United States Department of Agriculture

Jess Project

Final Environmental Impact Statement

Forest Service

Pacific Southwest Region

R5-MB-281a

February 2016

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United States Department of Agriculture

Jess Project

Final Environmental Impact Statement

Salmon/Scott River Ranger District, Klamath National Forest, Siskiyou County, California

Township (T) 40 North (N) Range (R) 12 West (W), Sections 23-24, 26-28, & 34-36; T40N R11W, Sections 28-33; T39N R12W, Sections 1-4 & 9-12; and T39N R11W, Sections 4-6, Mt. Diablo Meridian

Forest Service **Klamath National Forest**

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Jess Project
Final Environmental Impact Statement
Siskiyou County, California

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Abstract:

The *Jess Project Final Environmental Impact Statement* (final EIS), prepared under the Healthy Forests Restoration Act of 2003, documents the analysis and discloses effects of the no-action alternative, the proposed action and one other action alternative. The purpose of the project is to (1) improve defensibility against wildfire to the municipal watershed and nearby communities; (2) improve compositional, structural, and functional attributes of biologically diverse forest ecosystems by restoring ecological processes that build resiliency to high-intensity wildfire and insect and disease infestation; and (3) provide a broad range of ecosystem services including wood products, rural economic health, biodiversity and beneficial uses of water. Alternative 1 is the no-action alternative and continues the current level of management and use. Alternative 2 was modified from the proposed action as described in the notice of intent to prepare an environmental impact statement for this project, as described in the *Draft Environmental Impact Statement* (draft EIS). Alternative 3 was developed based on public comment on the notice of intent to prepare this project and on review and input from resource specialists; it is designed to minimize the removal or downgrading of habitat for northern spotted owl and to avoid treatments in riparian reserves. Comments received on the draft EIS and corrections noted by resource specialists were considered in developing the final EIS which is available at http://www.fs.usda.gov/project/?project=38943. A 30-day objection period, available to those who have submitted written comments during the scoping process or comment period on the draft EIS, follows the publication of this final EIS before a Record of Decision is signed (36 CFR 218.7).

Send Objection to:	Submit via mail to the reviewing officer: **Randy Moore, Regional Forester, USDA Forest Service**; Attn: *Jess Project;* 1323 Club Drive, Vallejo, CA 94592, FAX (707-562-9229), or delivered during business hours M-F 8:00am to 4:00pm. Electronic objections, in common formats (.doc, .pdf, .rtf, .txt) formats, may be submitted to: objections-pacificsouthwest-regional-office@fs.fed.us with Subject: *JessProject*. OR on the project website at http://www.fs.usda.gov/project/?project=38943.
Objections Period Ends:	Objections must be received **30 days after publication** of the legal notice in the Siskiyou Daily News.

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Summary

The Klamath National Forest (Forest) has prepared a final environmental impact statement (final EIS) on a proposal to increase defensibility of Sawyers Bar, California against wildfire, to restore ecosystem processes, and to support rural economic health on approximately 8,535 acres in the North Fork of the Salmon River area. This project is proposed under the Healthy Forests Restoration Act of 2003 (HFRA).

This action is needed because epidemic infection rates of dwarf mistletoe in the Douglas-fir and white fir are leading to mortality of these tree species and blister rust is leading to premature mortality of sugar pine. These conditions, in concert with drought, are slowing the recruitment of healthy young trees and the growth of mid-seral stands, as well as contributing to premature death of large, older trees. The community of Sawyers Bar is adjacent to the project area and is considered a community at risk from wildfire. The Sawyers Bar Community Wildfire Protection Plan identifies several roads within the project area as emergency access routes that are not safe because of the need for fuels reduction on roadsides. The community's municipal watershed, Jessups Gulch, is also in the project area; it is identified as at risk from wildfire. Many of the residents of Siskiyou County are dependent on resource extraction for economic opportunities and forest products.

Relevant issues identified from public scoping and collaboration efforts are:

1. There was a disagreement about the effects of logging on northern spotted owl habitat and increasing barred owl competition.
2. There was a disagreement about the effects of logging and fuels treatments within riparian reserves on canopy cover and wildlife connectivity.

Other issues resulting in Alternatives Considered but Eliminated from Detailed Study are:

A. A recommendation that was made during scoping to add fuels treatments along the Sawyers Bar road.

B. A recommendation that was made during scoping for an alternative that retains all large dwarf mistletoe-infected trees.

C. A recommendation that was made during scoping for an alternative that retained 60 percent canopy, excluded riparian reserves from treatment, and concentrated on thinning from below in plantations.

