seral stands in a landscape of primarily late seral stands. The ability for big game to move throughout this landscape would not be compromised and key habitat components would be maintained.

Effects of Current and Reasonably Foreseeable Actions

Timber harvest and associated activities

Timber harvest and associated activities may contribute to the environmental habitat baseline for deer as well as possible effects to species ability to utilize a specific area during project implementation. Timber harvest and hauling could cause these animals to temporarily avoid affected areas. Given that roads used to access timber harvest areas are closed to the general public, there would be little to no increase in the risk of mortality to wildlife, especially with the enforcement of contractual provisions. Additionally, timber harvest can result in areas lacking in hiding or movement cover and increased edge effect for approximately 5 to 15 years, depending

on the species. This lack of cover may result in foraging areas greater than 600 feet from cover being less utilized, especially diurnally.

The Little Feet Project, Little Feet Fuels Reduction, and Ant Flat Maintenance Burn are foreseeable projects planned within the boundaries of the Galton AA and are likely to be implemented either before or during implementation of the Galton Project. These projects use timber management, slashing, and prescribed fire, and as a result some, but not all, down woody debris and snags may be lost in treated areas. These activities may incidentally affect deer use within some areas on a temporary basis, but would not have adverse cumulative effects.

Harvest of blown down or damaged trees associated with future storms is possible in the Analysis Area. If a salvage project is identified and implemented, the cumulative effects to deer would be evaluated at that time. These activities may incidentally affect use within some areas on a temporary basis, but would not have adverse cumulative effects because of the small scale and short timeframe required for completion.

Precommercial thinning

Precommercial thinning may temporarily move deer out of the stand that is being thinned, however cover in the Analysis Area is not limiting. Thinning may increase the forbs and shrubs deer will eat by opening up the stands. Negligible effects to deer are expected with this activity.

Pre-commercial thinning on National Forest land occurs when past regenerated timber stands meet certain stand conditions. It is expected that approximately 1000 acres would be treated through pre-commercial thinning within the AA during the time period this proposed project is active. Pre-commercial thinning would maintain hiding cover values of the stand for associated species. During thinning operations, there may be short-term localized disturbance to deer in the stand being thinned. Pre-commercial thinning on State land is considered a minor activity. With the limited amount of pre-commercial thinning on State lands, potential effects to listed species and their prey would be indiscernible.

The Forestwide Young Growth Vegetation Management project would treat approximately 400 to 600 acres annually, dependent on funding, using precommercial thinning or commercial thinning treatments. Stands proposed for treatment are second growth stands and would be subject to a number of criteria before they were determined eligible for treatment. The Forestwide Young Growth Vegetation Management project would have the same effects on big game as the effects described for vegetative actions including precommercial thins and timber harvest (above).

The Ten Lakes Travel Management Project will address over-snow and mechanized travel planning for the Ten Lakes area. The area affected by the proposal includes the Ten Lakes WSA and areas with common entrance points to the WSA. There are three main over-snow entrance points to the Ten Lakes WSA: the Grave Creek corridor; Clarence and Stahl Creek; and the Burma/Blacktail area. Over-snow travel is currently not limited. Mechanized use (primarily mountain bicycles) is also unrestricted. The alternatives contained in the Ten Lakes Travel Management Draft Environmental Impact Statement contain various amounts of over-snow and mechanized travel for the project area. A final decision has not been made for this project and the cumulative effects analysis utilizes the Proposed Action as the basis for the analysis in the Galton Vegetation Management Project. The Ten Lakes Travel Management Project proposed action limits over-snow use both spatially and temporally, and spatially limits mechanized use which would decrease potential affects to secure habitat and winter range for big game from the existing condition. Therefore, the cumulative effects of the Ten Lakes Travel Management Project in

conjunction with past, present, reasonably foreseeable actions would result in fewer potential effects to big game habitat due to fewer projected effects from the Ten Lakes Travel Management Project.

Cattle Grazing

Currently, 100 cow/calf pairs are permitted to graze on the Grave Creek allotment from May 15 to September 30. This allotment is located within both a whitetail and mule deer winter range. Range monitoring over the years has not indicated competition for forage because the majority of the grazing by cattle occurs along the road or in recent harvest units. The current level of cattle use is not expected to increase in the next ten years. Continued monitoring will evaluate the forage component in this area for wintering deer.

Noxious Weed Control

Efforts to treat present infestations of noxious weeds and to eradicate infestations of new invaders are ongoing. All activities will comply with the Kootenai National Forest Invasive plant Management ROD (2007). Weed treatment activities would not lead to any adverse effects on deer or its habitat because treatments isolate non-beneficial weed species and would actually benefit forage species important to many species (USDA Forest Service 1997, 30).

Fire Suppression

In the event of a wildfire, construction of fire lines, helispots, and safety zones could disrupt animals using these areas, as well as the wildfire area. These activities would remove cover from these areas, however for the majority of the Analysis Area, cover is not a limiting component. The amount and timing of such an impact cannot be predicted. The effects of fire suppression will result in fewer early seral stands, and a resulting decrease in a mosaic of habitat that is important to deer, especially in the higher elevation mule deer summer range.

Road Management Activity

Actions such as road maintenance and administrative use associated with permit administration, data collection, and monitoring of NFS lands are not likely to measurably affect deer because they generally do not result in vegetation removal or persist for long periods of time. The standing tree and snag component would only be affected if considered a hazard to road users. These activities would not result in any change to deer habitat, thus no adverse cumulative effects would be expected.

Public Use

Other forest product activities occurring presently and typically on an annual basis are the gathering of pine cones, boughs and commercial gathering of Christmas trees. These activities occur throughout the project area and have little-to-no effect on the landscape due to the unspecific nature of the use and the low impact on the resources (foot traffic, hand tools). These activities would be more prominent within the lower elevation habitat, where there are more open roads. These activities are more likely to occur during late fall or early winter, and therefore do not occur during the timeframe deer could most be affected by activities on the winter range (late winter, early spring).

Ongoing hunting activities are regulated by the MFWP. The Forest Service influences hunter access through road management. Hunting activities within the Analysis Area will cumulatively

contribute to minor short-term effects (during the general hunting season) to habitat security. Effects from hunting vary with activity levels and can include short-term disturbance. Mortality risk to the listed species like the deer is increased through hunting. The potential increase of early seral habitat creation through proposed prescribed burns may draw hunters to these areas. However these proposed areas are dispersed throughout the mainly unroaded portions of the Analysis Area, therefore dispersing wildlife use. Hunting levels within the Analysis Area are not expected to significantly change due to the action alternatives, since no new road construction will occur.

Recreation Maintenance

Routine maintenance of trails and developed and dispersed recreation sites may temporarily displace some wildlife species. Approximately 159 miles of trail are maintained each year within the project area. Recreation maintenance could involve the harvest of trees in mature forest stands that pose a hazard to users. However, the scale of the impact would be negligible as a cumulative effect to deer utilizing the immediate area, or adjacent forest stands.

Special Uses

Operations of outfitter/guides would not result in any change to general and specialized wildlife habitats (winter range) that listed species may utilize, as they do not involve the harvest of trees. There would be no cumulative effects to deer and their habitats associated with these activities other than possible temporary and local avoidance of an area due to the presence of humans.

Permits associated with access to private homes, right-of-ways for utilities, and outfitter/guides are not expected to contributed to the cumulatively impact on wildlife because they are limited to previously disturbed and hardened sites like trails and roads.

Climate Change

Climate change could have effects on big game habitat at a forest level and are discussed in the KNF FEIS on page 372: “Climate change may increase the likelihood of large-scale disturbance. However, moving stand conditions towards historic conditions and the Desired Conditions for vegetation would decrease stand densities and increase their resiliency to large-scale disturbance. Habitat conditions would be nearer to what would be present under natural disturbance processes, which includes the pattern and amount of forage/cover for big game. The vegetative component of habitat for big game would be nearer to what was present historically, and would be more resilient to large-scale disturbance and the impacts of climate change. Climate change may alter big game use of winter range, as well as change the timing of movements between seasonal ranges (p. 92 in USDA 2010).”

Lands

There are no known land exchanges planned within the AA at this time. For a discussion of existing private lands, please see below.

Activities on Private Land

Any cumulative effects to wildlife species will be partially dependent on the duration (seasonal versus year-round) of use of these parcels and homes. Anticipated effects include species displacement, reductions in specialized habitats (e.g. old growth, snags, and down woody debris), habitat alteration and/or habitat loss. Many of the activities that may occur on the private parcels

can only be surmised. Based on past years building, it is estimated that approximately 2 houses/year may be built within the AA.

Other Agency Actions

On State of Montana lands within the planning area, including the Woods Ranch WMA, no activities are planned at this time. On State of Montana Trust lands, permitted cattle grazing is expected to continue and would have similar effects to those described under cattle grazing above. Additionally, 40 acres of Trust Lands are leased to the Indian Springs Golf Course which has already converted several acres of natural bunch wheat grasses to exotic grasses used by this type of industry. Regardless, these activities would not directly impact wildlife habitat modeled and identified as suitable habitat on NFS lands.

Regulatory Framework Findings

Forest Plan

The 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[3]:

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 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. Ecosystem burning activities would occur in these areas however they 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 Galton 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. See "Movement" under the "Direct and Indirect Effects" discussion. Therefore, the Galton project would contribute to progress toward achieving FW-DC-WL-17.

[3] Goals, desired conditions, objectives, standards, and guidelines can be found on the noted pages in the 2015 Forest Plan.

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 Galton project area is currently is not meeting desired conditions for forest structure associated with early seral conditions, especially in the higher elevations of the Project area. Proposed vegetation management treatments would increase the amount of early seral habitats and trend towards the desired levels. This would benefit the deer and other wildlife 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 Galton 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.

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 include required winter harvest within winter range during this timeframe. However, based on past harvest experience in white tail winter range as well as use exhibited by mule deer which favor the mapped low elevation winter range areas during the fall and spring rather than the critical winter period, treatment of these areas would not negatively affects these species. Also, harvest activities would be concentrated within only a couple of treatment areas at a time and not spread out throughout winter range. See "Winter Range" within the "Direct and Indirect Effects" discussion. Therefore, the Galton project was designed in accordance with FW-GDL-WL-08 and 09.

p.32, **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 requiring winter harvest minimize disturbance on some units. The percentage of actual disturbance over the project area would also minimize disturbance during this critical time period (see "direct and indirect effects" discussion). Therefore, the Galton project was designed in accordance with 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.

p. 32, **FW-GDL-WL-14. Connectivity**: In wildlife linkage areas identified through interagency coordination, federal ownership should be maintained.

The overall ability of big game to move through the landscape would not be affected by either action alternative. See "Movement" discussion in the "Direct and Indirect Effects" section. Therefore, the Galton project was designed in accordance with FW-GDL-WL-13.

All lands currently under federal ownership will remain so as Galton does not propose any exchanges. See "Movement" within the "Direct and Indirect Effects" discussion. Therefore, the Galton 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, MA1b, and MA1c are found within the project area in association with grizzly bear Core and elk security habitat areas as well as IRAs. The helicopter burn units proposed in these areas would help to create a variety of successional stages that would increase use over the entire landscape. See "Secure Habitat" within the "Direct and Indirect Effects" discussion. Therefore, the Galton project would contribute to progress toward MA5a,b,c-DC-WL-01.

Geographic Area

p. 91, **GA-DC-WL-TOB-04**: Habitat conditions for cover/forage and low levels of disturbance are maintained for big game on key low elevation winter ranges in the Murphy, Meadow, and Deep Divide areas. Cover/forage conditions may be improved through restoration activities such as vegetative treatments or reduction of noxious weeds.

When considering all big game species, nearly all of the proposed harvest acres are located within big game winter range. Treatments are desired to trend the vegetation towards more historic conditions where understory burns were more frequent. Limited treatment on key areas in the Murphy winter range, along with prescriptions designed to maintain desired winter range components contribute toward this desired condition. Maintenance of key components in the harvest units in the Deep Divide area will retain and may improve forage conditions in this area. See "Winter Range" within the "Direct and Indirect Effects" discussion. Therefore, the Galton project would contribute to progress toward GA-DC-WL-TOB-04.

P.91, GA-DC-WL_TOB-05: Wildlife move to and from the border with Canada.

See "Movement" within the "Direct and Indirect Effects" discussion as well as response to FW-GDL-WL-13 and 14 above. Therefore, the Galton project would contribute to progress toward FW-DC-WL-BUL-04.

Federal Law

National Forest Management Act

The project would comply with NFMA direction to provide for diverse populations of plant and animal communities by through compliance with the Forest Plan.

Other Guidance or 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 Galton 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, especially in the higher elevations, 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 that would provide forage species 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. 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. 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

Tim Thier, MFWP Wildlife Biologist

Communications early in the project reviewed areas considered for ecosystem burns to improve mule deer habitat. They also consisted of the type of proposed actions occurring within big game winter range, evaluation of winter range conditions, as well as discussing harvest treatment in relation to the winter timeframe.

Recommended Wilderness, Wilderness Study Area, and Inventoried Roadless Areas

Introduction

The project area boundary includes the Ten Lakes Recommended Wilderness (26,000 acres), the Ten Lakes Wilderness Study Area (34,100 acres) and all or part of four IRAs totaling approximately 89,216 acres. Many of these acres overlap. See Map 5. This analysis considers the effects to the entire roadless expanse-that is both the roadless area (RW, WSA, and IRA's) and the unroaded lands contiguous to the roadless areas.

For National Forest System lands in Montana, Inventoried Roadless Areas (IRAs), are those mapped under the 2001 Roadless Area Conservation Rule. These areas are also identified in Appendix C of the FEIS for the Forest Plan (USDA FS 2013). The official set of maps is maintained at the Washington Office of the Forest Service.

Ten Lakes Recommended Wilderness

The 2015 Kootenai Forest Plan includes the Ten Lakes Recommended Wilderness (MA1b). Those acres are described in the 1985 Legislative Report to Congress. Regardless of policy or Forest Plan direction the Ten Lakes MA1b will be managed in accordance with language found in the 1977 Montana Wilderness Study Act (MA1c). Therefore this area will be discussed in terms of the Wilderness Study Area (WSA).

Ten Lakes Wilderness Study Area

The 2015 Forest Plan includes the Ten Lakes Wilderness Study Area (MA1c). The Ten Lakes WSA was congressionally designated in the Montana Wilderness Study Act of 1977 (PL 95-150). It is administered to maintain the wilderness character and the potential for inclusion in the National Wilderness Preservation System that existed in 1977 when the act was passed.

Inventoried Roadless Areas

For National Forest System lands in Montana, Inventoried Roadless Areas (IRAs), 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 Washington Office of the Forest Service.

Marston Face – (No. 01-172) The area totals 9,092 acres and is located in the southern and eastern portion of the project area, extending from Patrick Ridge northwesterly from the Stillwater State Forest on the east. The area is accessible from Highway 93 and the Deep creek Road. Trails radiate from Mt. Marston (just outside the area boundary) along Patrick Ridge (Trail 860), Laughing Water Creek (Trail 98) and down slope to the west of Highway 93 on the northern end of Dickey Lake (Trail 361). (USDA FS 2013)

Ten Lakes and Ten Lakes Contiguous Area – (No. 01-683) The area totals 48,510 acres. The Ten Lakes Area includes the Ten Lakes Montana Wilderness Study Area (MWSA) and five areas contiguous to the MWSA, identified as the Ten Lakes Contiguous Area #683a. Ten Lakes is located in the northeast corner of the Forest, next to the US/Canada border. A portion of this areas was designated as the Ten Lakes Scenic Area by the Regional Forester in 1964. The Ten Lakes MWSA is managed under the 1977 Montana Wilderness Study Act, pending action by Congress.

The Ten Lakes MWSA is designated as its own management area, MA1c in the 2015 Forest Plan. (Ibid, 2013). In the 2015 forest planning process existing (1987) IRA's were reviewed and other unroaded areas evaluated. The updated inventory was included in the Roadless Area Conservation Rule, Final Environmental Impact Statement, volume 2, dated November 2000. The evaluation added 7,900 acres to the 1987 Ten Lakes Contiguous IRA #683a increasing it to 14,700 acres. The contiguous area (IRA #683a) is now included as part of Ten Lakes IRA #683.

The Ten Lakes MWSA and Ten Lakes contiguous areas are evaluated together. The contiguous areas include Blacktail Basin in the northwest corner, the Eureka Face, a portion of the upper basin of Griffith Creek, upper Stahl Creek, add Bluebird Basin, and areas in Wickiup Creek, Divide Creek and Drip Creek. (Ibid, 2013)

Thompson Seton – (No. 01-483) This IRA is only partially on the KNF. The KNF portion of the IRA is 29,739 acres. The remaining 52,234 acres are on the Flathead National Forest. The Thompson Seton area is located in the North end of the project area. The Whitefish Mountain Range divide forms the Flathead-Kootenai National Forest boundaries, as well as the eastern edge of the project area. The KNF portion of this area is bounded on the north by the Trail Creek Road (#114), on the east by the Flathead National Forest, on the south by FSR 368 and the Stillwater State Forest, and on the west by the Graves Creek Road. (Ibid, 2013)

Tuchuck – (No. 01-482) This IRA is only partially on the KNF. The KNF portion of the IRA is 2,235 acres. The remaining 17,730 acres are on the Flathead National Forest. This area is located on the north end of the project area. The portion of the Tuchuck IRA on the KNF borders roads and timber harvest land on the west, the Flathead National Forest on the east, Grave and Lewis Creek Roads on the south. The IRA can be accessed from the North Fork Road on the FNF side and the Therriault Lakes Road from the west. (Ibid, 2013) The Tuchuck IRA does not contain any project activities and therefore will not be further discussed in this analysis.

Unroaded areas

A total of approximately 1450 acres of unroaded area is apparent in three areas that are contiguous to roadless areas on the lower east side of the Ten Lakes IRA. Unnroaded areas do not have a special designation; the Forest Plan and Management Area designation guide management.

Regulatory Framework

Forest Plan

The 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. 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 resource direction relevant to this project are found under Forest Plan Consistency at the end of this document and include:

Goals, forest wide standards, and forest wide guidelines specific to IRAs

MA1b direction, MA1c direction, MA5a,b,c direction

Montana Wilderness Study Act

The Montana Wilderness Study Act of 1977 (Public Law 95-150) designated the Ten Lakes Wilderness Study Area. The WSA is to be administered to maintain the wilderness character and the potential for inclusion in the National Wilderness Preservation System that existed in 1977 when the act was passed.

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 land 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. Google Earth was used to analyze unroaded areas contiguous to the IRAs that make up the roadless expanse by overlaying historical harvest units, IRAs, roads, and units from the action alternatives.

Analysis Area

The analysis area for effects to this resource includes MA 1b, MA1c, all of the Marston Face and Ten Lakes/Ten Lakes Contiguous IRAs, the portions of the Thompson Seton and Tuchuck IRAs within the KNF Boundary, and the roadless expanse found in MA5a, MA5b, or MA6. The area selected for analysis is of a scale suitable for the recognition of direct, indirect and cumulative effects to the resource.

IRA Table 1 shows the special area acres within the project area. Many of these acres overlap. See Map 5.

IRA Table 1. Special Area Acres within the Project Area

Special Area	Total Acres	Acres in the Galton Vegetation Project
Ten Lakes Recommended Wilderness (MA1b)	26,000	26,000
Ten Lakes Montana Wilderness Study Area (MA1c)	34,100	34,100
Marston Face IRA	9,092	9,092
Ten Lakes and Ten Lakes Contiguous IRAs	48,510	48,510
Thompson Seton IRA	81,613	29,379
Tuchuk IRA	19,965	2,235

Analysis Methods

While the Wilderness Act of 1964 does not specifically define “wilderness character,” the framers of the Act appear to have incorporated three mutually reinforcing societal ideals that are integral to the historical purpose of wilderness and to an understanding of wilderness character (Kaye 2000, 2002) and Scott (2002):

Natural environments relatively free from modern human manipulation and impacts

Personal experiences in natural environments that are relatively free from the encumbrances and signs of modern society

Symbolic meanings of humility, restraint, and interdependence in how individuals and society view their relationship to nature.

Wilderness character may be described as the combination of biophysical, experiential, and symbolic ideals that distinguishes wilderness from other lands. These ideals combine to form a complex and sometimes subtle set of relationships among the land, its management, and the meanings people associate with wilderness.

This analysis focuses on the potential effects of project activities on roadless characteristics (Our Approach to Roadless Area Analysis of Unroaded Lands Contiguous to Roadless Areas (12/2/10)).

Table 2 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.

IRA Table 2. Relationship between Wilderness Attributes and Roadless Area Characteristics

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 the 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

Environmental Consequences

The following analysis will compare the effects of the proposed alternatives on the wilderness attributes/roadless characteristics within the roadless expanse.

Gauging effects to the natural and undeveloped wilderness attributes is relatively straightforward. It is accomplished by measuring the presence and magnitude of human-induced change to an area (physical impacts like roads and fences). It is also tracked by how the landscape appears to

people, even though there may have been some minor human modifications. Travel management planning decisions that may affect these attributes are largely confined to trail disturbances (either through reconstruction or change in use type), and accompanying weed infestations, visual impact from trails, and displacement of or effects to wildlife. Altering the physical engineering of trails (that is converting single-track to double track) would also affect water movement, soil displacement and vegetation.

Opportunities for solitude were gauged during the Roadless Area Review and Evaluations (RARE I and II) process using the Wilderness Attribute Rating System, based primarily on physical features of the area: size, presence of vegetative or topographic screening, distance from civilization and so forth. The RARE process evaluated the potential for roadless areas to be included in the National Wilderness Preservation System.

Evaluating effects to remoteness (opportunity for primitive recreation), are typically tracked for two parameters: physical and social. The physical parameters of an area that foster a sense of remoteness, including an area's size, distance from roads, visibility of lights, and sounds associated with civilization, would not change with travel management decisions about appropriate uses of trails in any alternative. When evaluating effects to remoteness, the social aspect of how people travel within an area is an effect often discussed.

Existing Condition - Ten Lakes Recommended Wilderness, Ten Lakes Wilderness Study Area, and Ten Lakes Inventoried Roadless Areas (No. 683 & 683a)

Existing Condition

The Ten Lakes Recommended Wilderness Area (MA1b) and the Ten Lakes Wilderness Study Area (MA1c) and the Ten Lakes IRAs overlap for the most part. The Ten Lakes WSA (MA1c) is a unique situation, and differs from congressionally designated Wilderness areas, Inventoried Roadless Area policy and direction in the Forest Plan such as recommended wilderness (MA1b). Regardless of policy or Forest Plan direction, the Ten lakes WSA will be managed in accordance with language found in the 1977 Montana Wilderness Study Act (MA1c), awaiting Congressional action. Therefore, the RW and WSA areas will be discussed together. The boundaries for each area have some differences, but the characteristics described below are rated the same way.

The 2015 Forest Plan includes the Ten Lakes Wilderness Study Area (MA1c). The Ten Lakes WSA was congressionally designated in the Montana Wilderness Study Act of 1977 (PL 95-150). It is administered to maintain the wilderness character and the potential for inclusion in the National Wilderness Preservation System that existed in 1977 when the act was passed.

The area is generally surrounded by signs of past forest management activities, roads or population centers. The Ten Lakes area is directly west of the Thompson Seton and Tuchuck roadless areas and overlooks the Tobacco Valley where the towns of Eureka, Rexford, Fortine and Trego are located. Many of the basins surrounding the area were roaded and logged during the spruce bark beetle infestation in the 1950s, which explains the irregular shape of the area. Parts of the contiguous areas contain old roads and harvest units.

The Galton Vegetation project does not address travel management or recreation. The Ten Lakes Travel Management project will address those issues.

A total of approximately 1450 acres of unroaded area is apparent in three areas that are contiguous to roadless areas on the lower east side of the Ten Lakes IRA. One is near 700 acres in size and lies south and west of Stahl Creek, south and west of Stahl Creek Road #7021, and can be described as a high mountain bowl with a small water feature (Sections 8 & 9, T36N R25W). A second is near 600 acres in size and lies west and south of Clarence Creek, west of Clarence Creek Road #7022, and includes the east/west ridge to the east of Stahl Peak (Sections 3 & 4, T36N R25W and Sections 34 & 35, T37N R25W). The third is smaller at less than 150 acres in size and lies to the east and northeast of Foothills Road #756 (Section 31, T36N R25W and Section 6, T353N R25W).

IRA Table 3. WSA Wilderness Character Indicators - 1977 and Existing Condition

Wilderness Quality	Resource Indicator	Measure	Existing Condition 1977[1]	Existing Condition Alt 2	1977 Wilderness quality maintained

Wilderness Quality	Resource Indicator	Measure	Existing Condition 1977[1]	Existing Condition Alt 2	1977 Wilderness quality maintained
Natural Integrity	Human induced change to an area Physical development	Vegetative Acres treated Miles of NFS road Miles of NFS trail Private mine claims Number of standing structures	750-1600 10-19 55.0 6 4	158 2 55.4 1 3	Yes, improved
Apparent naturalness	Looks natural to most people	Impact of vegetative treated acres and physical development	High same measures as above	High, same measures as above	Yes, stable
Solitude and Opportunities for primitive recreation	Physical features-	Size of area Screening, Perimeter to core Intrusions	34,000 good 1-3 miles several	34,000 improved 1-3 miles Increased	Yes, Stable
Solitude and Opportunities for primitive recreation	Social indicators	See Ten Lakes Travel Management Project	See Ten Lakes Travel Management	See Ten Lakes Travel Management	No, degraded

[1]In order to compare 1977 with 2016, miles and acres were determined using GIS and current locations, which may be different than previous maps or other data.

Direct and Indirect Effects to Ten Lakes Recommended Wilderness, Ten Lakes Wilderness Study Area, and Ten Lakes and Ten Lakes Contiguous Area Inventoried Roadless Areas (No. 683 and 683a), and Ten Lakes Roadless Expanse

Alternative 2 – No Action

Natural ecological processes would continue with the exception of fire during critical fire season, which would continue to be controlled through fire suppression efforts during critical fire seasons. Unplanned ignitions and prescribed fire may be allowed in some areas under certain circumstances. Other natural processes including weather, insects and disease, and time would continue to shape the area. The spread of noxious weeds would continue. The apparent naturalness of the area would continue for persons viewing and entering the area. The undeveloped attribute would remain unchanged for most areas, but this and the opportunity for solitude may decrease over time as more people utilize the area for recreational activities and if the local area becomes more populated. No special features would be affected.

The suppression of fire in the area would result in existing openings continuing to see encroachment from a variety of trees and vegetation, and also reduced huckleberry 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. Succession will play a large role with conifers re-establishing populations on past burned landscapes. Unplanned ignitions may be allowed to burn under certain circumstances, thereby creating openings or mosaic patterns within the landscape. The scale at which these changes may occur is difficult to predict due to the nature of fires and fire behavior.

The old road prisms and harvest units within and around the area would continue to naturalize over time and evidence of their existence would eventually be obscured.

Action Alternatives 1 and 3

There are no proposed harvest treatments, road building or watershed improvement activities in the Ten Lakes IRA, RW, or WSA area in either action alternative. One 45 acre regeneration unit (111) and portions of an ecosystem burn unit (16) is proposed in the contiguous unroaded area near Foothills Road in both action alternatives. This project proposes a number of ecosystem burn units within the Ten Lakes IRA area.

IRA Table 3. Proposed Treatment Acres

	Ten Lakes IRA, RW, & WSA		Ten Lakes Contiguous Unroaded Areas	
	Alt 1	Alt 3	Alt 1	Alt 3
Ecosystem Burn	5,610 acres	723 acres	557 acres	185 acres
Shelterwood or Seedtree with Reserves	0 acres	0 acres	45 acres	45 acres
Total Treatment Acres	5,610 acres	723 acres	602 acres	230 acres

Alternatives 1 and 3 propose varying levels of ecosystem burning within this area. The intent of this treatment would include returning fire to the landscapes, maintaining a range of variability in forest conditions, creating openings, rejuvenation of whitebark pine, reducing ground and ladder fuels, changing stand density and composition, and rejuvenating shrubs and brush. In areas dominated by dense subalpine fir, Douglas-fir or decadent lodgepole pine, prescribed burning may occur at a higher intensity, killing portions of the overstory. This would create pockets of mortality and visible openings on the landscape (generally less than 100 acres). Alternative 1 proposes 5,610 acres of treatment areas within the WSA and Alternative 3 proposes 723 acres. Alternative 1 and 3 both propose ecosystem burning in the roadless expanse through Unit 16. Proposed unit 16 would have 557 acres of treatment in Alternative 1 with 185 acres in Alternative 3. Alternatives 1 and 3 both propose regeneration harvest in the roadless expanse through Unit 111. Unit 111's silvicultural regeneration prescription is either Shelterwood or Seedtree with Reserves where an overstory of trees would be retained. The number of trees left from this 45 acres unit would depend upon the condition of the stand prior to harvest. See Chapter 3's Forest Vegetation section for details. Besides improving the health of the stand, unit 111 will blend in with the surrounding area due to its shape, location on the slope, and proximity to surrounding ecosystem burn unit 16 also in the roadless expanse.

The natural attribute of this area 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 character and ecological processes of these areas. Many plant and animal species found in these areas are dependent on fire to maintain the habitats they need to survive. (See vegetation wildlife section). Exclusion of fire allows for encroachment of fire-intolerant species and may actually reduce the biological values apparent to naturalness characteristics. Reintroducing fire may enhance the characteristic of naturalness through the areas by establishing forest characteristics that would have been more typical in this area in the past

Some of the proposed ecosystem burns would require preparation around the burn perimeters. Some slashing could occur, especially on those units near the US/Canada border. Due to natural feature and the use of prescriptions that would take advantage of fuel moisture content and weather conditions, slashing would be minimal. As a result, the ecosystem burns would have minimal effects to the undeveloped characteristics of the IRA.

Remoteness and solitude may be interrupted by the sound of helicopter flights and field crews during the ignition of the proposed ecosystem burns. This would be a short term effect and overall the remoteness and solitude related to the prescribed burn would remain unchanged. These burns are also scheduled to occur over several years and required to follow the "Guide to Effects Analysis of Helicopter Use in Grizzly Bear Habitat" (See Design Criteria). The ecosystem burns could create some pockets of mortality which could allow motorized over snow vehicle access to places not currently being accessed. Very little of this is foreseen due to the prescription of the ecosystem burns, the location of the ecosystem burns, and the expected stand conditions following the ecosystem burns (see Fuels Section). This project proposes no travel management or recreation changes.

Special features such as grizzly bear and Canada lynx habitat would be enhanced (see wildlife section). The scenic resource in the Ten Lakes Scenic Area could change and areas of red-needled trees and blackened may be visible during the short term (See Scenic Resources Section). Over time the vegetation would grow and signs of fire activity would fade away. The Therriault Pass Special Geologic Area would not be affected.

Existing Condition – Marston Face and Thompson Seton IRAs

Marston Face #172

The entire 9,902 acres of the Marston Face IRA are within the Galton Vegetation Project Area. The area extends from Patrick Ridge northwesterly from the Stillwater State Forest on the east. The area is accessible from Highway 93 and the Deep Creek Road. Trails radiate from Mt. Marston. Marston Face IRA is surrounded on three sides by roads (FSR 900, 1002, and 368) and past harvest units. Two of the road systems intrude into the area, FSR 900 to the lookout tower on top of Mt. Marston and FSR 368 in Deep Creek. This IRA includes four old roads and associated harvest. Two of the roads were re-contoured in 1996 (Road 7003 and 7003A); Trail 361 begins on an old road bed; and Road 368D is overgrown and impassable. (USDA FS 2013) In 2015, a large portion of the area was burned in the Marston fire. There are no apparent unroaded areas contiguous to this IRA to contribute to the roadless expanse.

The natural attribute of the IRA is rated at medium, with high quality or undisturbed soil, water, and air. Some signs of timber harvest remain in the IRA with old road prisms and stumps although vegetative growth has obscured most of the evidence. There is evidence of natural fire and fire suppression activities from the 2015 Marston Fire. The fireline has been rehabilitated with natural materials and seeded, but some stumps from trees cut during fireline construction are still visible. The Tobacco Valley and evidence of human occupation and development are visible from the Marston Face IRA. Noxious weeds are present in the IRA.

Long term ecological processes are predominantly 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 could allow for natural fires (unplanned ignition) to burn under some circumstances (See Fire/Fuels Section and Map 15 Fire History).

The undeveloped attribute of the area is rated at medium, appears mostly free of human disturbances. There is some evidence of man-made structures including the Mt. Marston Lookout tower and associated radio antennas. Two road intrusions exist (FSR 900 and 368, discussed above). There are approximately 17 miles of trail in the area. Ridgelines and trails receive most of the concentrated use.

Opportunities for remoteness and solitude, the feeling of being alone or remote from civilization, are rated high. The areas has some areas of steep rocky terrain, however, the majority of the IRA was burned in the 2015 Marston Fire. Recreational use is primarily on the Forest Service system trails.

Special Features are rated as medium/low. The area provides habitat for grizzly bears and Canada lynx.

Thompson Seton # 483

The KNF portion (29,379 acres) of this IRA is completely within the boundary for the Galton Vegetation Project. The Whitefish Mountain Range divide forms the Flathead-Kootenai National Forest boundary, as well as the eastern edge of the project area. The KNF portion of this area is bounded on the north by the Trail Creek Road (#114), on the east by the Flathead National Forest, on the south by FSR 368 and the Stillwater State Forest, and on the west by the Graves Creek Road.

Harvest activity and associated road construction in both Blue Sky and Williams Creeks resulted in deep incisions into the area, which is reflected by the boundary for this IRA. Blue Sky trail 74 and old harvest units adjacent to it make a cherry stem incision which was not included as part of the IRA. Williams Creek trail 73 and adjacent harvest units make a cherry system between the Thompson Seton and Marston Face IRAs, and were not included in either IRA. Two unroaded areas contiguous to the Thompson Seton IRA are evident. Each contributes less than 200 acres each totaling less than 400 acres to the roadless expanse. One of the contiguous unroaded areas lies to the south of Road #7019 and to the east of the sharp switchback in Road #7066 (Section 4 & 9, T35N R25W). The other unroaded area contiguous to the IRA lies northeast of Krinklehorn Peak and east of Krag Peak (Section 1, T35N R25W).

The natural attribute of the area is rated at medium, with high quality or undisturbed soil, water, and air. Evidence of past harvest and roads are visible in the foreground. Harvest areas and valley communities are visible in the foreground. 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 may allow for unplanned ignitions to burn in the IRA under certain circumstances. Noxious weeds are present in the IRA.

The undeveloped attribute is rated as medium, appears mostly free of human disturbances. Locke Cabin is within this area. There are approximately 22 miles of trail in the area, including the Whitefish Divide Trail.

Opportunities for remoteness and solitude, the feeling of being alone or remote from civilization, is rated as high. Recreation use is light and the possibility of meeting another party is remote.

Special features are rated as low. This area includes habitat for grizzly bear and Canada Lynx. This area has no major or very few minor special features.

Direct and Indirect Effects to Marston Face and Thompson Seton IRAs.

Alternative 2 – No Action

Natural ecological processes would continue with the exception of fire during critical fire season, which would continue to be controlled through fire suppression efforts during critical fire seasons. Unplanned ignitions and prescribed fire may be allowed in some areas under certain circumstances. Other natural processes including weather, insects and disease, and time would continue to shape the IRAs. The spread of noxious weeds would continue. The apparent naturalness of the IRAs would continue for persons viewing and entering the IRAs. The undeveloped attribute would remain unchanged for most areas, but this and the opportunity for solitude may decrease over time as more people utilize the IRAs for recreational activities and if the local area becomes more populated. No special features would be affected.

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 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. Succession will play a large role with conifers re-establishing populations on past burned landscapes. Unplanned ignitions may be allowed to burn under certain circumstances, thereby creating openings or mosaic patterns within the landscape. The scale at which these changes may occur is difficult to predict due to the nature of fires and fire behavior.

The old road prisms and harvest units within and around the IRAs would continue to naturalize over time and evidence of their existence would eventually be obscured.

Direct and Indirect Effects

Action Alternatives 1 and 3

There are no proposed harvest treatments, road building or watershed improvement activities in the IRAs in either action alternative. Two different types of harvest are proposed in the Thompson Seton Roadless Expanse. Both alternatives 1 and 3 propose a portion of a regeneration unit (110) and only alternative 3 proposes a portion of a commercial thin unit (118). The action alternatives propose two types of burning activities within both the Marston and Thompson Seton IRAs. Planting is proposed in the Marston IRA.

IRA Table 4. Proposed Treatment Acres

	Marston Face #172		**Thompson Seton #682**		**contiguous unroaded area**	
	Alt. 1	**Alt 3.**	**Alt 1**	**Alt 3**	**Alt. 1**	**Alt. 3**
Prescribed Burn w/Mechanical Pretreatment	109 acres	109 acres	0 acres	0 acres	0 acres	0 acres
Ecosystem Burn	0 acres	0 acres	1,611 acres	438 acres	0 acres	0 acres

Whitebark pine planting	0 acres	780 acres	0 acres	0 acres	0 acres	0 acres
Commercial Thin	0 acres	0 acres	0 acres	0 acres	0 acres	17 acres
Shelterwood or Seedtree with Reserves	0 acres	0 acres	0 acres	0 acres	16 acres	16 acres
Total Treatment Acres	109 acres	889 acres	1,611 acres	438 acres	16 acres	33 acres

Marston Face #172

Alternatives 1 and 3 propose one 109 acre unit of prescribed burning with mechanical pre-treatment. This treatment would be used to accomplish a variety of resource objectives where the stand densities, topography, or visual concerns preclude the use of prescribed burning without mechanical treatment. Mechanical pre-treatment would slash small diameter trees using chainsaws prior to conducting a prescribed burn. Slashing could be done around the edges of the unit or throughout the unit. The objective of the prescribed burn would be to reintroduce fire to the landscape, maintain existing openings and create new ones to improve habitat for wildlife species.