D. A recommendation that was made during a public meeting for an alternative that would use multiple entries of harvest to meet project goals.

E. A recommendation that was made during a public meeting to use smoke from prescribed burning to manage dwarf mistletoe levels.

These issues led the agency to develop alternatives to the proposed action; effects of these alternatives were disclosed in the draft EIS. The alternatives include:

Alternative 1 is the no action alternative. This is the continuation of the current level of management and use.

Alternative 2 is the modified proposed action. This alternative treats about 1,960 acres. This includes 435 acres of ridgetop fuels treatments, 615 acres of roadside fuels treatments, 810 acres of commercial harvest, 130 acres of non-commercial treatments for timber stand improvement, and ten acres of meadow treatments. About two miles of temporary roads on existing roadbeds will be used and hydrologically stabilized at the completion of the project. There are unit-specific treatments proposed for hydrologic riparian reserves that are intended to meet the Aquatic Conservation Strategy and the Clean Water Act.

Alternative 3 was developed based on Relevant Issues #1 (effects to northern spotted owl habitat) and #2 (effects to riparian reserves). This alternative treats about 1,505 acres. This includes 465 acres of ridgetop fuels treatments, 740 acres of roadside fuels treatments, 210 acres of commercial harvest, 110 acres of non-commercial treatments for timber stand improvement, and ten acres of meadow treatments. About two miles of temporary roads on existing roadbeds will be used and hydrologically stabilized at the completion of the project. There will be minimized removal/downgrading of northern spotted owl habitat and no treatments in the hydrologic riparian reserves.

Comments on the draft EIS were received from seven commenters: two timber industry representatives, three environmental organizations, and two federal agencies. Based on these comments, and interdisciplinary team review of new information, an final EIS was prepared. The final EIS includes a section on changes between the draft EIS and final EIS in Chapter 1. Responses to comments on the draft EIS are included in Appendix G of this final EIS.

A comparison of analyzed treatments by alternative is presented in Table S- 1-1.

Table S- 1-1: Comparison of Thinning and Fuels Treatments in Plantations and Natural Stands by Alternative (Alt.) in Acres Treated

Treatment Type		Alt. 1	Alt. 2	Alt. 3
Ridgetop Fuels Treatments	Handpile	0	85	90
	Mastication	0	70	85
	Fuel Break	0	30	40
	Underburning	0	250	250
Commercial Silvicultural Treatment	Ground-based	0	690	180
	Skyline	0	120	30
Non-Commercial Silvicultural Treatments	Mastication	0	60	45
	Non-commercial treatment with hand-piling and burning	0	70	65
Roadside Fuels Treatment		0	615	740
Meadow Treatment		0	10	10

More detailed descriptions of all treatments are provided in Chapter 2 and Appendix A of this final EIS. Maps of treatment layouts are located in Appendix B. Support documents for this project, including resource reports and maps, are available on the project website at http://www.fs.usda.gov/project/?project=38943.

Based upon the effects of the alternatives considered in detail, the responsible official will decide whether to adopt and implement the proposed action, an alternative to the proposed action, or take no action. Alternative 2 is the preferred alternative because it moves a substantial portion of the project area toward conditions that are more ecologically resilient to insect and disease infestation, and more defensible against high-intensity wildfire.

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Chapter 1: Purpose of and Need for Action

1.1 Document Structure

The Forest Service has prepared this Final Environmental Impact Statement (final EIS) in compliance with the National Environmental Policy Act (NEPA) and other relevant Federal and State laws and regulations. This final EIS discloses the direct, indirect, and cumulative environmental impacts that would result from the proposed action and alternatives. The document is organized into four chapters:

- **Chapter 1. Purpose and Need for Action:** This chapter briefly describes the proposed action (as presented in public scoping), the existing and desired conditions that drive the need for change, and other purposes to be achieved by the proposal. This section also summarizes how the Forest Service informed the public of the proposed action and how the public responded.
- **Chapter 2. Alternatives, including the Proposed Action:** This chapter provides a detailed description of the agency's modified proposed action as well as alternative actions that were developed in response to comments raised by the public during scoping. The end of the chapter includes a summary table comparing the proposed action and alternatives considered in detail with respect to their environmental impacts.
- **Chapter 3. Affected Environment and Environmental Consequences:** This chapter describes the affected environment and environmental impacts of the proposed action and alternatives.
- **Chapter 4. Consultation and Coordination:** This chapter provides a list of preparers and agencies consulted during the development of the environmental impact statement. Also included are a list of acronyms and glossary of terms used, literature cited, and an index of page numbers by document topic.
- **Appendices:** The appendices provide more detailed information to support the analyses presented in the environmental impact statement.

Additional documentation, including more detailed analyses of project-area resources, may be found in the project planning record located on the project webpage at http://www.fs.fed.us/nepa/nepa_project_exp.php?project=38943.

1.2 Changes between Draft and Final Document

Some changes have occurred between the draft EIS and this final EIS based on public comment and new information. These changes are clarifications or provide additional, corrected and updated information. The following are some key differences between draft EIS and final EIS.

The Whites fire of 2014 may have affected the Jess project since the fire itself and containment lines for the fire are within the 5th and 7th field watersheds being analyzed in

this project. The fire itself did not enter into the project area; however, containment lines were constructed within the project boundary (Figure B-5 in Appendix B). The effects of the fire and containment lines were analyzed for each individual resource between the draft EIS and the final EIS. These effects are documented in amendments to each resource report and can be found in the project record; if the Whites fire or the construction of containment lines affected the resource, the effects are discussed by resource in Chapter 3 of this document.

Relevant issues were reorganized to separate and clarify which relevant issues resulted in alternatives analyzed in detail and which issues resulted in alternatives considered but eliminated from detailed study.

The description of the proposed action in Section 1.5 was changed from the proposed action as scoped to the proposed action as described in the draft EIS. The description of the proposed action in Section 2.2.2 was reduced to a summary of the proposed action as described in Section 1.5. There were no changes made to the proposed action between the draft EIS and the final EIS.

In response to new information regarding a recently discovered infestation of the noxious weed spotted knapweed within the project area, project design feature Noxious Weeds-6 was added in order to prevent spreading this infestation due to project related activities (See Table 2-1 in Section 2.2.4).

A table summarizing effects to federally-listed and Forest Service sensitive wildlife species (Table 3-4) was added to Section 3.3 of Chapter 3 to clarify the effects of alternatives.

As a result of on-going consultation efforts with the Fish and Wildlife Service two of the wildlife project design features were updated to address concerns regarding operating within certain habitat types for the northern spotted owl:

- Wildlife-2: this project design feature was updated to include foraging habitat.
- Wildlife-3: this project design features was updated to include units that are in foraging habitat and the language for the limited operating periods was updated to be consistent with the Wildlife Botanical Assessment.

All project design features, including Wildlife-2 and Wildlife-3 can be found in Chapter 2, Section 2.2.4 of this document.

Since the publication of the draft EIS the process for obtaining the Federally Threatened, Endangered, and Proposed species list has changed per direction from the Fish and Wildlife Service. The updated list references and any resulting analysis can be found in the amendments to reports for Fisheries, Botany, and Wildlife. Additionally the analysis of effects to the Endangered Gray Wolf was added to Section 3.3 of this document.

The 2014 Whites fire affected wildlife habitat within the Jess project analysis area for wildlife species. Table 1-1 summarizes the acres of habitat within the analysis areas that have changed as a result of the fire.

Table 1-1: Changes in Wildlife Habitat Acres after the 2014 Whites Fire

Habitat Type	Pre-fire Acres of habitat within Analysis Area	Post-fire Acres of habitat within Analysis Area
Subunit KW-8 of the northern spotted owl Critical Habitat Unit 9	12,727	11,595
Older Forest (nesting/roosting) habitat	2,366	2,317
Mid-seral Forest (foraging) habitat	9,953	9,618
Open mid-seral Forest (dispersal) habitat	3,010	2,550
Early seral Forest (non-habitat)	5,937	5,450
Northern goshawk suitable habitat	12,282	11,935
Pacific fisher denning/resting habitat	12,282	11,935

In response to comments concerning the analysis for pacific fisher, the analysis has been updated to include habitat typing specific to the literature descriptions of fisher habitat (See Section 3.3 of this final EIS and the Wildlife resource report addendum).

Information in Appendix G of the draft EIS (Disposition of Scoping Comments) has been replaced by responses to comments on the draft EIS. In addition, various sections of the final EIS have been expanded to display how the public comments are incorporated.

The Westside Fire Recovery Project was added to Appendix C, Actions Considered for Cumulative Effects.