The natural attribute of this IRA 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 ecological processes. Many plant and animal species found in these areas are dependent on fire to maintain the habitats they need to survive. (See wildlife section). Exclusion of fire allows for encroachment of fire-intolerant species and may actually reduce the biological values apparent to naturalness characteristics. Reintroducing fire may enhance the characteristic of naturalness through the areas by establishing forest characteristics that would have been more typical in this area in the past. Planting of whitebark pine in Alternative 3 may also increase the apparent naturalness of the area by maintaining the historic whitebark pine stands lost in the 2015 Marston fire.

The proposed prescribed burn would not require construction of fireline due to natural features and the use of prescriptions that would naturally contain fire through fuel moisture content and weather conditions. Some small diameter stumps (< 4” diameter) may be evident from slashing during the short term, but would become less visible as they decay over time. As a result, the prescribed burn would have minimal effects to the undeveloped characteristics of the IRA. Whitebark pine planting would have no effect on the undeveloped characteristic.
Remoteness and solitude may be interrupted by sounds of slashing noise during the mechanical pretreatment phase of the proposed activity. They may also be disrupted by the sound of helicopter flight and field crews during the ignition of the proposed burn. This would be a very short term effect and overall the remoteness and solitude related to the prescribed burn with mechanical pre-treatment would remain unchanged. Short term effects may also be noted in areas that would be determined to benefit from whitebark planting. Sight and sounds of planting crews may temporarily reduce the sense of remoteness and solitude.

Special features such as grizzly bear and Canada lynx habitat would be enhanced (see wildlife section). Another special feature of the IRA is whitebark pine habitat. Planting of whitebark pine in areas that burned during the 2015 Marston fire to encourage their regeneration would also

enhance that special feature.

Thompson Seton #682

Alternatives 1 and 3 propose varying levels of ecosystem burning within this IRA. The intent of this treatment would include returning fire to the landscapes, maintaining a range of variability in forest conditions, creating openings, rejuvenation of whitebark pine, reducing ground and ladder fuels, changing stand density and composition, and rejuvenating shrubs and brush. In areas dominated by dense subalpine fir, Douglas-fir or decadent lodgepole pine, prescribed burning may occur at a higher intensity, killing portions of the overstory. This would create pockets of mortality and visible openings on the landscape (generally less than 100 acres). Alternative 1 proposes 1,611 acres of treatment areas within the IRA and Alternative 3 proposes 438 acres.

Alternatives 1 and 3 both propose regeneration harvest with prescriptions of either Shelterwood or Seedtree with Reserves where an overstory of trees would be retained. Approximately 16 of the 80 acre unit falls within the roadless expanse. The number of trees left would depend upon the condition of the stand prior to harvest. See Chapter 3's Forest Vegetation section for details. Besides improving the health of the stand, this regeneration unit will blend in with the surrounding area due to its shape, location on the slope, and proximity to surrounding historic regeneration units. Alternative 3 proposes a 51 acre commercial thin unit. About one-third of this unit or 17 acres falls into the roadless expanse. Commercial thinning results in about half of the canopy being removed. The emphasis is on the health of the residual stand.

The natural attribute of this IRA 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 ecological processes of these areas. Many plant and animal species found in these areas are dependent on fire to maintain the habitats they need to survive. (See wildlife section). Exclusion of fire allows for encroachment of fire-intolerant species and may actually reduce the biological values apparent to naturalness characteristics. Reintroducing fire may enhance the characteristic of naturalness through the areas by establishing forest characteristics that would have been more typical in this area in the past.

Some of the proposed ecosystem burns would require preparation around the burn perimeters. Some slashing could occur. Due to natural features and the use of prescriptions that would take advantage of fuel moisture content and weather conditions, slashing would be minimal. As a result, the ecosystem burns would have minimal effects to the undeveloped characteristics of the IRA.

Remoteness and solitude may be interrupted by sounds of helicopter flight and field crews during the ignition of the proposed ecosystem burns. This would be a very short term effect and overall the remoteness and solitude related to the prescribed burn with mechanical pre-treatment would remain unchanged.

Special features such as grizzly bear and Canada lynx habitat would be enhanced (see wildlife section).

Cumulative Effects

The Ten Lakes Travel Management Project will address over-snow and mechanized travel plan for the Ten Lakes area. The area affected by the proposal includes the Ten Lakes WSA and areas with common entrance points to the WSA. There are three main over-snow entrance points to the Ten Lakes WSA: the Grave Creek corridor; Clarence and Stahl Creek; and the Burma/Blacktail area. Over-snow travel is currently not limited. Mechanized use (primarily mountain bicycles) is also unrestricted. The alternatives contained in the Ten Lakes Travel Management Draft Environmental Impact Statement contain various amounts of over-snow and mechanized travel for the project area. A final decision has not been made for this project and the cumulative effects analysis utilizes the Proposed Action as the basis for the analysis in the Galton Vegetation Management Project.

Timber harvest, road building and decommissioning, and wildfire suppression are some of the activities that have occurred in the project are. The effects of past management have diminished over time and current conditions for the natural, undeveloped, opportunities for solitude, special features and manageability characteristics are described above. Natural ecological processes would continue with the exception of fire, which would continue to be suppressed during the critical fire season.

Effects of Ongoing and Reasonably Foreseeable Actions

The effects of ongoing and reasonably foreseeable actions when combined with the anticipated effects of the proposed activities would result in some changes to the areas. These changes are expected to be relatively short-term in duration (one to fifteen years), mostly affecting views and viewsheds, with even shorter-term effects to attributes such as remoteness and solitude (single days to weeks). The overall condition of the areas would improve over the long-term as past management activities (harvest and roadbuilding) continue to revegetate and blend into the overall landscape and proposed activities incorporated prescribed and natural fire into the landscape.

Vegetation Management – All current and ongoing vegetation management projects within the analysis area are located outside MA1b, MA1c, and the IRAs, and would not have discernible effects to the areas.

Ten Lakes Travel Management Project -The Ten Lakes Travel Management Project will address over-snow and mechanized travel planning for the Ten Lakes area. The area affected by the proposal includes the Ten Lakes WSA and areas with common entrance points to the WSA. There are three main over-snow entrance points to the Ten Lakes WSA: the Grave Creek corridor; Clarence and Stahl Creek; and the Burma/Blacktail area. Over-snow travel is currently not limited. Mechanized use (primarily mountain bicycles) is also currently unrestricted. The alternatives contained in the Ten Lakes Travel Management Draft Environmental Impact Statement contain various amounts of over-snow and mechanized travel for the project area. A final decision has not been made for this project and the cumulative effects analysis utilizes the Proposed Action as the basis for the analysis in the Galton Vegetation Management Project. The cumulative effects of the Ten Lakes Travel Management Project in conjunction with past, present, reasonably foreseeable actions would may result in some level of effect to the recommended wilderness quality of the Ten Lakes Wilderness Study Area. The Ten Lakes Travel Management project is analyzing and disclosing the potential effects of the various alternatives.

Salvage of Incidental Mortality from Underburning - Alternatives 1 and 3 would authorize salvage of mortality that occurred during fuel treatments. There are 16 criteria listed on page 14 of the FEIS that would need to be complied with prior to any salvage occurring. These criteria provide for the protection of resources and compliance with Forest Plan direction. There is no salvaging allowed in recommended wilderness, wilderness study areas, or inventoried roadless areas, thererfore there would be no effects to these resources. This activity would not occur under Alternative 2, so no effects would occur if Alternative 2 is selected.

Cattle Grazing – The Grave Creek Allotment is adjacent to the Thompson Seton IRA. Cattle may temporarily stray into the area. Effects would be minimal.

Noxious Weed Treatment - For Alternatives 1, 2, and 3, the noxious weed treatment would reduce the amount of non-native invasive plants on the treated areas. This is beneficial to the naturalness component of the areas.

Fire Suppression – There could be effects to the areas from fire suppression. Control of wildfires is expected to contribute to accumulations of dead and down fuels, and the vigorous undergrowth of small tree thickets that could accelerate initiation of major crown fires in forest stands. This continued increase of live and dead fuels would greatly increase the risk of stand-replacement fires in dry years. Unplanned ignitions may be allowed to burn under certain circumstances, thereby creating openings or mosaic patterns within the landscape. The scale at which these changes may occur is difficult to predict due to the nature of fires and fire behavior.

Road Management – This would have no effect to the areas as roads lie outside of the areas.

Recreation Maintenance – Trail maintenance will continue. This would have an indiscernible effect to the areas.

Special Uses – The special uses in the project area would have indiscernible effects to the areas. Most lie outside the boundaries. The Outfitter and Guide permits limit group size and terms of the permit include Leave No Trace and Food Storage Requirements.

Public Use – Public uses are expected to continue. None of these activities would contribute effects to the areas.

Travel Management – The Ten Lakes Travel Management Project is currently under analysis and includes the Ten Lakes and Ten Lakes Contiguous Areas. That project will contain its own analysis of the Travel Management activities in the area.

Private Property – Activities on private property will have no effect on the areas because they are outside of the boundary of MA1b, MA1c, and the IRAs.

Other Agency – Activities on State of Montana Lands are outside the boundaries of the IRAs and are not expected to contribute effects to the IRAs. The use of the area by the Department of Homeland Security – Border Patrol could contribute an the effect of Opportunities for Solitude to the Ten Lakes and Ten Lakes Contiguous Areas and the Tuchuck IRA by contributing noise from their use of motorized vehicles.

Regulatory Framework

Forest Plan

MA1c-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. All alternatives contribute to this desired condition. No harvest activities or management activities are proposed within MA1c.

MA1c-DC-FIRE-01. Fire plays an increased role as a natural disturbance agent. The Galton Vegetation project would make progress toward this desired condition by including ecosystem burning as a disturbance agent.

MA1c-STD-AR-03. Road construction is not allowed. The project is designed in exact accordance with this standard, no road construction is proposed in the WSA.

MA1c-STD-AR-04. Reconstruction of roads is not allowed. The project is designed in exact accordance with this standard, no road reconstruction is proposed in the WSA.

MA1c-STD-TBR-01. Timber harvest is not allowed. The project is designed in exact accordance with this standard, no timber harvest is proposed in the WSA.

MA1c-GDL-FIRE-02. Planned ignitions may be used as a tool for ecosystem restoration purposes where the need is linked to human-induced changes caused by factors such as fire suppression and/or the introduction of non-native species. The project is designed in accordance with this guideline, with ecosystem burning planned.

MA5a,b,c-DC-VEG-01. Natural ecological processes (e.g., plant succession) and disturbance (e.g., fire, insects, and disease) are the primary forces affecting the composition, structure, and pattern of vegetation. Alternatives 1 and 3 area contribute to progress toward this desired condition because they propose varying amounts of ecosystem 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. Alternatives 1 and 3 area contribute to progress toward this desired condition because they propose varying amounts of ecosystem burning.

GOAL-IRA-01. Inventoried Roadless Ares will be managed to protect values and benefits of roadless areas. This project is designed to protect the values and benefits of roadless areas and contributes to progress toward this goal.

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. This project was designed in exact accordance with this standard, No harvest activities or roads are proposed within any IRA.

FW-GDL-IRA-01. Wilderness potential will be maintained on 16 percent of the inventoried roadless areas on the forest. The project is designed in accordance with this guideline and does not change the wilderness potential within MA1b or MA1c.

Montana Wilderness Study Act

The Montana Wilderness Study Act of 1977 (Public Law 95-150) designated the Ten Lakes Wilderness Study Area. The WSA is to be administered to maintain the wilderness character and the potential for inclusion in the National Wilderness Preservation System that existed in 1977 when the act was passed. *This project contains no proposals that would degrade the wilderness character or the potential for inclusion in the National Wilderness Preservation System.*

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." *This project does not include proposals for road construction, road reconstruction, or timber harvest and is therefore consistent with the Roadless Area Conservation Rule.*

Scenic Resources

Introduction

This report analyzes the visual impacts of the proposed management activities in the Galton Vegetation Project. The analysis will determine whether the activities would meet Forest Plan desired conditions and guidelines for scenic quality using the Scenery Management System (SMS). The Galton Vegetation Project Area encompasses all of three (3) Planning Areas (Wigwam, Grave, and Murphy) and the Fortine Ranger District portions of two (2) Planning Areas (Stillwater and Ksanka). This area includes the Ten Lakes Wilderness Study Area (WSA), the Ten Lakes Scenic Area, Grave Creek, Therriault Lakes, Dickey Lake, Marston, and Ant Flat. The boundary for this project covers approximately 170,300 acres of which about 127,380 acres is National Forest System Lands (NFSL). Project activities are proposed only on NFSL.

Regulatory Framework

The regulatory framework pertaining to Scenic Resources is summarized below. For additional information, please refer to the Recreation Analysis File.

Federal Legislation and Directives

Multiple-Use Sustained-Yield Act of June 12, 1960 (P.L.86-517, 74 Stat.215): This act provides direction to the NFS lands to provide access and recreation opportunities. The act states, "The policy of Congress is that national forests are established and administered for outdoor recreation…"

The Wilderness Act of September 9, 1964 (16 U.S.C. 1131(note), 1131-1136): This act establishes the National Wilderness Preservation System to be administered for the "…use and enjoyment of the American people…"

National Trails System Act of October 2, 1968 (P.L. 90-543, 82 Stat.919, as amended): This act establishes the National Trails System and authorizes planning, right-of-way acquisition, and construction of trails established by Congress or the Secretary of Agriculture.

Forest and Rangeland Renewable Resources Planning Act of August 17, 1974 (P.L. 93-378, 88 Stat. 476, as amended): This act declares (per Sec. 10) that "…the installation of a proper system of transportation to service the NFS ….shall be carried forward in time to meet anticipated needs on an economical and environmentally sound basis…"

Federal Land Policy and Management Act of October 21, 1976 (P.L. 94-579, 90 Stat. 2742, as amended): This act declares (per Sec. 102) that "…the public lands be managed in a manner that…will provide for outdoor recreation and human occupancy and use."

Montana Wilderness Study Act of November 1, 1977 (PL-150) S393 This act designated the Ten Lakes Wilderness Study Area (WSA) and directed that the WSA be managed to maintain the wilderness character that existed when the act passed and to ensure its potential to be included in the wilderness preservation system.

Environmental Quality Act of 1970 "declares that there is a national policy forth environment which provides for the enhancement of environmental quality."

Wild and Scenic Rivers Act of 1968 declared: "…certain selected rivers of the Nation which, with their immediate environments, possess outstandingly remarkable scenic, recreation , geologic, fish and wildlife, historic, cultural, or other similar values, shall be preserved in free-flowing condition."

National Environmental Policy Act of 1969 states that it is the "continuing responsibility of the Federal Government to use all practicable means to…assure for all Americans safe, healthy, productive, and aesthetically and culturally pleasing surroundings."

Public Rangelands Improvement Act of 1978 declares that "unsatisfactory conditions on public rangelands… reduce the value of such lands for recreational and aesthetic purposes…"

National Forest Management Act of 1976 Part 219.21(f) requires: "The visual resource shall be inventoried and evaluated as an integrated part of evaluating alternatives in the forest planning process, addressing both the landscape's visual attractiveness and the public's visual expectation. Management prescriptions for definitive land areas of the forest shall include visual quality objectives."

Forest Service **Manual 2380**, Landscape Management

U.S. Department of Agriculture developed **Agriculture Handbook 701: Landscape Aesthetics: A Handbook for Scenery Management, 1995**

Code of Federal Regulations (CFR)

- 36 CFR 219 — Planning
- 36 CFR 291 — Occupancy and Use of Developed Sites and Areas of Concentrated Public Use
- 36 CFR 293 — Wilderness-Primitive Areas
- 36 CFR 294 — Special Areas; Roadless Area Conservation; Final Rule

Forest Plan

The 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.

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.

- GOAL-SES-01
- FW-DC-AR-02
- FW-DC-TBR-03
- FW-GDL-AR-01
- FW-GDL-TBR-01
- MA1c-GDL-AR-02
- MA5a,b-GDL-AR-06
- MA6-GDL-AR-05

Resource Indicators and Measures

The Scenery Management System (SMS) that is being used for this analysis focuses on the concept of scenic integrity. SMS defines scenic integrity as a measure of the degree to which a landscape is visually perceived to be seen as whole with regards to its character or attractiveness. The analysis uses this system to assess the impact of management activities on the landscape, determining how they may affect the scenic integrity (SI), specifically if the actions move the SI to or further from the Scenic Integrity Objective (SIO). SI and SIO are measured on a scale from very low to very high as shown in the table below.

Scenic Resources Table 1. Scenic Integrity Objectives

Scenic Integrity Objectives (SIO)	Brief Description/Definition
Very High (VH)	Landscape is intact with only minor changes from the valued landscape character associated with significant scenic landscapes. This SIO is typically but not exclusively associated with specially designated areas such as wilderness or other designations that imply the landscape is natural appearing.
High (H)	Management activities are unnoticed and the landscape character *appears* unaltered.
Moderate (M)	Management activities are noticeable but are subordinate to the landscape character. The landscape appears slightly altered.
Low (L)	The landscape appears altered. Management activities are evident and sometimes dominate the landscape character but are designed to blend with surroundings by repeating form, line, color, and texture of attributes described in the landscape character
Very Low (VL)*	Management activities create a “heavily altered landscape”. Changes may strongly dominate the landscape. *This SIO is not a goal or objective.

The following table summarizes each alternative’s affects regarding any change that would occur to the existing scenic integrity with regards to the scenic integrity objective.

Scenic Resources Table 2. Resource Indicators and Measures for Assessing Scenic Resources

Resource Element	Resource Indicator	Measure
Scenic Integrity Objective (SIO)	Scenic Integrity	Resulting change to the existing Scenic Integrity with respect to SIO

Methodology

The scenic resources report analyzes the visual impacts of the proposed management activities to determine whether the activities would meet Forest Plan desired conditions and guidelines for scenic resources. The analysis utilizes the Scenery Management System (SMS) found in FSM 2380 and United States Department of Agriculture (USDA) Forest Service Handbook 701, Landscape Aesthetics: A Handbook for Scenery Management (USDA Forest Service, 1995).

Both a forest inventory of existing scenic integrity and scenic integrity objectives were completed during the Forest Plan revision process when changing from the Visual Management System to SMS. SMS does not prescribe what management activities can and cannot be allowed on the landscape. SMS gives a desired outcome for scenic resources through Scenery Integrity Objectives (SIOs) by recognizing that landscapes are not static; that some constructed features add to the scenery; and that ecological concepts need to be included in the descriptions of landscapes. The SIO completed during the Forest Plan revision process will be used in the analysis.

The Galton Vegetation Analysis Area forms the analysis area for scenic resources. This is appropriate because a forest visitor's visual experience will be largely determined from areas within the analysis area. Although the distant part of the landscape or background contributes to the scenic resource, the management is outside the scope of this analysis.

The key visual routes in the project area are US Highway 93 from Dickey Lake to the US/Canada Border as well as Grave Creek-Lewis Creek road #114 and Therriault Lakes road #319 from the highway to Big and Little Therriault Lakes. Three points along the highway will be used and one from the other road system.

There are also key visual routes that view the area from outside the analysis boundary. US Highway 37 from the Koocanusa Bridge to US Highway 93 and Lake Koocanusa from Koocanusa Bridge to the US/Canada Border are key visual routes. Subsidiary visual routes include Yaak 92 Road from Koocanusa Bridge to district boundary, West Kootenai road #474 to West Kootenai, Dodge Summit road #470, road #7202, Meadow Creek road #855, and Fortine Creek road #36. None of these individual visual routes will be analyzed because the visual routes listed above will be analyzed and they cover similar views.

Within the analysis area there are additional visual routes that include Burma road #1001, Sinclair Creek road #7077, Glen Lake road #7125, Therriault Creek road #7136, Mud Creek road #7145, Foothills road #756, Stahl road #7021, Clarence Creek road #7022, Deep Creek road #358, South Dickey Lake road #3788, Summit Creek road #1002, and Marston road #900. These individual routes will not be analyzed because the key visual routes that will be analyzed cover similar views.

Trails are also visual routes. The forestwide guidelines direct management activities for scenic travel routes, this would include the Pacific Northwest National Scenic Trail (PNNST). Two

viewpoints from this visual route will be analyzed, Stahl and Wam Lookouts. Wolverine Trail #84 will also be analyzed.

Communities that view the analysis area include West Kootenai, Rexford, Eureka, Fortine, Trego, and Stryker. All of these communities view the western portion of the analysis area and the visual routes or points analyzed have been determined to adequately cover these views.

The Ten Lake Wilderness Study Area (WSA) MA, which includes the Scenic Area, has specific guidelines regarding the SIO. The higher elevation lookout sites of Stahl and Wam L.O. that lie within the WSA provide panoramic views of large portions of the project/analysis area. They will be used to analyze the effects on the WSA MA as well as the PNNST.

Information Sources

A guidance paper entitled The Implementation Guide for Scenery Management under the Forest Plan was used. It contains six different appendices including the Northern Region Scenic Resource Mitigation Menu & Design Consideration for Vegetation treatments and vital Google Earth 3D Visual Overlay Modeling section.

Google Earth Pro was used to model the units.

Incomplete and Unavailable Information

It is assumed that natural events may change the views of Glacier Park and the Canadian Rockies as well as the entire project area.

Affected Environment

Existing Condition

The existing scenic integrity was broadly mapped for the forest. In this scenic resource analysis, the existing condition is equivalent to the existing scenic integrity unless it is found to be different when reviewing a site specific view point. The effects of each alternative will result in the scenic integrity either remaining as is, or moving closer to or further from the scenic integrity objective. This determination is referenced in conjunction with the existing conditions described for this project. See Scenic Resources Map.

The existing scenic integrity is the result of human actions placed upon the landscape or scenic character. Landscape or scenic character is what gives a place its identity or its sense of place. It results from a mix of cultural, and biological and physical elements. These elements along with human actions are described below.

Cultural Elements

Cabins and Lookouts

Although structures are direct human alterations, the cultural value placed upon them can make them attributes to the scenic resource. There are three cabins (Weasel, Wolverine, and Locke) and three lookouts (Marston, Stahl, and Wam) known to exist in the analysis area. There are possibly up to five more old mining cabins in various stages of disrepair and collapse. The history behind all of the cabins and lookouts in the project area are positive cultural associations. By keeping the cabins and lookouts historically accurate when repairing and maintaining them, they remain a positive cultural association.

Mines

Since the late 1800s, no mining claims have been patented nor has any mining activity occurred throughout the analysis area. One private patented mining claim named the Bluebird Mine still exists to the southeast of Green Mountain in the Bluebird Basin. At one time there were six private patented mining claims all within the original Ten Lakes Scenic Area. All but the Bluebird Mine were acquired by the Forest Service in the 1980's through exchanges. Signs of mining and its associated activities can be seen at the abandoned Twin Peaks and Independence Mines, and on the Gibralter Ridge, Blacktail, and Highline trails. Mining evidence includes adits, old cabins, old machinery and materials, etc. These remnants that are gradually melting into the ground are historically significant and are seen as positive cultural features and contribute to this areas sense of place. By not disturbing these remnants, they remain a positive cultural association.

Biological and Physical Elements

Lakes and Streams

There are numerous named lakes (Dickey, Murphy, Martin, Hagadore, Rattlebone, Glen, Lick, Dry, Costich, Baboon, Paradise, Bluebird, Bat, Wolverines, Rainbow, Big and Little Therriault, and Weasel), several smaller unnamed lakes, rivers (portions of the Tobacco and the United States portion of the Wigwam), major streams (Grave Creek and its tributaries and Deep Creek and its tributaries), and numerous smaller streams scattered throughout the project area over a broad elevation range. These lakes, rivers, and streams offer a variety of recreation opportunities and are often a destination for forest visitors due to the activities they provide but also for their scenic beauty.

High Elevations Mountain Peaks and Ridges

The background that influences some of the existing scenic resource conditions are Glacier National Park and the Canadian Rockies.

The project area's landform has been strongly influenced by alpine and continental glaciers. At the higher elevations, alpine glaciers created steep bedrock headwalls, valley troughs, cirque basins, and rocky ridges. At the lower elevations, continental glaciers generally scoured the ridge tops and noses and filled the side-slopes and valleys. Terraces and rolling topography exist along the base of the mountains. Elevation ranges from less than 2,600 feet near the town of Eureka to 7,830 feet at the top of Poorman Mountain near the US/Canada Border.

Recreation users of the area like to access the higher peaks and ridges for the challenge and for the views those locations provide. Popular destinations include Poorman Mountain, Green Mountain, Mount Wam, Stahl Peak, St. Claire Peak, two peaks of Therriault Pass, Mount Gibralter, Deep Mountain, Mount Marston, Mount Locke and the ridges associated with them. These peaks are accessed via existing trail(s) or are relatively close to existing trail(s). Mount Marston can also be accessed by road. Less accessible peaks such as Independence Peak, Ksanka Peak, Mount Barnaby, Mount Scotty, Bald Mountain, Mount Lewis, Krag Peak, and Mount Petery appeal to the more adventurous recreationists.

Plant Species

The analysis area's landscape is primarily forested; generally described as heavily forested. Within this description,the drier sites tend to have the most park-like openings whereas the moister sites have more of a continuous canopy. Mid to high elevation areas tend to have some variation with rock out crops and avalanche shoots. The timber stands that occur on drier sites at

lower elevation consist of ponderosa pine, Douglas-fir, western larch, and lodgepole pine. In the lower-elevation, moist, subalpine areas timber stands of western larch, lodgepole pine, Douglas-fir, subalpine fir, and Engelmann spruce with some western white pine, western red cedar, and western hemlock occur. In the dry, cold, upper-elevations there are timber stands of lodgepole pine, subalpine fir and Engelmann spruce with some western larch and Douglas-fir. Whitebark pine and subalpine larch occur at elevations typically above 6,200 feet. Alpine meadows found in the higher elevations provide views of abundant grasses and wildflowers.

Wildfires

Trees and other vegetation are charred, burned, and killed during a wildfire event. Fire atlas records for the Kootenai National Forest (KNF) for the years 1908-1992 show 155 lightning-caused fires and 234 human-caused fires in or near the analysis area. During the 84 year time period, the KNF experienced numerous extreme fire seasons including, 1910, 1930, 1940, 1967, 1973, 1979, 1984, 1988, and 1991. Since that period five more extreme seasons have occurred, which include the three largest wildfires recorded in the analysis area. The five years were 1994, 1998, 2000, 2003, and 2015. With the exception of the 2015 fires, the other fires have had time for vegetation to grow and blend well into the landscape creating a natural mosaic with some scattered openings of various sizes.

The largest wildfires recorded in the analysis area are the Marston Fire which burned approximately 7,500 acres in 2015, the High One Fire on Barnaby Mountain which burned 1,300 acres in 1994 and the Kopsi Fire in Bluesky Creek which burned 1,060 acres in 1998. Portions of the High One Fire that were fairly visible from the Tobacco Valley and from Highway 93 are now less apparent. Fire suppression efforts included a fuel break, where trees and brush are cut, but no hand line. This fuel break was visible in the background along a key visual route, Highway 93, but is much less visible today. It was planted with shrubs to camouflage the removal of vegetation and is recovering well. The Kopsi Fire is not visible from any key visual routes such as Grave Creek or Therriault Lake roads. The Marston Fire is quite visible from Highway 93. The mosaic of differing intensities can be easily seen and accentuate the topographic relief of the area. The area looks freshly burned but the mosaic helps it look natural. Human deviations such as fire line and fuel breaks are not easily seen from Highway 93. None of these larger fire areas are within the Ten Lakes Scenic Area and only a portion of the High One fire was in the Wilderness Study Area.

Landslides, Avalanche Chutes, and Floods

During landslides, avalanches, and floods trees and other vegetation are uprooted, snapped off, weakened and swept away; soil is displaced through runoff and creek flooding; and rivers and creeks may change their course. The type of management actions that are taken after landslides, avalanches, or flooding occurs usually includes removal of trees and debris that are safety hazards; clearing or removal of debris negatively impacting improvements such as roads, trails, or campgrounds; remove debris negatively impacting wildlife habitat; and harvesting of fallen timber. Openings created by natural events can improve habitat, in avalanche chutes, and can be popular areas for wildlife viewing. They can also destroy habitat and alter a pleasing view to a more chaotic, but natural view. A number of avalanche chutes can be seen from Grave Creek and Therriault Creek roads, two even have interpretive signs along the road.

Insects and Disease

Outbreaks of insects and diseases affect vegetation throughout time with varying degrees of damage leaving trees stressed, weakened or killed. Different insects and diseases have varying

visual effects to trees and vegetation with varying stages of discoloration and defoliation occur prior to mortality.

Windstorms

During windstorms trees can be uprooted and snapped, crushing the vegetation below them. Openings created by natural events can improve habitat and be popular areas for wildlife viewing. They can also destroy habitat and alter a pleasing view to a more chaotic, but natural view.

Human Actions

Designation of Ten Lakes Scenic Area and Wilderness Study Areas

On May 4, 1964 the Regional Forester designated the approximately 6,541 acres Ten Lakes Scenic Area under Regulation U-3. The area was to be administered in conformance with the requirements of U-3 and in accordance with the management guidelines in the establishment report and "Classification Report and Management Plan for Ten Lakes Scenic Area." This area became part of the Ten Lakes Wilderness Study Area (WSA) as designated in 1977. The Scenic Area was almost double in size in the Forest Plan to over 14,000 acres; all acreage still lies within the WSA. These designations affect the guidance or direction given to manage these areas; action or non-action that is taken in reference to this guidance or directon could possibly affect the scenic integrity of the area.

Vegetation Management

Vegetation management includes harvest and prescribed fire. It affects the scenic resource because it alters the landscape from its natural state through the manipulation of vegetation that includes the largest and most visible plant species, trees. Individual trees as well as larger areas that include entire stands of trees could be affected. Characteristics from nature can be emulated to help blend the management activity and thereby to lessen the effects of the actions to the scenic resources. Things to consider with regard to vegetative management are the line, form, and shape. These things include but are not limited to edge effect, outline, slope position, aspect, and patterns. Time changes the severity of vegetative management actions on the scenic resources as the vegetation grows and re-establishes, making openings and treatment areas less noticeable by blurring any lines and edges. Over time stumps break down and are less noticeable

The scenery management system (SMS) recognizes that nature is not static. The visual image seen immediately upon completion of a management treatment is not what has been analyzed. It is the longer term effects trending towards positive movement to the SIO that needs to be the focus.

The cut line on the border between the United States and Canada can be seen from the middleground (1/2 mile -4 miles) from a key visual route within the analysis area, specifically Therriault Lakes Road #319. During 1860-1861 both governments employed hundreds of men and animals to survey, mark, and clear the boundary. In 1900 the swath was widened to 20-30 feet and it is cleared every few decades. An interpretive sign along the road where the swath is most easily seen was placed to educate the public. The management of the swath is not within the control of the Forest Service and many people would not notice it if not for knowledgeable travel companions or the interpretive sign.

Intermediate Timber Harvest (sanitation/salvage, improvement cutting, and commercial thinning) has occurred on approximately 6,000 acres or 5% of the analysis area between 1940 and 2010. Regeneration harvest (clearcut, seed tree, and shelterwood) has occurred on approximately 12,900

acres or 10% of the analysis area between 1940 and 2010. Regeneration harvest on private land within the analysis area has occurred on 1,354 acres, less than 1% of the analysis area.

Some harvest units can be seen in the background on the drive from US Highway 93 from Dickey Lake to the US/Canada Border. Only portions of the harvest units are visible as they sit lower on the slope which receives less emphasis from observers than the high mountain peaks. The view of the analysis area from the most northern end of US Highway 93 reveals a visible deviation from the natural form. It is on the private land within the analysis area and includes a large rectangular pattern created when the private land was harvested to create pasture land. It is low on the slope within two miles of the US/Canada border on private land. The straight lines and geometric shape make the lack of trees more pronounced. The National Forest System Lands across the face that are above the valley and private land have a scenic integrity of high to very high.

Harvest units are visible in the foreground and midground as one enters the analysis area via key visual routes of Grave-Lewis Creek (Road 114) and Therriault Lakes (Road 319) roads as well as subsidiary travel routes. They contain both regeneration and intermediate type harvest units of differing age classes. The visual impact of harvest units improves with time because of the ingrowth of vegetation that softens any edges or straight lines. Differences in vegetation height can be seen; its visual impact depends on the shape, topography, and location of the unit. Both the background and middle ground views tend to improve faster than foreground views due to the ability to see evidence of past harvest such as stumps and skid trails in the foreground.

Prescribed burning is done both post timber harvest and without timber harvest. Post timber harvest burning of activity fuels is done to reduce slash after harvest as well as for site preparation for stand regeneration. Prescribed burning without timber harvest is termed ecosystem burning and the intent to reduce fuels and improve habitat for wildlife. Sometimes slashing of trees is necessary on ecosystem burns to help achieve the intent of the burn.

The charred ground and possible scorched trees of post timber harvest prescribed burning effects are shorter lived than the visual effects of the harvest itself. The next year green vegetation will begin to grow, covering the black carpet beneath the remaining stand and the red needles will fall off the trees leaving the view from afar less noticeable.

Natural fuels treatment or ecosystem/wildlife burns can change the appearance of the landscape by leaving burned trees (black, red, and dead) and killing pockets of trees. A prescription is written for each burn depending upon the reason for the burn. Various numbers of burned trees as well as various size openings are left depending upon what was prescribed and the success to which the burn accomplished the prescription. Some require non-commercial vegetation management, and can consist of thinning, lopping, pruning, and slashing prior to under-burning, pile burning, and jackpot burning. Thinning and slashing results in a more open timber stand with small stumps/stobs remaining. These stumps/stobs are not visible in a background view but the openings they leave may be. The visual impact of the openings depends upon the size, pattern, and slope.

Prescribed burns above Dickey Lake in the late 1980s and early 1990s for wildlife habitat were very successful but not without controversy regarding the visual effects. All of the prescribed burns and wildfires go through stages of red needles with no new regrowth to no red needles and regrowth to soften the visual pattern from afar. The most unfavorable burn to some in that area was a severe looking burn that mimicked the shape and density of the existing opening very well. Ten years after the burn, it is difficult for a person to know it was not a natural event.

When the size, shape, and pattern created by existing harvest and burn units is not characteristic to the landscape, units can be designed to help blend the existing deviations to better suit the landscape and trend toward or keep within the desired SIO.

Road Management

Roads play a major role regarding scenic resources. They provide access to recreation as well as being recreation itself. Driving for pleasure is one of the most popular recreation activities on the KNF. Scenery is the mainstay of this activity.

Key viewpoints and visual routes are fundamental for viewing. The broadest panoramic view of the as analysis area as the background is along the drive from US Highway 93 from Dickey Lake to the US/Canada Border. It is one of the key visual routes within the analysis area. There are other vantage points in and outside of the analysis area from many roads that have similar views of the analysis area, but this key one is quite well representative of most of them. The other key visual routes inside of the analysis area are the Grave Creek-Lewis Creek road #114 and Therriault Lakes road #319.

Roads are also human introduced factors that detract from the natural landscape and must be considered for their visual impact to scenic resources. A stretch of the Marston road #600 at the top of the mountain leading to Mount Marston Lookout can be seen from varying viewpoints, even from Highway 93. It is most apparent when covered with snow. If one looks carefully, the lookout can also be seen. The rerouting of Highway 93 in the early 1990s left severe cut slopes along Dickey Lake. Although the cut slopes are not Forest Service caused, the project was permitted by the Forest Service. They are stable but have not revegetated well. There are no open NFS roads in the Ten Lakes Scenic Area.

Trail Management

Just as roads do, trails serve as visual routes in scenic analysis. The Bluebird Trail #83 and Wolverine Trail #84 are considered key visual routes in the analysis area.

Within the analysis area, there are approximately 141 miles of National Forest System (NFS) trails which are all restricted year-long to wheeled-motorized vehicles and another 20 miles of roads that are restricted year-long to wheeled motorized vehicles which are managed as NFS trails. All trails and roads managed as trails have existed on the landscape over 30 years.

The ability of a trail to be seen from a vantage point depends on its location on the slope, surrounding vegetation, tread width, and amount of trees that have been cleared. There are five separate trail classes numbered 1 through 5 that represent the scale of development and the intended design and management standards prescribed for a trail from minimally developed to fully developed. Trail classes 4 and 5 require a much wider tread width and tree clearance width than trail classes 1 through 3. Trail Classes 4 and 5 can also have hardened non-native surfacing, making them easier to be seen. With this increased trail width, greater tree clearance, and possible non-native surfacing, there is a greater chance of a trail in Trail Class 4 or 5 being seen than a narrower trail within Trail Class 1, 2, or 3.

More importantly is the placement of the trail on the landscape. No matter what the trail width or tree clearance, the location of a trail on the slope and the surrounding vegetation play the major role in the probability of the trail being seen from sensitive vantage points.

The trailheads at Horse Camp and the Blue Sky Trailhead (#74) have additional structures to assist people in loading and unloading. These two trailheads with the additional features along with all of the other trailheads, which are not much more than a wide spot in the road, were all designed to fit within the landscape character and maintain the scenic integrity of each site.

Recreation Site Management

Site development is minimal at the six developed campgrounds and one developed recreation site in the analysis area. Big Therriault, Little Therriault, Horse Camp, Grave Creek, Murphy Lake, and North Dickey Lake Campgrounds as well as the pavilion at Birch Creek Recreation Area fit within the natural environment in which they are found due to minimal and simple design.

Special Use Permits, Easements, and Agreements

Currently there are 34 special use permits and easements issued for use in the analysis area as well as one agreement. None of the Outfitter and Guide (O & G) permits have structures and O & G permits without any structures are not considered when evaluating visual impact. The permits having the most visual impact to the scenic resources are the diversion ditches and weirs. Two separate permits are held. One is on Deep Creek and the other on Grave Creek, with a majority of both the encumbrances viewed from the actual sites.

The Deep Creek permit is for the access roads, irrigation ditches, and the water diversions that divert water from Deep Creek in two locations. There is less than 1/8 a mile of access road and ditch along with one diversion structure. The scenic integrity of this area is moderate.

The permit involving Grave Creek is held by an irrigation district. It holds the easements and permit for ditches and structures dealing with the diversion of water from Grave Creek. The Special Use Permit was issued in 1923 after easements for ditches were secured. Most of the ditches occur on private land. It is the diversion, headgate, and fish screens that occur at the source that have the most visual impact. A number of processes occurred throughout the years, the last in 2000, resulting in visual improvement of what can be seen there today. From the main parking area and Site One of the Grave Creek campground one can see rock weirs, the fish screen, and the concrete diversion with more rock weirs occurring upstream. To create more of an understanding of why the human alteration is present, an interpretive sign was developed and stands adjacent to the creek near the main parking area. This helps explain the departure of the area's natural character.

There is one grazing allotment within the analysis area, the Grave Creek Allotment. Much of the forage in the allotment is transitory and occurs along roads and in harvest openings. Any effect on the visual resource is from the foreground. Background and middle ground are unaffected. The reduction in grass is generally not noticeable in cutting units. The reduction in grass may be noticed along roads but its impact is far less than the impact of the actual road.

The desired condition of scenic resources is to move in the direction of the Scenic Integrity Objective (SIO). The SIO was broadly mapped for the forest. This determination is being used for this project.

Environmental Consequences

The resource elements that have the greatest chance of affecting scenic resources are biological & physical elements and human actions, specifically vegetation management and road management. Vegetation is managed through harvest and prescribed fire to try and influence the biological

&physical elements that we are not directly in control of. The discussion and comparisons of alternatives will center on vegetation management.

As discussed in the methodology, the views used to compare the alternatives are US Highway 93 from Dickey Lake to the US/Canada Border; Grave Creek-Lewis Creek road #114; Wolverine Trail #84; and the Pacific Northwest National Scenic Trail (PNNST). A number of points represent the four views or viewing areas listed, they are discussed below.

- US Highway 93 from Dickey Lake to the US/Canada Border specifically:
    - Junction with State Hwy 37
    - Mile Marker 175 just north of Glen Lake Road
    - Fortine Mercantile Parking Lot
- Grave Creek-Lewis Creek road #114 specifically the junction with Vukonich Lane.
- Wolverine Trail #84 vistas near the middle where the switchbacks are.
- Pacific Northwest National Scenic Trail (PNNST) specifically Stahl and Wam lookouts.

The existing scenic integrity was broadly mapped for the forest. In this scenic resource analysis, the existing condition is equivalent to the existing scenic integrity unless it is found to be different when reviewing a site specific view point. The effects of each alternative will result in the scenic integrity either remaining as is, or moving closer to or further from the scenic integrity objective. This determination is referenced in conjunction with the existing conditions described for this project.

Direct and Indirect Effects - Alternatives 1 & 3

The ecosystem burning and harvest treatments can in general help scenic integrity when used to blend any existing openings and also when used to create a more healthy, diverse, and productive ecosystem with naturally occurring visual patterns. In scenery the direct effect of ecosystem burning and harvest treatments has an immediate short term component that degrades the SI. This occurs immediately after harvest or burning when the area has not yet recovered and changes are fresh. Within a few years, when the undergrowth has greened, the direct short term effect of the harvest or burning is not observable and the long term direct effect can start to be seen, only to be improved upon with time as the area becomes lusher due to continuing ingrowth of vegetation.

The two action alternatives are very similar with regards to acres of vegetation management with less than a 10% difference in acres. The difference in regeneration harvest units would have the most noteworthy effect between the alternatives. This is because the size, shape, and placement on the slope of a regeneration unit is more significant to the units effect on the SI than that of other harvest units or burn units due to the greater amount of vegetation removed. Alternative 1 proposes 359 acres of regeneration harvest while Alternative 3 proposes 334 acres. Alternative 1 has 2 more units of regeneration harvest totaling fifteen acres more than Alternative 3.

These two action alternatives have four common regeneration units, 110, 111, 112, and 114. They are all in an area with SIO of moderate. Units 110, 112, and 114 in combination with improvement cuts 108 and 113 would improve the area’s SI. It currently has existing openings that are blocky and do not look natural, specifically the smaller checkerboard like openings. Unit

111, in combination with the adjacent ecosystem burn units, would similarly improve the SI but not as much. The existing SI was not as impacted as the area where units 110, 112, and 114 would lie. The effect of these four common regeneration units is positive by moving towards the desired SIO.

Alternative 1 has one more regeneration unit besides the common regeneration units. The additional unit is number 97; it is 133 acres large. Although it can be seen from Wam LO, the harvest will blend due to the angle from which it is viewed, but more so because of the opening patterns of the vegetation on the mountain ranges that can be seen in the same view. It is in an area with an SIO of high. The effect of this unit would be positive in general due to the long term direct effect but the short term direct effect would be neutral because of its proximity to Mt Wam.

Along with the units common to both action alternatives, Alternative 3 has three more units. Those three units total 109 acres. They are units 119, 127, and 133. None of the units would be easily seen, much less from the established views. Unit 119 is located where essentially only those on the ground would be able to view it. The proposed improvement cutting unit adjacent to it as well as the ecosystem burn unit across the road from it, would help it fit into the landscape. It is in an area with an existing SI of moderate as well as an SIO of moderate. Unit 127 would not be easily seen from many views due to its shape and location but it can be seen from Stahl LO. Less than 10 acres of the south west corner of this 29 acre unit can be seen from Stahl LO. The unit is adjacent to an old regeneration unit. The prescription calls for a shelterwood or seed tree with reserves meaning there will be some trees left standing on site. This combined with the shape of the unit and the placement next to the old unit would have a positive effect on the SI by elongating the unit and softening its southern border. It is in an area that does not currently meet the SIO of high. A portion of proposed Unit 133 can be seen from the lower end of road #114. This unit is one of a number of other similar regeneration units as well as improvement cutting units that will improve the area by softening edges and connecting openings of the existing small checkerboard regeneration units scattered across it. It is in an area with an existing SI of moderate as well as an SIO of moderate. The effects of the units would be positive to the scenic resource.

Fuel treatment between the alternatives is not so similar with Alternative 1 having almost 4 times as many acres. Specifically 8031 acres of ecosystem burning in Alternative 1 to 1722 acres in Alternative 3. Prescribed burn with mechanical pre-treatment is identical with the same 110 acre unit in both alternatives.

The ecosystem burns may not be visually pleasing upon immediate completion with some black and red needles, but it is a short term effect. The longer term desired effects within the forest ecosystem is to re-establish and re-introduce fire to reduce fuel buildup and stimulate the growth of browse and other native fire-dependent plant species, while overall helping to restore the overall health of the forest. The biggest difference between the two action alternatives is the number of proposed ecosystem burn units that are in the SIO of very high; Alternative 1 proposes 19 units and Alternative 3 proposes three units. Many of the units are easily viewed by many of the established views but most pronounced from Stahl and Wam Lookouts. Both lookouts can easily see six proposed ecosystem burn units in Alternative 1, four of the six are common to both alternatives. One of the three proposed ecosystem burns in Alternative 3 can be seen from both lookouts. When completed within prescription the ecosystem burns' affect would be a positive one moving the SI towards the SIO. The long term positive effect of the ecosystem burns would be greater in Alternative 1 than Alternative 3 because it has 16 more units in the areas with a SIO of very high that will benefit by creating a healthier, more diverse, and productive ecosystem.

There is not much difference between the action alternatives with regards to new temporary roads being constructed. The roads locations are all on flat or rolling topography and cannot be scene from the established views. The affect from this is neutral for both action alternatives.

The vista enhancement vegetative treatment is only proposed in Alternative 1. The proposed vistas are all narrow and along roads. The vistas would provide for better viewing of the landscape and enhance the visual experience in the long term. There would be short term effects including slash and slash piles that would be burned. They are in areas with SI of high and an SIO of high.

Alternatives 1 and 3 would authorize salvage of mortality that occurred during fuel treatments. There are 16 criteria listed on page 14 of the FEIS that would need to be complied with prior to any salvage occurring. These criteria provide for the protection of resources and compliance with Forest Plan direction. Areas that would be suitable for salvage are expected to be 1 to 5 acres in size, typically along unit boundaries. Salvage in these areas would alter the unit shape very slightly and would not change the overall appearance of the unit. This action is not expected to have any effect on the scenic resource. This activity would not occur under Alternative 2, so no effects would occur if Alternative 2 is selected.

Direct and Indirect Effects - Alternative 2 (No Action)

If neither of the action alternatives were implemented, the SI of the project area would essentially remain static with regards to direct human management action.

The only change in the scenic resource would result from natural occurrences such as wildfire, landslides, avalanches, floods, windstorms, and outbreaks of insect and disease. The potential for any type of improvement or trend toward the SIO would be unknown. It would depend up the location and severity of the natural events whether they enhanced the SI or possibly degraded it. If left untreated an area could be subject to high intensity stand replacing fire that could burn an entire view shed as opposed to the mosaic anticipated form implementing the prescribed burns in the proposed action.

If left untreated those areas with previous management that left the SI in less than desirable condition due to shape and placement of units will take much longer to move towards the desired SIO then if treated. If left untreated there is no direct chance of improving the viewing of the landscape through vistas.

Cumulative Effects

Spatial and Temporal Context for Effect Analysis

The Galton Vegetation Project Area forms the analysis area for scenic resources. This is appropriate because a forest visitor’s visual experience will be largely determined from areas within the analysis area. These areas within are most often representative from views outside of the area. Although the distant part of the landscape or background contributes to the scenic resource, the management is outside the scope of this analysis. The background that influences some of the existing scenic resource conditions are Glacier National Park and the Canadian Rockies. Due to the distance to the park, the background view would not change. The Canadian Rockies are rocky and steep enough it is also unlikely that active management will change the view shed.

With regards to scenery, the vegetation and burning have an immediate short term effect to scenery. This occurs immediately after harvest or burning when the area has not yet revegetated and changes are fresh. Within a few years the direct long term effect of the harvest or burning begins to move towards our objectives with regards to improving scenery. The growth involved with the natural processes continues over time, continually enhancing the scenery towards the SIOs.

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

Maintenance burning at Ant Flat is small in scope and short in duration with little chance of impact to anything but the immediate visual effects standard with burning.

Pre-commercial thinning is also small in scope and short in duration with the long term SI effects beneficial by improving the vigor of the trees.

The Ten Lakes Travel Management project would not change the scenic quality of the area and therefore would not contribute to any cumulative effects for the scenic resource.

Regulatory Framework Findings

Forest Plan

The Forest Plan provides forestwide and management direction for Scenic Resources. Both action alternatives are consistent with the forestwide goals, desired conditions, and guidelines as well as the management area direction by providing settings consistent with scenic opportunities by trending towards the SIO. Both of the action alternatives trended toward improving the existing SI while the no action alternative was neutral to moving away from the existing SI let alone the SIO.

Listed below are the Forestwide and Management Area direction applicable to this project with regards to Scenic Resources.

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. *By trending towards the SIO we are providing settings consistent with scenic opportunities. Both action alternatives do this.*

FW-DC-AR-02. The scenic resources of the KNF compliment the recreation settings and experiences while reflecting healthy and sustainable ecosystem conditions. *The vegetation management proposed in the alternatives will improve the health of the ecosystem while trending towards the SIO in both action alternatives.*

FW-DC-TBR-03. Timber cutting on other than suitable lands 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 recreation and scenic-resource management consistent with other management direction. *The proposed vistas in Alternative 1 would provide for better viewing of the landscape and enhance the visual experience. They are in areas other than lands suitable for timber production and have both a SI and SIO of high.*

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 Pacific Northwest National Scenic Trail, designated Scenic Byways, and National Recreation Trails. *Viewpoints from the Pacific Northwest National Scenic Trail were used when determining the effects to the scenic resource. Both of the action alternatives trended toward improving the existing SI and are consistent with the above guideline.*

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 the other management direction. *The proposed vistas in Alternative 1 would provide for better viewing of the landscape and enhance the visual experience. They are in areas other than lands suitable for timber production and have both a SI and SIO of high.*

MA1c-GDL-AR-02: Management activities should be consistent with the Scenic Integrity Objective of Very High. *All the alternatives, including the no action alternative, remain neutral or improve upon the scenic character. This is because the two action alternatives improve upon today's scenic integrity.*

MA5a,b-GDL-AR-06: Management activities should be consistent with the Scenic Integrity Objective of Moderate to High. *All the alternatives, including the no action alternative, remain neutral or improve upon the scenic integrity objective in this MA.*

MA6-GDL-AR-05: Management activities should be consistent with the Scenic Integrity Objective of Low to High. *All the alternatives, including the no action alternative, remain neutral or improve upon the scenic integrity objective in this MA.*

Summary

Scenic resources is not directly part of the purpose and need for action. By meeting the purpose and need for action scenic resources, are affected as discussed in the analysis. Alternative 2, no action, is not beneficial with regards to scenic resources. There are parts of the SI that does not match the SIO in the project area. By taking no direct management action there would be no direct beneficial effects.

Both action alternatives would make some progress toward moving scenic resources towards the SIOs.

Air Quality

Introduction

Smoke produced from the prescribed burning of natural fuels and timber harvest residue can have an adverse effect on air quality. Smoke production can be influenced by the type and timing of burning, amount of available fuel and weather conditions. The same factors that influence the amount of smoke produced by wildland fires influence the smoke produced by prescribed burning. Methods of slash treatment and site preparation other than prescribed burning are available. However, most of these alternatives require costly equipment, can cause excessive soil disturbance, do little to remove the slash, provide inadequate site preparation for tree planting and regeneration, and do not restore fire to the ecosystem.

Regulatory Framework

Four guiding documents establish direction and provide the framework for fire management: Forest Plan, Forest Service Manual, Federal Wildland Fire Policy and Program Review, and the National Fire Plan. These documents provide direction for implementing a fire management program. Fire handbooks, guides, research, and technical papers also provide insight.

Forest Plan

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 and nonattainment areas.

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

Analysis Area

The Galton Vegetation Project Area is roughly bounded by the U.S./Canada border to the north, the Flathead National Forest Boundary to the east, Stillwater State Forest to the south, and the vicinity of US Highway 93 to the west. The project area is partially within the wildland urban interface and entirely within Airshed 1 (one of ten airsheds monitored by the Montana/Idaho Airshed Group). The analysis area for air quality is expanded from the project area to include areas downwind. Air quality in this area is generally good and does not exceed predetermined levels of suspended particulate matter, with only minor impacts occurring during open burning season in spring and fall. Most emissions from prescribed burning, wildfires, and dust within the project area are dispersed downwind in an east to northeast direction by prevailing west and southwest winds. The Class I airshed of Glacier National Park could be downwind if burning occurred under west winds. The towns of Fortine, Trego, Stryker, and Eureka may be affected with drift smoke under inversions. There is a designated impact zone (area of special concern for particulate impacts) around the community of Eureka, approximately 3 miles to the north and 5 miles to the east of town (See Project File). These local areas would experience some impact from smoke when burning within the Galton Project Area. Smoke could settle into the lower valley bottom areas during the night and early morning hours and would be of short duration.

Road dust is a source for particulates during dry periods in summer and fall in forested areas. This source of particulates is not limited to summer months though, as the area can also be impacted to a certain extent as road surfaces dry in winter. Pollution from this source is generally localized as the dust usually settles within close proximity of the road itself.

Measurement Indicators

Particulate matter (PM2.5 and PM10) emissions from burning will be used to analyze the relative differences between the alternatives.

Federal and State ambient air quality standards have been established for particulate matter (PM), which is the pollutant of most concern from smoke. The effects of smoke from prescribed burning are reduced visibility and increased levels of small diameter particulates, specifically PM2.5 (less than or equal to 2.5 micrometers) and PM10 (less than or equal to 10 micrometers). These are of concern for human health reasons, particularly PM2.5 which is smaller and tends to be inhaled deeper into the lungs where it is much harder to expel. Most of the PM10 particles that are inhaled are trapped in the mucus membranes of the nose and throat.

The current Federal and State standards are:

PM10: 1) the concentration of PM10 must not exceed 150 micrograms per cubic meter over a 24-hour period; or 2) the annual arithmetic average must not exceed 50 micrograms per cubic meter.

PM2.5: 1) the concentration of PM2.5 must not exceed 65 micrograms per cubic meter over a 24-hour period; or 2) the annual arithmetic average must not exceed 15 micrograms per cubic meter.

Particulate Matter (PM10 and PM2.5) monitors are located in Libby, Kalispell, Whitefish, Missoula, Helena, and several other sites in Montana.

Existing Condition and Trends

Monitoring conducted by the Montana Department of Environmental Quality has demonstrated that prescribed burning of logging slash, when burned in compliance with State regulations, is not a major contributor to reduced air quality in Lincoln County. The potential impacts of smoke from prescribed burning have been minimized through airshed coordination.

The mountainous topography of the analysis area influences the smoke dispersal. Smoke produced at higher elevations is nearer the free air winds that occur at and above ridge tops, so dispersion is usually better than at lower elevations. Conversely, smoke produced at lower elevations is more likely to be affected by valley inversions and must rise farther to enter the free air wind. Prescribed burns and wildfires on south exposures are more likely to be affected by local thermal winds than those on north slopes. Prescribed burns and wildfires on slopes exposed to the prevailing wind would have better smoke dispersion than those located on the lee slope.

Smoke produced within the analysis area from wildland fires and prescribed burns would most likely be carried in an easterly direction by the predominantly westerly windflow pattern that influences western Montana.

Air quality is also affected by dust produced by vehicle traffic, including logging trucks, especially on native surface (non-aggregate) roads. The amount of dust produced is influenced by the silt content of the road surface layer, the distance traveled, the weight and speed of the vehicle, as well as weather conditions. Aggregate-surfaced roads produce a relatively smaller amount of dust than native surface roads, especially during dry weather.

Analysis of Direct and Indirect Effects

Alternative 2 (No Action)

Alternative 2 does not propose any prescribed burning of harvest activity fuels or naturally occurring fuels. There would be no direct effect to the air quality of the analysis area from the implementation of this alternative. However, Alternative 2 would not reduce fuel loadings. Wildfire ignitions in or adjacent to the analysis area could escape initial attack efforts and burn through unmanaged stands. This would result in indirect effects to the air quality of the project area communities and sensitive areas. If such a fire were to burn in the typical lodgepole or western larch/Douglas-fir stands found in the analysis area, PM2.5 and PM10 would be produced, resulting in reduced visibility.

Dust would not be produced from timber harvest and related activities, including yarding, log hauling, and road maintenance. It would still be produced during administrative use, and use by forest visitors, but these activities would be associated with general forest management and not this project.

Effects Common to Action Alternatives (Alternatives 1 and 3)

The direct effects of prescribed burning on air quality in the analysis area would be an increased level of small diameter particulates, specifically PM2.5 and PM10, and a reduction in visibility. The closest sensitive areas downwind are Eureka, Fortine, Stryker, and Trego, Montana, which are within the analysis area. The east side of the Eureka Impact Zone, as defined by Montana DEQ, is partly within the Project Area boundary. Refer to the Air Quality section of the Project File for a map of the Impact Zone. The effects to the Eureka Impact Zone and sensitive communities downwind would be slight because the timing of prescribed burn ignition is regulated by the Montana/Idaho Airshed Group. The group looks at the current and expected forecast for mixing winds for smoke dispersion in determining which prescribed burns to approve. The populated local area (approximately 1-8 miles away) would experience some impact from smoke, mostly at night and in the early morning hours.

Smoke settling down-drainage and into the Tobacco Valley may move north under an extended high-pressure system. Short periods of smoke concentration may occur in the local area adjacent to the prescribed burn unit during night and early morning inversions following the day of ignition. Diurnal heating and mixing would disperse smoke as the inversions break in the early morning and mixing continues throughout the afternoon hours. Residual smoke production from large logs, stumps, and piles would be expected for several days.

Hand and excavator piling and subsequent burning of those piles produces the least amount of smoke. Dense fuels optimize flaming combustion and there is less smoldering than in larger-scale burns. Smoke impacts would be for a short duration, but fall inversions may have localized smoke impacts to sensitive areas near units that are piled.

Ecosystem burns are landscape-scale burns done in the absence of timber harvest. These burns are ignited in a controlled manner to influence heat and smoke production. Smoke impacts from this analysis area generally last a few days and are noticeable in the Tobacco Valley and sometimes Grassmere, British Columbia areas.

Compared to the other methods, underburning of logging slash generates the most smoke. Smoke produced during burning is generally lofted high enough to avoid the Eureka, Fortine, Stryker, and Trego areas. Nighttime inversions or poor smoke dispersion affect this area to a greater

degree as residual fuels burn out and smoke settles into the cool valley bottom. These effects often last 1-3 days following an underburn.

Dust would be produced from timber harvest and related activities, including yarding, log hauling, and road maintenance. It would also be produced during administrative use, and use by forest visitors. It is impossible to quantify the amount of dust that would be produced by each of the alternatives. However, dust can be addressed through the inclusion of Timber Sale Contract CT5.31#_T-103 (dust abatement solutions) or placement of aggregate in timber sale contracts.

Effects of Action Alternatives

Prescribed Burning

The estimated amount of smoke emissions produced by prescribed burning associated with the alternatives is portrayed in Air Quality Table 1. Smoke from fuel treatment is related to fuel loading. To best meet resource objectives, approximately 25 tons per acre of material 3 inches and greater in diameter would be left on-site for regeneration harvests. Average fuel loads consumed would be an estimated 30 tons per acre for harvest units and 10 tons per acre for ecosystem burns and piled units. For harvest units where slash would be disposed of by piling a figure of 25 tons per acre was used. Smoke emission factors can be used to predict PM2.5 and PM10 emissions released during slash disposal. This is displayed in Air Quality Table 1 below. Worst-case scenario conditions for particulate calculations include estimates for particulates released during all phases of combustion. The Project File contains the calculations used to develop these estimates.

The effects of prescribed burning for each action alternative are directly related to the acres of timber removed, acres of natural fuel treatments, and the amount of associated activities that would take place. The effects of smoke from prescribed burning are reduced visibility and increased levels of small diameter particulates, specifically PM2.5 and PM10. These are of concern for human health reasons, as previously stated.

Prescribed burning in the eastern portion of the project area has the potential to impact visual quality and deliver airborne pollutants to the Glacier National Park Class I airshed. The effects of visual impairment would be less noticeable during spring weather because park use is very limited then due to deep snow. The overall probability of impacting the air quality of Glacier National Park is considered to be low because of the distance from the analysis area, and the amount of time smoke has to disperse.

Air Quality Table 1. Particulate Amounts Produced by Prescribed Burning Associated with All Activities

	Underburns following Harvest - No Piling	Underburns following Harvest and Piling	Excavator Piles	Ecosystem Burns	Total Acres	Total Particulates (Tons)
Alternative 1 (Acres)	**0**	**1835**	**1846**	**8041**	**10009**	
$PM_{2.5}$ (Tons)	0	92	249	402		743
PM_{10} (Tons)	0	110	286	482		879
Alternative 1 Total	0	202	535	885		**1622**

Alternative 2 (Acres)	0	0	0	0	0	
$PM_{2.5}$ (Tons)	0	0	0	0		
PM_{10} (Tons)	0	0	0	0		
Alternative 2 Total	0	0	0	0		**0**
Alternative 3 (Acres)	94	1886	84	1792	**4681**	
$PM_{2.5}$ (Tons)	24	94	11	90		219
PM_{10} (Tons)	26	113	13	108		260
Alternative 3 Total	50	207	24	197		**479**

Wildland Fire

For analysis purposes, it was assumed that all the acres proposed for timber harvest/fuel treatment in Alternatives 1 and 3 are burned by intense, stand-replacing wildland fire. Stand-replacement fire would produce the highest volume of particulates; therefore, it is used here as a worst-case scenario. In doing this, a basis for comparing the potential air quality impacts of wildland fire to the potential impacts of management activities is derived. Air Quality Table 2 displays these estimates. A value of 50 tons per acre was used for fuel consumed in this exercise. This is not an attempt to depict reality, but merely an analysis for comparison purposes.

Air Quality Table 2. Particulate Amounts Produced by Managed Versus Wildland Fire

Alternative	Acres	$PM_{2.5}$in Tons	PM_{10} in Tons	Totals
Alternative 1 (Managed)	10009	743	879	**1622**
Alternative 1 and 2 * (Wildfire)	10009	4704	5130	**9834**
Alternative 3 (Managed)	4681	219	260	**479**
Alternative 3 (Wildfire)	4681	2200	2399	**4599**

*Alternative 1 (Wildfire) acreages are used to depict a wildfire scenario for Alternative 2.

The potential amount of smoke produced would vary by alternative and would be proportionate to the amount of fuel hazard reduction resulting from each alternative. The greatest degree of reduction of wildland fire potential through fuel hazard reduction would occur from the implementation of Alternative 3, while the least amount would occur with Alternative 2.

The comparison of relative impacts from implementing an action alternative versus experiencing a stand-replacement wildland fire indicates that, on an acre-to-acre basis, an action alternative would produce 83 percent fewer particulates than an intense wildland fire affecting the same area.

Implementation of Alternative 2 would also affect wildland fire smoke by the gradual change in the existing fuel complexes as dead woody fuels accumulate secondary to insect, disease, and weather disturbance. Live fuels, especially ladder fuels, would also increase over time as stand density becomes greater and shade-tolerant species begin to grow in the understory. As the fuel

loadings increase, the incidence and intensity of wildland fires, and the smoke they produce, would increase.

Design Criteria pertaining to prescribed burning have been developed to address air quality concerns. Refer to Chapter 2.

Salvage of Incidental Mortality from Underburning

Alternatives 1 and 3 would authorize salvage of mortality that occurred during fuel treatments. There are 16 criteria listed on page 14 of the FEIS that would need to be complied with prior to any salvage occurring. These criteria provide for the protection of resources and compliance with Forest Plan direction. The effect on air quality is expected to be negligible due to the small amount of acres that could be treated. In some cases, no additional fuel treatments may be necessary, in other cases, jackpot burning or pile burning may occur. Any burning treatments would be subject to the previously disclosed measures for addressing air quality. This activity would not occur under Alternative 2, so no effects would occur if Alternative 2 is selected.

Cumulative Effects Analysis

The Cumulative Effects Worksheet, located in the Air Quality Section of the Project File, contains the detailed analysis of all past, current, and reasonably foreseeable activities listed in Chapter 3. 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 are described in the section titled "Summary of the Effects of Past Actions on the Existing Condition" below. The anticipated effects from proposed activities were added to the existing condition and described in the section titled "Summary of Direct and Indirect Effects of the Action Alternatives on the Existing Condition". The impacts of current and reasonably foreseeable actions are then added to the existing condition to determine the cumulative effects. The analysis area considered for cumulative effects was the same as that considered for the direct effects analysis.

Summary of the Effects of Past Actions on the Existing Condition

There is very little effect from past actions on this resource. Effects to the existing air quality condition are directly affected by the time period when the activity occurs. Activities that could cumulatively effect air quality must occur during a relatively short time period (generally weeks). Past activities may have occurred in relatively close spatial locations but if they do not occur within the same time period then they have no significant cumulative effect.

Summary of Direct and Indirect Effects of the Action Alternatives on the Existing Condition

Alternative 1 would add approximately 1768 tons of particulate matter to the atmosphere during the life of the project. This is in addition to fugitive road dust that occurs annually within the analysis area. Prescribed burning, wildfires, and other dust generating activities occur annually on private and other agency lands; however, there is no way of quantifying the effects of these activities. These particulates would be spread out over approximately 10-15 years and would be monitored by the Montana/Idaho Airshed Group.

Alternative 2 would not add any management generated particulate matter to the atmosphere. There is an increased likelihood of wildfire smoke impacting the analysis area under this alternative, due to fuel conditions across the landscape. Fugitive road dust and activities on private and other agency lands would still occur. These activities would cause some effects to the air quality resource.

Alternative 3 would add approximately 531 tons of particulate matter to the atmosphere during the life of the project. This is also in addition to fugitive road dust and private and other agency activities that may occur within the analysis area. These particulates would be spread out over approximately 10-15 years and would be monitored by the Montana/Idaho Airshed Group.

Effects of Current and Reasonably Foreseeable Actions

Vegetation Management and Fuels Reduction Activities - The cumulative effects on air quality from prescribed burning smoke produced as a result of the implementation of an action alternative would result in an incremental decrease in air quality as PM2.5 and PM10 particulates from this source are combined with other particulates from local and upwind regional sources. Prescribed burning of logging slash on other federal land would contribute 8 tons of particulates. This would also be monitored by the Montana/Idaho Airshed Group.

General wind patterns may cause smoke to drift into Glacier National Park and the Flathead Valley. Visibility may be temporarily reduced while prevailing weather influences mixing and smoke dispersal. The condition can also produce visual benefits such as vivid sunsets and sunrises. Effects would be minimized in the spring because of fewer park and forest visitors, higher fuel moistures that allow for fewer emissions, better smoke dispersion, and reduced impacts from other PM10 producing activities.

Vegetation management occurring on private lands would result in some pile burning in the spring and fall. Private burners are under the same airshed allowances as the Forest Service. The Montana/Idaho State Airshed Group determines how much particulate matter is allowed into any given airshed on a daily basis. Road dust, if created, would be the only effects from pre-commercial thinning, planting, and blowdown salvage activities. These effects would be localized and of little consequence because the amount of dust produced would be of short-duration (minutes) and would mostly affect other forest visitors.

Ten Lakes Travel Management Project - The Ten Lakes Travel Management Project will address over-snow and mechanized travel planning for the Ten Lakes area. The area affected by the proposal includes the Ten Lakes WSA and areas with common entrance points to the WSA. There are three main over-snow entrance points to the Ten Lakes WSA: the Grave Creek corridor; Clarence and Stahl Creek; and the Burma/Blacktail area. Over-snow travel is currently not limited. Mechanized use (primarily mountain bicycles) is also currently unrestricted. The alternatives contained in the Ten Lakes Travel Management Draft Environmental Impact Statement contain various amounts of over-snow and mechanized travel for the project area. A final decision has not been made for this project and the cumulative effects analysis utilizes the Proposed Action as the basis for the analysis in the Galton Vegetation Management Project. The cumulative effects of the Ten Lakes Travel Management Project in conjunction with past, present, reasonably foreseeable actions would result in no measurable effects with regards to air quality resource becausecurrent activities are expected to continue and are not resulting in air quality degradation at the current levels.

Cattle Grazing - Cattle grazing within the allotment have not contributed cumulatively to air quality impacts. Grazing occurs on State and private lands. Cattle grazing activities within the Analysis Area would not contribute cumulative effects to air quality due to the nature of cattle grazing activities.

Noxious Weed Treatment - These treatments reduce non-native species in the analysis area. Cumulatively, this activity has a negligible effect on air quality within the analysis area due to the nature of weed treatment activities.

Fire Suppression - The cumulative effects of wildland fire smoke on air quality would include all pollution sources contributing particulates to the air mass in addition to the smoke produced by wildland fires within the analysis area. The greatest cumulative effect would occur when wildland fires are burning outside and upwind of the analysis area and wildland fires within the analysis area burn at the same time. The cumulative effect of these sources could result in extended periods of poor air quality.

Road Management - The cumulative effects on air quality of road activities such as road blading and brushing produced as a result of the implementation of one of the action alternatives and routine road maintenance would result in an incremental short-term decrease in air quality as PM2.5 and PM10 particulates are increased for a short period of time. Other vehicle traffic and industrial sources would also contribute to the cumulative particulate loading in the vicinity of the roads.

Recreation Maintenance - These activities produce no emissions and have no measurable effects on air quality. Maintenance on trails could aid in fire fighter access, limiting particulate production from wildfires, but these effects cannot be discerned until after a fire start occurs.

Special Uses - These permits typically include water transmission lines and road access to private land. Cumulatively, these activities have no effect on air quality, as they produce no emissions.

Public Use - Fugitive road dust is created as 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 surface material to pulverize. Dust is lofted by the rolling wheels as well as by the turbulence caused by the vehicle itself. This air turbulence can persist for several minutes after the vehicle passes. This occurs any time the public uses a road for a variety of reasons, and is an ongoing situation during most seasons. These emissions are short-term and localized near the open roads.

The moisture content of the road surface has the greatest influence on the amount of fugitive dust produced. Roads are generally closed by snow during the winter months within the analysis area Dust associated with timber harvest and related activities would be addressed through provisions in timber sale contracts specifying the application of dust abatement solutions or the placement of aggregate. Most dust production would occur during the dry months of July, August, and September. Limited precipitation does fall during these months, but usually would only reduce dust production, not eliminate it. Dust levels can be expected to return to pre-rain levels within three to seven days.

Christmas tree and bough cutting are negligible activities that generally occur when road conditions produce very little road dust due to high humidities or road moistures.

Private Property - Smoke associated with burning on private land can also be expected to occur. While the District has no control over burning that takes place on private land, the conditions resulting from these sources would be taken into effect when determining whether to ignite proposed burns.

Private land development has been occurring for the last century in the Analysis Area; however, it has been most active in the last two decades. Private land development has converted some forested land to low-density forest or grasslands and roads. In most cases, landowners have desired a forested setting in the immediate vicinity of dwellings and structures contiguous with forested public lands. However, with ongoing prevention efforts some landowners have begun to mitigate the risk of wildfire around their homes by thinning their property. When thinning slash is piled and burned, smoke is produced and can have an effect on whether the Forest Service is allowed to burn.

Other Agency - Grazing is the same as described above. The golf course has no measurable effect on air quality. Tree planting has no effect on air quality outside those effects discussed above under public use. The Woods Ranch has no further management planned in the foreseeable future, so no further air quality impacts are expected from this land.

Road maintenance on State and private lands is considered an infrequent activity and follows Best Management Practices. With the limited amount of road maintenance on private and state lands, potential effects on air resources would be indiscernible. DHS activities produce some road dust that could have short-term, localized impacts to forest visitors. Otherwise, these activities have no other cumulative effects.

Cumulative Effects Finding

There are minimal cumulative effects associated with past actions. Effects to air quality from past management activities are short-lived. Road construction, in terms of the existing road infrastructure, is the main activity that contributes to reduced air quality over time. This is due to continued use of open roads to access public lands. Under some conditions, these roads contribute dust to the airshed; however, this dust is generally not a major source of pollution across the analysis area. Particulate production from prescribed burning and wildland fires is typically short-lived (up to a few months) and goes away after the source is extinguished.

As disclosed above, there are very minimal cumulative effects to air quality, as most pollution is short-lived and moved out of the area after a day or two. Any burning associated with the action alternatives is also coordinated through the Montana/Idaho Airshed Group. When unacceptable levels of particulate production are projected, Forest Service burning may be curtailed in order to avoid air quality impacts. This allows air quality impacts to be managed in a way that avoids negative cumulative impacts. However, inaction (Alternative 2) would lead to a state of worsening fuels conditions, which in turn leads to a greater probability of wildfire activity. As shown in the effects analysis, the particulate matter distributed to the atmosphere under a wildland fire scenario creates greater effects. These effects cannot be coordinated through the Montana/Idaho Airshed Group, and therefore, negative cumulative effects could occur during severe wildland fires within the Analysis Area.

Consistency with Regulatory Framework

Forest Plan

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). The Forest should cooperate with federal, state, tribal, and local air quality agencies as appropriate in meeting applicable air quality requirements.

Alternative 2 does not contain any fuel reduction treatments and the likelihood of a fire escaping initial attack and escalating into a stand-replacing fire is increased, along with the related adverse impacts on air quality. Alternative 2 would not be consistent with the Forest Plan objective.

Other Laws and Regulations

By participating in the Montana/Idaho Airshed Group, complying with the Memorandum of Understanding with the Air Resources Management Bureau, and meeting the requirements of the State Implementation and Smoke Management Plans, Alternatives 1 and 3 would be consistent with the Clean Air Act. Alternative 2 would be consistent with the Clean Air Act because no emissions would be generated through the No Action Alternative. However, in the event of a wildfire, emissions would likely exceed air quality standards.

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

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 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 a financial efficiency analysis as part of project decision-making. It prescribes present net value as the criterion for a financial 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. 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, Flathead, and Sanders 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, provides a diverse social environment for the geographical region around the KNF, including the Fortine Ranger District. 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, 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.

Socioeconomic measures used to describe the affected environment were obtained from the Headwater Economics' Economic Profile System – Human Dimensions Toolkit (EPS-HDT 2011), which compiles and summarizes primary population and economic data from a variety of government sources into a report. Key measures used in this report include land ownership, population, income, and economic diversity. These measures are summarized in the Project File (Vol 5 Doc 003).

Methodology

Three measures are appropriate for this economic analysis: project feasibility, financial efficiency, and economic impacts. These measures are described below, including methodologies.

Project Feasibility

Project feasibility deals with the issue of whether or not a project is financially feasible. Historically, since many of our projects had a substantial commercial timber component, project feasibility dealt mainly with "sale feasibility", or the likelihood that the timber would sell. However, because many projects today involve restoration work, which may have a very small commercial timber component or none at all, the notion of feasibility needs to be extended. Project feasibility looks at the feasibility of a project from a budgetary standpoint; that is, how much is the project going to cost, for all of the planned activities. If the project is going to be implemented through a stewardship contract, estimates of potential revenue from timber removals and the costs of mandatory activities provides information on whether or not the value of the timber removed will likely be enough to cover the costs of the mandatory stewardship activities.

The determination of feasibility relies on a residual value (stumpage = revenues - costs) feasibility analysis that uses local delivered log prices and stump to mill costs to determine if a project is feasible. The appraised stumpage rate from this analysis is compared to the base rate (revenues considered essential to cover regeneration plus minimum return to the Federal treasury). The project is considered to be feasible if the appraised stumpage rate exceeds the base rates. If the feasibility analysis indicates that the project is not feasible, the project may need to be modified. Infeasibility indicates an increased risk that the project may not attract bids and may not be implemented.

Financial Efficiency

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 underburning to stimulate browse and reduce 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."

Costs for restoration 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

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 an impact analysis. The IMPLAN modeling system (MIG 2003) allows the user to build regional economic models of one or more counties for a particular year. The model for this analysis used the 2013 IMPLAN data. 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 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) Forest Service expenditures for contracted restoration activities included as part of the proposed treatments. The direct employment and labor income benefits employees and their families and therefore directly affects 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. Indirect effects are felt by the producers of materials used by the directly affected industries. Induced effects occur when employees of the directly and indirectly affected industries spend the wages they receive.