1.3 Background

The Jess project area is about 8,535 acres located mainly in the area surrounding Jessups Gulch which is a tributary to the North Fork of the Salmon River. The project area is about two miles south of Sawyers Bar, California. The legal location is Township (T) 40 North (N) Range (R) 12 West (W), Sections 23-24, 26-28, and 34-36; T40N R11W, Sections 28-33; T39N R12W, Sections 1-4 and 9-12; and T39N R11W, Sections 4-6, Mt. Diablo Meridian. The project is within the Olsen-North Fork Salmon (18010210020801); Shiltos-North Fork Salmon (18010210020706); Jessups North Fork Salmon (18010210020704); and Eddy Gulch (18010210020703) 7th field watersheds. All of these watersheds are within the North Fork Salmon River 5th field watershed. Elevation ranges from 2,400 to 6,000 feet.

1.3.1 Existing Condition

Defensibility against Wildfire

The town of Sawyers Bar is identified as a community-at-risk to wildfire. According to the Forest Fire Management Plan, the project area lies almost entirely within the area where homes and wildlands intermix which is known as the Wildland Urban Interface (USDA Forest Service 2009). The Sawyers Bar Community Wildfire Protection Plan identifies several of the roads within the project area as emergency access routes (Salmon River Watershed Restoration Council 2004, page 12). The Community Wildfire Protection Plan also identifies the community's source for municipal water, Jessups Gulch, as being at risk from wildfires (Salmon River Watershed Restoration Council 2004, page 9).

The project area is outside of the historic range of variability for fire return intervals, meaning that wildfires in the area have not occurred at as high a frequency over the last 100 years as was true in the past. However, fire modeling predicts that, even during extreme fire weather conditions (90th percentile weather conditions), there is a low probability of severe fire behavior (flame lengths will be less than four feet) on 75 percent of the project area. This is due to reduction in fuels due to projects within and adjacent to the project area including the Eddy Gulch Late Successional Reserve Habitat Restoration project, the Glassups Timber Sale and associated prescribed burning. These projects have reduced or will reduce the understory component and potential wildfire flame lengths throughout the North Fork Salmon River 5th field watershed.

There are several existing wildfire control features in the project area along the ridges surrounding Jessups Gulch and the ridgeline surrounding the Blue Ridge Lookout. Many of the manmade features were built during the 1987 wildfire season. These features are in various stages of maintenance. Some small handlines near the Eddy Gulch road have been receiving annual maintenance and are currently in fully-functioning condition. Other areas have had some ladder fuel accumulation and are in need of treatment to be used efficiently during a direct attack on a wildfire.

Stand Health and Diversity

Past fire suppression and other past management activities have led to changes in vegetation species composition and stand structure. The tree stands are so dense that tree growth and vigor are decreasing and the forest's susceptibility to insects and disease is increasing (USDA Forest Service 1995d, pages 3-5). Shade-intolerant species such as hardwoods and pines are no longer successfully regenerating and are becoming less common in the project area. The encroachment of white fir and Douglas-fir is reducing the historically dominant hardwoods, ponderosa pine, and sugar pine in the project area (USDA Forest Service 1995d, pages 3-7). Further, the area's structural diversity is being decreased because of the sizes of openings have decreased by 40 percent and the distance between openings has doubled (Skinner 1995).

Insects and disease have affected all tree species in the project area. Sugar pines are affected by blister rust. Dwarf mistletoe can be found in every conifer species at

uncharacteristically high infection levels. It is not common to use the term epidemic for a slow moving pest such as dwarf mistletoe but the project area displays the characteristics of an epidemic outbreak of dwarf mistletoe. There are several aspects to consider when determining if insects or disease are at epidemic levels. These factors are discussed relative to the Jess project area in Table 1-2.

Table 1-2: Characteristics of an epidemic infection rate of a forest pest compared to current conditions in the Jess project area.