Data used to estimate the direct effects from the timber harvest and processing were provided by the University of Montana's Bureau of Business and Economic Research (BBER) (Morgan et al. 2007). This national data is broken into multi-state regions and is considered more accurate than that which is available from IMPLAN. The Northern Rockies BBER Region (Montana and Idaho) is used for this analysis. The BBER data represents the results of mill censuses that correlate production, employment, and labor income. The economic impact area for this analysis consists of three Montana counties, Lincoln, Flathead, and Sanders, plus two Idaho counties, Bonner and Boundary.

Potential limitations of these estimates are the time lag in IMPLAN data and the data intensive nature of the input-output model. Significant changes in economic sectors since the latest data for IMPLAN have been adjusted using information from the BBER.

Environmental Consequences

Project Feasibility

The estimation of project feasibility was based on a residual value appraisal model, 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 predicted high bid is compared to the base rate, which in this case is $17.65/CCF for Alternative 1 and $18.82/CCF for Alternative 3. The predicted high bid and minimum rate are displayed in Table 1. Predicted high bids for all action alternatives exceed the minimum rate, suggesting that the project is likely feasible. The revenue estimates from the feasibility analysis are used in the financial efficiency analysis discussed below.

Economics Table 1. Project Feasibility and Financial Efficiency Summary (2014 dollars).

Category	Measure	Alt 1	Alt 2	Alt 3
Timber Harvest Information	Acres Harvested	1777	0	1852
	Volume Harvested (CCF)	20,911	0	18,275
	Base Rates ($/CCF)	$17.65	$0	$18.82
	Minimum Rate ($/CCF)	$3.03	$0	$3.03
	Predicted High Bid ($/CCF)	$87.16	$0	$79.79
	Total Revenue	$1,409,571	$0	$1,125,865
Timber Harvest & Required Design Criteria	Present Net Value (2014$)	$996,732	$0	$762,950
Timber Harvest & All Other Planned Activities	Present Net Value (2014$)	$183,133	$0	$399,168

Financial Efficiency

The financial efficiency analysis is specific to the timber harvest and restoration 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 restoration 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 sale feasibility analysis. The predicted high bid is used for the expected revenue (rather than the appraised stumpage rate) since the predicted high bid is the best estimate of the high bid resulting from the timber sale auction. The PNV was calculated using a 4% real discount rate over the project's lifetime. For more information on the values or costs, see the project file.

This analysis is not intended to be a comprehensive benefit-cost or PNV 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.

Economics Table 1 above summarizes the project feasibility and financial efficiency, including the base rates, appraised stumpage rate, predicted high bid, total revenue, and PNV for the proposed alternative. 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 activity costs, including other optional management activities. Results shown in Table 1 indicate that both action alternatives are financially efficient (positive PNVs). Alternative 1 is more financially efficient when only considering the timber sales and required design criteria; however, Alternative 3 is more financially efficient when considering all project activities due to the drastic reduction in prescribed burn acres compared to Alternative 1.

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. When evaluating trade-offs, the use of efficiency measures is but one tool used by the decision maker in making the decision. Many things cannot be easily or meaningfully quantified, such as effects on wildlife and the restoration of watersheds and vegetation. The decision maker takes many factors into account in making the decision.

Project Expenditures Including Mandatory and Optional Stewardship Activities

Economics Table 2 displays the different expenditures associated with harvest as well as other stewardship activities. Only certain expenditures are used in the PNV calculations (those already included in the appraisal were not included to avoid double counting). Planning costs (NEPA) were not included in any of the alternatives since they are sunk costs at the point of alternative selection.

Economics Table 2. Project Expenditures Including Stewardship Activities.

Category	Alt 1	Alt 2	Alt 3
BMP maintenance on haul roads*	$145,053	$0.00	$126,522
New temp road construction/obliteration*	$8,381	$0.00	$12,933
Landing cleanup*	$3,360	$0.00	$3,600
Purchaser slash for site prep	$15,850	$0.00	$15,925
Erosion control*	$2,901	$0.00	$2,530
Burning fuel piles - landings*	$5,040	$0.00	$5,400
Regeneration Planting*	$107,700	$0.00	$100,200
Regen exams*	$3,590	$0.00	$3,340
Brush Disposal - Deposits*	$218,461	$0.00	$229,604

Other - Include Contractual Obligations (Road closure, Barriers, Trail Restoration, etc.)*	$3,350	$0.00	$1,550
Sale Preparation	$217,580	$0.00	$189,783
Sale Administration	$72,527	$0.00	$63,261

**These costs have already been included in the stumpage price appraisal / sales feasibility analysis and therefore excluded from the PNV calculation.*

Economic Impact Effects (Jobs and Labor Income)

The analysis estimated the jobs and labor income associated with the processing of the timber products harvested and conducting mandatory and optional stewardship activities. Timber products harvested from the proposed project and the non-timber activities would have direct, indirect, and induced effects on local jobs and labor income. In order to estimate jobs and labor income associated with timber harvest, timber harvest levels are proportionally broken out by product type. In this case, 77% of the appraised commercial timber harvest material was classified as sawtimber, with 23% being classified as non-sawtimber. In order to estimate jobs and labor income associated with reforestation and restoration activities, expenditures for these activities were developed by the resource specialists. Only the expenditures associated with the contracted activities are included in the impact analysis; however, this included all activities except burning of the piles, prescribed burning, sale preparation, sale administration, and regeneration exams.

A job (as defined in IMPLAN) is an annual average of monthly jobs. This is a standard convention and consistent with methods used by the U.S. Bureau of Labor Statistics. When jobs are counted this way, one cannot tell from the data the number of hours worked or the proportion that are full or part-time or anything about seasonality; only that they are yearlong. These jobs are different than full time equivalent (FTE) jobs.

Economics Table 3 displays the direct, indirect and induced, and total estimates for employment (part and full-time) and labor income that may be attributed to the proposed action. It is important to note that these may not be new jobs or income, but rather existing jobs and income in the regional economy that are supported or sustained by this project. It is anticipated that the timber harvest would occur over a five-year period, with the restoration activities spread out over eight years.

Estimates of average annual part-time and full-time jobs shown in Economics Table 3 are heavily dependent upon the implementation period of the project. The estimates shown in Economics Table 3 reflect the average annual employment over an estimated implementation time of 8 years (5 years for the timber portion of the project). If the actual implementation period is shorter than this, more jobs would be supported over a shorter period of time. Conversely, if the implementation period is expanded, fewer jobs would be supported annually but for a longer period of time. Also, within the implementation period of a project, the numbers of jobs supported may or may not be filled by the same personnel nor distributed evenly over time, depending upon the nature of the project, turnovers, number and type of firms involved and other factors. Therefore, it would be misleading – or, not meaningful at best – to calculate a ‘total employment over the life of the project’ figure. Due to these issues, readers are further cautioned against multiplying the average annual employment number(s) as presented below, with the project

implementation timeframe (years) in an attempt to arrive at the 'total employment over the life of the project' figure.

The action alternatives' employment contributions ranged from approximately 17 to 18 jobs, contributing $0.9 million to $1.0 million in total labor income on an annual average basis. Again, IMPLANs method of reporting employment as annual averages means that one cannot discern the number of hours worked or the proportion that is full time vs. part time. This method of accounting means that one job lasting 12 months = two jobs lasting six months each = three jobs lasting four months each. Each of those examples would appear as one job in IMPLAN. It is therefore helpful to consider employment figures shown in Economics Table 3 as the 'cumulative' employment effects / requirement across different sectors in the local economy, associated with the proposed activities (in this case those direct, indirect and induced labor necessary to support the harvest of 20,911 CCF in Alternative 1 and 18,275 CCF in Alternative 3 plus the other related management activities). In other words, 'one job' as reported in IMPLAN may be a collection of different jobs (e.g. a full-time equipment operator working 3 months + a full-time driver working 3 months + 2 half time accountants working 6 months each). The No Action Alternative maintains no jobs nor income because there are no activities associated with this alternative.

Economics Table 3. . Annual average employment and labor income contributions from all project activities.

Employment	**Alt 1**	**No Action**	**Alt 3**
Direct	10	0	9
Indirect and Induced	8	0	7
Total	**18**	**0**	**17**
Labor Income (Thousands of 2014$)			
Direct	$500	$0	$453
Indirect and Induced	$536	$0	$472
Total	**$1,035**	**$0**	**$924**

** 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.*

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:

Vegetation Management - Cumulative economic effects would be seen within the local community as a result of the pile burning in the Little Feet timber sale. This activity would provide employment and income opportunities to some current Forest Service employees.

Ten Lakes Travel Management Project -The Ten Lakes Travel Management Project will address over-snow and mechanized travel planning for the Ten Lakes area. The area affected by the proposal includes the Ten Lakes WSA and areas with common entrance points to the WSA. There are three main over-snow entrance points to the Ten Lakes WSA: the Grave Creek corridor; Clarence and Stahl Creek; and the Burma/Blacktail area. Over-snow travel is currently not limited. Mechanized use (primarily mountain bicycles) is also currently unrestricted. The alternatives contained in the Ten Lakes Travel Management Draft Environmental Impact Statement contain various amounts of over-snow and mechanized travel for the project area. A final decision has not been made for this project and the cumulative effects analysis utilizes the Proposed Action as the basis for the analysis in the Galton Vegetation Management Project. The cumulative effects of the Ten Lakes Travel Management Project in conjunction with past, present, reasonably foreseeable actions may result in some change to the economics depending on the selected alternative. Over snow activities contribute to the local economy in a number of ways and are dependant on a number of factors, including but not limited to: number of users, length of season, and snow conditions.

Cattle Grazing – The 100 cow/calf pairs under allotment in the Analysis Area provide economic activity in the local area.

Noxious Weed Treatment – A minor amount of weed treatment is conducted in the Analysis Area annually. This produces economic activity in the local area through the purchase of herbicides and seasonal employment for those who apply the treatments.

Road Management – Road maintenance would provide jobs and other economic benefits to the local economy. The Forest Service utilizes private contractors to perform maintenance activities such as road blading, cleaning ditches and culverts, and installing culverts. This activity would have a beneficial cumulative effect.

Recreation Maintenance – Maintenance of trails and developed and dispersed recreation sites would provide jobs and other economic benefits to the local economy. This would have a beneficial cumulative effect.

Special Uses – Many of the 26 special use permits contribute to the local economy by providing jobs and other economic benefits including payments for lodging (for non-local clients), gasoline, food, meals, and other items. This would have a beneficial cumulative effect.

Public Use - Recreational use would provide indirect economic benefits to the local economy. These benefits would include payments for lodging, gasoline, food, meals, and other items. These activities would have a beneficial cumulative effect.

Private Property – The sale of timber on private lands near the Project Area will have a positive impact on the local economy, maintaining jobs and labor income in the surrounding counties. Other activities on private land may provide jobs and other economic benefits to the local economy. These would have beneficial cumulative effects.

For the Galton Vegetation project, the jobs and labor income associated with the above listed activities would add to the economic activities in the action alternatives resulting in a cumulative

contribution to the stability of the local economy during the life of the project and also for the future.

Consistency with Regulatory Framework

Forest Plan

Social and Economic Systems (SES) - Alternatives 1 and 3 contribute to GOAL-SES-01by providing timber harvest opportunities, opportunities for forest products, and settings for recreation. Alternative 2 contributes to opportunities for forest products and settings for recreation, but not to any new economic activities.

Alternatives 1 and 3 contribute relatively equally toward FW-DC-SES-01, 02, and 03. Alternative 2 produces no new economic outputs or values, as there are no activities with this alternative, and has a neutral contribution toward these desired conditions. Alternative 1 produces far more in terms of wildfire protection (FW-DC-SES-04) through the treatment of over 10,000 acres versus almost 4700 acres in Alternative 3. However, both contribute toward meeting FW-DC-SES-04. Alternative 2 is neutral toward achieving this desired condition.

Alternatives 1 and 3 contribute toward meeting FW-OBJ-SES-01 through planned activities. Alternative 2 is neutral toward this objective.

Cooperation and Community Involvement (CCI) – All alternatives are consistent with both FW-DC-CCI-01 and 02. No proposals conflict with either desired condition, nor does a lack of proposed activity.

Other Laws and Regulations

The Forest Service Manual contains direction regarding economic analysis to (1) conduct the appropriate level of analysis commensurate with the complexity of issues, scope of decision, and significance of expected results; (2) to select cost-effective methods of conducting economic and social impact analyses to ensure that the degree of analysis is commensurate with the scope and complexity of the proposed action; and (3) to determine the scope, appropriate level, and complexity of the economic and social analysis needed. All Alternatives are consistent with that direction.

Cultural Resources

Introduction

Cultural Resources are non-renewable resources representing the physical remains of past human activity. They include a range of different resource types. These resources include locations containing archeological and architectural remains resulting from human activity in the prehistoric and historic periods which document past human use of the forest as well as locations of continued traditional use activities, primarily associated with areas of religious or traditional subsistence concern to American Indians.

Existing Conditions and Trends

The analysis area for Cultural Resources is the same as the project area. The project area contains mostly steep and moderately steep mountain slopes adjacent to permanent flowing water. It has a low-to-high probability of containing cultural resources. Valley bottoms, ridge areas and areas along creeks have been determined to have a moderate-to-high probability of containing sites; side hills and steep mountain slopes have a low probability of containing sites.

District and Forest records provide an understanding of the expected cultural resources within the project area. Additionally, over 130 cultural resource inventories have occurred within the project area. Information concerning the nature and location of cultural resources is confidential, and is not subject to public disclosure per Public Law 94-456 (16 U.S.C.470 sec. 9 (a) (1) (2)). Both the National Historic Preservation Act (NHPA) and the Archeological Resources Protection Act (ARPA) provide that the location of historic properties is exempt from public disclosure. This exemption protects historic properties from vandalism and looting and protects properties culturally significant to American Indians (FSH 6209.13 11.22). ARPA also establishes civil and criminal penalties for individuals removing or damaging archeological resources on federal lands.

Analysis of Direct and Indirect Effects

Alternative 2 (No Action) Alternative 2 would have no direct effect on cultural resources. Under this alternative no actions are proposed, and any previously recorded or as yet undiscovered sites would remain undisturbed. The current condition and trend of the subunit would continue. The no action alternative is consistent with the laws, regulations and treaties concerning cultural resources.

Effects Common to All Action Alternatives

All Action Alternatives propose ground-disturbing activities and increased access to remote areas that have the potential to affect historic and prehistoric sites. Ground-disturbing activities could result in direct impact to the sites, while increased access can lead to vandalism, theft, and other indirect impacts. All areas proposed for ground-disturbing activities have been, or would be inventoried prior to the implementation of any activity that has the potential to impact cultural resource sites.

Although management’s intent is to identify all cultural resource sites, and avoid or mitigate prior to proposed ground-disturbing activities, there is the potential for unidentified sites to be located during project implementation. As natural weathering and erosion, and land alteration projects remove forest ground cover, there is a chance that subsurface archeological sites, impossible to detect on a surface survey, will be exposed where the cultural resource inventory is now considered complete. Recognizing the difficulty of locating ephemeral American Indian sites with

even the most intensive inventories, the KNF timber sale contracts have a standard clause #C6.24. Contract clause #C6.24 allows the Forest Service to unilaterally modify or cancel the contract to protect cultural resources, regardless of when they are identified. It can require project implementation to cease if a property is discovered during project implementation so that forest archeologists can complete Section 106 consultation on property eligibility and project effects. The discovery of any cultural resource sites during the implementation of the proposed project could result in implementation delays (USDA Forest Service 1987b Appendix 19).

The Forest Archaeologist will notify and consult with the State Historic Preservation Office, as required by law, to determine the significance of the discovery and the effects of the project. The Confederated Salish and Kootenai Tribes and the Kootenai Tribe of Idaho would be included in discussions where American Indian affiliated sites are involved.

The activities listed below may have a measurable cumulative effect to the cultural resources.

Vegetation Management and Fuels Reduction Activities – All of the Galton Vegetation Analysis Area units have received a cultural resource survey. Any blowdown, thinning or prescribed burn projects as they occur will need survey if they have not been surveyed. Project implementation will avoid sites whenever possible. If avoidance is not possible then sites will be protected, or mitigated. There will be no cumulative effects to cultural resources.

Ten Lakes Travel Management Project -The Ten Lakes Travel Management Project will address over-snow and mechanized travel planning for the Ten Lakes area. The area affected by the proposal includes the Ten Lakes WSA and areas with common entrance points to the WSA. There are three main over-snow entrance points to the Ten Lakes WSA: the Grave Creek corridor; Clarence and Stahl Creek; and the Burma/Blacktail area. Over-snow travel is currently not limited. Mechanized use (primarily mountain bicycles) is also currently unrestricted. The alternatives contained in the Ten Lakes Travel Management Draft Environmental Impact Statement contain various amounts of over-snow and mechanized travel for the project area. A final decision has not been made for this project and the cumulative effects analysis utilizes the Proposed Action as the basis for the analysis in the Galton Vegetation Management Project. The cumulative effects of the Ten Lakes Travel Management Project in conjunction with past, present, reasonably foreseeable actions would result in no measurable effects with regards to the cultural resourcesbecause no vegetation management activities are being proposed with this project and any new ground disturbing activities would be subject to surveys prior to any activity occurring.

Livestock Grazing – Currently, there are no known effects to any sites occurring from cattle grazing.

Noxious Weed Treatment – Most noxious weed treatment is along roadways. This activity would have no ground disturbing activities, and would not involve the use of heavy equipment other than on existing road surfaces. There would be no effects to cultural resources.

Fire Suppression – Fire suppression and rehabilitation activities may affect cultural resource sites. An archeologist would be available to provide information regarding known sites. When avoidance during a wild land fire is not possible, management would follow measures outlined in the Region 1 Programmatic Agreement. Appendix 3 of the Northern Region Programmatic Agreement regarding Cultural Resource Management on National Forests in the State of Montana seeks to limit the potential for fire suppression activities to impact sites by setting guidelines to protect cultural resources during these activities. In addition, the forest works with the tribal

liaison of the Confederated Salish and Kootenai Tribes during wildfires to allow protection of resources important to the tribe.

Road Activities - Road maintenance and use associated with permit administration, data collection, monitoring, and administration of NFS lands does not involve the use of heavy equipment other than on existing road surfaces. Based on the types and extent of these uses in the Decision Area, there should be no impacts to cultural resources.

Recreation Maintenance – Fee campgrounds, building construction, and new trail construction or reconstruction would require a cultural resource inventory prior to the implementation of the project. There would be no cumulative effects to cultural resources.

Special Uses – Outfitter/guides confined to known trails and road surfaces will have no cumulative effects to cultural resources.

Public Actions – Recreation activities occur off existing road surfaces and are small in scale. Based on the types and extent of these uses in the Decision Area, there will be no cumulative impacts to cultural resources.

Actions such as small forest product gathering (Christmas trees, boughs, mushrooms, and cones), other special uses, and firewood cutting will continue. These activities do not involve the use of heavy equipment other than on existing road surfaces. There should be no cumulative effects to cultural resources.

Private land or state land - Development on private or state land has the potential to impact cultural resources. However, the Forest Service has no authority over private or state land use.

Department of Homeland Security-Border Action- The project is adjacent to the United States/Canada border and receives a great deal of use year-round by The Department of Homeland Security and Forest Service Law Enforcement. This use is expected to continue.

Regulatory Framework

The specific laws, regulations and treaties are further described below.

36 CFR 800 describes the process for meeting compliance with the National Historic Preservation Act (NHPA), as ammended (16USC 470-470t, 110) .

Antiquities Act of 1906 protects any object of antiquity on federal lands.

American Indian Religious Freedom Act of 1978 (AIRFA) (P.L. 95-442) preserves the inherent rights of American Indians ‘for freedom to believe, express and exercise “ their traditional religions.

Archaeological Resources Protection Act of 1979 (ARPA) provides for criminal and civil penalties for anyone collecting artifacts or damaging archaeological sites on federal lands without a federally issued permit to excavate for research purposes, and provides for consultation with affected tribal governments.

Executive Order 11593-Protection and Enhancement of the Cultural Environment of 1971provides for the protection and enhancement of the cultural environment.

Executive Order 13007-Indian Sacred Sites of 1966 directs federal land managers to "(1) accommodate access to and ceremonial use of Indian sacred sites by Indian religious practitioners and (2) avoid adversely affecting the physical integrity of such sacred sites" and to "where appropriate, agencies shall maintain the confidentiality of sacred sites".

Executive Order 13084-Consultation with Indian Tribal Governments of 1998 directs agencies to grant fee waivers in areas where the agency has the discretion to do so, when a tribal government makes a request. When a request is denied, the agency must respond to the tribe in writing with the rationale for denial.

Forest Service Handbook (FSH 6209. 13 11.2, 11.22) describes the exemption of the location and nature of archaeologic and historic sites from disclosure under the Freedom of Information Act.

Forest Service Manual (FSM 2360.1-2361.32d) describes administrative policies and guidelines applicable to cultural resource management.

Hellgate Treaty of 1855 The Salish (Flathead), Kootenai, and Upper Pend d'Oreilles have rights reserved under the Hellgate Treaty. The rights reserved include the "right of taking fish at all usual and accustomed places, in common with the 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".

Interior Executive Order (EO) 3175 of 1992 requires all federal agencies to carry out the trust responsibilities of the federal government, to assess the impacts of their actions on Indian trust resources and to consult with tribes when impacts are identified.

National Environmental PolicyAct (NEPA) of 1969 establishes national policy for the protection and enhancement of the environment. Part of the function in protecting the environment is to "preserve important historic, cultural, and natural aspects of our national heritage."

National Historic Preservation Act (NHPA) of 1966 as amended through 2000 requires federal agencies to take into consideration the effects of their activities or permitted activities on cultural properties, and provides for the participation of Indian tribes where there is the potential to affect sites identified as "Traditional Cultural Properties" or culturally significant to Americans Indians. It is the federal law governing the preservation of historic and archeological resources of national, regional, state, and local significance on all proposed ground disturbing activities. Section 106 of the NHPA requires that the head of a federal agency having any jurisdiction over an undertaking, or authority to license any undertaking, shall take into account the effect of the undertaking on any site, district, building, structure, or object that is included in, or eligible to, the National Register of Historic Places. The standard review process is described in federal regulations issued by the Advisory Council on Historic Preservation. Entitled, "Protection of Historic Properties," the regulations appear in the U.S. Code of Federal Regulations at 36 CFR Part 800. This act pertains to tangible properties important in history and prehistory. 1992 amendments reflect the increased importance placed on tribal relations. A section of the act directs state and federal governments to assist in the establishment of preservation programs on Indian lands.

Native American Graves Protection and Repatriation Act (NAGPRA), recognizes the rights of the Indian Tribes and American Indian organizations as caretakers of human remains, funerary objects, sacred objects, and objects of cultural patrimony with which they can demonstrate a

reasonable biological or cultural affiliation, and conveys to such groups the rights to decide upon the disposition of such items.

Kootenai NF MOU with CSKT Facility Regarding Curation of Prehistoric Artifacts This MOU formalizes the curation arrangement between the Kootenai NF and The CSKT.

Forest Plan - The Forest Plan provides goals,desired condition, objectives and guidelines for cultural resources to satisfy federal guidelines, laws, and policy and integrates them into its overall resource management effort. In addition, the forest must work closely with the appropriate American Indian tribes concerning this resource.

GOAL-CR-01. Provide education about the importance of protecting cultural resources and the consequences for unlawful damage to or taking of cultural resources to reduce looting, vandalism, and incidental damage.

FW-DC-CR-01. Cultural Resources are inventoried, evaluated for inclusion on the National Register of Historic Places, 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.

FW-OBJ-CR-01. Annually complete an inventory of 50 to 100 acres containing or predicted to contain, highly valuable, threatened, or vulnerable cultural resources (non- project acres).

FW-OBJ-CR-02. Over the life of the Plan, evaluate and nominate 5 to 10 significant cultural resources to the National Register of Historic Places.

FW-OBJ-CR-03. Over the life of the Plan, develop 5 historic contexts, overviews, thematic studies, or cultural resource property preservation plans to help guide management and use of National Register eligible or listed properties, districts, traditional cultural properties, and cultural landscapes.

FW-OBJ-CR-04. Annually complete one public outreach or interpretive project that enhances public understanding and awareness of cultural resources and/or history of the Plan area.

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.

No tribal comments on the management activities proposed in the project area action alternatives have been received to date. Therefore, all alternatives would be consistent with Forest Plan

direction and laws and regulations pertaining to cultural resources. All alternatives are consistent with the laws, regulations and treaties concerning government-to-government consultation.

Other Requirements

Energy Requirements and Conservation Potential of Various Alternatives and Mitigation Measures

Energy (fuel) would be required to perform management activities proposed in all action alterntatives, including but not limited to: harvesting and transportation of timber products, conducting fuels treatments sugh as excavator piling, implementing prescribed burning activities, road reconstruction activities, and temporary road construction activities. The proposed project would not involve construction or maintenance of any new facilities.

Energy requirements are minor and the project activities do not lend themselves to particular energy conservation measures. Activities for the project involve a short-term and non-significant expenditure of energy.

Natural or Depletable Resource Requirements and Conservation Potential of Various Alternatives and Mitigation Measures

All action alternatives are designed to conserve natural resources. Areas where timber harvest occurs will be reforested with appropriate species and to appropriate stocking levels. Design criteria and Best Management Practices also help to conserve resources.

Urban Quality, Historic and Cultural Resources, and the Design of the Built Environment, Including Reuse and Conservation Potential of Various Alternatives and Mitigation Measures

All action alternatives are designed to preserve historic and cultural resources. Consultation with Tribal governments regarding this project have occurred and have determined that no cultural sites will be affected. There is no permanent construction associated with this project and therefore no effect on the built environment.

Chapter 4 Response to Comments for Galton DEIS

Comment Categories

Sixteen letters containing comments on the Galton project's Draft Environmental Impact Statement were received during the comment period. One commenter provided two letters with different comments. 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. One commenter provided several attachments with the comments. Responses to those attachments are voluminous and are not contained within the body of this document. They are available on the web at:http://www.fs.usda.gov/projects/kootenai/landmanagement/projects Scroll down to *Kootenai National Forest Current and Recent Projects* and select *Galton*

Comment Categories include:

Forest Plan
Aquatic Resource
Climate Change
Cultural Resources
Economics
Fire and Fuels Management
Forest Vegetation-General
Forest Vegetation-Old Growth
General Comment
Methodology, Data Analysis, and NEPA Process
Public Involvement
Roads and Roadless
Scenic
Snags and Coarse Woody Debris
Soils
Travel Management
Weeds
Whitebark Pine
Wilderness
Wilderness Study Area
Wildlife

Forest Plan

[02, 01] Comment: *The Galton 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 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 Galton DEIS.*

The FS' preferred Alternative 3 proposes 1,850 acres of commercial logging including 334 acres of "regeneration harvest," 1,112 acres of "Intermediate Harvest," 97 acres of "commercial thin" and 307 acres of "Intermediate Variable Density harvest." (DEIS Table 3 at p. 18.) Alternative 3 also proposes Whitebark pine planting on 835 acres that were burned at a high severity in the 2015 Marston fire, 1,996 acres of noncommercial "Fuel Treatment" including 204 acres of "understory thinning," 1,682 acres of "ecosystem burn" and 109 acres of "prescribed burn with mechanical pre-treatment." (Id.) Alternative 3 would feature "Road Management" described as "44.8 miles of Road Maintenance to meet Best Management Practices" and 2.0 miles of "Temporary Road Construction."

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 Galton Vegetation project. The Galton Vegetation project is a site-specific implementation of the plan.

[02, 03] Comment: *Significant 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 the positive expressed in the RFP's timeless, aspirational DCs, along with far too few restraints that serve the conservation of biological diversity and promotion of ecological sustainability.*

Response: The 2015 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.

[02, 12] Comment: *The RFP's strategy of "moving toward" or "making progress toward" DCs or resilience is highly problematic because it overwhelmingly 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" reference 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, to planning for landscape-scale desired future dynamics. (Emphasis added.) 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: 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 Galton project has been designed to move towards the desired conditions as described with the Forest Plan by Management Area and individual resource. For example, the Galton project area contains six Management Areas (MA): MA1b (Recommended Wilderness – Ten Lakes); MA1c (Wilderness Study Area – Ten Lakes); MA3 (Special Areas); MA5a (Backcountry – Non-motorized year round); MA5b (Backcountry – Motorized year round) and MA6 (General Forest). The amount of each MA contained within the Galton project is detailed on page 39 of the FEIS. The Forest plan describes the desired condition for MA1b (starting at page 46); MA1c (starting at page 49); MA3 (starting at page 55); MA5a and MA5b (starting at page 62); and MA6 (starting at page 64).

The Galton 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 Forest Plan in the description of MA6 (page 64) says, "Vegetation and watershed restoration is accomplished predominantly through active management."

Prescribed fire and timber harvest are proposed in both action alternatives. Alternative 1 contains xxx acres of prescribed fire within MA 2, 5. Alternative 3 contains xx acres of prescribed fire within MA 2, 5. (Please see Galton FEIS Table 1, page 10; Table 3, page 20).These actions are designed to take 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 Galton project is proposing – a blend of mechanical treatment with prescribed fire and prescribed fire fuels units without harvest. The Galton project is utilizing wildland fire. This article does not contradict the Galton project.

Concerning McRae el al. 2001 and Hessburg and Agee 2003: The Galton DEIS never contends that logging and wildfire are the same. Remaining structure after treatments can mimic mixed and low severity fires. Also the 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 Galton project proposes over xxx acres of prescribed fuels units with the intent to reintroduce mixed severity fire on the landscape.

[02, 13] 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.)

Response: TheForest Plan provides the overarching direction for management activities on the Kootenai National Forest. The Galton FEIS measures the project's effects relative to the 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 Galton FEIS does provide some measures of the proposed activities. P. 107 of the 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 54-56 of the Galton FEIS 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 3 on page 56 has a summary of vegetation objectives achieved for each alternative by acres treated.Nowhere in the document does it state that resilience can only be manufactured, engineered, or imposed by management. The 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 (Forest Plan FEIS page 87). The Galton ID Team utilized a variety of tools (databases, GIS, satellite imagery, and ground reconnaissance) to develop the proposed action (ID team notes located in the Project File). A certified silviculturist evaluated stands 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 Forest Plan. Stands that had an existing condition that was departed from the desired condition were proposed for treatment. There are 170,300 acres in the project area, and a maximum (Alternative 1 – Proposed Action) of 10,009 (includes vegetation management and fuel treatment) 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 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.

[02, 14] Comment: *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.")*

Response: The usage of the HRV and desired condition of the Forest Plan is related to the Forest Plan, and not specific to the Galton project.

[02, 24] Comment: *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 direction, 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 1987 Forest Plan old growth standards, that is inconsistent with the best available science. Instead, the RFP greatly waters down protections for old growth and associated wildlife, and in fact provides direction for logging old growth without sufficient scientific support.*

Response: Your comment regarding Forest Plan direction on old growth is not specific to the activities being proposed as part of the Galton project, but is related to the Forest Plan. The Galton FEIS points to sufficient scientific support to harvest in old growth. FEIS page 80 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).

[02, 36] 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—a keystone species upon which other species depend. Cherry (1997) notes that:*

Woodpeckers play critical roles in the forest ecosystem. Woodpeckers are primary cavity nesters that excavate at least one cavity per year, thus making these sites available to secondary cavity nesters (which include many species of both birds and mammals). Black-backed and three-toed woodpeckers can play a large role in potential insect control. The functional roles of these two woodpecker species could easily place them in the 'keystone' species category—a species on which other species depend for their existence.

Response: This comment is not specific to the activities being proposed as part of the Galton project, but are related to Forest Plan development. The FEIS for the 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.)

[02, 216] 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.

Aquatic Resource

[02, 50] Comment: *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. 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.*

Response: The Forest Plan on page 136 states "Application of the interim RMOs would require thorough analysis. That is, if the objective for an important feature such as pool frequency is met or exceeded, there may some latitude in assessing the importance of the objectives for other features that contribute to good habitat conditions." It then states "The goal is to achieve a high level of habitat diversity and complexity through a combination of habitat features, to meet the life-history requirements of the fish community inhabiting a watershed." The data in Fisheries Table 2, page 210 of the FEIS, shows that reaches where the pool RMO is not being met, that habitat complexity could be attained through the abundance of Large Woody Debris at the site. In every reach where the pool RMO was not met there were a minimum of 59 pieces of wood per mile. This is just shy of three times more than the RMO.

[02, 51] Comment: *The DEIS states that "proposed work would ...reduce the effects of non-point source sediment to streams, (and) help reduce the risk of effects due to peak flow runoff events." The DEIS fails to quantify the existing non-natural sediment levels going into project area streams, and fails to quantify the risk of sediment effects due to peak flow runoff events.*

Response: Water Table 7, page 188 (FEIS) discloses the existing sediment from roads and reductions from proposed improvement work. The BMP and stream crossing improvements in the table do quantify the risk of sediment delivery due to peak flow events, as they are considered in the calculations. The effects of that sediment delivery would be less than what is currently being experienced by the aquatic organisms in these watersheds because the amount of sediment would be reduced from existing levels that are currently supporting viable fish populations.

[02, 52] Comment: *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 prayer that no large storms will occur before exposed soils are recovered by vegetation regrowth. 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.*

Response: The FEIS on page 230 states, "There would likely be some short-term inputs due to the BMP activities, but these amounts would be less over time than doing no BMP upgrades." It further states in the same paragraph that, "Road maintenance to meet current BMPs would not retard the attainment of RMOs because no riparian vegetation would be removed, thus stream temperature and LWD availability would remain unaffected." Temporary Road Construction was addressed in the next paragraph of page 222. "No new stream crossings would be made with these roads. No riparian vegetation would be removed with this activity, thus stream temperature and LWD availability would remain unaffected." The FEIS does not portray RHCAs as "fail-safe" buffers, but relies on science cited in the Forest Plan on page 137 where several authors "concluded that non-channelized sediment flow rarely travels more than 300 feet and that 200-300 foot riparian "filter strips" are generally effective at protecting streams from sediment from non-channelized flow." There are differences in landtypes and precipitation patterns between the Kootenai National Forest and the Clearwater National Forest.

[02, 53] 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: As stated in the DIES, page 168, the WEPP model was used to model sediment contribution potential of the existing road system in the analysis area based on field survey data. This model was also used to provide a quantitative estimate of sediment reduction based on improvements to existing sediment sources. Field survey data is located in the project file.

[02, 54] 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 203-208 of the FEIS list all regulatory framework pertaining to aquatic species. A chief concern of the collective direction is protecting, maintaining, and/or improving aquatic habitat. Pages 239-240 of theFEIS go on to address each Forest Plan component for Riparian, Aquatic Habitat, and Aquatic Species Resources and how the project adheres to this direction. The FEIS on page 239 states, "In addition, the analysis considers how the action provides 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, and within the multiple use objectives of a land management plan adopted 16 USC 1604 (g)(3)(B)." Further, "Fish population surveys within analysis area streams clearly indicate stable populations of westslope cutthroat trout (native sensitive species), brook trout (desired non-native species), and rainbow trout (desired non-native species). Multiple year classes of these species are present indicating successful survival, reproduction, and sustainability. These species are widely distributed across the analysis area, indicating diverse, suitable habitats that are providing the foundation for all life stabes and life histories of native and desired non-native fish species to thrive."

[02, 55] Comment: *How does the FS assure consistent implementation of measures and standards specified in the Aquatic Conservation strategies as indicated in the 1998 Biological Opinion for the Effects to Bull Trout? Have watershed baselines been updated according to the INFISH Biological Opinion?*

Response: The Conservation Strategy for Bull Trout on USFS lands in Western Montana was published in May 2013 and updated the watershed baselines. The Kootenai River section is Chapter 12, pages 535-543. These baselines were used in the development of the Forest Plan Revision, which was consulted on, and signed in 2015.

[02, 56] Comment: *The DEIS doesn't explain how prescribed burning and logging in RHCAs will not retard RMOs.*

Response: The FEIS proposes no harvest or burning in RHCAs.

[02, 57] Comment: *The DEIS doesn't present enough data or analysis to demonstrate consistency with FW-STD- FW-STD-RIP-01, FW-STD-RIP-02, FW-STD-RIP-03, RF-2, RF-3, RF-4, RF-5.*

Response: FW-STD-RIP-01, 02, and 03 have to do with managing in RHCAs, which this project is not proposing. RF-2, 3, and 4 are addressed through BMPs (Appendix 2, FEIS) and Design Features (FEIS, pp 26-33). RF-5 is addressed in the Design Features (p 28), as well as pages 202 and 203 of the FEIS.

[02, 58] Comment: *The FEIS does not mention, let alone demonstrate consistency with Fire/Fuels Management standards FM-1 and FM-4, Watershed and Habitat Restoration standard WR-1 and Fisheries and Wildlife Restoration standard FW-1*

Response: FM-1 is partially covered and FM-4 is covered verbatim in the Design Features on page 28 under RMO attainment in the "Objective" column. FM-1 is not covered as it pertains to fire suppression strategies, practices, and actions as fire suppression is not part of the proposed project. FW-1 is addressed under "RMO attainment" and "Provide aquatic organism passage" on page 28 of the FEIS.

[02, 59] Comment: *What does the RFP mean, under FW-GDL-WTR-03, "To the extent practicable" for the purposes of the Galton project?*

Response: For BMPs specific to the Galton project, see Appendix 2 of the FEIS. In addition to these BMPs, design criteria specific to the Galton project is on page 24 of the FEIS.

[02, 60] Comment: *There isn't nearly enough analysis in the DEIS to demonstrate that management activities in WQLS watersheds comply with TMDLs (FW-GDL-WTR-01).*

Response: The discussion of TMDLs in the project area is on page 182 of the FEIS. It states that "According to the discussion of forest management practices in the TMDL, modern forestry practices under existing conditions, are not considered significant sediment loads due to required applications of BMPs, Forest Plan standards and other reasonable land, soil and water conservation practices (FW-DC-WTR-02, FW-GDL-WTR-01)." All applicable BMPs will be implemented during and after all road activities. Suspended sediment in project area streams has been monitored over the last 10 years with no concerns as displayed on page 184of the FEIS. Furthermore, Water Table 7, page 188 (FEIS) discloses the existing sediment from roads and reductions from proposed improvement work. This project will at least maintain and potentially improve the existing condition of WQLS in the project area.