Characteristics of an Epidemic	Current Conditions of the Jess project Area
Comparison of the Current Levels to Historic or Reference Conditions	Douglas-fir and white fir in the project area have an infection rate of dwarf mistletoe that is uncharacteristically high when compared to similar forest types in the area and historically. (USDA Forest Service 2013a and Silviculture Report)
Observed Rates and Extent of Population Increase and/or Spread	Tree rings showed a marked reduction in size over about the last 20 years indicating a reduction in growth. This is most likely a result of the stress of drought, inter-tree competition and an increase in dwarf mistletoe infection rates. Trees that are being highly affected by dwarf mistletoe (broom volume ratings of 4-6) are common in the project area. Mallams (2007) found in southwest Oregon 11% of trees with a broom volume rating of 5 and 45% of trees with a broom volume rating of 6 died within ten years (USDA Forest Service 2013a). There is evidence of dwarf mistletoe in every major conifer species in the project area, indicating that several species of dwarf mistletoe are present (Silviculture Report).
Species Composition, Age and Size of Trees in Stand	The overstory trees are surrounded by smaller, younger trees of the same species. This lack of species diversity at the small scale perpetuates the uncharacteristically high dwarf mistletoe rate in the project area. The Douglas-fir and white fir in the project area are under added stress due to the impacts of the widespread and severe levels of their respective dwarf mistletoes, which is causing mortality in all sizes of these trees. Continued infection of younger understory Douglas-fir will limit the ability for them to grow into large old trees that will survive for many decades (USDA Forest Service 2013a).
The Stand Density or Stocking Levels	It is obvious that the trees in the Jess project area are under a great deal of stress, due to the combined effects of high density and drought. (USDA Forest Service 2013a). Stand Density Index is a relative measure of stocking levels expressed as a number of ten-inch diameter trees per acre. Since all the stands are above 55% of maximum Stand Density Index, mortality is occurring and fuel loading is increasing. As stand densities increase, the effects of inter-tree competition will intensify (Silviculture Report).
Climate Change Impacts	The trees in the Jess project area are under a great deal of stress, due to the combined effects of high stocking and drought (USDA Forest Service 2013a). The addition of the uncharacteristically high dwarf mistletoe infection rates makes the project area less resilient to the stresses that are added due to climate change.
Disturbance Events such as Drought, Wind, Snow, and Ice Storms	The area is entering its third year of drought which increases the inter-tree competition for water and decreases the ability of trees to survive the effects dwarf mistletoe infection.

Meadow Function

Meadow habitats within the project area are underrepresented. Existing wet meadows support populations of spiny-tail fairy shrimp (*Streptocephalus sealii*) and high levels of

plant diversity while providing big game forage opportunities. Due to fire suppression, conifer species are encroaching into meadow systems, reducing the size and quality of meadow habitats (Forest Plan, page 4-32).

Rural Community Health

The local community uses fuelwood as the primary source of heating (USDA Forest Service 1995d, page 6-2). The municipal watershed for Sawyers Bar is in the project area. There are limited opportunities for employment in the area. Most residents are dependent on resource extraction (USDA Forest Service 1995d, page 6-2).

1.3.2 Desired Condition

The desired condition is derived from the Forest Plan (USDA Forest Service 1995a), the North Fork [Salmon] Watershed Assessment (USDA Forest Service 1995d) and the Sawyers Bar Community Wildfire Protection Plan (Salmon River Watershed Restoration Council 2004).

Defensibility against Wildfire

Low fuel loads will be maintained or reduced in the North Fork Salmon River watershed (USDA Forest Service 1995d, page 6-4). Ultimately, the existing condition will be maintained where direct attack of a wildland fire can take place. This includes conditions where low flame lengths (less than four feet) are predicted. Wildfire will be able to be managed in the watershed while protecting valuable forest resources and the intermixed communities (Forest Plan, page 4-52). The Community Wildfire Protection Plan recommends that fuels be reduced above and below the emergency access roads in the project area (Salmon River Watershed Restoration Council 2004, pages 9-10). The Community Wildfire Protection Plan also recommends the municipal watershed be defensible against wildfire (Salmon River Watershed Restoration Council 2004). The ridges will be open and behave as shaded fuel breaks for wildfire defense. The upper third of slopes, just below the ridges, will have a mix of large diameter Douglas-firs, ponderosa pines and rust-resistant sugar pines (USDA Forest Service 1995d, page 6-4). Stands on the middle third of the slope will be trending toward having multi-layered canopies and old-growth characteristics.

Stand Health

The project area will be compositionally, structurally, and functionally diverse. There will be a mix of historically dominant species. Fire-adapted, shade-intolerant species such as ponderosa pine, sugar pine, and various hardwoods are established and common in the project area (USDA Forest Service 1995d, page 6-5). The fire-frequent mixed conifer forests will include clumps, openings, and widely spaced single trees, providing spatial variability. Blister rust resistant sugar pines will be present within the project area. Mid-

mature stands will be trending toward fire resilient, late-seral stands. Insect and disease infestation will be at endemic levels throughout the project area.

Meadow Function

Meadow habitat will primarily be covered with herbaceous and shrubby vegetation. Long-term productivity of existing meadow species, habitat diversity, and hydrologic utility will be maintained.