[02, 61] Comment: *The DEIS exaggerates the minimization of effects attributed to following BMPs, and the DEIS ignores science that doesn't agree.*

Response: As stated on page 177 of the FEIS "The WEPP Road model was not designed, nor is it used to develop exact estimates of sediment generated from roads and sediment entering the stream system. The model provides a consistent method of comparing alternatives to each other as well as to modeled natural conditions and/or measured stream conditions." The DEIS/FEIS authors are not aware of what science is being ignored.

[02, 62] Comment: *"There are 691 miles of existing road within the analysis area. Less than half of the road miles (263 miles) are Forest Service Roads." The DEIS doesn't disclose the cumulative effects of those non-system roads.*

Response: Changes in the transportation system within the analysis area are not being proposed with this project. There will be no change in the number of system roads as a result any alternatives. Table 7, page 36 of the FEIS shows miles of road by ownership. A total of 1.31 miles (<1%) of road are undetermined. The rest of the roads not included in the miles of Forest Service road include those managed by private landowners, the county, and the state.

[02, 63] Comment: *How does the ECA modeling methodology factor in areas of compacted soil in its estimations of water yield above reference conditions?*

Response: As discussed on page 175 of the FEIS, equivalent clearcut acres (ECAs) were used along with other information (e.g., stream condition) to describe the existing condition and potential impacts resulting from past, current and proposed land management activities in each watershed in the Analysis Area. ECAs are commonly used to analyze potential changes in water yield by translating canopy removal from timber harvest, road building or natural disturbances (e.g., wildland fire) to a common unit. The assumptions and limitations related to ECA analysis are described on page 177-178 of the FEIS.

[02, 64] Comment: *"Episodic climatic events such as rain-on-snow, high-intensity thunderstorms, saturation caused mass soil movement or shorter-duration peak flow events cannot be addressed using ECAs." (170.) Since those events cause the most impacts to stream channels, and the amount of water yield is exacerbated by roads, logging, and other management actions, it seems that cumulative effects are being ignored.*

Response: Potential impacts to water yield from this project are analyzed within the context of the desired conditions in the watershed, not in the context of large scale disturbance events. Cumulative effects to water yield based on current and reasonably foreseeable actions including each alternative are analyzed on page 181 and 192-198 in the FEIS.

[02, 65] Comment: *Since the DEIS utilizes only the WEPP Road model for estimating sediment above natural, how are other management activities or legacies assessed for their sediment contributions?*

Response: The use of the WEPP model and its limitations are discussed in FEIS on pages 175. This model was used to develop estimates of sediment generated from roads and sediment entering the stream system. This is one parameter used to describe the existing condition and effects of the proposed alternatives on water resources and to show that the Galton project at least maintains and potentially improves watershed conditions in order to provide water quality, water quantity and stream channel conditions that support ecological functions and beneficial uses in accordance with the Forest Plan GOAL-WTR-01.

[02, 66] Comment: *Does the WEPP Road model provide estimates of sediment yield into streams and other water bodies?*

Response: The WEPP Road model was not designed, nor is it used to develop exact estimates of sediment generated from roads and sediment entering the stream system. The model provides a consistent method of comparing alternatives to each other as well as to modeled natural conditions and/or measured stream conditions (FEIS page 177).

[02, 67] Comment: *"Because of this natural variability, it is difficult to separate the management induced changes from changes due to natural disturbances. ...(W)ith regard to forest management activities, potential geomorphic effects are similar to those that would occur from natural disturbances." This is contradicted later in the DEIS. This section should be removed.*

Response: The discussion of scientific uncertainty on page 178 of the FEIS describes the natural variability and resulting uncertainty related to estimating management effect to stream channels.

This discussion is important to the validity of our effects analysis and the comparison of effects between alternatives.

[02, 68] Comment: *"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." The DEIS does not present enough data or analysis to demonstrate consistency with those RFP standards and guidelines.*

Response: TM-1 is met by not proposing any activities in RHCAs, MM-3, 4, and 5 are met because no mineral activities are proposed with this project, and RA-4 is covered under SWCP 15.11 in Appendix 2 of the FEIS.

[02, 69] Comment: *The hydrology analysis doesn't present a credible, quantitative sediment analysis. Suspended sediments have apparently been monitored. Has anything like cobble embeddedness, fine sediment deposits, or bedload sediments been measured, and if so, where and how frequently?*

Response: The effects with regard to sediment delivery are discussed on FEIS pages 186-189. Quantitative sediment analysis is displayed in Water Figure 1 on page 184 of the FEIS for the existing condition of monitored streams in the project area. Channel stability and substrate composition was collected at monitored reaches and is located in the project file. A summary of the collected data can be found in Water Table 5, page 184-186 of the FEIS. A discussion of the parameters used to categorize channel type is provided on pages 176-177 of the FEIS; this includes a discussion of the numerical classification of particle size.

[02, 70] Comment: *"(ECA) values are continually reviewed as the KNF watershed professionals implement activities and monitor results. Numbers are usually reported as single values, but are viewed as a range of allowable ECAs based on local geology, climate, and stream systems." Please cite the monitoring result documents. Also, what are the ranges of allowable ECAs that are "viewed"?*

Response: Ranges of allowable ECAs are described on page 186-187 of the FEIS. Further discussion of how historic ECAs are calculated and ECAs specific to each watershed in the project area is documented in the project file.

[02, 71] Comment: *The DEIS does not disclose the current condition of project area watersheds utilizing the Watershed Condition Framework (WCF).*

Response: An analysis of current condition of the project area watersheds as well as anticipated conditions after completion of this project is located in the project file.

[02, 72] Comment: *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: Existing roads in the project area will undergo regular district road maintenance (estimated 3 to 4 miles per year) as funding becomes available on non-haul routes (FEIS page 189). As discussed on page 10 of the FEIS, 50.4 miles of road in the project area will receive maintenance to meet current BMPs. Map 3 of the FEIS displays roads that will be brought up to BMP standards. Changes in the transportation system within the analysis area are not being proposed with this project. There will be no change in the number of system roads as a result any alternatives. Peak flows are not expected to increase as a result of the management activities which include only minor amounts of additional ECAs (Water Table 9, page 197 of the FEIS). Furthermore, maintenance on existing roads will at least maintain and potentially improve watershed condition in the project area.

[02, 73] 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 Galton project eliminate all such roads (ditches on the inside of the road) in the project area?*

Response: Changes in the transportation system within the analysis area are not being proposed with this project. There will be no change in the number of system roads as a result any alternatives. Reducing the likelihood or risk of these occurrences through road maintenance and application of BMP standards protects both the roads and the connected stream systems.

[02, 74] 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: It is not within the scope of this project to upgrade forest roads other than those discussed in the FEIS. As discussed on page 10 of the FEIS, 50.4 miles of road in the project area will receive maintenance to meet current BMPs. Map 3 of the FEIS displays roads that will be brought up to BMP standards.

[02, 75] Comment: *"The overall sediment reduction from road BMP improvements would be 1.3 tons per year for Alternative 1 and 1.2 tons per year for Alternatives 3." Every year, forever?*

Response: Each year following BMP improvement there will be an estimated 1.3 tons per year for Alternative 1 and 1.2 tons per year for Alternative 3 reduction from the present condition.

[02, 76] Comment: *USDA Forest Service 2005d states: "Cumulative effects may also occur at the landscape level, where large areas of compacted and displaced soil affect vegetation dynamics, runoff, and water yield regimes in a sub-watershed." The DEIS does not consider this as best available science.*

Response: As stated on page 174 of the FEIS, watershed boundaries are used as analysis boundaries. The analysis area for water resources includes all watersheds containing proposed activities. These areas are displayed in the Streams, Lakes, and Watersheds Map in the Water Project File. Watersheds were chosen because, by definition, a watershed is a unit of land upon which water flows downhill to a common outlet (Black 1996). Therefore, activities in adjacent watersheds would typically not affect each other.

[02, 77] 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 changes to the transportation system within the analysis area are being proposed with this project. Regular district road maintenance (estimated 3 to 4 miles per year) would continue as funding becomes available on non-haul routes (FEIS page 189). Analysis on activities outside the project area are beyond the scope of this project.

[02, 78] Comment: *The DEIS suggests the project doesn't implement BMPs on non-haul routes. Did the FS conduct thorough field surveys of all non-haul routes in the project area to assess ongoing damage and thus needs for upgrades using BMPs?*

Response: No changes to the transportation system within the analysis area are being proposed with this project. Regular district road maintenance including BMP improvements (estimated 3 to 4 miles per year) would continue as funding becomes available on non-haul routes (FEIS page 189).

[02, 79] Comment: *The DEIS doesn't even demonstrate project consistency with all the listed BMPs. Avoiding sensitive soil types, for example. The DEIS lists BMPs, but the DEIS does not demonstrate consistency with them.*

Response: BMPs are applied at the project implementation level of the project, not at the planning stage. These practices are identified in the planning stage to demonstrate to the reader what types of mitigations may be applied to meet each objective identified.

[02, 80] Comment: *It begs the legitimacy of the designation of 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 the FS apparently cannot estimate their environmental impacts or otherwise account for them.*

Response: As stated in the FEIS, page 190, No new road construction is proposed, however, there would be temporary road construction to access some of the units. All temporary roads would be used for one season and recontoured after use. Two miles of temporary road are proposed for both Alternative 1 and 3. None of the temporary roads would include construction of

new stream crossings. Furthermore, all applicable BMPs as outlined in Appendix 2 of the FEIS will be implemented on temporary roads.

[02, 81] Comment: *The DEIS states:*

The Forest Plan designated a macroinvertebrate assemblage as an aquatic Management Indicator Species (MIS). This MIS will be measured through the use of the River Invertebrate Prediction and Classification System (RIVPACS) Index. This index describes the similarity of the invertebrate species composition at a reach (observed) to the species composition predicted to occur at a reference site within similar environmental conditions (expected).

The DEIS does not explain how the RFP MIS insure viability of bull trout, westslope cutthroat trout, or western pearlshell mussel.

Response: Macroinvertebrate assemblages do not insure viability of bull trout, westslope cutthroat trout, or western pearlshell mussels. The MIS designation is one indicator that is to be used in combination with other indicators to portray a more comprehensive look at watershed health.

[02, 82] Comment: *The DEIS does not disclose population trends of bull trout, westslope cutthroat trout, or western pearlshell mussel.*

Response: Bull trout redd count information is provided on pages 217 and 219 of the FEIS. Although redd counts are not good predictors of population size, it is a less invasive method to monitor population health. Population estimates for westslope cutthroat trout are provided for sites that have been sampled in more than one year on pages 224 through 226 of the FEIS. Western pearlshell mussel population information is displayed on pages203 and 204 of the FEIS. No mussels have been found recently.

[02, 83] Comment: *The DEIS makes only vague statements about project compliance with FW-GDL-WTR-02 and FW-GDL-WTR-03.*

Response: Pages 199-200 of the FEIS describes compliance with FW-GDL-WTR-3. A list of BMPs specific to this project can be found in Appendix 2 of the FEIS. No road or trail storage or decommissioning will occur as a result of this project, therefore FW-GDL-WTR-02 is not applicable.

[02, 84] Comment: *The DEIS fails to properly disclose and analyze cumulative impacts on bull trout critical habitat, including the PCEs. Critical habitat would be adversely affected. The FS has not completed its consultation with the U.S. Fish & Wildlife Service regarding adverse impacts on bull trout and bull trout critical habitat, therefore we are not informed as to terms and conditions in the upcoming Biological Opinion. However, due to the deficiencies in the DEIS's analyses identified above, it is clear that the Galton timber sale would violate the Endangered Species Act in regards to bull trout.*

Response: An analysis of bull trout critical habitat is provided on pages 220-222 of the FEIS under the heading "Analysis of Bull Trout Critical Habitat". The commenter is correct in that the

FS has not completed its consultation with the U.S. Fish and Wildlife Service due to the fact that a Selected Action had not been identified at the time the DEIS was released.

[02, 85] Comment: *How does the DEIS consider temperature increase effects of all the "regeneration logging" and burning, the potential of which is recognized in the RFP?*

Response: Water temperature is addressed on page 221of the FEIS and the effect of regeneration harvest on stream temperature on page 231 of the FEIS.

[02, 86] 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 FEIS on pages175 -178. The use of ECAs for the Galton Project is consistent with the Forest Plan as ECAs were used for watershed characterization as well (Forest Plan FEIS Appendix D).

[02, 87] Comment: *As is typical in the DEIS, the cumulative effects analyses for fish disclose practically nothing concerning causes from past management, so that deviations from reference conditions are explained. Additionally, the failure to monitor under the 1987 forest plan and the lack of data undermines the credibility of the agency.*

Response: The existing condition descriptions represent the "cumulative effects" analysis due to past management activities. Because of the nature of the stream environment, the existing condition is a result of everything that has happened in each watershed prior to this analysis. This is covered on page 234 of the FEIS under Summary of Existing Condition. All the data contained in the Riparian, Aquatic Habitat, and Aquatic Species section of the FEIS (pp 202 - 240) represents the conditions created cumulatively by all natural events and human interactions with the environment since this area was formed. Forest Plan monitoring is documented in Forest Plan monitoring reports 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.

Climate Change

[02, 201] Comment: *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. The Galton DEIS fails to analyze, disclose, and consider scientific information that is not in agreement with its position on soil carbon storage, logging, and wildfire.

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 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 Galton project, and the Forest Plan, contain adaptive management and use treatment monitoring as part of the method for evaluating changing needs.

{A}Response: 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) (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 (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 Galton 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.

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: “Kay88 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.

[02, 203] Comment:*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.*

Response: 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: "Kay88 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. 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 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 Galton project, and the Forest Plan, contain adaptive management and use treatment monitoring as part of the method for evaluating changing needs.

[02, 204] Comment: *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.

Cultural Resources

[03, 01] Comment: *I have read through the project list and concluded that no historical properties would be affected and the project be able to proceed as planned. I am worried about one site, it's on map 12 24LN1369 seems Pretty close to the cutting units, so I was wondering if you could buffer that one.*

Response: Additional communications between the Tribes and the USFS will occur regarding the site in question. The treatment unit boundaries will be modified as necessary to provide for protection of the site.

Economics

[01, 24] Comment: *You reject the research conclusions of 241 Ph.D. scientists quoted in Opposing Views Attachment #1 who demonstrate how logging-related harm (and in a few cases destruction) is inflicted on multiple natural resources in and near the sale area. Incredibly, you rely on the advice of 3 or 4 timber employees financially motivated to sell timber. You know the log for community stability P&N statement appears in at least 80% of all timber sale NEPA documents. This has become the commonly used excuse by USFS line-officers to sell unneeded timber sales and you use it here.*

Response: The economics section of the FEIS contains information utilized to determine the economic feasibility of this project.

[01, 25] Comment: *If you were really concerned about local community stability and local job creation you would offer this sale as an SBA sale to prevent a large timber corporation from logging it using their own labor. This would prevent the logs from being hauled many miles to be processed at a mill far removed from the small communities you claim need economic help. Of course your motivation to sell this timber sale has nothing to do with community stability. We both know "local community stability" and "local job creation" is part of the USFS dishonest script to trick the public into accepting tragic timber sales.*

Response: The determination regarding Small Business Administration Set-Aside sales is a process that is beyond the scope of this analysis. The SBA Set-Aside program is administrated by the Small Business Administration. The Forest doesn't have the flexibility to set-aside sales as it chooses.

[02, 210] Comment: *The economics analysis doesn't disclose the costs of all cumulative FS management in the project area for the foreseeable life of the Galton 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: Other management activities that have not been scoped or are outside of the proposed activities for the Galton Project are not required to be covered in this analysis, nor is it an appropriate analysis to undertake. The project costs that are mentioned, except the monitoring, are listed on pages 542-545, and in the Economics Table 2 of the FEIS. Monitoring can be paid for through a variety of means and usually comes from bid premium on the timber sale. Regeneration exams are included in Economics Table 2.

[02, 211] Comment: *The economics analysis is all about justifying management by expounding upon the benefits to the local economy. On the other hand the costs to U.S. taxpayers for all these local focus benefits are not analyzed or disclosed. The externalized costs of the existing and subsequent environmental damage due to project activities and other human activities are also not considered.*

Response: As stated on page 539 of the FEIS, the economic analysis, "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 effects the local economy in the surrounding area." The analysis area is defined for the Galton project is defined under "Analysis Area" on page 539 of the FEIS.

[02, 212] Comment: *It would be consistent with the DEIS's outlook if the DEIS expressed the benefits of creating more jobs for the local economy by increasing the amount of noxious weed treatments.*

Response: Only items or activities required for the completion of the main activity (i.e. timber harvest) are used in the calculation of job creation. Weed treatments are typically paid for with

either bid premium or appropriated funds.

[02, 213] Comment: *Ecosystem services were not analyzed. Check the 2012 Planning Rule for why this is important.*

Response: The 2012 Planning Rule was written to guide the development of Land Management Planning documents, not project-specific NEPA documents, such as the Galton FEIS. Ecosystem services, such as job creation, and other economic impacts are analyzed throughout the Economics section of the FEIS (pp 535-543).

Fire and Fuels Management

[01, 13] Comment: *Dr. Cohen (a USFS employee) is an expert in fire behavior. In his paper Objectives and Considerations for Wildland Fuel Treatment in Forested Ecosystems of the Interior Western United States he states: "Treating fuels to reduce fire occurrence, fire size, or amount of burned area is ultimately both futile and counter-productive." Ranger Donnor, please tell the public why you reject the opinion and conclusions of a fire physicist employed by the USFS who spent his entire career developing ways to reduce fire damage to homes in the WUI and instead rely on a few USFS interdisciplinary team members who are financially motivated to sell timber. Their proposal to commercially log what you refer to as "hazardous fuels" to reduce fire intensity and rate of spread is the antithesis of what "best science" recommends.*

Response: The Galton project proposes to treat fuels in the wildland urban interface in an effort to modify fire behavior. Fire starts will continue to occur across the landscape. The ID Team is aware of Dr. Cohen's research and has utilized it during the development of this project (FEIS pp. 128-129).

[01, 14] Comment: *Dr. Jack Cohen (a USFS employee) and the 11 Ph.D. independent scientists quoted above all indicate logging does not affect fire starts or intensity, yet an unnamed member of the IDT wrote this No Action effect:*

Fire and Fuels

"Alternative 2 would maintain or increase the risk of stand-replacement fire and loss of property values." (page 122)

In the final NEPA document please tell the public why you reject the research conclusions of well respected Ph.D. fire ecologists shown above and instead accept the effects written by an unnamed member that contradict the scientists' findings.

Response: The referenced statement from the DEIS does not contradict scientist findings. The referenced statement came from a paragraph in the DEIS that describes conditions that would be expected to occur if the 'no action' alternative were to be selected. Fuels across the landscape would increase over time, thereby increasing the risk of a stand-replacement fire occurring.

[01, 15] Comment: *Dr. Jack Cohen (a USFS employee) and the 11 Ph.D. independent scientists quoted above all indicate logging does not affect fire starts or intensity, yet an unnamed member of the IDT wrote this No Action effect:*

Soils

"Alternative 2 does not propose any fuels treatments. Therefore, no direct, indirect, or cumulative effects to soils would result from Alternative 2. Alternative 2 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 damage to soil heating (Keane et al. 2002)." (page 153)

In the final NEPA document please tell the public why you reject the research conclusions of well respected Ph.D. fire ecologists shown above and instead accept the effects written by an unnamed member that contradict the scientists' findings.

Response: The referenced statement from the DEIS does not contradict scientist findings. The referenced statement came from a paragraph in the DEIS that describes conditions that would be expected to occur if the 'no action' alternative were to be selected. Fuels across the landscape would increase over time, thereby increasing the risk of a stand-replacement fire occurring.

[01, 16] Comment: *Dr. Jack Cohen (a USFS employee) and the 11 Ph.D. independent scientists quoted above all indicate logging does not affect fire starts or intensity, yet an unnamed member of the IDT wrote this No Action effect:*

Hydrology

"Also, although roads are the dominant source of sediment in the project area watersheds, there is potential for additional sediment from natural sources such as high intensity fire." (page 181)

"In addition, Alternative 2 does not propose any activities that would reduce the potential for high intensity wildfire and could result in both cumulative and indirect effects to water quality (see Soils Specialist Report for further discussion)." (page 182)

In the final NEPA document please tell the public why you reject the research conclusions of well respected Ph.D. fire ecologists shown above and instead accept the effects written by an unnamed member that contradict the scientists' findings.

Response: The referenced statement from the DEIS does not contradict scientist findings. The referenced statement came from a paragraph in the DEIS that describes conditions that would be expected to occur if the 'no action' alternative were to be selected. Fuels across the landscape would increase over time, thereby increasing the risk of a stand-replacement fire occurring.

[01, 17] Comment: *Dr. Jack Cohen (a USFS employee) and the 11 Ph.D. independent scientists quoted above all indicate logging does not affect fire starts or intensity, yet an unnamed member of the IDT wrote this No Action effect:*

Wildlife Lynx

"Due to the denser fuel conditions, resulting stand replacing fires in these stands would likely be larger resulting in a more homogenous landscape." (page 275)

Wildlife Flammulated Owl

"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 analysis area (see the Vegetation and Hazardous Fuels sections)." (page 378)

Wildlife Migratory Birds

"A higher risk of wildfire would continue (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 the black-backed woodpecker." (page 441)

Wildlife Elk Habitat

"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." (page 459)

In the final NEPA document please tell the public why you reject the research conclusions of well respected Ph.D. fire ecologists shown above and instead accept the effects written by an unnamed member that contradict the scientists' findings.

Response: The referenced statement from the DEIS does not contradict scientist findings. The referenced statement came from a paragraph in the DEIS that describes conditions that would be expected to occur if the 'no action' alternative were to be selected. Fuels across the landscape would increase over time, thereby increasing the risk of a stand-replacement fire occurring.

[01, 18] Comment: *Dr. Jack Cohen (a USFS employee) and the 11 Ph.D. independent scientists quoted above all indicate logging does not affect fire starts or intensity, yet an unnamed member of the IDT wrote this No Action effect:*

Scenic

"If left untreated an area could be subject to high intensity stand replacing fire that could burn an entire view shed as opposed to the mosaic anticipated form implementing the prescribed burns in the proposed action." (page 513)

In the final NEPA document please tell the public why you reject the research conclusions of well respected Ph.D. fire ecologists shown above and instead accept the effects written by an unnamed member that contradict the scientists' findings.

Response: The referenced statement from the DEIS does not contradict scientist findings. The referenced statement came from a paragraph in the DEIS that describes conditions that would be expected to occur if the 'no action' alternative were to be selected. Fuels across the landscape would increase over time, thereby increasing the risk of a stand-replacement fire occurring.

[01, 19] Comment: *Dr. Jack Cohen (a USFS employee) and the 11 Ph.D. independent scientists quoted above all indicate logging does not affect fire starts or intensity, yet an unnamed member of the IDT wrote this No Action effect:*

Air Quality

"Alternative 2 would not add any management generated particulate matter to the atmosphere. There is an increased likelihood of wildfire smoke impacting the analysis area under this alternative, due to fuel conditions across the landscape. " (page 521)

In the final NEPA document please tell the public why you reject the research conclusions of well respected Ph.D. fire ecologists shown above and instead accept the effects written by an unnamed member that contradict the scientists' findings.

Response: The referenced statement from the DEIS does not contradict scientist findings. The referenced statement came from a paragraph in the DEIS that describes conditions that would be expected to occur if the 'no action' alternative were to be selected. Fuels across the landscape would increase over time, thereby increasing the risk of a stand-replacement fire occurring.

[01, 22] Comment: *Modify the Proposed Action to do the following in addition to hazardous fuels removal:*

•distribute Firewise handouts to WUI residents describing the fine fuels removal methods (where and how).

•contact the people living in the WUI and announce Firewise workshops will be held to answer questions.

•offer to remove the fine fuels (with written permission) on private property owned by elderly and disabled homeowners who cannot do the work themselves.

•modify the P&N to reflect what should be the prime goal of this timber sale: reduce the chance that homes will burn in the WUI should a wildfire start in the area. Fuels reduction would then be an alternative, but this would open the door to the 3 actions shown above.

Response: The Firewise program is active in Lincoln County and works to provide information to interested landowners. The Forest Service cannot spend appropriated funds to provide fuels reduction on private lands without special authorization. There are a number of grants and other funding sources available to private landowners to address fuels on private property. The purpose and need for the project does contain an element for fuels reduction within the WUI area as well as benefits to other resource areas.

[02, 16] Comment: *The RFP FEIS states: "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 Galton DEIS doesn't present the kind of data that would validate that RFP assumption about the project area.

Response: The Galton FEIS describes existing conditions within project area that do not match the desired conditions expressed in the Forest Plan. The FEIS pages 50-53 displays and discusses the forest types of the project area compared to the desired condition of each biophysical setting.In some areas shade intolerant species are well below desired levels. This is likely due to an increase in competition from shade tolerant species and fire suppression (FEIS pg. 51-53). The FEIS addresses the structure and compares the desired size class of the Forest Plan to the existing size class of the project area as well as by each VRU within the three biophysical settings(FEIS pg. 50-53).The Fire and Fuels Management section (FEIS page 127), the no action effects would result in "Many stands in the Project Area are in a condition conducive to stand replacing fire…..Ladder fuels exist in many of the stands and fire would easily reach the crowns and become a stand replacing crown fire." Stand conditions in the areas proposed for treatment were reviewed by members of the ID Team (reference Project File field notes) to verify stand conditions.

[02, 17] Comment: *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. 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.*

Response: Cumulative effects considers current, past, and reasonable foreseeable actions within the Project Area. Predicting future budget allocations is not possible or appropriate for this analysis.

[02, 19] *Churchill, 2011 states: "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." Don't processes in the project area function that way?*

Response: 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 and 3 of the warm/dry biophysical setting patch size from 20-200 acres may be a representative range. In VRUs 5 and 7 of the warm/moist biophysical setting, the patch size may range from 50 to 5,000 acres or larger with a mean of 632 acres (FEIS pages 46-49). 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.

[02, 43] Comment: *On pp. 4-5, the DEIS provides for Purpose and Need statements related to fire:*

• Fuels within the WUI need to be managed to reduce the risk of stand-replacement fires…

• There is a need to create openings to provide browse for big game…

• There is a need to reduce sub-alpine fir encroachment within whitebark pine stands and also create areas of early successional forest…

• The role of fire within forest ecosystems needs to be re-established…

There is direction in the RFP regarding accepting wildland fire in its role of actually serving those needs (except perhaps for fuel reduction near homes), however the DEIS contains many statements to the effect that fire suppression will continue regardless of the alternative selected. The FS is unable to demonstrate consistency with RFP direction to allow or promote fire as a natural process.

Response: The Forest Plan discusses the need to suppress fires on page 21(FW-DC-FIRE-03) and page 22 (FW-OBJ_FIRE-02). Specific direction for the use of planned and unplanned fire for each Management Area is contained in Chapter 3 of the Forest Plan. Most MAs allow for the use of both planned and unplanned fire. A risk assessment is completed for all unplanned natural ignitions to determine a course of action. . Key indicators influencing the course of action include how many fires are occurring across the district or forest, firefighter safety, where those fires are located relative to values at risk, what is the current and predicted weather, what time of year is the fire occurring, and will this fire help achieve the desired conditions.

[02, 44] Comment: *Mixed-severity fires, and in particular patches of high-severity fire, benefit grizzly bears by increasing cover of berry producing shrubs (such as huckleberry) that the bears rely upon to get fat before winter, and promoting regeneration of whitebark pine—the seeds of which are an important food source for the bears (DellaSala and Hanson, 2015, Ch. 4, pp. 89, 101).*

Response: Timber harvest, prescribed burns, and post-harvest treatments such as prescribed burning, when conducted within Forest Plan standards, generally have a positive effect on the growth of forage plants important to bears (page 255 FEIS). The Galton Vegetation project's alternatives propose ecosystem burns that would improve early seral production of forbs and shrubs that bears feed on. See Page 255 where it states: "These helicopter burns were designed to increase early seral habitat within the BMUs and provide a diverse landscape that provides both forage and cover for movement across the landscape. These projects may result in short-term disruption of movement by grizzly bears while the burns are being completed, but will increase use over the entire landscape in the long term by introducing some early seral patches that will provide forage for bears and other species. Given the lack of early seral habitat within the entire Therriault BMU, these proposed actions would increase/improve the habitat suitability with respect to bear food production."

[02, 45] Comment: *Under descriptions of VRUs, the mentions various fire intervals. Were these intervals established based upon reference conditions established using historic data taken from the Galton Project Area? Also, where the DEIS says "intervals of x –y years", how likely is it that any given site would NOT experience fire within that interval? We're trying to understand what is "normal" here, and if the FS's statements are possibly being misleading as to the precision of these fire intervals.*

Response: Fire intervals within the various VRUs were derived from Vegetation Response Unit and Target Landscape Prescriptions Refer to FEIS page 122-124 and documents in the project file Vegetation Response Unit and Target Landscape Prescriptions (USDA Forest Service 1999), Fire Regime Condition Class and Associated Data for Fire and Fuels Planning: Methods and Applications (Hann and Strohm 2003), Fire Ecology of Pacific Northwest Forests (Agee 1993), and comparing the Prescribed Natural Fire Program with Presettlement Fires in the Selway-Bitterroot Wilderness (Brown 1995).

[02, 46] Comment: *"(B)ased on fire history research and recent wildfire experiences on the Kootenai National Forest in 1994, 2000, and 2015 it is expected that no action and continued suppression of ecologically important mixed severity fire would eventually promote larger stand-replacing fires than typical, particularly as forest homogeneity increases and higher stand densities persist." This is saying that stand replacing fires on the KNF have been larger than typical. How was science used to make such a determination? Are there reports that are based in data taken post-fire that confirm this expectation?*

Response: The fuel loadings within the Galton area would continue to increase under a no treatment, full suppression strategy. This would lead to large areas of high fuel loadings and increase the potential for large fires to develop. Stands would move toward a greater proportion of shade-tolerant species, which are not as adapted to fire. Insect and disease problems can become more substantial as forest conditions age, particularly with mountain pine beetles and balsam bark beetles. No action in this area would not provide the opportunity to restore western larch, western white pine, and whitebark pine to characteristic levels that are considered more resilient, better adapted to fire, and with a greater degree of tolerance to root disease, bark beetles, and climate change.

A risk assessment is completed for all unplanned natural ignitions to determine course of action. Key indicators influencing the course of action include how many fires are occurring across the

district or forest, firefighter safety, where those fires are located relative to values at risk, what is the current and predicted weather, what time of year is the fire occurring, and will this fire help achieve the desired conditions.

[02, 47] Comment: *"For Alternatives 1, 2 and 3, fire suppression would continue the current trend away from Forest Plan desired conditions for vegetation." (DEIS at 61.) This is the same as saying the FS cannot manage consistent with RFP direction such as FW-DC-FIRE-03 and FW-OBJ-FIRE-02.*

Response: Fire suppression will continue in areas where there are threats to public safety, primarily the wildland urban interface.The control of wildfire would result in fuel accumulation and understory development without any additional management actions. Most of the actions contained within the Galton project occur within the wildland urban interface. There are some prescribed fire treatments that occur outside of the wildland urban interface that are designed to reduce fuels, create habitat for wildlife, and restore fire to the landscape. "The use of wildland fire(both planned and natural, unplanned ignitions), increases in many areas across the Forest. Fire plays an increasing 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" (FW-DC-FIRE-03). Over the life of the Plan, manage natural, unplanned ignitions to meet resource objectives on at least 10 percent of the ignitions(FW-OBJ-FIRE-02).

[02, 48] Comment: *The DEIS mentions the scenario, "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… ." Where are the forestwide cumulative effects of this scenario analyzed and disclosed?*

Response: Forest wide cumulative effects are outside the scope of this project.

[02, 49] 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. Specific information regarding the Behave Plus model as well as results of model runs are contained in the Project File. Fire behavior is determined by fuels, weather and topography. The Galton project cannot alter weather or topography but can influence fuel conditions that exist on the landscape. Fuel treatments will alter fuels within the project area and will trend the area toward the desired conditions in the Forest Plan.

[05, 01] Comment: *We appreciate the detailed Draft EIS alternative descriptions and mitigation measures. For example, the best management practices (BMP) for soil and water conservation in Appendix 2 provide good detail on applicable BMPs and how the BMP will be implemented. We reccomend compiling a list of applicable air quality mitigation measures, unless already developed as part of the Idaho/Montana Airshed Group, to further*

reduce air emissions. Potential air mitiagation measures include: Measures to improve slash pile combustion efficiencies to reduce smoke and/or promote the use of the slash (e.g. mulch); limit idling of heavy diesel equipment and transportation vehicles; Require heavy diesel equipment to use cleanest available engines or retrofits with diesel particulate control technology; Maintain engines; Use low-sulfur or alternative fuels; Expand application area for dust abatement measures; and Implement detailed dust control plans particularly where dust is expected near occupied dwellings.

Response: Adherence to the most current "Interagency Prescribed Fire Planning and Implementation Procedures Guide"(last updated April 2014) is required.Approval to implement a prescribed fire project for air quality is vetted through the Montana/Idaho Airshed group. Utilization of biomass by purchasers is encouraged during the harvest operations andprior to burning to minimize emissions. The Forest Service does not have the authority to require equipment retrofits, type of fuel used, or specify amount of idling time. Piled fuels will be allowed to dry to achieve more efficient combustion.

Timber Sale Purchasers are required to abate dust on haul routes prior to dry conditions that would create dust, particularly when adjacent to private land and dwellings. Purchasers are required to apply initial applications of dust abatement treatment followed by subsequent applications as needed during the period of contract. Timber Contract Provisions, C(T)5.31# - Road Maintenance Requirements and C(T)5.314# - Dust Abatement Treatment, identify roads by segment, dust abatement treatment and application rates to be used. These contract provisions will be included in the timber sale contracts for projects analyzed under the Galton EIS.

[07,05] Comment: *I am in support of your thinning/burning/clearing efforts*

Response: No response required.

[08, 02] Comment: *We generally support Alternative 1's proposals for ecosystem burning within the WSA but think the KNF should only proceed with these burn areas if funding and conditions warrant, and prioritize burns that provide the greatest net benefit to wildlife or white bark pine restoration. Natural fire will no doubt precede 'management' in some places. Management fires obviously introduce carbon into the atmosphere and should be considered carefully.*

Response: Adherence to the most current "Interagency Prescribed Fire Planning and Implementation Procedures Guide"(last updated April 2014) is required.Approval to implement a prescribed fire project for air quality is vetted through the Montana/Idaho Airshed group.

[09, 07] Comment: *I support accomplishing as much prescribed burning as possible in the project area. It will support native species (wildlife and plants) and start to restore natural processes the Forest Service's overly aggressive fire suppression policies have impeded.*

Response: No response required.

[10, 01] Comment: *In light of last years Marston Fire and the work done along the road systems to help contain the fire, I would like to see the Kootenai National Forest take a more proactive approach on the road systems along the base of Ksanka and Gibraltor. Roads #7077 and #756 have dense stands of timber along both sides of the roadway. It would be far easier to treat the fuels ahead of the next inevitable fire with the Galton Project than to get the work done during an actual wildfire. Treating these stands ahead of time would give the District better control as to what happens and how it happens, creating a far more acceptable landscape that can be just as effective, if not more so, in slowing the spread of any fire coming down off the upper slopes. It is not a matter of if a fire will happen, but when.*

Response: The moist forest type in combination of prevailing winds would push the fire upslope and away from private values. The area is adjacent to core grizzly bear habitat as well as lynx habitat. The IDT felt there were higher priority WUI areas that warranted treatment.

Forest Vegetation – General

[01, 20] Comment: *Eliminate ALL proposed clearcut units. If you must regenerate the areas explain to the public why and use a silvicultural RX that will not affect the visual character of the area in any way. Clearcuts with reserves are still clearcuts. Please understand private industrial tree farm conditions must never be created in national forests … even on suitable land.*

Response: A certified silviculturist visited each unit proposed for treatment and developed a site-specific prescription. Even-aged management is proposed on 359 acres in Alternative 1 and 334 acres in Alternative 3. The stand diagnosis, which contains site specific information about each stand is contained in the Project File.The disclosure of effects of the proposed treatments on the scenic resources is contained in the Scenic Resources section of FEIS starting on page 514. The effects of the vegetation treatments is disclosed on pages 524 through 527. The treatments are expected to soften existing hard edges and blend areas of past harvest into a more natural appearing landscape.

[01, 21] Comment:

•*provide data and text demonstrating that soil, slope, or other watershed conditions will not be irreversibly damaged by seedtree and shelterwood silvicultural prescriptions.*

•*provide data and text demonstrating that seedtree and shelterwood silvicultural prescriptions are appropriate to meet the objectives and requirements of the relevant land management plan.*

Failure to do so will violate NFMA Section 6 (E)(i) and (iii) as well as NFMA Section 6 (F)(i).

Response: A certified silviculturist visited each unit proposed for treatment and developed a site-specific prescription. Even-aged management is proposed on 359 acres in Alternative 1 and 334 acres in Alternative 3. The stand diagnosis, which contains site specific information about each

stand is contained in the Project File.Consistency with the Forest Plan is contained on pages 68 through 71 of the FEIS. NFMA consistency is disclosed on pages 66 and 67 of the FEIS. Watershed effects are disclosed on pages 186 through 191 of the FEIS.

[02, 09] Comment: *As testimony to the fact that the FS doesn't even consider its proposed treatments to actually resemble the results of wildland fire (or approach "reference conditions") that it claims will happen is the proposal to conduct "Salvage of Incidental Mortality from Underburning." Yes, fire kills trees. Why does their being of merchantable size render them ineligible from being ecologically desired for resembling reference conditions? This further strains the credibility of the agency's position that their doing this project not mostly to provide a source of lumber.*

Response: Alternatives 1 and 3 would authorize salvage of mortality that occurred during fuel treatments. There are 16 criteria listed on page 14 of the FEIS that would need to be complied with prior to any salvage occurring. These criteria were designed to provide for the protection of resources and compliance with Forest Plan direction. Effects disclosures for the salvage of incidental mortality is contained in each resource section within the FEIS.