Rural Community Health

Wood products will be available to the public and will be used as biomass when the market allows (Forest Plan Standards and Guidelines, MA17-7, MA17-12, and Forest wide Standards and Guidelines 21-48, 21-49; pages 4-132 and 4-50, respectively). There will be opportunities for natural resource-based enterprises to be developed (Forest Plan, Forest wide Standards and Guidelines 27-1, 27-8; page 4-65).

1.4 Purpose and Need for Action

An interdisciplinary team composed of specialists from a wide array of disciplines in collaboration with interested parties developed a proposal consistent with all Forest Plan Standards and Guidelines. The collaboration efforts included several public meetings and field trips to discuss the need for change and potential actions in the project area (see appendix E for details on the collaborative effort). By comparing the existing conditions in the project area with the desired conditions from the Forest Plan, Sawyers Bar Community Wildfire Protection Plan, and the North Fork Salmon Watershed Assessment, the interdisciplinary team identified the following purpose and need for this project:

- Improve defensibility against wildfire to the municipal watershed and nearby communities;
- Improve compositional, structural, and functional attributes of biologically diverse forest ecosystems by restoring ecological processes that build resiliency to high-intensity wildfire and insect and disease infestation; and
- Provide a broad range of ecosystem services including wood products, rural economic health, biodiversity and beneficial uses of water.

The project's ecological restoration is based on the concept that the ecological function is expressed in the pattern of trees on the landscape (Larson and Churchill, 2012) which encompasses species composition, structural diversity and openings. The project's restoration has two foci. The first focus is to improve resiliency to disturbance, such as insects and disease infestation (especially dwarf mistletoe in white fir and Douglas-fir) and wildfire. The epidemic mistletoe infection rate in the project area is affecting not only the current stand but also the recruitment of the next generation of trees and is impeding the development of the young stands into more open, late-seral stands. The second focus is to increase species and structural diversity in the project area. Historical mapping done

circa 1940 shows that areas on the ridges were dominated by pines and hardwoods. This is unusual in the Salmon River Watershed, especially on a predominately north-facing slope.

1.5 Proposed Action

The interdisciplinary team, in conjunction with the informal collaborative group composed of local interested parties, inventoried the project area to identify resource concerns and develop management activities (proposed activities to achieve the purpose and need) for the Jess project. The following proposed activities have been identified to move the project area from the existing condition toward the desired condition; these activities are combined into a proposed action. Project design features and best management practices (BMPs) are incorporated into this proposed action. The Forest Service proposes the following treatments on about 1,950 acres within the 8,535 acre project boundary.

The proposed action was modified between scoping and the draft EIS; no changes were made between the draft EIS and final EIS. Between scoping and the draft EIS, six acres of non-commercial thinning were added to provide for maintenance of the genetics progeny site within the project area. Six acres of mastication were changed to hand-pile and burn due to the inability for mastication equipment to access the unit. The roadside fuels treatments were expanded to 200 feet on either side of the road per the Community Wildfire Protection Plan recommendation. The prescription for non-commercial treatments, including hand-piling and burning, was changed from trees less than nine inches dbh and the roadside fuels treatment changed from less than six inches dbh to less than ten inches dbh. The project interdisciplinary team determined that this change will allow for improved stand treatment and defensibility, and is more consistent with the current timber market.

A map of Alternative 2 can be found in appendix B (Figure B-3). Treatments proposed for the Jess project can be categorized as: 1) Ridgetop fuels treatments, 2) Roadside fuels treatments, 3) Silvicultural treatments, and 4) Meadow treatments. The ridgetop fuels treatments are hand-piling/burning, mastication and underburning. Silvicultural treatments include non-commercial thinning using hand-piling/burning (removing trees with less than ten inch dbh), mastication, and commercial harvest (removing trees with greater than or equal to ten inch dbh). These treatments are commonly used on the Forest to reduce stand stocking levels to desired condition, increase or maintain structural and species diversity, and increase the development of the large tree component. To achieve treatment objectives, unit-specific silvicultural prescriptions and tree marking guidelines were developed and can be found in the Silviculture Report on the project website. Alternative 2 is the preferred alternative because it moves a substantial portion of the project area toward conditions that are more ecologically resilient to high-intensity wildfire and insect

and disease infestation; and is more defensible against wildfire because more acres will be treated across the landscape.

1.5.1 Ridgetop fuels treatments

Ridgetop fuels treatments are focused on re-arranging fuels to improve the defensibly of the Jessups Gulch watershed from wildfire. Small diameter (less than ten inch dbh) conifers will be thinned, hand-piled, and burned. Mastication will occur along strategic ridges between the hand-piled areas to complete the ridgetop treatments.