[02, 19] Comment: *Map 10 displays the past actions that have occurred within the project area. These past actions include vegetation management including regeneration harvest, intermediate harvest and prescribed fire and the map depicts wildfires. Depending upon the objective of the treatment, these areas may be resistant or resilient to disturbance processes or provide a modified response to those disturbances for a period of time since the action occurred. The length of time this modified response will persist is dependent upon the biophsyical setting and habitat type of the stand being described.*

Response: Alternatives 1 and 3 would authorize salvage of mortality that occurred during fuel treatments. There are 16 criteria listed on page 14 of the FEIS that would need to be complied with prior to any salvage occurring. These criteria provide for the protection of resources and compliance with Forest Plan direction.

[02, 20] Comment: *At p. 54 the DEIS suggest the Northern Region Overview and the RFP AMS "identified the western larch cover type as "at risk" due to the lack of low-intensity, periodic disturbance and a shift toward stand-replacing fire." What is the best available scientific research relied upon by the Northern Region Overview and the RFP AMS which indicates "low-intensity, periodic disturbance" is need to maintain the western larch cover type?*

Response: On pages 52-53 of the FEIS in the description of the vegetation and disturbance processes for VRUs 5, 7, 10, and 11; the processes that have historically led to the development of these western larch stands are described. Pages 48-49 of the FEIS describe the reference conditions for these VRUs. The AMS document (in the project file) contains a bibliography on page 53-58 which contain the scientific research used to develop the document.

Forest Vegetation – Old Growth

[02, 23] Comment: *Proposing to log old growth, the DEIS doesn't even demonstrate consistency with the RFP's protectively weak DCs, standards, and guidelines concerning old growth.*

Response: The FEIS page 85 describes the consistency of the proposed treatments to the Forest Plan. The Forest Plan states in 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 of 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 2 (No action), old growth amounts are predicted to increase, however no changes to resistance or resilience would occur due to management action. Resistance and resilience would be increased in Alternative 1 on 821 acres of effective old growth and 224 acres of recruitment/unknown old growth and in Alternative 3 on 476 acres of effective old growth and 17 acres of recruitment/unknown old growth. Therefore the Galton Vegetation project would contribute progress toward achieving this desired condition. FW-STD-VEG-01 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 (See Forest Plan glossary for old growth definition)." Alternative 2 (No Action) does not propose any treatment in old growth. Vegetation management in Alternatives 1 and 3 would be designed to maintain the characteristics of the old growth stands so they would continue to meet the Forest Plan definition of old growth post treatment. All of the proposed units within old growth have pre-treatment exams, a silvicultural prescription written by a certified silviculturist, and post treatment monitoring scheduled to monitor effects of the treatment and verify the old growth character. Stands identified as recruitment or unknown would have post treatment monitoring scheduled as well and any future treatment would be towards them reaching old growth. Therefore Galton Vegetation project is designed in accordance with this standard. The Forest Plan in FW-GDL-VEG-01 that "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 Forest Plan glossary for definitions of resistance and resilience)." Under Alternative 2 (No action), old growth amounts are predicted to increase, however no changes to resistance or resilience would occur due to management action. Resistance and resilience would be increased in Alternative 1 on 821 acres of effective old growth and 224 acres of recruitment/unknown old growth and in Alternative 3 on 476 acres of effective old growth and 17 acres of recruitment/unknown old growth, by modifying their structure and species composition. They are designed not to modify the characteristics of old growth beyond meeting the Forest Plan definition of old growth. Therefore the Galton Vegetation project was designed in accordance with this guideline. No road construction (temporary or permanent) within old growth is planned, so FW-GDL-VEG-02 does not apply. No other MA or GA desired conditions, guidelines, or standards are applicable to old growth in this project area.

[02, 25] Comment: *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. Biologically speaking, the FS should "ask" the real experts if logged old growth is still functioning. Likewise, the FS has no studies that validate the Galton DEIS assumptions that old-growth associated wildlife populations will respond positively to the proposed logging and burning.*

Response: As stated in the wildlife analysis for the Forest Plan and response to comments (FEIS Appendix G, page 525) for the Forest Plan, there are no wildlife species found on the KNF 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.

[02, 26] Comment: *Is "mapped old growth" identical to the "stand-level old growth inventory"? Also, the DEIS doesn't explain what "unknown old growth" is.*

Response: Mapped old growth is the spatial depiction of the stand level old growth GIS map layers. This is described in detail in the Forest Plan FEIS on pages 74-75. Unknown old growth ismanaged as old growth and istypically comprised of remote/inaccessible stands that have been verified by NAIP images/photo images and classified as unknown until it can be verified at the stand level.

[02, 27] Comment: *The DEIS states that "Recruitment old growth stands have many old growth characteristics, but do not currently meet the definition of old growth as defined by Green et.al." How "many old growth characteristics" does recruitment old growth have to have to fall in this category? Are there other stands in the project area that are not given the "recruitment" designation that would also qualify? If so, why are they not "being managed with the goal of meeting that definition in the future"?*

Response: The use of Green et al. 1992 (and corrected versions) as defined in the Forest plan is the direction used for old growth management. The Forest Plan FEIS defines Recruitment Potential Old Growth on page 602 as "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."There are other stands in the project area that meet the definition of Recruitment Potential Old Growth, but are not currently being managed to meet those objectives. Vegetation on the Kootenai National Forest is managed to meet a wide range of objectives including but not limited to old growth, wildlife habitat, timber production, and recreation opportunities.

[02, 28] Comment: *Has the FS located "recruitment" old growth in fire refugia?*

Response: Old growth is displayed on Map 14 of the FEIS. Recruitment old growth was determined via the methods described on page 75 of the FEIS. At this time effective old growth within the Galton Vegetation project area occupies many of the areas that might be considered fire refugia.

[02, 29] Comment: *What are "reference conditions" for patch sizes of old growth?*

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. As stated on page 75 of the Forest Plan FEIS "Regarding the historic range of variability of old growth on the KNF, 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 a 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."

[02, 30] Comment: *The DEIS does not discuss the science that indicates what the DEIS calls "dry site old growth" actually can experience stand replacing fires which are characteristic of "reference conditions." The DEIS throws around the term "uncharacteristic fire" seemingly as a scare tactic rather than with a scientific basis.*

Response: The proposed treatments are designed to mimic the conditions described on page 77 of the FEIS which describes the qualities desired for old growth in the warm/dry biophysical setting.

[02, 31] Comment: *Under the No Action alternative, the DEIS states, "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." To what degree does the DEIS assume this wouldn't happen under the action alternatives?*

Response: The action alternatives assume that natural disturbances are present as well. The FEIS (page 78-82) displays the acres of old growth that would have a modified response to these disturbances as a result of the vegetation management, and may retain old growth characteristics after the disturbance has run its course. This may not be true in all cases, such as an example of Douglas-fir beetle. In a stand that had small diameter trees removed to modify fire behavior, the large diameter Douglas-fir trees that are primary fodder for the beetles would be unchanged from the existing condition, thus similar loss would still be expected as under the No Action alternative.

[02, 32] Comment: *Old Growth Table 3 (p. 75-76) claims that only 12 acres would be logged by alternative 3 and none by alternative 1. This is contradicted at p. 350: "Planned harvest in low quality foraging habitat (old growth) is prescribed in 74 and 82 acres in Alternatives 1 and 3 (respectively)."*

Response: This statement on page 350 of the DEISwas reworded in the FEIS (pages 374-375) to clarify the proposed treatments. Mechanical pretreatment is proposed on 74 (Alternative 1) and 71 (Alternative 3) acres with 11 acres of intermediate harvest also proposed in Alternative 3.A description of mechanical pretreatment is contained on page 489 of the FEIS. The acres in the tables on both pages 75-76 and 350 of the FEIS correctly reflect each vegetation management treatment type. Alternative 3 proposes 11 acres of harvest in effective old growth (see "intermediate harvest acres" as the treatment type in Sensitive Species Table 9, with 11 acres under Alternative 3 (page 350 FEIS). As stated in the response to comment [02, 34], it is not the intention of the Forest Service to include those acres in the Selected Action.

[02, 33] Comment: *The DEIS states, "the Fortine project had intermediate treatments in old growth that maintain the number of large trees and reduced the threat of potential wildfires reaching lethal intensities." How long does the FS expect this "reduced… threat of potential wildfires reaching lethal intensities" will last on those Fortine project sites before more treatments are necessary?*

Response: The old growth treatments occurred in the Fortine project area. They primarily occurred in the warm/moist biophysical setting. Objectives were to reduce canopy bulk densities, reduce the continuity of surface and ladder fuels, promote early seral species while retaining old growth criteria. According to Fischer and Bradley (1987) the modified fire behavior response can be expected for 25-35 years post treatment.

[02, 34] Comment: *"Alternative 3 proposes 11 acres of commercial thinning (unit 118) within a subalpine biophysical setting that after ground review would not enhance the old growth characteristics." By leaving this in Alternative 3, is the FS saying this is consistent with the RFP?*

Response: Field verification has determined that activities in 11 acres of unit 118 would not enhance old growth characteristics for resistance and resilience. These 11 acres will not be included in the Selected Alternative.

[02, 35] Comment: *"We recognize that historical conditions probably provided a higher level of old forest habitat through time than what is provided by the Forest Plan direction (a mean of 27.7% as opposed to 10%)." (Dueker and Sullivan, 2001.) 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 those are not best available science on old growth reference conditions, please cite what the FS considers to be "best available science".*

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. As stated on page 75 of the Forest Plan FEIS "Regarding the historic range of variability of old growth on the KNF, 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 a 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."

[02, 37] Comment: *The KNF seems unable to estimate the Reference Conditions for old growth, either in the project area or forestwide. At p. 79 it states, "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, western white pine and whitebark pine. Many of the mature seral forests were well over 200 years old in the mid-1800s." Discussing cumulative effects, The DEIS states, "It is unknown how much old growth was harvested." The KNF"s OLY draft EIS from earlier in 2016 states reasons for the KNF's disability:*

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.)

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. As stated on page 75 of the Forest Plan FEIS "Regarding the historic range of variability of old growth on the KNF, 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 a 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."

[02, 38] Comment: *The DEIS defines Old Growth Habitat:*

A community of forest vegetation that has reached a late stage of plant succession characterized by a diverse stand structure and composition along with a significant showing of decadence. The stand structure will typically have multi-storied crown heights and variable crown densities. There is a variety of tree sizes and ages ranging from small groups of seedlings and saplings to trees of large diameters exhibiting a wide range of defect and breakage both live and dead, standing and down. The time it takes for a forest stand to develop into old growth condition depends on many local variables such as forest type, habitat type, and climate. Natural chance events involving forces of nature such as weather, insect, disease, fire, and the actions of man also affects the rate of development of old-growth stand conditions.

The DEIS does not disclose which of the above characteristics of old growth are used to categorize stands in the project area as old growth. It says, "Field verification of old growth stands was completed using stand exams with snag plots." It also says, "(M)anagement considerations and characteristics of old growth and stand attributes necessary for a stand to be considered old growth are also discussed and summarized Green et al (1992) and Pfister et al (2000). That information is incorporated by reference." Do those criteria include "multi-storied crown heights and variable crown densities"? Do they include "a variety of tree sizes and ages ranging from small groups of seedlings and saplings to trees of large diameters exhibiting a wide range of defect and breakage both live and dead, standing and down"? Do they include "a diverse stand structure and composition along with a significant showing of decadence"?

Response: The use of Green et al. 1992 (and corrected versions) as defined in the Forest Plan is the direction used for old growth management

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[02, 39] Comment: *The DEIS says, "Data sources to identify old growth stands include … the Forest Inventory and Analysis (FIA) data that collects and reports data at the Forest*

scale." Please explain how FIA statistics are used to classify an area of the Forest or Project Area as old growth.

Response: Page 74 of the FEIS states that "Data sources to identify old growth stands include District files and surveys, the KNF old growth GIS layer developed from stand-level old growth inventory that is aggregated and summarized at the Forest scale, and the Forest Inventory and Analysis (FIA) data that collects and reports data at the Forest scale. Field verification of old growth was completed using stand exams with snag plots." Forest-wide FIA data was not used to classify a specific area on the ground, but to analyze how disturbance effects the predicted amounts of future old growth. That process is described in detail in the Forest Plan FEIS pages 74-80 and page 69 of the Galton FEIS.

[02, 40] 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.*

Response: This comment is specific to the Forest Plan and not to the Galton project. The use of Green et al. 1992 (and corrected versions) as defined in the Forest plan is the direction used for old growth management. The ID team did not find what the commenter was referring to in Green et al. that final determination to be made by qualified ecologist or wildlife biologist. Green et al. 1992 states that that "Region 1 old growth types were developed by three committees representing the major geographic areas of northern Idaho, western and eastern Montana. Each National Forest involved concerned publics as these definitions evolved. … These definitions will be used in the implementation of Forest Plans. Page 1 of Green et al.

[02, 41] Comment: *Where the DEIS shows old growth or recruitment old growth overlapping with past logging, the FS must perform surveys to confirm the areas meet old-growth criteria.*

Response: A portion of the old growth designated stands with the project area have had walk through surveys conducted. See the Old growth project file. For those stands that did not have a walk through survey conducted, the FSVeg and FACTs databases were queried to determine when previous exams were conducted and to review stand vegetation data. See Old growth project file for this information. After reviewing this information a determination was made regarding the stand's old growth designation.

[02, 42] Comment: *Our DEIS Comments Attachment is taken directly from the 1987 forest plan, and is a list of wildlife species associated with old growth. How does the RFP insure viability of those species, given that there is no MIS for old growth, snags, or coarse woody debris? How does the Galton DEIS analyze impacts on those species?*

Response: This issue was addressed in the Forest Plan response to comments. The retention of old growth habitat for wildlife use and the effects of old growth management under the Forest Plan is described in the FEIS (p. 212-214 of USDA, 2013). Additionally, see the response to comments in the appendices for the Forest Plan related to old growth, MIS, and the coarse filter/fine filter approach to maintaining viability that is utilized in the Forest Plan (Forest Plan FEIS p. 434-436, 483-485, 525-526, 529-534 in USDA 2013). To summarize, the Forest Plan utilizes a coarse filter approach to provide for the viability of most wildlife species on the Forest. This is done by

managing towards a set of desired conditions for vegetation (habitat) based on a natural range of variation and natural disturbance processes. For those species needing additional direction to maintain viability, extra "fine filter" direction was included in the Forest Plan. Old growth, based on Forest Plan direction, would be maintained, enhanced, and increased in amount across the Forest. By managing for the amount, type, and pattern of habitat consistent with natural disturbance processes, conditions would be similar to those found under natural disturbance processes and wildlife viability would be maintained. This includes for old growth habitat, snags, downed wood, and for those species that may utilize that type of habitat for part of their life cycle. Finally, the Galton Vegetation FEIS discusses its affects to the viability of sensitive species at the project scale starting on page 334. These analyses also discuss how this project is consistent with the 2015 Forest Plan.

[02, 125] Comment: *The DEIS states, "Without the reduction of dense understory, through fuels reduction and tree harvest, the development of large diameter trees would continue to decline." The FS is unable to stick to it a single, coherent active management narrative in this DEIS simply because at some point the narrative must obviously conflict with the truth.*

Response: In addition to fuels reduction and tree harvest, such as understory thinning, other natural disturbances, including insects and fire could play a role in reducing dense understories. Reduction in the density of trees occupying a site increases the resources, such as water, space, and light that are available for the remaining allowing them to increase growth both height and diameter.

[02, 156] Comment: *Events that occurred on the forest concerning old growth clearly demonstrate the problems with trusting the FS. See: http://www.wildrockies.org/forestfraud/*

Response: The website shows harvest activity that was associated with a post-fire salvage project that occurred following the 1994 fire season. The IDT is not familiar with the stand conditions that existed post-fire or pre-harvest with this particular project as it occurred on another ranger district. The Galton Vegetation project proposes to reduce surface/ladder fuels, reduce canopy bulk density, and promote early seral species within the stands. The stands will meet old growth criteria set by Green et al. (2009) as defined by the Forest Plan following the proposed activities.

[02, 159] Comment: *The DEIS 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.*

Response: Pages 75-78 of the FEIS describe the existing condition for patch size, stand composition and structure of the existing old growth within the project area. As stated in the Forest Plan FEIS (page 75) we are currently unable to quantify the historic range of variability. Therefore we are unable to compare and contrast these features.

[13, 01] Comment: *My comments are specific to the designated OG in Section 20, T36N, R26W and would probably be appropriate to other lower elevation OG. The current condition of these designated OG stands does not represent the historic OG stands that once occupied the valley bottom. The current DF dominated high down and ladder fuel component would probably never have existed 150 years ago. Open stands of PP, DF and WL would have likely*

been what the historical OG would have looked like. For some reason the FS has decided all OG should not be treated, except by wildfire. When these stands exist near private land, allowing wildfire prone stands to develop like this one is not very neighborly. Sometimes vegetative treatment is necessary to maintain or create OG that is more suitable to its habitat. It is fortunate for you that your neighbors on the south and west sides of this public property have thinned their pine stands and reduced the fuel loads. This treated private property has a better chance of developing into a future OG stand than what is currently occupying the public ground. I would like to see the Forest Service consider treating their lower elevation designated OG to maintain or develop stands that truly represent the OG that historically occupied these habitats.

Response: Thank you for your comment. The Forest Plan does allow for vegetation treatment in old growth to improve resistance and resilience to disturbances and stressors. The Galton Vegetation project proposes vegetation management activities in effective and recruitment old growth on 821 acres in Alternative 1 and 476 acres in Alternative 2. At this time the section you described was not prioritized for treatment. It will be considered for future opportunities.

General Comments

[01, 03] Comment: *Based on the clear content of your draft EIS Retired Deputy Chief Furnish would consider your Galton timber sale one that:*

- *uses agency dogma to further the "agency's timber-first priority"*
- *will create a "landscape of cookie cutter homogeneity"*
- *will "take from the forest at the expense of future generations"*
- *ignores emerging "societal values inviting the agency to change"*

Response: The Galton project was designed to respond to the Purpose and Need stated in Chapter 1 of the FEIS.

[12, 01] Comment: *re galton veg mgt - wher eyou intend to burn up the forest and put in roads. i have comments on this plan and here they are.*
1. ban new roads
2. ban all grazing
3. ban all hunting and trapping
4. ban chemnical applications with toxic pesticids to kill 5. ban logging 6. ban mining or drilling
its time that this open space is recognized as owned by 325 million p eople includin gour kids hwo need to have nature in their lives. i believe the forest service acts as a moneygrubbing evil agency determined to make money for their own agency and destroy what belons to all the people in this country. you are not managing properly. you are managing with money and

rape of the forest in mind. i oppose your plan and ask that you respect the pubilc opinionsof protectin gour forests. this ocmmetn is for the public record. please receipe. jean publiee jeanpubilc1@yahoo.com

Response: The Galton project does not propose to build new roads, only limited temporary road construction is proposed. The grazing allotment within the Galton project area is authorized under an existing decision. The Galton project does not contain any proposals to alter the existing permit. Hunting and trapping are authorized and administered by the State of Montana Department of Fish, Wildlife, and Parks. Application of herbicides were authorized under the Kootenai National Forest Invasive Plant Management Record of Decision (2007). Timber harvest is an important tool used in forest management. The Galton project does not contain any proposals for mining or drilling.

Methodology, Data, Analysis, and Modeling

[01, 04] Comment: *It appears you have consciously excluded the science literature that describes the likely resource harm that will be inflicted by commercial logging at any location under most conditions.*

Response: Appendix 4 contains the literature cited and utilized during the development and analysis of the Galton project. Additional scientific information that was provided by the public or other interested parties was considered by the respective resource specialists. The manner in which this information was utilized is documented in the project file.

[01, 05] Comment: *Include applicable science literature in the References section. Each research conclusion quote contained in the Opposing Views Attachments contains links to the source literature for the quote. I will expect to see the source literature in the References section and cited in the body of the final EIS.*

Response: Please see response to comment [01, 04] above.

[01, 31] Comment: *Include the source literature for particularly relevant science quotes contained in the Opposing Viewpoint Attachments in the References section of the final EIS and cite the quotes contained in the attachments in the body of the final EIS. Indeed, it makes sense for a public servant to present the public with the whole story which includes benefits and drawbacks of project implementation.*

Response: Please see response to comment [01, 04] above.

[01, 33] Comment: *Disclose accurate No Action effects to the natural resources in and downstream from the sale area. If the IDT member still feels their resource will be plundered by not logging and roading and maintaining the conditions that have existed for many decades, then quote the science and identify the data that led them to these conclusions. The court will not accept unsubstantiated claims of damage.*

Response: Anticipated effects of Alternative 2 (No Action) are disclosed throughout Chapter 3 of the FEIS for each respective resource. Scientific references are disclosed throughout these sections as well.

[02, 06] Comment: *In limiting its view to static vegetative conditions, the DEIS sets on the task of analyzing deviations from the reference conditions by using such constructs as Vegetative Response Units (VRUs), Biophysical Settings, and Habitat Type Groups. Despite the rather esoteric nature of those constructs, the DEIS gives little indication as to how the FS has surveyed the project area to be able to delineate the forest into these various VRUs, biophysical settings, and/or Habitat Type Groups. In other words, what measurements of the real world have been conducted? Furthermore, where is the data stored? The FS is obligated to demonstrate that the data are accurate and reasonably up-to-date. The DEIS doesn't provide any reasonable assurance along those lines.*

Then, those landscape subunits (VRUs, Biophysical Settings, and Habitat Type Groups) are further categorized into other constructs such as age class, size class, and tree species composition. The meaningfulness of such categorization is also dependent upon the accuracy of the real-world data gathered to assign areas to each of these other categories. Again, the DEIS doesn't provide any reasonable assurance along those lines.

Please identify the source(s) of data the DEIS is relying upon for determining VRUs, Biophysical Settings, Habitat Type Groups, age class, size class, and tree species composition. Please explain if that data has been derived from surveys of the project area, or if the HRVs are being extrapolated from some other specific geographic region.

Response: Data sources are as stated on page 45 of the FEIS. Previous analyses in the area were utilized for historic information. Existing Forest Service databases provided information to characterize the affected environment for the project area. Ground reconnaissance and the FSVeg database were the primary sources of information used to describe the existing vegetation conditions. Determination of VRU and Biophysical setting was most recently reviewed in conjunction with the Forest Plan analysis. This information can be located on pages 50-52 and 55-56 of the Forest Plan FEIS. Habitat typing was done during the most recent stand exam. These are verified during field reconnaissance and development of the silvicultural prescription. As stated on page 46 of the FEIS data sources include field reconnaissance and the FSVeg database. FSVeg data is based on stand exams that were conducted from 1982 to 2001.

[02, 07] Comment: *The DEIS also fails to disclose the limitations of its fire regime classification. This is another major flaw of the analysis, given management-induced fire exclusion is being assigned most of the blame for deviations from vegetative reference conditions.*

Response: Refer to FEIS page 122-126 and documents in the project file USDA Forest Service 1199, Hann and Strohm 2003, Agee 1993, and Brown 1995. Field reconnaissance, large fire history maps, and vegetation layers were used to determine the fire regime classification.

[02, 09] Comment: *In narrowly focusing upon fire exclusion as the major reason for vegetative "deviations from reference conditions" the Galton DEIS fails to explain the degree to which past logging has caused deviations. The DEIS does explain that the logging as proposed is not the same as the admittedly anti-ecological past logging, yet there is no quantified cumulative effects comparisons on how these outdated logging methods have contributing to the alleged deviations.*

Response: On pages 41-49 of the FEIS, the document clearly states that forest insects and disease have played a major role in the shaping the structure and function of the forests currently found in the Galton Vegetation project area. The role of wildfire within these forests although important is secondary to these other disturbance agents. Vegetative conditions as they relate to past harvest are described on pages 53-54 of the FEIS. Cumulative effects regarding past actions are discussed on page 62-65 of the FEIS. Map 10 is a spatial depiction of past actions within the project area.

[02, 15] Comment: *The DEIS states that "Ground reconnaissance and the FSVeg database were the primary sources of information used to describe existing vegetation conditions." Please disclose the statistical accuracy of the FSVeg database, the sources and degree of error or imprecision.*

Response: Page 46 of the FEIS discloses the data sources utilized in this analysis. Stand exams utilized in this analysis were conducted from 1982 to 2001. 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.

[02, 18] Comment: *Also in describing what it claims to be landscape departures from reference conditions, the Galton DEIS does not provide a spatial analysis, either for the true reference conditions or of current project area conditions. The Galton DEIS has no display or analysis of the deviations of project area landscape pattern from reference conditions.*

Response: Reference conditions are described on pages 41-49 of the FEIS. Pages 49-54 of the FEIS describe the current condition of the landscape. This includes descriptions of deviation and descriptions of conditions that are within reference conditions. Map 13 is a spatial depiction of the referenced VRUs. The Forest Plan FEIS (pages 84-86) describes landscape pattern as it pertains to reference conditions and current conditions.

[02, 21] Comment: *The DEIS also does not present adequate analysis areas proposed for thinning in foreseeable forestwide management projects.*

Response: During the development of the Galton Vegetation proposed action, all opportunities that appeared to be candidates for treatment were considered and included either in the proposed action or in project alternatives. Treatments authorized by a decision on the Galton project would preclude any Young Growth Project treatments in the Galton Vegetation vicinity in the near term. The Forestwide Young Growth Project contains criteria for age and structure in order to determine if treatments could occur at the stand level. Stands that met initial screening criteria were identified as part of the initial proposal for the Forestwide Young Growth Project. There has not been a decision issued on the Forestwide Young Growth project and the final screening criteria are still in a development stage. Therefore, no analysis of cumulative effects can be done, and must be completed at the time that specific stands are proposed for treatment by the Forestwide Young Growth Project.

[02, 22] Comment:*Many of the Galton 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. The Ninth Circuit Court of Appeals has stated that an EIS must disclose the limitations of its models in order to comply with NEPA. The Galton DEIS does not disclose the limitations of its modeling methods. The FS should conduct a Science Consistency Review for the RFP and for the Galton Project. 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: AWR contends the Forest Service must follow an outline purportedly called a "science consistency review" prescribed by Guldin et al (2003) in which a team of reviewers is compiled "…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." This type of review is already accomplished both through the NEPA interdisciplinary team (ID Team) analysis of the Galton project, as well as through various collaboration, public comment process for NEPA, and the FS administrative review procedures.

The Forest Service prepared the FEIS in compliance with the National Environmental Policy Act (NEPA) and other relevant Federal and state laws and regulations. The Galton FEIS discloses the direct, indirect and cumulative environmental impacts that could result from the proposed action and alternatives. The Galton project analysis used the best available science, as demonstrated throughout the DEIS and FEIS.

The ID Team used a variety of sources of information to conduct their analysis, including stand exams, walk-through surveys, transects, remote sensing information, and information collected for projects analyzed in the past. Specific to each resource:

Forest Vegetation – FEIS page 46, "Previous analyses, such as the Graves Creek Ecosystem Assessment at the Watershed Scale (EAWS) (2000), were used to provide background information for this analysis. Information collected for the EAWS as well as existing Forest Service databases provided the information used to characterize the affected environment for vegetation within the Galton analysis area. Ground reconnaissance and the FSVeg database were the primary sources of information used to describe existing vegetation conditions. Stand exam data is from 1982-2001.

Old growth – FEIS page74, "Data sources to identify old growth stands include District Files and surveys, the KNF old growth GIS layer developed from stand-level old growth inventory that is aggregated and summarized at the Forest scale, and the Forest Inventory and Analysis (FIA) data that collects and reports data at the Forest Scale. Field verification of old growth stands was completed using stand exams with snag plots and walk-thru exams. Where field verification was not feasible stand data from FSVeg and FACTs was assimilated and compared with NAIP and Google Earth imagery to determine validity.

Snags and Coarse Woody Debris – Coarse woody debris data was collected for forest stand proposed for regeneration and intermediate harvest and understory thinning/fuel treatment areas. These are located in the Soils project file. Further methodology is described on page 87-88 of the FEIS.

[09, 05] Comment: *The analysis also fails to recognize the reasonably foreseeable action of implementing the Forest Plan in the Whitefish Divide. Therefore, the cumulative effects analysis is incomplete.*

Response: Reasonably foreseeable actions are those site specific actions that are ongoing or proposed. The Forest Plan provides overarching direction for managing the forest but does not contain site specific project proposals.

NEPA Process

[01, 01] Comment: *You have no list of preparers which violates 40 CFR 1502.17 and 40 CFR 1502.10.*

Literature is cited throughout the DEIS, however there is no References or Literature Cited section. This is not only unprofessional but violates 40 CFR 1502.21. High school students learn when literature is cited in the body of a document there must be a References section identifying the document that contained the citation,

Request for changes to be made to the final NEPA document: Include a List of Preparers and a References section including a description of the literature cited in the body of the DEIS.

Response: The list of preparers is contained in Appendix 5 and the Literature Cited is contained in Appendix 4. This information was included in the hard copy document as well as posted on-line. This information will also be part of the Final EIS.

[01, 02] Comment: *It's clear that the line-officers on the Kootenai National Forest did not learn from the Agriculture Department's inspector general's findings based on a 1999 audit of the USFS timber program. The first sentence of the NYT article describing the audit findings says this:*

"Federal auditors have found that the Forest Service frequently fails to assess, prevent or correct environmental damage from logging on the national forests."

This DEIS smoothes-over and minimizes the "environmental damage from logging" that will be caused by the Galton timber sale." A few IDT members know this but their position pays to well to jeopardize it by doing the right thing for future generations of Americans. The complete text of the NYT disclosure can be read at the following link:

Response: The DEIS and FEIS disclose the proposed action and alternatives as well as the anticipated effects of implementing these actions in compliance with NEPA.

[01, 32] Comment: The DEIS does not discuss the items shown below

(e) Energy requirements and conservation potential of various alternatives and mitigation measures.

(f) Natural or depletable resource requirements and conservation potential of various alternatives and mitigation measures.

(g) Urban quality, historic and cultural resources, and the design of the built environment, including the reuse and conservation potential of various alternatives and mitigation measures.

Request for final NEPA document modifications: Please comply with the law by including the missing information above.

Response: The FEIS includes disclosures for these elements on pages 548-549.

[01, 34] Comment: *Make the documents that currently reside in the Project File available as online Appendices to the NEPA document, or clearly indicate the link to the documents where they appear in the References section.*

Response: The FEIS contains information utilized to determine effects and inform the decision maker. Not all information is included in the FEIS in an effort to conform with 40 CFR 1502.21 which discusses cutting down on bulk without impeding agency and public review of the action. Materials contained in the Project File are available to the public through the FOIA process(1506.6(f)).

[01, 35] Comment: *Change the P&N to reflect the real reason this timber sale is being planned. Remove the claimed resource benefits and place them in the Chapter 2 predicted effects disclosures*

Response: The Purpose and Need for the Galton project was developed to respond to desired conditions set forth in the Forest Plan.

[02, 04] Comment: *The Galton project's "Purpose and Need for Action" is justified by the DEIS: "Some resources in the project area are exhibiting conditions and trends that deviate from the reference conditions identified during the ecosystem assessment." But in terms of defining the project purpose and need, the DEIS limits is view of reference conditions to vegetative conditions and fire regimes—nothing else. This is despite the fact that the DEIS itself admits that Reference Conditions must include "disturbance regimes …and the resulting vegetation patterns, processes, and structure…" (p. 44, emphasis added).*

Response: The FEIS identifies a number of disturbance factors that can and have influenced the forest. The Existing Condition statements within Purpose and Need Section of the FEIS (p. 2-5) speaks to fire, fire suppression, insects, and disease as factors that have influenced the forested environment within the Galton Project area.

[02, 219] Comment: *The DEIS proposes "a Forest Plan amendment and would utilize the planning regulations in effect prior to May 9, 2012 per 36 CFR 219.17." The FS has no discretion to conduct forest plan amendments under regulations that are no longer in effect.*

Response: The 2012 Planning Rule transition provision described in the current regulations at 36 CFR 219.17 provides the FS the authority to use prior regulations. Specifically it states at 36 CFR 219.17(b)(2): "With respect to plans approved or revised under a prior planning regulation, including the transition provisions of the reinstated 2000 rule (36 CFR part 209, published at 36 CFR parts 200 to 209, revised as of July 1, 2010), plan amendments may be initiated under the provisions of the prior planning regulation for 3 years after May 9, 2012, and may be completed and approved under those provisions…"

[02, 220] Comment: *The proposed Salvage of Incidental Mortality from Underburning, which we recognize above as running counter to the project's very Purpose and Need, would*

require later public involvement under NEPA. This DEIS does not, and cannot analyze the effects of such a proposal.

Response: The FEIS (page 14) discloses 16 criteria which must be met in order to conduct any salvage of incidental mortality from underburning. Resource specialists considered and analyzed up to 20 acres per year of this type of salvage within their respective resource areas.

[02, 221] Comment: *The DEIS does not analyze and disclose the cumulative effects of livestock grazing. Little or no site-specific data is presented on riparian area damage, soil compaction or other disturbance, noxious weed spreading, water pollution, or other ecological damage. How grazing influences forest stand development and interacts with fire is not analyzed or disclosed.*

Response: The cumulative effects of cattle grazing is disclosed within each resource section. Forest Vegetation - p61; Old growth - p80; snags and coarse woody- p89; PTES Plants WBP - p96; Invasive species - p113; Fire and Fuels - p126; Soils - p161-162; Hydrology - p186; Riparian, Aquatic Habitat, Aquatic Species - p227; Wildilfe - p260, 285, 304, 415, 479, 497, 532

Public Involvement

[01, 23] Comment: *Post your responses to ALL public comments online so the 322 million Americans\ national forest owners might read them if they choose.*

Hiding your responses to comments in the Project File clearly violates United States' law. This is abuse. Will you pay the bills if a person has an accident driving to the district? Its insane to keep the responses off the net. You clearly have something to hide.

Failure to post your responses to ALL public comments online will violate 36 CFR 215.6(d) because the Responsible Official did not "address comments received from the public during the comment period in an appendix to the environmental assessment."

Response: Chapter 4 of the FEIS contains the response to public comments. Electronic versions of the NEPA documents are posted to the Kootenai WWW site at: http://www.fs.usda.gov/kootenai

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[02, 217] Comment: *The DEIS states, "The Forest also hosted a stakeholder group beginning in the Fall of 2012. Recommendations from that group are incorporated into this document." What does it mean that recommendations were "incorporated into" the DEIS? What recommendations from the stakeholder group did the FS use to shape alternatives? Also, how did the KNF notify the broader public of these public meetings?*

Response: Some information provided by the stakeholder group was used in the development of Alternative 3. The stakeholder group was initially formed by a mailing (postal service and e-mail) to a wide group of interested parties in 2013. The individuals that initially responded to this mailing were encouraged to communicate with peers and other interested parties to either get

them involved with the group or provide feedback through a representative. All meetings were held in public venues and were open to the public.

[02, 218] Comment: *The DEIS states that "Alternative 3 is an "action" alternative that was developed to respond to public comments" and "also identifies new opportunities for vegetation management that were requested in public comment." That being said, the theme of Alternative is not explained. What the issues are that led to the full consideration of this alternative under NEPA is not explained.*

Response: The FEIS has been changed to reflect this comment. Chapter 2 now contains information describing the development of Alternative 3

Recreation - Snowmobiling

[06, 02] Comment: *In regards to public use, I don not agree that snowmobiling should be mentioned in any portion of this plan because they are involved in travel planning and not vegetative management. There are statements (as on page 229) made that suggest snowmobiles have no effect on vegetative management and I do not know that I could agree knowing that it has never been studied. I think snowmobiling should be expunged from the entire document.*

Response: We were unable to locate the statement you reference on page 229. Snowmobiles can cause damage to the leaders of young trees during periods of low snow pack. This damage can lead to deformation of seedlings and introduce rot and disease to the tree.

Roads and Roadless

[01, 06] Comment: *You indicate you plan to construct 1.36 miles of new road as part of the Proposed Action. A report authored by Gerald Coghlan, WO Acting Director of Engineering in 1998 indicates there are 372,956 miles of existing national forest system road (page 5 of report below). The agency currently constructs 2,000 miles of system road per year. At this rate there are 409,000 miles now in our national forests. In addition to that, there is at least double this amount in unsurfaced, sediment producing, outsloped, temporary roads that have not been totally obliterated and "put to bed" where the fill is returned to the cut. The average distance to the moon (it varies) is 384,403 miles … and you propose more. Can you comprehend this? Isn't there enough road?*

Response: The Galton project does not propose any new permanent road construction. It does propose to utilize temporary road that would be removed from the landscape following the treatments.

[01, 07] Comment: *Please don't exclude a "no new road" alternative from analysis in detail by claiming the P&N will not be met. The P&N includes timber harvest but it does not specify a volume of number of acres. The "no new roads" alternative will reduce the acres treated, but will still meet the P&N since most harvest would still occur. This alternative is very important because it eliminates road-construction related adverse natural resource impacts.*

Response: The Galton project does not propose any new permanent road construction. No adverse effects were identified with the temporary road construction that is proposed by the Galton project.

[01, 08] Comment: *Without exception, road construction and reconstruction are activities that cause damage to some important natural resources in the forest. New road construction is particularly detrimental to aquatic and wildlife resources.*

Response: The effects of the alternatives proposed by the Galton project are displayed in Chapter 3 of the FEIS. No detrimental effects to aquatic or wildlife resources were identified during the analysis of the alternatives.

[01, 09] Comment: *Since best science and Dr. Dombeck agree that there are "few more irreparable marks we can leave on the land than to build a road", isn't this is a valid reason to analyze a "no new road" alternative in detail?*

Comment: The Administrative Procedures Act directs judges to set aside an agency action if the court determines that the action is "arbitrary, capricious, an abuse of discretion, or otherwise not in accordance with law." 5 U.S.C. § 706(2)(A). A line-officer who ignores best-science and instead makes a Decision on weak, meager evidence provided by people with financial interest in a sale being sold (i.e. IDT members that represent timber and engineering) is guilty of violating the APA. You have done this.

Response: The Galton project does not propose to build any new permanent roads. Temporary roads would be used to access all or portions of some treatment units and then removed from the landscape following the treatment. The ID Team analyzed the potential effects for each alternative and this information was available to the Decision Maker for their consideration during the process.

[01, 10] Comment: *Please don't claim the No Action alternative satisfies this request to analyze a "no new roads" alternative in detail. The timber sale contains some actions that will benefit the ecosystem of the area. A "no new roads" alternative would include these actions. The P&N will still be met because volume will be available from existing roads. A "no new roads" action alternative is reasonable. It will benefit the forested ecosystem, it produces volume and reduces fuels, and eliminates the ecosystem damage caused by roads that is identified in Opposing Views Attachment #4.*

Response: The No Action alternative serves as a baseline to compare the existing conditions on the landscape with the effects of the alternatives proposed.

[01, 11] Comment: *Failure to analyze a timber sale with no new road construction will violate:*

- *40 CFR 1500.2(e) and (f) because the Responsible Official was unable to avoid or minimize adverse effects of the project upon the quality of the human environment without complete knowledge of all likely adverse effects. Most adverse effects of road construction activities described by scientists in the Opposing Views Attachment #4 was not mentioned in the final NEPA document EA.*

Response: The ID Team analyzed the potential effects for each alternative and this information was available to the Decision Maker for their consideration during the process. The literature utilized to conduct the analysis is contained in Appendix 4 of the FEIS

[01, 26] Comment: *Roads that will be used again in the future must be constructed to system road standards with surfacing and a ditch to reduce sediment generation. If the final EIS does not clearly indicate that your proposed temporary roads will be obliterated such that a running surface no longer exists, it will show you plan to allow these temporary roads to pump sediment for decades until the so-called temporary road is used again for the next timber sale. Please become familiar with the Clean Water Act.*

Response: Temporary roads proposed for use in the Galton project would be obliterated and recontoured immediately after cessation of use. Roads are scarified and care is taken to make the road template less visible. (FEIS p.17) Temporary roads are hydrologically neutral following the obliteration process.

[01, 27] Comment: *The DEIS indicates 1.25 miles (pg 8) or 1.36 miles (pg 15) of temporary roads will be constructed as part this timber sale. Is the public supposed to guess?*

Response: The table on page 8 is incorrect. The correct mileage is 1.36 and this has been corrected in the FEIS.

[01, 28] Comment: *At page 15 you indicate temporary roads will be "Temporary roads are obliterated and re-contoured immediately after cessation of use. Roads are scarified to reduce compaction, and care is taken to make the road template less visible. The work is generally accomplished within the timber sale, and completed before the sale is finalized."*

Clearly, nobody on the IDT understands what happens when a road is "obliterated and re-contoured." When roads are "obliterated and re-contoured" the fill material is brought back into the cut and the drainage structures are taken out. The ground is brought back to the natural angle of repose. Except for the lack of vegetation the sideslope looks like it did before the road construction started. There is no running surface left. How is it scarified? With no road template how would one make it less visible?

Response: Road obliteration can take many forms. The intent is to make the road hydrologically neutral and prevent motorized access along the route. The process typically incorporates large

woody materials, large rocks, and brush to deter access along the route. Any drainage structures (culverts, ditches, etc.) are removed. Scarification is typically accomplished using an excavator and ripping the compacted surface.

[01, 29] Comment: *Since temporary roads are outsloped with no ditch, sediment that is generated during precipitation events, finds its way to streams and harms the aquatic resources after initial construction … unless the road is really obliterated which you aren't proposing to do.*

Your so-called temporary roads are not temporary. You know this and choose to hide it from the public.

Response: Temporary roads are built to facilitate safe transportation and to last through the time they are needed, without regard to insloping or outsloping. They are contractually required to be recontoured following their use. Discussions on the effects of temporary roads on aquatic resources are discussed on pages 190-191 and 230 of the FEIS. In addition, soil and water resources are monitored after completion of all activities in the unit. This monitoring includes review of the entire unit including temporary roads by trained hydrologic technicians.

[01, 30] Comment: *You ignore agency best management practices. You have no temporary road monitoring plan. Spending a little money on monitoring is better than spending a lot of money cleaning the stream … or hiding the fact that temporary roads are the reason the stream is muddy. The DEIS does not contain a discussion explaining why you believe temporary road monitoring is not necessary on this project.*

Response: Please see response to Comment [01, 29]

[02, 113] Comment: *The Galton DEIS states that no logging would occur in the inventoried roadless areas. Also "(t)here are no unroaded areas adjacent to roadless areas in this project" however, the maps are not clear enough to verify this. The Galton DEIS does not analyze whether any land contiguous to the roadless area is indeed roadless and may have been left off the roadless inventory. 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: Analysis was conducted to ensure that no unroaded areas would be affected by the proposed activities. The map displayed in the FEIS does not depict all roads that exist on the landscape in order to provide more clarity to the overall map. Information regarding this analysis is contained in the Project Record

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[02, 114] Comment: *The Galton DEIS does not provide an adequate analysis showing that prescribed burning in the roadless area is responding to any existing ecological need. There are no demonstrable "deviations" from reference conditions in roadless areas. The DEIS fails*

to acknowledge the best scientific information that recognizes the high ecological integrity and functioning of unmanaged areas.

Response: Fuel loading through disease, decadence, and fire exclusion now occur over large portions of the project area. See the full write up on existing conditions on page 117. Under the Forest Plan, Management Area 5 guidelines allow for the use of planned and unplanned ignitions. "The use of fire serves as a primary role for trending the vegetation toward the desired conditions as well as serving other important ecosystem functions". (MA5a, b, c-DC-Fire-01). The use of wildland fire (both planned and natural, unplanned ignitions), increases in many areas across the Forest. Fire plays an increasing 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 (FW-DC-FIRE-03).

Scenic

[02, 214] Comment: *The DEIS fails to demonstrate that all that regeneration logging proposed would be consistent with RFP scenic integrity direction.*

Response: The Desired Condition with regards to Access and Recreation in the Forest Plan, states that scenic resources of the KNF are to compliment the recreation settings and experiences while reflecting healthy and sustainable ecosystem conditions (FW-DC-AR-02). On pages 524 and 525 of the FEIS it speaks to how the regeneration units will help to blend the existing openings in the landscape and improve the shape to more natural looking openings. Evidence to support how the regeneration harvest is integral to a healthy and sustainable ecosystem is located on pages 10-13 in the FEIS.

Snags and Coarse Woody Debris

[02, 122] Comment: *Given that the logging (and more intense burning) would reduce the number of available snags of some or all size classes for predictable durations, the DEIS must better explain how it the action alternatives would be consistent with FW-DC-VEG-07.*

Response: Desired conditions for snags and coarse woody debris are located in the Forest Plan. A forest-wide guideline (FW-GDL-VEG-04) 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. See pages 80-83 of the Forest Plan FEIS for a description of the analysis of snags.

[02, 123] Comment: *The DEIS does not reconcile the fact that many of the proposed management actions to move toward FW-DC-VEG-06 conflict with W-DC-VEG-07.*

Response: Since native insects and pathogens are also now responsible for a much larger proportion of forest disturbance than they were historically, this impact has resulted in accelerating stands towards late seral, shade intolerant (and root disease susceptible) species(see page 64 of FP FEIS bottom paragraph as well as bottom paragraph on page 62). Current conditions support this trend on the KNF and the project area. Achieving the FW-DC-VEG-06 would not affect the attainment of FW-DC-VEG-07 because the desired range of snags across all forested acres on the KNF (table 1 page 13 of Forest Plan) is based on historic snag densities as displayed in Bollenbacher et al. 1999. (see middle of page 81 FP FEIS).

[02, 124] Comment: *How recent are the surveys for quantities of coarse woody debris in the project area?*

Response: Coarse woody debris surveys were conducted in stands proposed for regeneration harvest, commercial thin, improvement harvest, understory thinning/fuel reduction activities. These surveys were conducted between 2009 and 2011. Information can be found in the Soils project file.

[02, 127] Comment: *What scientific evidence exists that assures the actively managed portion of the project area will maintain quantities and sizes of snags and coarse woody debris within reference conditions, if the forest is "treated" at the expected rate and intensity?*

Response: Desired conditions for snags and coarse woody debris are located in the Forest Plan. A forest-wide guideline (FW-GDL-VEG-04) 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. See pages 80-83 of the Forest Plan FEIS for a description of the analysis of snags.

[02, 154] Comment: *The DEIS refers to an unpublished, non-peer reviewed Region 1 paper (Bollenbacher et al. 2009) to estimate snags in the project area. Snags are the result of a dynamic process and their persistence on the landscape is temporary, and subject to complex factors. It would seem that Bollenbacher et al. 2009 is being applied in this DEIS for an invalid purpose. Has the FS validated these modeled estimates by ground trothing in the project area, and if so how recently?*

Response: The use of Bollenbacher et al. 2009 in the Forest Plan is not specific to the activities being proposed as part of the Galton Vegetation project, but is related to the Forest Plan direction. As stated in Bollenbacher et al. 2009 and FEIS page 89-90, 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 FEIS 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 no occur evenly across space. Snag densities are most likely lower in areas closer to town and visual observations suggest 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 and subalpine biophysical settings. Also the Marston face, Barnaby and Lewis creek areas contain high snag densities due to past wildfire. High elevation areas such as those in the Foundation creek, Stahl creek, Weasel creek, and upper Graves Creek drainages

also contain high densities of snags from whitebark pine killed by western white pine blister rust. In terms of effects of the Galton Vegetation project to snags, pages 86-88 address that management activities can both create and reduce snag densities. Snags/CWD Table 1 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 Galton Vegetation project. Post fire data is reflected in the existing conditions described throughout the FEIS.

Soils

[02, 88] Comment: *By its very nature, logging creates a situation that for some duration, wood in the soil will be below reference conditions. This is alluded to in the paragraph on p. 157 beginning with "The temporal scale." No matter how the DEIS and RFP try to dance around it, the FS cannot reconcile this fact with principles of ecological sustainability.*

Response: As stated on page 171 of the FEIS this project meets Forest Plan Guideline FW-GDL-SOIL-02 which requires course woody debris to be retained following vegetation management activities per FW-GDL-VEG-03. Furthermore, the following design criteria was included to ensure compliance with this Forest Plan Guideline: 1. Maintain soil productivity through retention of Coarse Woody Debris (CWD) at levels recommended in Forest Plan. Only material greater than 3" would count towards the required tons per acre of CWD. Provide adequate CWD to meet the requirements by biophysical settings/VRU in FW-GDL-VEG-03. 2. Where possible, allow for one winter season between harvest and under-burning to maximize leaching of nutrients from logging slash into the soil.

[02, 89] Comment: *The DEIS lists Regional Soil Quality Standards (R-1 Supplement No. 2500-2014-1) as part of its Regulatory Framework. Since there are no soil standards in the RFP, is project consistency with the Regional Soil Quality Standards required for the project to be consistent with NFMA?*

Response: The Regional Soil Quality Standards (R-1 Supplement No. 2500-2014-1) provides soil quality standards to assure the statutory requirements of NFMA are met (page 138, FEIS).

[02, 90] Comment: *The DEIS does not explain why ground-based logging equipment might be allowed to operate on slopes less than 40 percent, in compliance with FW-GDL-SOIL-01.*

Response: According to FW-GDL-SOIL-01 in the Forest Plan, ground based equipment should only operate on slopes less than 40 percent, in order to avoid detrimental soil disturbance. Where slopes within and activity area contain short pitches greater than 40 percent, but less than 150ft in length, ground-based equipment may be allowed, as designated by the timber sale administrator. Page 24-25 includes the following design criteria in order to comply with FS-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 and also in accordance with State of Montana BMPs Section IV.B. Page 171 of the FEIS states that, "In areas where slopes are consistently greater than 40 percent units where prescribed skyline/cable yarding systems are expected to occur (refer to Tables 2 and 4).

[02, 91] Comment: *Scientifically and statistically speaking, how reliable is the common tile spade shovel test method (p. 133) for determining if a plot location has a 15% increase in natural bulk density?*

Response: All field surveys were completed in accordance with R1-2500-2014-1 to determine existing and predicted soil disturbance values (FEIS pages 140-141).

[02, 92] Comment: *Since "The predicted values do not account for changes in soil type, the recovery of soils over time, or existing conditions" (136), what good are the predicted values?*

Response: The potential detrimental disturbance numbers for each proposed harvest unit are based on empirically derived coefficients that were obtained and averaged from numerous monitored sites throughout the Kootenai National Forest (Kuennen 2003; 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) will be implemented.

[02, 93] Comment: *The DEIS fails to specify how the project would be consistent with FW-GDL-SOIL-02 and FW-GDL-VEG-03.*

Response: Pages 160-162 of the FEIS provides a discussion of how this project meets coarse woody debris retention requirements following management activities (FS-GDL-SOIL-02 and FW-GDL-VEG-03). In addition, design criteria to specifically meet these guidelines is shown beginning on page 26 of the FEIS.

[02, 94] Comment: *The Galton DEIS does not adequately demonstrate project consistency with the Regional 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 (FEIS pages 139-140). Field surveys consisted of random stratified transect/sample point methods with confidence intervals at 80% ± 5% with the majority of surveys being 95% ± 5% based on the confidence intervals documented in the project file. 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 FEIS page 140-141 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.

[02, 95] Comment: *"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.*

Response: Soil surveys were conducted using R1 Soils Protocol (FEIS pages 140-141). 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). Soils survey field forms can be found in the Soil project file.

[02, 96] Comment: *The DEIS doesn't explain why DSD is not being estimated for prescribed burning activity areas. Given the potential for detrimental burning effects, those cumulative effects must be site-specifically disclosed.*

Response: Soils Table 2 on page 142 the FEIS includes estimated DSD for prescribed burning activity areas. Percentages present 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. The existing and estimated DSD for each unit is shown in Soils Table 5, pages 154-157 of the FEIS.

[02, 97] Comment: *The Galton DEIS does not disclose that DSD areal extent percentage limits are based on feasibility of timber sale implementation rather than concerns over soil productivity. 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 Galton DEIS also fails to scientifically validate the R-1 SQS for utilization as a soil productivity proxy.*

Response: The soils analysis used activity areas as directed in Northern Region (R1) Soil Protocol 2500-2014-1 (FEIS pages 140-141). The impact of all past disturbance (including logging) within activity areas are shown as the percent existing disturbance in FEIS Soils Table 5 (pages 154-157). All units were field surveyed (FEIS pages 154-157).

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 Hydrology Section of the FEIS (pages 172-201). 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); FEIS page 143-144.

[02, 98] Comment: *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%.*

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.

[02, 99] Comment: *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.*

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 FEIS pages 161-163. The analysis of physical (detrimental) soil disturbance can be found in fEIS pages 153-161.

A discussion of landtypes with inherent low productivity can be found in FEIS pages151-153.

[02, 100] Comment: *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.*

Response: The adequacy of using the Soil Technical Guide is beyond the scope of this project. All soil surveys completed for the Galton Project Area were completed by the soil scientist or soil science assistant with equal intensity and a confidence level of 80% ± 5% 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 tile 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.

[02, 102] Comment: *NEPA requires that an EIS specify the effectiveness of its mitigations. 40 C.F.R. 1502.16. The Galton 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: As shown in Soils Table 5 all proposed units will remain at or below 15% DSD after all activities are completed for all alternatives (FEIS pages 154-157). No mitigation of DSD will be required due to the activities proposed for the Galton project.

[02, 103] Comment: *The Galton 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 Galton 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 Galton 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%).

[02, 104] 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 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.*

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).

[02, 105] Comment: *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.*

Response: As explained on pages 139-140 of the FEIS, the analysis of direct and indirect effects of the alternatives focuses on individual soils analysis area as defined by the Forest Service Manual R-1 Supplement No. 2500-2014-1):

"Analysis Area: A soils analysis area is a discrete land area affected by 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 with range allotments. All proposed temporary roads, landings and skid trails associated with proposed harvest areas are included within the analysis area." The soil analysis area for this project involves timber stand improvements, timber harvest, piling, fuel treatments, fire line construction, skid trails, landings, weed spraying, new and temporary road construction, and road decommissioning and storage, and post-harvest activities. System roads are not a part of the soils analysis areas because they have been removed from production. Implications of soil damage on a watershed scale is addressed in the Hydrology section of the FEIS (pages 172-201).

[02, 106] Comment: *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.

Response: The hydrological implications of soil damage on watersheds is addressed in the Hydrology Section of the FEIS (pages 172-201). 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 (FEIS pages 172-201 and Appendix 2). 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 (FEIS pages 182-183; 188-189; 197; and 198-204 (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. Specific Design Criteria regarding soils are listed on FEIS Table 5, pages 26-33. Refer to FEIS Appendix 2 for Best Management Practices.

[02, 107] Comment: *The DEIS ignores a lot of science that indicates most soil compaction comes with the first pass of logging machinery.*

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. A discussion of detrimental soil disturbance, which includes compaction is on pages 153-161 of the FEIS.

[02, 108] 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.

[02, 109] 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 (FEIS page 139-140). The impacts of all past disturbance (including logging) within activity areas are shown as the percent existing disturbance in FEIS pages 154-157, Soils Table 5. Documentation of field surveys are present in the Galton 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 Hydrology resource section of the FEIS (pages 172-201).

[02, 110] Comment: *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 as shown in Soils Table 2, page 142 of the FEIS.

[02, 111] Comment: *The DEIS does not demonstrate consistency with FW-GDL-SOIL-04: "Ground-disturbing management activities on landslide prone areas should be avoided."*

Response: As described on FEIS page 171 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 Galton project is designed in exact accordance with FW-GDL-SOIL-04.

[02, 112] Comment: *The DEIS does not demonstrate consistency with 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.*

Response: The Design Criteria for soil productivity beginning on page 26 of the FEIS includes the following: 1. Maintain soil productivity through retention of Coarse Woody Debris (CWD) at levels recommended in Forest Plan. Only material greater than 3" would count towards the required tons per acre of CWD. Provide adequate CWD to meet the requirements by biophysical settings/VRU in FW-GDL-VEG-03. 2. Where possible, allow for one winter season between harvest and under-burning to maximize leaching of nutrients from logging slash into the soil. Furthermore, as shown in Soils Table 4 on page 152 of the FEIS, activity on low productivity soils make up 9% in Alternative 1 and 11% in Alternatives 3 make up 9% . In addition, as discussed on page 145, low productivity soils are not necessarily nutrient-limited and may be

categorized as low productivity due to steep slopes, harsh aspects, high elevation, or other factors that limit tree growth.

Travel Management

[07, 04] Comment: *Your summary indicates there are 26 or 31 miles of snowmobile trails available, depending upon the time of year. And 121 miles for stock and foot traffic. I have NEVER seen a horseman out when I have been snowmobiling, and the only foot traffic is a few near the trail heads with their dogs. Why can't some of those trails be opened up for multiple use? Snowmobilers do far less damage, like none, to a trail than pack string does. Don't get me wrong, I'm not saying kick the pack string off, I'm saying let the sleds on.*

Response: Within the Wilderenss Study Area (WSA) the management is directed by WSA guidelines.

[08, 08] Comment: *It was our understanding when the Galton Veg management plan and the Ten Lakes travel management plan were separated for separate analysis, that the Galton plan would incorporate a travel management element.*

Response: The purpose and need of the Galton Vegetation Project does not include transportation management, and therefore such decisions are beyond the scope of this project. Although, the Transportation Analysis completed for the original Galton Project in 2009 identified opportunities for road management in the area (36 CFR subpart a), these were not carried forward in the Galton purpose and need.The Ten Lakes Travel Management and Galton Vegetation Management projects were separated to clearly address the court-order travel managementplanning for the Ten Lakes WSA in one decision and vegetation management needs in the other. Forestwide non-winter travel management planning has been completed per the published motor vehicle use maps (36 CFR 212 subpart b). Forestwide oversnow motorized winter travel management (outside the WSA) will be completed subsequent to completing the Ten Lakes Travel Management Plan (36 CFR 212 subpart c.

[08, 09] Comment: *We think the Draft EIS should have included travel management component in the non-WSA area of the Galton Range and Whitefish Range. While some roads are given treatment to bring them up to BMP level, numerous road remain in the area and the DEIS does not seem to make a comprehensive assessment of them. This scant or minimal assessment of roads does not in our view constitute a travel analysis. The DEIS and forthcoming FEIS are the appropriate places to address a travel management plan for the area outside of the Ten Lakes WSA.*

Response: The forest has completed a forestwide and a project specific travel analysis per subpart a of the Travel Management Rule (36 CFR 212). The Galton Transportation Analysis identified opportunities for road management in the area, but these were not carried forward as part of the purpose and need in the Galton Vegetation Management project. Travel management per subpart a of the Travel Management Rule (ibid) has been completed forestwide. Subsequent to completing the Ten Lakes Travel Management Plan, the forest will be addressing forestwide

(outside of the Ten Lakes WSA) oversnow motorized travel management planning per subpart c of the Travel Management Rule (ibid).

[08, 10] Comment: *Our members and the public at large have had to accommodate KNF procrastination on the Ten Lakes WSA and Galton travel plans since before the 2007 court mediated settlement that required the KNF to produce a travel management plan for the area by December 2009. Now the KNF chooses once again to punt down the road the decision on travel management for the non- WSA (including the Whitefish Divide area).*

Response: The court mediated settlement requires travel management planning for the WSA, not for the greater area. Travel management per subpart b of the Travel Management Rule (36 CFR 212) has been completed forestwide per the forest's motor vehicle use map. The forest will address forestwide oversnow travel management planning per subpart c (ibid), including the Whitefish Divide area, after completing the court-ordered WSA plan.

[08, 11] Comment: *The revised KNF plan designates the Whitefish Divide area as MA 5a (Backcountry, nonmotorized year round) yet does not use the Galton Veg Management Plan to implement the new forest plan direction with respect to existing roads in Blue Sky and Williams creeks. These two road should be converted to trails and the forest plan direction implemented. In addition, over snow motorized use should be stopped in MA 5a areas.*

Response: The Forest Plan MA5a guideline MA5a-GDL-AR-02 allows existing routes to remain within MA5a allocations. It states: "Additional routes and areas should not be designated for motor vehicle use in MA5a", therefore the existing roads in Blue Sky and Williams Creeks are acceptable.

Oversnow winter travel management planning is outside the scope of the Galton Vegetation Management Project. However, subsequent to completing the Ten Lakes Travel Management Plan, the forest will be addressing forestwide oversnow motorized travel management planning, including the Whitefish Divide Area.

[08, 12] Comment: *Truly, the hard decisions on these roads and winter motorized use was made in the forest plan.*

The Galton Vegetation Management Plan is the place to implement these decision. The Galton FEIS needs to include and analysis and decide on travel planning for the Galton area outside of the WSA.

Response: The programmatic direction and allocations in the Forest Plan provide a framework and text guiding project and activity level decision-making over the next 15 years. It is a strategic, programmatic document and does not make project-level decisions or irreversible or irretrievable commitments of resources. Those kinds of commitments are made after more detailed, site-specific analysis and further public comment as part of the site-specific National Environmental Policy Act (NEPA) process (pages 1 and 2 of the Forest Plan). However, not all project actions will address all aspects of Forest Plan direction and the forest expects to make progress toward desired conditions over time. Travel management decisions are outside the scope of the Galton Vegetation Management Project. Subsequent to completing the Ten Lakes Travel Management

Plan, the forest will be addressing forestwide oversnow motorized travel management planning, including the areas in Galton outside of the WSA.

[09, 01] Comment: *Neither Ten Lakes Travel Planning nor the Galton analysis addresses travel planning in Whitefish Divide. Please tell me when this analysis, which is key to wilderness recommendation for Whitefish Divide, will be completed.*

Response: Subsequent to completing the Ten Lakes Travel Management Plan, the forest will be addressing forestwide oversnow motorized travel management planning, including the Whitefish Divide Area.

Weeds

[01, 12] Comment: *Request for changes to be made to the final NEPA document: Assure it states "herbicides that contain glyphosate will not be applied." The decision document should also say this.*

Failure to tell the public this chemical will not be used leaves the door open for glyphosate application. This violates:

40 CFR 1501.2 (b), 40 CFR 1502.16(a) and (b), and 40 CFR 1508.8(b) because Chapter 3 omits important environmental effect disclosures (i.e. glyphosate exposure sometimes causes cancer)

The Apr. 21, 1997 Executive Order No. 13045 because the Responsible Official does not ensure that this project will not disproportionately expose children to environmental health risks and safety risks.

Response: Any application of herbicide would be conducted according to the criteria outlined in theKootenai National Forest Invasive Plant FEIS and ROD. The anticipated effects of herbicide application were disclosed in that document and are beyond the scope of the Galton project. Glyphosate is only one of the herbicides authorized under this decision. The treatment of invasive species may include the use of mechanical, biological, and chemical controls.

[02, 101] Comment: *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.*

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). 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." Soil quality and productivity discussions can be found in the Kootenai National Forest Invasive Plant FEIS on pages 3-99 to 3-100. Trends show that soil productivity decreases with the presence of invasive species.

[02, 115] Comment: *"The spread of noxious weeds would continue" in IRAs. In fact, the prescribed burning would make weeds spread even more, which is inconsistent with the RFP.*

Response: The Forest Plan FW-DC-VEG-10 states that 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. Effects to noxious weeds in ecosystem burn areas, such as those within or adjacent to IRA's are disclosed on page 116 of the FEIS. Monitoring will be conducted on prescribed burns to determine the presence/threat of noxious weeds after activities are completed. Appropriate response will be determined at that time, examples could include, herbicide application, biological control release, pulling.

Whitebark Pine

[02, 187] Comment: *The DEIS does not insure that all the logging and burning being proposed in whitebark pine habitat would be conducted consistent with the best available science. There is no indication that scientific peer review has been conducted for the Region One Whitebark Pine Strategy. Even the planting of whitebark pine presents some risks, particularly if natural regeneration is already occurring. The DEIS does not indicate that USFWS review of the DEIS for this ESA "warranted" species is being properly conducted.*

Response: The USFS consults with USFWS on Proposed, Threatened, and Endangered species. At this time Whitebark pine is analyzed as a Sensitive species due to its designation as such in the Northern Region in 2011 (see page 94 of the FEIS). The Region One Whitebark Pine Strategy is a strategy based on the peer reviewed literature. As a strategy this information is continually evolving as scientists and practitioners work together. That information can be found in the project file, per the webpage listed in the bibliography.

[02, 188] Comment: *We are particular concerned that the fire exclusion that the FS apparently cannot refrain itself from carrying out constitutes cumulative effects towards extirpation or extinction. Although "The proposed treatments are designed to restore fire processes and enhance whitebark pine ecosystems" (97) the DEIS doesn't explain a single, detailed scenario where naturally occurring fire would be less likely to be suppressed at any time in the future.*

Response: When allowing unplanned natural ignitions within the project area, the following criteria will be used. The number one priority on each fire is firefighter and public safety. A risk assessment will be done for all unplanned natural ignitions to determine course of action.. Key indicators influencing the course of action include how many fires are occurring across the

district or forest, firefighter safety, where those fires are located relative to values at risk, what is the current and predicted weather, what time of year is the fire occurring, and will this fire help achieve the desired conditions.

Wilderness

[06, 05] Comment: *As a wilderness advocate, I personally would like to see all available acreage in the Galton area included as wilderness. The areas that have been outlined for recommended for wilderness study areas and roadless study areas on pages 486 and 487 are all deserving for inclusion in our Wilderness Lands.*

Response: The authority to designate wilderness lies with the United States Congress.

[07,02] Comment: *I know this is not a new idea, but why can't these WSA's and WMA's be considered a National Recreation Areas instead of conversion into full-fledged wildernesses?*

Response: The authority to designate National Recreation Areas lies with the United States Congress.

[07,05] Comment: *And the last point I would like to make is about this quiet trails business. Let me say that I think we should have all vehicles noise and emissions tested. Including those damn noisy Harley's. Ever camped in YNP and listened to a bunch of Harley's come rolling in? Well, it is irritating, isn't it. How about being deep in the bowels of the Bob Marshall and heard a jet fly over at 35,000 feet? Point is, there is noise everywhere all the time. If it is louder than the tinnitus in my ears, I can hear it too. A snowmobile in the woods that has not been altered with aftermarket noisemakers is no more offending than the airplane, and the perceived discomfort is short lived. Having areas "locked up" and recreationalists "locked out" so someone can listen to their thoughts in the woods is poor management of a valuable resource.*

Response: Thank you for your comment.

[09,06] Comment: *Once again the Kootenai National Forest bias again the Wilderness Study Areas is apparent with maps that highlight the Ten Lakes Scenic Area but choose to poorly depict the Ten Lakes Wilderness Study Area, which is of higher priority and enjoys higher legal standing.*

Response: Both areas are depicted on the maps. The legend for each map conveys the meaning of symbols used on the map. Color, pattern, weight of lines, or any other option regarding the depictions of features on our maps does not equate with ranking or importance.

Wilderness Study Area

[02, 116] Comment: *The DEIS does not explain how such actions as slashing, creating fire control lines, and helicopter ignition in the Ten Lakes WSA is consistent with the enacting legislation or the RFP direction concerning WSAs. This is also inconsistent with maintaining wilderness character of all roadless areas proposed for such actions.*

Response: Disclosures of effects from slashing, creating fire control lines, and helicopter ignition are disclosed on pages 506-507 of the FEIS.

[09, 08] Comment: *However, slashing or salvage of mortality is not in compliance with the Montana Wilderness Study Act and should not occur in the Ten Lakes Wilderness Study Area.*

Response: There is no slashing or salvage proposed within the Ten Lakes Wilderness Study Area**.**

Wildlife

[02, 02] Comment: *The other action alternative, "Proposed Action" Alternative 1 includes 43 acres of clearcutting (called "Scenic Vista Enhancement") that is inconsistent with RFP standards protecting Canada lynx habitat, and thus a forest plan amendment would be required.*

Response: As described in the effects analysis section of in the Galton FEIS on page 288-289 of the lynx analysis, Alternative 1 proposes 20 acres of harvest within multi-story mature successional forest within the Therriault LAU (see T&E Species Table 15) for a number of roadside vistas that would include harvest of mature multistory forest as well as other types of habitat in 1-4 acres strips along the open roadsides. This alternative reduces the amount of mature multi-story habitat by <1% in an LAU with an abundance of winter foraging habitat. However, this action in Alternative 1 does not meet Standard Veg S6 and is therefore not consistent with the forest-wide standard FW-STD-WL-01. Therefore, if Alternative 1 is chosen, it would require an amendment to the Forest Plan.

[02, 118] Comment: *The Galton DEIS and the RFP are 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 Galton Vegetation project, but are related to Forest Plan direction. The wildlife analysis and response to comments in the 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 Forest PlanFEIS, Appendix G, "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 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).

[02, 119] 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 Galton DEIS.*

Response: As explained in the methodology section of the Canada lynx analysis (Galton FEIS, page 278-279), 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 02, Comment 162.

[02, 120] Comment: *The complete lack of consideration of RFP wildlife population monitoring requirements in the Galton 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: This was addressed in the Forest Plan FEIS, Appendix G (p. 434-436 and 531-534 in USDA 2013b). There are no Forest Plan wildlife population monitoring requirements to be addressed within the Galton Vegetation FEIS. For wildlife species analyzed at the project level that are not federally listed, Forest Plan 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 Program, Chapter 5, page 100).

[02, 121] 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 old-growth inventory of questionable accuracy. 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" such as Sensitive species on the KNF? Also, please "explain (the) methodology for measuring this habitat."*

Response: This comment was already addressed in the Forest Plan FEIS, Appendix G, explaining how the Forest Plan maintained viability (p. 531-534 in USDA 2013b). 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. 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 Galton Vegetation project, but are related to Forest Plan direction.

The FEIS for the Forest Plan responded to the same series of comments (FEIS Appendix G, pages 532 – 533) and addresses how the Forest Plan direction addresses species viability. The following are points that summarize the response in the 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 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 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.

[02, 127] Comment: *What scientific evidence exists that assures the actively managed portion of the project area will maintain quantities and sizes of snags and coarse woody debris within reference conditions, if the forest is "treated" at the expected rate and intensity?*

Response: Desired conditions for snags and coarse woody debris are located in the Forest Plan. A forest-wide guideline (FW-GDL-VEG-04) 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. See pages 80-83 of the Forest Plan FEIS for a description of the analysis of snags.

[02, 128] Comment: *The Galton 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?

Response: Please see the response to Letter 2, Comment 121. This comment was also addressed in the Forest Plan FEIS Appendix G describing how the Forest Plan maintained wildlife viability (p. 531-534 in USDA 2013b). 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.

[02, 129] Comment: *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.

Response: Please see the response to Letter 2, Comment 121.This comment was also addressed in the Forest Plan FEIS Appendix G describing how the Forest Plan maintained wildlife viability (p. 483-485, 531-534 in USDA 2013b).

[02, 130] Comment: *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: Please see the response to Letter 2, Comment 121.This comment was also addressed in the Forest Plan FEIS, Appendix G describing the Forest Plan's monitoring and how the Forest Planmaintained wildlife viability (p. 525-526, 531-534 in USDA 2013b).

[02, 131] Comment: *Recently, the U.S. Fish and Wildlife Service stated, "listing the fisher (Northern Rockies population) may be warranted..." (https://www.federalregister.gov/articles/2016/01/12/2016-00157/endangered-and-threatened-wildlife-and-plants-90-day-findings-on-17-petitions).*

Response: Fishers are thought to be one of the lowest density carnivores in Montana (Vinkey, 2003), although densities appear to vary throughout the Northern Rockies (Galton FEIS page 390). ERG (2012) report assessed fisher habitat on the Kootenai (KNF) and neighboring Idaho Panhandle National Forest (IPNF). In this assessment, the historical range of variability for fisher habitat on the adjacent IPNF shows approximately twice the amount of habitat as on the KNF both in the high and low ranges. More recent habitat assessments looked at potential fisher habitat across the North Idaho and western MT landscapes (Galton FEIS, page 393). These assessments indicated similar patterns as to where fisher habitat has the highest probability to occur. The eastern portion of the KNF (location of the Galton Vegetation Project) showed that habitat was sparse in this area. Additionally, the neighboring IPNF has experienced extensive fisher surveys and research and have detected fisher across the forest. The western portion of the KNF (Cabinet-Yaak area) is geographically connected to the IPNF and is also an area that has had repeated fisher detections (Galton FEIS, page 393). Fisher occurrence within the project area in the past is minimal, and recent trapping summary data from Montana Fish, Wildlife and Parks shows no fisher having been trapped from the Galton Project area since trapping records were kept starting in 1959 (Thier, pers. comm. 2016).
Regarding the historic range of variability of old growth in the analysis area, 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 addressed the difficulty in estimating HRV for old growth on p. 75 of the FEIS for the Forest Plan (USDA 2013), and it also described the substantial increase expected in stands in the very large size class over the next 50 years (p. 102 in USDA 2013). In addition, past actions including past harvest are displayed on page 36 of the Galton FEIS where only 8% of the 127,380 acre project area has been regeneration harvested.

[02, 132] Comment: *How much of the suitable fisher habitat in the project area has been validated by field survey?*

Response: As stated in the Galton FEIS on page 390, fisher habitat for the analysis area was assessed as a low to non-habitat probability area for fisher based on forest-wide habitat assessments. The analysis area was considered as providing mainly fisher dispersal habitat within

those portions of the analysis area more likely to be used by fisher (old growth and riparian areas within the analysis area) (Galton FEIS, page 392). Applicable harvest and burn units were reviewed for wildlife habitat suitability as well as a portion of the old growth stands within the Analysis area. See also the response to Letter 02, Comment 131.

[02, 133] 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 Galton Vegetation project, but are related to Forest Plan direction. The 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 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 Galton Vegetation FEIS fisher analysis for habitat management and consistency with Forest Plan direction.

The fine filter approach was identified and provided through Forest Plan direction for a variety of wildlife species, including other sensitive species. See the Forest Plan Forestwide direction for wildlife as well as the Galton Vegetation FEIS sensitive species analyses for species specific direction.

[02, 134] 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 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 02, Comment 133 and the wildlife analysis for the Forest Plan (FEIS, page 208) for a discussion of these two approaches. The Galton Vegetation fisher analysis includes an effects discussion relative to "Riparian Habitat", "Old Growth Habitat" and "General Forest Structure" (i.e., trees and snags, down wood), (Galton FEIS, pages 394-396) as well as a cumulative effects discussion relative to these conditions

(Galton FEIS, pages 396-398). See the other species analyses for similar effects discussion as appropriate to the species.

[02, 135] Comment: *What is the best available science that the FS is relying upon to conclude that the project's logging and burning will be beneficial for fisher?*

Response: The Galton FEIS "Statement of Findings" (page 399-400) for the fisher makes a determination for alternatives 1 and 3 of "may impact individuals and/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 fisher." This determination is based on reasons listed on pages 399 and 400 of the Galton FEIS including the statement that "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 providing for potential habitat within the analysis area".