Underburning in the Jess project is focused on ridgetops and improving defensibility of the Jessups Gulch watershed from wildfire. A 250-acre block near the ridge will be underburned. This treatment overlaps with commercial and non-commercial treatment units. Underburning will be completed when the one-hour fuel moisture is between about seven percent and nine percent, the ten-hour fuel moisture is between about nine percent and 14 percent and the 100-hour fuel moisture is about 11 percent to15 percent. The air temperature will be between 50 and 85 degrees Fahrenheit, relative humidity will be about 25 percent to 60 percent and the wind speeds between zero and ten miles per hour. This prescription is intended to keep mortality of vegetation below 10 percent and canopy loss to less than five percent.

1.5.2 Roadside fuels treatments

Fuels treatments are designed to slow and modify fire behavior and provide safe ingress and egress to the public and firefighters during a wildfire event. Brush and small diameter trees (less than ten inch dbh) adjacent to roads will be manually cut, hand-piled and burned. Actual treatment areas may vary in size and width depending on fuel conditions but will be 200 feet or less from either side of the road. Trees less than ten inch dbh will be variable-density thinned to an average of 20-foot spacing. Existing brush densities will be reduced by 40 percent to 60 percent. All hazard trees will be identified and removed in accordance with hazard tree guidelines (Angwin et al. 2012).

Roadside fuels treatments will be implemented to complement treatments planned by the local fire safe council and the Eddy Late Successional Reserve Habitat Restoration project.

1.5.3 Silvicultural Treatments

Non-commercial silvicultural treatment will include removing small diameter conifers (less than ten inch dbh) to leave about a 28-foot to 30-foot bole spacing or a specified distance from trees of a certain diameter. A “D-plus” rule is applied to determine spacing. The “D” is the tree diameter in inches which is directly converted to feet (for example, a ten inch dbh becomes ten feet of spacing). The “plus” is an additional distance in feet to arrive at desired inter-tree spacing. For example: D plus 8 feet for an 8 inch dbh tree will provide 16 feet of spacing between trees; a 4-inch dbh tree will provide 12 feet of spacing

between trees. There will be species-specific preferences for thinning in some units based on topographic location, amount of disease present and desired regeneration species.

Commercial silvicultural treatments will be focused on the upper 2/3 of slopes. There are no treatments proposed in the lower 1/3 of slopes. The prescriptions take into account the elevation of the stand, the aspect, and the slope position. Species preference will again vary by unit and be driven by topographic location, amount of disease present, and desired regeneration species.

Partial harvesting of larger diameter trees dates back to the 1960s; this harvest created openings within many of the stands. These openings have regenerated and are currently stocked with seedling, sapling and pole-sized (less than ten inch dbh) trees. Where these pockets and small aggregations are densely stocked, non-commercial thinning is prescribed to reduce competition.

Enhancement of hardwoods and reduction of conifer competition is prescribed in several units. Patches of saplings and pole-sized trees will be avoided during treatment. Overall, the best crowns will be maintained with crown spacing varying from five to twenty feet wide. Sugar pines proven to be rust-resistant, available from a local seed zone and appropriate elevation band, will be planted in newly created openings within areas of their historical dominance.

All commercial harvest units will be whole-tree yarded (the entire tree is removed) to minimize activity fuels. In addition, all commercial harvest units will be evaluated to determine the need for treatments to remove activity fuels, such as prescribed fire treatments which can include underburning, hand-piling or jackpot burning depending on the terrain, brush type, height or fuel loading. These treatments will focus on breaking up fuel continuity and brush concentrations within three to ten years after commercial treatments have been completed to minimize or eliminate hazards to the community or the municipal watershed.

The silvicultural prescriptions for the Jess project are varied and are intended, based on current stand conditions, to achieve the following:

- A reduction in the amount of understory (typically six inches dbh to 20” dbh) that has developed since the 1920s when local fire suppression became more successful or since partial harvest activities in the 1970-80s;
- Removal of sizeable numbers of conifers within stands that have a hardwood component and were historically more species diverse;
- Maintenance and restoration of the pine component that has been reduced through past management actions or disease;
- A reduction in the amount of dwarf mistletoe in all species but particularly white fir and Douglas-fir; and

- A reduction in stand density to reduce insect and disease outbreak potential, allow natural regeneration within plantations, and increase stand resiliency to unexpected wildland fire occurrence, potential changes in climate, and increasing drought conditions.