[02, 136] Comment: *"Based on recent fisher habitat models, the analysis area was identified as low probability/nonhabitat (Olson et.al. (2014), and Sauder (2014). Therefore, this analysis considered the Galton Vegetation analysis area as primarily providing fisher travel habitat as potential dispersers move through the area to higher quality habitat." Did the FS conduct field surveys to validate this habitat modeling using the FSVeg database? In any case it seems that, after logging a great deal of lower elevation old growth down through the decades, the FS can now discount the project area's potential for providing habitat for resident fisher. Best available science?*

Response: Fishers are thought to be one of the lowest density carnivores in Montana (Vinkey, 2003), although densities appear to vary throughout the Northern Rockies (Galton FEIS page 390). ERG (2012) report assessed fisher habitat on the Kootenai (KNF) and Idaho Panhandle National Forest (IPNF). In this assessment, the historical range of variability for fisher habitat on the adjacent IPNF shows approximately twice the amount of habitat as on the KNF both in the high and low ranges. More recent habitat assessments looked at potential fisher habitat across the North Idaho and western MT landscapes (Galton FEIS, page 393). These assessments indicated similar patterns as to where fisher habitat has the highest probability to occur. The eastern portion of the KNF (location of the Galton Vegetation Project) showed that habitat was sparse in this area, and elevations in the project area are generally much higher than areas known to have fisher. Additionally, the neighboring IPNF has experienced extensive fisher surveys and research and have detected fisher across the forest. The western portion of the KNF (Cabinet-Yaak area) is geographically connected to the IPNF and is also an area that has had repeated fisher detections (Galton FEIS, page 393). Fisher occurrence within the project area in the past is minimal, and recent trapping summary data from Montana Fish, Wildlife and Parks shows no fisher having been trapped from the Galton Project area since trapping records were kept starting in 1959 (Thier, pers. comm. 2016). The Galton Vegetation Project area lies east of the Yaak river drainage and east of Koocanusa Reservoir. Sauder (2014) discusses the Kootenai River Valley (now Lake Koocanusa) reportedly acts as a barrier to dispersal by many wildlife species, including martens, and suspects that it also acts as a barrier to movements of fisher (east and west). This factor, along with the lack of high quality predicted habitat in the analysis area, may explain the lack of fisher sightings (Galton FEIS, page 393). Please also see Response to comment (02, 137).

[02, 137] Comment: *The DEIS does not consider habitat connectivity with populations in the Flathead NF or Glacier National Park.*

Response: Please see response to Comment (02, 136). Habitat connectivity was considered for the fisher in the cumulative effects section. The spatial boundary for the cumulative effects analysis is the analysis area and is based on the low to non-probability of the species occurring. The analysis area is the extent of the area that could be affected by the proposed action (s) and would assess the effects of fisher traveling through the area (page 396Galton FEIS). Connectivity for other species such as lynx and grizzly bear were also assessed and a visual connectivity map that includes adjacent land ownerships such as the Flathead N.F. as well as Canada are displayed on maps 22 and 25 of the Galton FEIS as well as discussed in these specialist reports.

Fishers are thought to be one of the lowest density carnivores in Montana (Vinkey, 2003), although densities appear to vary throughout the Northern Rockies (Galton FEIS page 390). The comment above, assumes that there are populations of fisher on the Flathead NF, as well as Glacier. Past fisher sightings and trapping records for the project area, as well as areas adjacent to the project area such as the Flathead National Forest, show that there are few recent verified fisher records east of the project area (personal communications with Thier, 2016 and Jacobs, 2016). Glacier National Park, which has been void of harvest activities, also does not have verified fisher records on file (personal communications, Waller 2016). While there may be individuals using these areas, the overall paucity of verified sightings and minimal trapping records for this large area over time put into question whether this large area holds a population or consists of dispersing individuals occasionally using the area.

[02, 138] Comment: *The DEIS fails to specify how the project and its results would be consistent with FW-GDL-VEG-04 and FW-GDL-VEG-05.*

Response: Please see page 69 of the Galton Vegetation FEIS, where Galton project consistency with these guidelines (FW-GDL-VEG-04 and FW-GDL-VEG-05) is discussed.

[02, 139] Comment: *The DEIS does not explain how wildlife surveys will be conducted to insure consistency with FW-GDL-WL-21.*

Response: FW-GDL-WL-21: Management activities should avoid/minimize disturbance at known active nesting or denning sites for other sensitive, threatened or endangered species not covered under other forestwide guidelines. As discussed on page 398 of the Galton FEIS, "records of fisher occurrences are limited and support the habitat modeling which show low capabilities for supporting fisher habitat". Although fisher are not expected, the project would protect a den site if found (Galton FEIS page 398 and 399). Design criteria (Galton FEIS, page 32) state that if denning or ...nesting sites for these species are found during the course of layout or other management activities, best available information should be used to set a timeframe and distance buffer around active nests or dens.

[02, 140] Comment: *The DEIS does not specify, using measurable metrics, how the project will "Maintain islands of vegetation within large units to break up the distance of non-cover and to provide horizontal diversity within the larger units (and) will leave cover corridors between units, or cover blocks where necessary." (P. 31)*

Response: This comment is in reference to Design Criteria which is applicable to the following units: 8, 117, 118, 201, 210, 301, 302, and 305. During unit reconnaissance the certified silviculturist will identify existing islands of vegetation that meet the criteria of creating horizontal and vertical diversity. Consultation with the wildlife biologist will determine the appropriate amount of cover necessary to "break up distance of non-cover" on a unit by unit basis. This is highly dependent on the topography of the area and the existing stand conditions, so a "one-size fits all" approach is not desired.

[02, 141] Comment: *The DEIS largely ignores the habitat values large trees have for Townsend's big-eared bats, thereby ignoring the cumulative effects of past old-growth logging.*

Response: The Galton FEIS discusses the importance of bat roosting habitat including larger diameter trees and snags in many places in the bat section including on page 423-424 as well as a section on page 426 titled "Old Growth Habitat and other Potential Roost Sites" which discusses potential effects of the Galton Vegetation Project on day roosting habitat (trees and snags with cavities or thick bark). In addition, the cumulative effects section starting on page 427 discusses past actions including the effects of past harvest (Galton FEIS, page 428).

[02, 142] Comment: *The analyses for Sensitive species also fail to analyze and consider the implications of motorized access on the species' populations. For example, the presence of roads can be directly implicated in human-caused mortality (trapping) of wolverine. Trapping was identified as the dominant factor affecting wolverine survival in a Montana study (Squires et al. 2007). How motorized access impacts are to be minimized or avoided is not discussed in the DEIS.*

Response: In the Galton DEIS, the wolverine was analyzed as a sensitive species. In 2016, a judge reversed a prior ruling which therefore again made the wolverine a proposed species. The Final EIS for the Galton Vegetation Project, contains an updated wolverine analysis with this change incorporated.

In the 2013 proposed listing, the USFWS identified 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 (USDI FWS 2013). There are no Forest Service land management activities or public use activities on NFS lands that threaten wolverine populations (direct effects) or high-elevation habitats (indirect effects) due to the nature and scale of such human activities.

Page 325 of the Galton FEIS states: The trapping season for wolverines is currently closed, but trapping for other species does occur and incidental wolverine mortality is a possibility. The project would have minor effects on the risk of incidental trapping because: 1) temporary roads constructed for the project, as well as roads opened for the project, will be closed and/or rehabilitated after use and will remain closed to the public during and following project activities; 2) None of the action alternatives propose any new permanent roads which could lead to increase of incidental trapping.

Over-harvesting by trappers was discussed in the Galton FEIS (pages391-392) as a stressor to the fisher that is outside the control of the Forest Service Management. It discusses that "none of the action alternatives propose any new permanent roads which could lead to increased trapping pressure of fisher" (page 396, Galton FEIS). Page 289 of 2013 Forest Plan FEIS (cum. effects of legal and incidental trapping of fisher). In regards to sensitive species populations, please see the responses to comments to letter 2, response 120 and 121.

[02, 143] Comment: *Regarding wolverine, the DEIS states:*

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 (USDI FWS 2013). 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" (USDI FWS 2014). With the withdrawal of the proposed ruling, the wolverine was once again placed on the Regional Forester's list of sensitive species for the KNF.

Given that a District Court rejected the USFWS's rationale in withdrawing the proposal to list the wolverine under the ESA, the FS has an obligation to take a closer look and consult with the USFWS with the wolverine as a Proposed species.

Response: In the Galton DEIS, the wolverine was analyzed as a sensitive species. In 2016, a judge reversed a prior ruling which made the wolverine a proposed species under the 2013 ruling. The Final EIS for the Galton Vegetation Project, contains an updated wolverine analysis with this change incorporated. As a proposed species, the wolverine will be included in USFWS consultation of the chosen action.

[02, 144] Comment: *The DEIS doesn't adequately analyze or disclose the impacts of snowmobile use in the project area on wolverine or other wildlife species.*

Response: The 2013 proposed ruling, (USDI FWS 2013) states 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 (USDI FWS 2013). Snowmobile use was not proposed in the Galton Vegetation Project, and was not an element found to threaten wolverines directly. The Galton FEIS's grizzly bear analysis discusses snowmobile use (or "motorized over-snow vehicle") on page 252. The information discussed on this page is the result of the foreseeable action "Ten Lakes Travel Management" project as discussed on page 37 of the Galton FEIS.

[02, 148] Comment: *A Northern Region project EIS (USDA Forest Service, 2007a) notes the limitations of 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.

Crocker-Bedford (1990) noted:

After partial harvesting over extensive locales around nest buffers, reoccupancy decreased by an estimated 90% and nestling production decreased by an estimated 97%. Decreases were probably due to increased competition from open-forest raptors, as well as changes in hunting habitat and prey abundance.

Response: Although the FEIS for the 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 Forest Plan. 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 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 Forest Plan noted "that ERG (2012) found that viability would be maintained for all the species analyzed in that report" (FEIS, page 208).

[02, 149] Comment: *The analysis for most wildlife species does not analyze or disclose the adverse effects of cumulative decreased interior forest and increased edge effects.*

Response: In the Galton FEIS existing condition analyses for many species, it was discussed that in a large part of the analysis area, a general lack of disturbance has resulted in few openings and early seral habitat that can provide forage production. In the effects analysis, it was discussed how a mosaic of structural conditions is beneficial to many species. Also, larger units would "improve early seral production of forbs and shrubs that bears feed on (Galton FEIS, page 255). Early seral habitat within the BMUs provide a diverse landscape and will "increase use over the entire landscape in the long term by introducing some early seral patches that will provide forage for bears and other species" (Galton FEIS, page 263).

[02, 150] Comment: *Harvest unit 110 would reduce elk cover in the Murphy PSU on approximately 18 acres. (P. 460). This contradicts the DEIS's conclusion that elk security habitat would not be reduced. (P. 461.) The Murphy PSU is currently below RFP baseline security habitat. Lowering it further would violate FW-GDL-WL-10.*

Response: The "Other Species Table 7" on page 472 of the Galton FEIS shows both the coarse level Forest Plan existing condition estimate of security habitat for use in comparing relative levels of elk securityacross the Forest as well as the more refined Galton project level security habitat. In the document"Elk Security, Consistency with the Forest Plan" (Anderson, 2015), which waswritten by the KNF authors of the Forest Plan, the intent of FW-GDL-WL-10 is explained. As described in Anderson (2015), "[t]he intent of FW-GDL-WL-10 is to limit motorized access (e.g. pickups, ATVs, motorcycles) in order to reduce elk vulnerability during the hunting season." Project level calculations are based on public motorized access during the hunting season and the effectiveness of security areas based on other factors are discussed.

The FEIS for the Forest Plan (p. 329 in USDA 2013) stated that the coarse scale calculations from the existing condition for the Forest Plan could be updated at the project scale with more refined data, if available. This explains the differences in numbers between the "2015 Forest Plan Baseline Security Habitat" numbers and the project level "Existing Security Habitat" (last 2 columns in Table 7 mentioned above). As per Anderson 2015, the Galton elk security analysis based calculations on the roads open to public motorized use during the hunting season. As discussed in the elk methodology on page 468 of the Galton FEIS, elk security was calculated as generally timbered stands in blocks of habitat greater than or equal to 0.5 miles from an open motorized route during the hunting season. This is consistent with the effects analysis (Galton FEIS page 473-474) for alternatives 1 and 3, discuss how 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, and temporary roads." This would not change the percentage of security habitat in any of the elk PSU's as shown in the "Other Species Table 8" on page 460 and demonstrates consistency with FW-GDL-WL-10 as further discussed in Anderson, 2015 (project file). The effectiveness of the security habitat is discussed on pages 474-475 of the Galton FEIS. Harvest unit 110 is the only harvest unit located within the elk security habitat within the Galton project. This unit would reduce cover in the Murphy PSU on approximately 18 acres on the edge of the elk security block. This unit would provide a small area of foraging habitat adjacent to the large block of cover provided by the north end of the Murphy PSU and the south end of the Grave PSU (see map in project file). 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-O1, FW-DC-VEG-02, FW-DC-BEG-04, FW-DC-VEG-05, and FW-DC-VEG-11). There would be no reduction to the effectiveness of elk security habitat due to this proposed harvest.

[02, 151] Comment: *The project would also violate FW-GDL-WL-08 and FW-GDL-WL-09 because project activities would push elk around during the critical winter period.*

Response: Please see the big game analysis starting page 480in the Galton FEIS to show consistency with FW-GDL-WL-08 and FW-GDL-WL-09. The intent of both guidelines (as further clarified by the KNF authors of the Forest Plan in Anderson, 2015b) 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. Both alternatives require harvest on 135 acres (3 units) to be logged during the winter on mule deer winter range, and 1

unit (88 acres) on white-tail winter range due to grizzly bear requirements Galton FEIS, page 490. The analysis goes on to explain that this harvest may result in short-term disturbance during this activity, which may cause big game to move to adjacent stands, however it is not expected that they will be displaced from the treatment areas, nor would the short distance movement be expected to result in increased energy expenditure that could impact the health of the individual. 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 generally 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 (Page 492, Galton FEIS).

[02, 152] Comment: *Neither the RFP nor the DEIS consider the forestwide or project area cumulative effects of foreseeable fire suppression on black-backed woodpecker populations.*

Response: Both the Galton FEIS and the Forest Plan discuss the effects of fire suppression on black-backed woodpecker habitat. ERG (2012) analysis estimated an initial decline in high quality burned forest acres "due primarily to wildfire suppression" (Black-backed woodpecker analysis, Galton FEIS, page 370). In this same analysis, the cumulative effects section states that "Past and present actions, including wildfire suppression, have resulted in measurable cumulative impacts to black-backed woodpeckers and their habitat" (Galton FEIS, page 375).

[02, 153] Comment: *The DEIS does not explain how the RFP or project analyses assure that viability of Birds of Conservation Concern or Partners in Flight Priority Species.*

Response: The 2015 FEIS Migratory Bird section (page 343-357) discusses how Birds of Conservation Concern and Partners in Flight priority species were used to provide a framework to focus the discussion and analysis by focusing on migratory bird priority species/habitats (FEIS, page 343). The analysis of these habitats and species, found in the pages above, resulted in a determination that "Vegetation conditions under all action alternatives, will be maintained or improved for migratory birds and their habitat in the long-term, at the very least by creating a more resilient landscape (page 356, FEIS). These species can be found on pages 344 and 345-346 of the FEIS. The Galton FEIS Migratory Bird section explains that habitat types use by migratory birds were based on Partners in Flight priority habitat. "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). This analysis was described on pages 455-461 (FEIS) and findings presented on page 459 (FEIS). These findings state "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 (page 466, Galton FEIS).

[02, 155] Comment: *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.*

Response: Size of trees retained in units varies depending on the existing condition. Prescriptions will be developed by a certified silviculurist in conjunction with a wildlife biologist to meet the design criteria identified for each vegetation treatment area. In general healthy larger diameter trees will be retained. Crown ratios for Douglas-fir and ponderosa pine should exceed 40% and western larch should exceed 30%. Minimizing insect and disease issues is desired, although retaining some trees with those qualities will benefit wildlife species. In addition when it is present on the landscape a portion of the understory can be retained in clumps to break up sight distance and create vertical and horizontal diversity.

[02, 157] Comment: *The DEIS does not disclose the results of surveys or monitoring for Forest Plan management indicator species in the project area.*

Response: Page 321-322 of the 2013 KNF FEIS discusses management indicator species (MIS). "These MIS are to be used to compare alternatives in this EIS and analyzed effects. …..These MIS, elk and insectivores, were not proposed because of a viability concern. Additionally, viability of these MIS will not be analyzed in future projects, nor will they be monitored at the project level." See also the response to Letter 2, comment 158. In Appendix G of the FEIS for the Forest Plan also describes how MIS were to be used on the KNF (p. 525-526 in USDA 2013b).

[02, 158] Comment: *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 Galton DEIS failed to disclose or incorporate this information.

Response: The northern goshawk is not a management indicator species for the 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 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 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 Forest Plan direction to protect raptor nests, including northern goshawks, discovered during project planning or implementation is guided by FW-GDL-WL-16.

[02, 160] Comment: *"The deterioration of bighorn sheep habitat in northwest Montana is attributed, in part, to effective fire suppression over the past 50 years (MFWP 2010)." The Galton DEIS indicated these adverse cumulative effects will continue indefinitely. Viability of the Ten Lakes herd is not adequately addressed. In addition, the project would adversely affect winter range and escape cover.*

Response: Continuing on in the Galton FEIS on page 353, after the first comment listed above, it states that "Analysis of this resource is directly related to the Galton Vegetation Project Purpose and Need to "provide areas of seral species for wildlife species (FW-DC-WL-19) and "provide openings and areas of young-aged trees and shrubs for wildlife species (FW-DC-WL-18).
The cumulative effects section of the Bighorn Sheep section (Galton FEIS, page 363, reads "Fire suppression in particular may have led to encroachment of conifers into bighorn foraging habitat or caused increased tree densities in previously open-canopied stands. Vegetative conditions under both action alternative, would be maintained or improved for bighorn sheep in the long-term.
The Galton FEIS bighorn sheep effects analysis determined that 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" (Galton FEIS, page 353). This determination is based upon reasons listed on page 329 including "no activities or potential for disturbance to sheep on winter range located on the Woods Ranch WMA within the known home range of the Ten Lakes herd.

[02, 161] Comment: *"The effects analysis for bighorn sheep habitat is based on State management challenges and objectives for the individual herds… Specific habitat management strategies for the Ten Lakes herd are summarized in the draft Montana Sheep Conservation Strategy (MFWP 2010)." The DEIS does not disclose the specifics of State strategies.*

Response: Specific habitat management strategies for the Ten Lakes herd, summarized in the draft Montana Sheep Conservation Strategy (MFWP 2010) were listed in the Galton FEIS (page 353) and include: cooperative work with the USFS in habitat needs/improvements, cooperative relationships with domestic sheep owners including double fencing, aggressive management of weeds and grazing on Woods Ranch WMA, continuance of cooperative relations with land trust organizations to assist in protecting private lands adjacent to USFS sheep habitat. Those

strategies, specific to USFS lands and management were carried through this analysis as a "resource element and indicator" (page 336) and were also discussed on page 334 and 336 (Sensitive Species Table 5) and on page 337 under the heading titled "Habitat management strategies specific to Ten Lakes herd". The primary management challenge for the 10 Lakes herd is "maintaining the genetic integrity of the Trench genotype and protecting it from diseases associated with domestic sheep" (MFWP, 2010).

[02, 162] Comment: *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.*

Response: The 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 Galton lynx analysis, beginning on page 276 of the Galton FEIS, addresses all applicable direction and consistency with Forest Plan direction. Also, see the “Regulatory Framework Findings” section (page 287) 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 Forest Plan (USFWS 2013b). The lynx section in the wildlife specialist’s report for the Forest Plan, FEIS, Biological Assessment, and Biological Opinion contains an analysis of the effects from the Forest Plan on lynx and lynx critical habitat, including the updated designations that came out in 2014.

[02, 163] Comment: *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.*

Response: See response to 162 above.

[02, 164] 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. Logging proposed in stands tentatively mapped as multistory habitat prior to field validation. However, upon field validation these stands are claimed to be not multistory habitat. Did the surveys target snowshoe hare occurrence data in these stands? The RFP doesn’t consider the implications of projects finding a lot less multistory lynx habitat than the NRLMD assumed.*

Response: As explained in the methodology section of the Canada lynx analysis (Galton FEIS, page 278), 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. All proposed vegetation management units within the LAU were surveyed and/or evaluated through other methods as described in the "Methodology" sections of

the Galton FEIS's lynx (page 278-279) and lynx critical habitat (page 302) analysis. 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 commentor 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 file.

[02, 165] Comment: *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 categorization? After all, "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." (269)*

Response: All proposed vegetation management units within the LAU were surveyed and/or evaluated through other methods as described in the "Methodology" sections of the Galton FEIS's lynx (page 278-279) and lynx critical habitat (page 302) analyses. The project file includes documentation of unit review.

[02, 166] Comment: *"Mapped habitat within the Therriault LAU indicated 2 large polygons of lynx habitat without a known stage (lynx habitat – unknown stage)." (270) Instead of taking cautionary steps, the FS proposes to survey these areas after the NEPA process is final, in violation of NEPA.*

Response: Please see page 270 of the Lynx analysis under the "Assumptions and Limitations" section. This discusses a refinement of the lynx mapping at the project level. "Mapped habitat within the Therriault LAU indicated 2 large polygons of lynx habitat without a known stage (lynx habitat – unknown stage). These polygons occur in remote areas with no known fire or harvest history and after review of the NAIP and satellite imagery, this was confirmed. Without recent fires or harvest, these stands would fall into either the Stem Exclusion or Potential Multistory Forage stage. These stands were then removed from the unknown category and placed in the stem exclusion category. Management actions in these areas (prescribed burns in alternative 1 only) would require a Forest Plan amendment for management of lynx habitat as well as formal consultation with the U. S. Fish and Wildlife Service. Alternative 3 has been identified as the preferred alternative and does not include these prescribed burns.

[02, 167] Comment: *Kosterman, 2014 finds that 50% of lynx habitat must be mature undisturbed forest for it to be optimal lynx habitat where lynx can have reproductive success and no more than 15% of lynx habitat should be young clearcuts, i.e. trees under 4 inched dbh. This renders inadequate the agency's assumption in the NRLMD that 30% of lynx habitat can be clearcut, and that no specific amount of mature forest needs to be conserved. Kosterman, 2014 demonstrates that the NRLMD standards are not adequate for lynx viability and recovery, as is assumed by the Galton DEIS.*

Response: This comment is not specific to the activities being proposed as part of the Galton Vegetation project. Please refer to the project file for the letter from Regional Forester Leanne Marten to Michael Garrity dated 4/20/2016. This letter discusses Kosterman's thesis and its relationship to the Northern Rockies Lynx Management Decision (NRLMD).

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).

[02, 168] Comment: *The DEIS doesn't provide a rationale for not discussing all of the RFP's lynx standards and guidelines.*

Response: In the "Resource Indicators and Measures" section of the lynx analysis (Galton FEIS, page 278), it states that those "Objectives, standards, and guidelines considered but found 'not relevant' are found in the project file." For those not addressed in the Galton FEIS, each is listed in this project file document with a statement as to why it was not considered relevant to the Galton project.

[02, 169] Comment: *Treatments within currently unsuitable lynx habitat would delay 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.*

Response: Two of the 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 areas for vegetation management that are being referred to above are currently unsuitable lynx habitat. These are some of the areas targeted in Galton's proposed vegetation management treatments. "Each of the action alternatives include regeneration or intermediate harvest in all LAUs where harvest units have high canopy closure and contain little to no ground, shrub, or small conifer cover in the understory..." (Galton FEIS, page 289). These stands lack winter snowshoe hare habitat currently, but with treatment could increase future young forest habitat that would eventually provide winter snowshoe hare habitat. Also, see the response to Letter 02, Comment 162.

[02, 170] Comment: *The DEIS does not use specific, objective metrics for determining connectivity within or between LAUs.*

Response: Page 153 of the Forest Plan lists the goals standards and objectives of the Northern Rockies Lynx Management Direction. Standard ALL S1 states: New or expanded permanent development and vegetation management projects must maintain habitat connectivity in an LAU and/or linkage area. Page 285, of the Galton FEIS discusses how the action alternatives meet this

standard. In addition, Northern Rockies Lynx Management Direction Objective ALL 01 states: Maintain or restore lynx habitat connectivity in and between LAUs and in linkage areas. The Galton FEIS discusses the existing condition of connectivity within and between affected LAU's on page 283-284 of the Galton FEIS; the effects of Galton's alternatives on this objective are discussed on page 290 under "Objective ALL 01"; finally, maps 25, 26 and 27 (Galton FEIS) show existing connectivity and potential effects of Galton alternatives on this standard and objective.

[02, 171] Comment: *The DEIS does not demonstrate that the prescribed burning within multistory lynx habitat won't degrade the habitat in violation of the RFP.*

Response: The effects of prescribed burning for alternative 1 and 3 on lynx multistory habitat are described on page 289-290 of Galton FEIS and summarized under the heading "Summary" on page 290. These effects state that Alternative 1 includes proposed understory burn acres that fall within multi-story mature lynx habitat. These burns were designed to increase the amount of early seral habitat across this landscape, as very few acres of early stand initiation habitat exist within this landscape (Description of the Analysis Area, page 281-282Galton FEIS). Because of the size of some of these burns, a mosaic of lynx habitat types and site conditions are found, however there could be a reduction in multistory habitat with the implementation of this alternative, and would therefore not meet Lynx standard VEG6. Alternative 3 did not propose any vegetation management actions, including prescribed burning, in mature multistory lynx habitat, and would therefore meet standard VEG6 (Galton FEIS, page 290).

[02, 172] Comment: *The DEIS discloses that Alternative 1 would degrade lynx critical habitat, but somehow doesn't conclude the same with Alternative 3, which would cause essentially the same effects. Adverse modification of critical habitat would occur, in violation of the ESA.*

Response: The effects to lynx critical habitat from Galton alternatives 1 and 3 are discussed on pages 307-310 of the Galton FEIS. Specifically on page 308 of the Galton FEIS under the heading (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, it states that "Alternative 1 would slightly reduce the amount of mature multistory and young forest habitats in lynx critical habitat within the Therriault LAU as shown in T&E Species Table 18. Alternative 3 does not have harvest in mature multistory or young habitat." On page 309 of the Galton FEIS, it discusses how prescribed burns in Alternative 3 occur only in areas without mapped multistory forage or where evaluation of these stands indicated that preferred hare habitat did not exist. However Alternative 1 prescribed burn units occur within a variety of mapped habitats including mature multistory and young forest habitat. See also Letter 2, response to comment 171.

[02, 173] Comment: *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. We fully incorporate our comments and appeals of the Access Amendment within these comments. The RFP direction itself doesn't result in compliance with MS-1 requirements to favor this functionally endangered species.*

Response: This comment is not specific to the activities being proposed as part of the Galton project, but are related to Forest Plan direction. Forest Plan direction for grizzly bears as it relates

to motorized use in the Galton project and Northern Continental Divide Ecosystem (NCDE) is guided by FW-STD-SL-03. This states: Within the Kootenai portion of the NCDE recovery zone, BMU subunits shall maintain or improve the access and habitat parameters. Site specific motorized access densities and security core habitat are developed at the project level in consultation with the USFWS and through appropriate public involvement and NEPA procedures. Informal consultation with the FWS has been an integral part of the Galton project and the chosen action will follow consultation procedures. As discussed in the Forest Plan FEIS on page 248, there are 2 recovery ecosystems that overlap the Kootenai National Forest: The Cabinet Yaak Recovery Zone (CYE) and the Northern Continental Divide Ecosystem (NCDE). The Galton Vegetation project lies within the NCDE. The NCDE recovery zone is nearing delisting with estimates of over 1000 bears with the population growing at a mean annual rate of approximately 3% (Galton FEIS, page 248). The NCDE Grizzly Bear Conservation Strategy is currently in draft form and would be incorporated as an amendmentto the Forest Plan once the grizzly bear in the NCDE is delisted.

[02, 174] Comment: *The DEIS doesn't disclose how the reasonably foreseeable Draft Conservation Strategy for the NDCE for delisting lowers protections below current levels.*

Response: The NCDE Draft conservation strategy was discussed on page 267-268 in the Grizzly Bear Cumulative Effects Section as well as other places in the bear analysis as FW-GDL-WL-15 discusses incorporating the final conservation strategy as an amendment into the Kootenai Forest Plan (Galton FEIS page 244) once the NCDE grizzly population is delisted. The Draft Conservation strategy has not been finalized but reflects the best available science and maintains the existing motorized access restrictions as found in the Forest Plan FEIS (page 247) as well as other conditions that led to the recovery of the population. This Draft amendment does not lower protections from the existing condition as the commenter claims.

[02, 175] Comment: *The allowance of helicopter impacts to core area is one example of the scientific deficiencies of the RFP.*

Response: This comment is not specific to the activities being proposed as part of the Galton project, but are related to Forest Plan direction. Forest Plan direction for grizzly bears as it relates to motorized use in the Galton project and Northern Continental Divide Ecosystem (NCDE) is guided by FW-STD-SL-03 (see response 173 above). This states: Within the Kootenai portion of the NCDE recovery zone, BMU subunits shall maintain or improve the access and habitat parameters. Site specific motorized access densities and security core habitat are developed at the project level in consultation with the USFWS and through appropriate public involvement and NEPA procedures. Please see the document "Guide to Effects Analysis of Helicopter Use in Grizzly Bear Habitat" (USFS and USFWS 2009). This 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 Galton FEIS are consistent with this guidance (Galton FEIS, pages 32& 263-264).

[02, 176] Comment: *The acceptance of habitat core "blocks" of inadequate size is another flaw of the RFP.*

Response: Please see the response to Letter 2, Comment 173.

[02, 177] 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: Please see the response to Letter 2, Comment 173.

[02, 178] Comment: *The DEIS and RFP don't recognize the downward trend for the CYE grizzly bear, the failure to approach recovery goals, and the need to assure that connectivity with the NCDE using the best available science is critically important.*

Response: This comment is not specific to the activities being proposed as part of the Galton Vegetation Project as it is referencing the "downward trend for the CYE grizzly bear". As discussed in the 2013 FEIS on page 242, there are 2 recovery ecosystems that overlap the Kootenai National Forest: The Cabinet Yaak Recovery Zone (CYE) and the Northern Continental Divide Ecosystem (NCDE). The Galton Vegetation project lies within the NCDE. The NCDE recovery zone is nearing delisting with estimates of over 1000 bears with the population growing at a mean annual rate of approximately 3% (Galton FEIS, page 248). Also see the response to Letter 02, Comment 173; additionally the Cabinet Yaak Ecosystem (CYE) population does not have a downward trend. The Cabinet-Yaak Grizzly Bear Recovery Area 2014 Research and Monitoring Report (Kasworm et al. 2015) discusses that the "estimated finite rates of increase...for 1983-2014" along with other calculated factor indicate the growth rate for 2014 of 1.014 indicates an increasing population.

Connectivity between the NCDE and the Cabinet Yaak ecosystems was considered in the Forest Plan direction within the Access Amendment, as well as the Galton FEIS. Page 248 of the Galton FEIS states: "The analysis also includes portions of the Tobacco BORZ, as defined by the Forest Plan Access Management direction (Map 18). Grizzly bear use in this area is known to occur and generally thought to be used as portions of bear home ranges which also include the recovery area (NCDE). These areas are also thought of as connectivity areas between the NCDE and the Cabinet Yaak Ecosystem (CYE).

[02, 179] Comment: *The RFP allows temporary reductions of core security.*

Response: See response to Letter 2 Comment 173

[02, 180] Comment: *The RFP allows substantial "administrative use" of otherwise closed roads and considers it negligible.*

Response: See response to Letter 2 Comment 173

[02, 181] Comment: *The DEIS doesn't consider most of the US taxpayer funded costs of grizzly bear management 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 Galton Vegetation, 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, prescribed burning work often occurs through other funding sources such as grants.

[02, 182] Comment: *The DEIS doesn't analyze or disclose the spatial or other extent of snowmobile use in the project area.*

Response: The Galton FEIS's grizzly bear analysis discusses snowmobile use (or "motorized over-snow vehicle") on page 252. The information discussed on this page is the result of the foreseeable action "Ten Lakes Travel Management" project as discussed on page 37 of the Galton FEIS.

[02, 183] Comment: *The DEIS doesn't consider the cumulative effects of forestwide or Recovery Zone-wide management activities, which have an effect on population recovery and viability.*

Response: Please see page 247 of the Galton FEIS, under the heading of "Spatial and Temporal Context for Effects Analysis". This explains that Galton project activities are located both inside and outside of theTherriault and Krinklehorn sub-BMUs and include projects outside the NCDE within the Tobacco BORZ area. It discusses the well-established premise for selecting BMU's (CYE) and sub-BMU's (NCDE) as appropriate sized units that allow for analysis to consider effects associated with the activity's area of influence. It also discusses why these units are biologically meaningful to grizzly bears. The grizzly bear cumulative effects analysis considered all activities listed at the beginning of Chapter 3 (Galton FEIS, starting page35) for their effects to grizzly bears and grizzly bear habitat within these areas. See the grizzly bear cumulative effects analysis (Galton FEIS, pages 267 –271) and the project file.

[02, 184] Comment: *We don't believe that the DEIS presents proper vegetation-related justifications for logging grizzly bear habitat.*

Response: In addition to the Forest Plan direction Goal-WL-01, listed on page 271, there are numerous other locations where the Galton FEIS discusses benefits of management in grizzly bear and other wildlife habitat. Fire suppression efforts have reduced the creation of openings that can provide forage for wildlife including deer, elk, moose and bears. This is especially evident in the higher elevations that provide summer ranges for these species (Galton FEIS, page 3). Please also see page 243, under "Summary of Conclusions" that state that "The Galton Vegetation Project's proposed activities would move treated stands towards more resilient vegetative conditions more characteristic of the area which includes improved availability and productivity of forage species. Also see page 245, T&E species Table 2, and the discussion under the heading "Maintain/Improve Habitat Suitability With Respect to Bear Food Production" page 255.

[02, 185] 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: Please see Galton FEIS, page 256 in the section "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). 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 Forest Plan direction. This paragraph continues to summarize those conditions within the 2 sub-BMU's in Galton that promote the recovery of grizzly bears within the NCDE. The environmental consequences section starting on page 257-265 analyze the effects of the Galton Vegetation Project on these identified items including: attractants; habitat parameters including road impacts and effects to core, TMRD, and OMRD; effects to habitat including large remote areas, connectivity, juxtaposition of foraging habitat and cover and spring range. Page 265 ("Application of Interagency Grizzly Bear Guidelines") also discusses the Draft Conservation Strategy, which would be included as a Forest Plan amendment, once the NCDE population is delisted.

[02, 186] Comment: *The Action alternatives are not consistent with "maintain or improve the access and habitat parameters" of FW-STD-WL-03. Alternative 3 "not likely to adversely affect" is incorrect.*

Response: "FW-STD-WL-03 found on page 30 of the Forest Plan for the KNF states: "Within the Kootenai portion of the NCDE recovery zone, BMU subunits shall maintain or improve the access and habitat parameters as shown in table 6. Site-specific motorized access densities and security core habitat are developed at the project level in consultation with the USFWS and through appropriate public involvement and NEPA procedures." Informal consultation with FWS has been occurring throughout project development and specifically in regards to the access parameters. Consistency with Forest Plan standard FW-STD-WL-03 is also discussed on page 273 of the Galton FEIS: "Core habitat is reduced through harvest activities in the summer in Alternative 1. Habitat would return to existing levels the following year, but because of this, Alternative 1 would only partially contribute to this standard. Informal consultation was initiated on both alternative(s) and the access and core habitat levels discussed. While Alternative 3 slightly reduces core for a period of two weeks due to road work before and after winter harvest activities, the slight reduction over the entire area would not reduce overall habitat parameters. Therefore, implementation of Alternative 3 would contribute toward achieving this standard.Page 258 of the Galton FEIS states: "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 as well as operational limits on road work required for harvest. These design features will be discussed in more detail for the chosen action in the Biological Analysis as well as in the following effects discussion." Additionally, the "Statement of Findings" on pages 275 -276 includes a number of bulleted statements to support the Alternative 3 findings statement.

[02, 223] Comment: *A fatal flaw of Galton DEIS cumulative effects analysis 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: Detailed descriptions of previous vegetation management activities are found at the beginning of Chapter 3 page 36 (Galton FEIS). Since the mid-1990's 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 the Forest Plan provides desired conditions and guidelines to maintain burned forest habitat for associated species (Galton FEIS pg 375 of Black-backed woodpecker cumulative effects section). Also detailed descriptions of past harvest history by decade are located on page 54 (Vegetation Table 1). As discussed in the snag analysis of the Galton FEIS beginning on page 87, "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). The snag analysis continues on the same page to describe density and distribution patterns by habitat group and how disturbances can affect these patterns across the landscape. The past vegetative management resulted in the existing habitat conditions and is described at the beginning of every species analysis (affected environment) as well as in the forest-wide habitat analysis from Ecosystem Research Group (ERG) prepared in December of 2012. The Galton Vegetation Project area is dominated by unroaded and unmanaged lands which would have been predominately shaped by fires, fire suppression or insect and disease. With regards to soil productivity, 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.

[06, 03] Comment: *Another item of attention is the section on wildlife as it deals with the wolverine. I do not believe that the wolverine as a species should be minimized in the document. They have not been added to the endangered species list I think because of political reasons and not biological reasons. Even though I have no personal knowledge of their presence in the Ten Lakes Area I am assuming that with the snow conditions that it is a prime area for wolverines to inhabit. I think that since a study should be conducted of their actual movement within the Galton area.*

Response: In the Galton DEIS, the wolverine was analyzed as a sensitive species. In 2016, a judge reversed a prior ruling which made the wolverine a proposed species under the 2013 ruling. The Final EIS for the Galton Vegetation Project, contains an updated wolverine analysis with this change incorporated. Both analyses discuss the documented presence of wolverine in the Galton project area.

[06, 04] Comment: *Further, as far as a future condition, there has been talk over the years by biologists in the state on the possibility of reintroduction of Mountain Caribou into the forest. From the discussions I have had with biologists one of the prime areas that could be available and would have a real boon for viewing by the public and for hunting would be introduction in the Whitefish Divide area. I have been told the low level passes and the type*

of vegetation is very desirable for this possibility. I think it is interesting that a couple of them have come down from Canada on their own.

Response: Thank you for your comment. This comment is not specific to the activities being proposed by the Galton Vegetation Project.

[08, 05] Comment: *With respect to road management we support improving wildlife security wherever possible. We strongly support maintaining the existing Core as depicted in Map 19. We also support maintaining roads so as to prevent erosion, culvert blowouts, etc. Where funds are not available for long term stability, we support decommissioning roads.*

Response: Thank you for your comment.