1.5.4 Meadow Treatments

Small diameter conifers (less than ten inches dbh) will be hand-felled, hand-piled and burned. Meadows will be treated for noxious weeds using manual techniques.

Willows may be planted in and around the meadows where needed to increase shade and bank stability.

1.5.5 Connected Actions

The following connected actions will be analyzed as part of Alternative 2. About two miles of temporary roads on existing roadbeds will be used for short-term access to the project; these will then be hydrologically stabilized following project completion. Using temporary roads will reduce log skidding distances and associated impacts to soils and other resources (project design feature watershed-22 in Section 2.2.4). No new temporary roads are proposed. Existing landings will be used to the extent possible. There will be approximately one landing for each commercial harvest unit that will be about one acre in size. Road maintenance will occur before, during and after commercial harvest. See project design features for requirements and limitations of the road maintenance (Table 2-1 of Section 2.2.4).

Water drafting will occur for dust abatement. There are four primary drafting sites in the project area at established locations: North Fork Salmon River access points at Gallia Mine and downstream of Jackass Creek, Jones Gulch tributary at end of Forest Road 39N21A, and Jessups Gulch tributary at Burns Ranch. However, unforeseen circumstances, such as drought or fire suppression activities, may make the exclusive use of these sites difficult. If this should happen other drafting sites in the area may be identified for use in consultation with the fisheries biologist and/or an earth scientist. Project design features intended to minimize impacts to water quality from water drafting can be found in Table 2-1.

The inventory and mitigation of legacy sediment sources are required to receive a *Waiver of Waste Discharge Requirements for Non-point Source Discharge Related to Certain Federal Land Management Activities on National Forest System Lands* (Order No. R1-2010-0029) from the California Regional Water Quality Board, North Coast Region (Water Board). Most of the roads in the project area have legacy sediment sources that were addressed by the North Fork Roads Storm-proofing project (see appendix C).

However, five legacy sites requiring treatment are identified that are outside of the North Fork Roads decision but within the Jess project boundary (Figure B-6 in Appendix B). On Forest Service Road 39N54 and on the temporary road on an existing roadbed

adjacent to Road 40N46, there is a need to install a stream crossing dip to prevent stream water from diverting down the road. On the temporary road on an existing roadbed between 39N44 and 39N65, there is a need to remove a stream crossing during the hydrologic stabilization of the road when the project is complete. Finally, the crossing near the intersection of 39N41 and 39N44 needs to be upgraded to a larger size to accommodate high flows and needs to have a stream crossing dip constructed.

1.5.6 Treatments in Riparian Reserves

Riparian reserves "generally include an aquatic ecosystem system and adjacent upland areas that directly affect it" (Forest Plan, page 4-106). For purposes of this document, we call these riparian reserves "hydrologic" since they are defined in terms of a specific width around a body of water. Riparian reserves "can also include unstable and potentially unstable areas that are not associated with a riparian area…" (Forest Plan, page 4-106). For the purposes of this document, we call these riparian reserves "geologic" since they are defined by the geology of an area. There are 470 acres of geologic riparian reserves in the project area; there are no treatments proposed on these acres.

There are 2,265 acres of hydrologic riparian reserves in the project area. This does not include the 470 acres of geologic riparian reserves; there are no treatments proposed on these acres. The hydrologic riparian reserve treatments in Alternative 2 are unit-specific and include limitations based on the need to treat to meet Aquatic Conservation Strategy Objectives (Forest Plan, page 4-6). See appendix A for unit-specific treatments.

In general, the hydrologic riparian reserves will have no commercial treatments. The treatments in hydrologic riparian reserves will vary depending on the condition and function of the riparian reserve. Equipment will be excluded within the inner 100 feet of intermittent and perennial streams but may occur in the outer 70 feet of the hydrologic riparian reserves; these outer areas may be treated for fuels reduction or may be thinned when such treatments are needed to enhance the large tree components and other desired conditions of riparian reserves. A total of 260 acres of hydrologic riparian reserves exist in treatment areas; 120 acres are in commercial harvest units of which 60 acres will be treated. Specific treatments in hydrologic riparian reserve are summarized in appendix A. Silvicultural considerations for hydrologic riparian reserve treatments are incorporated into the treatment prescriptions in the Silviculture Report. No hydrologic riparian reserves will be entered by mastication equipment. Hand-piling and underburning will occur in hydrologic riparian reserves with limitations. There are 120 acres of hydrologic riparian reserve in the roadside fuels treatment units. The watershed project design features (Table 2-1 in Section 2.2.4) provide restrictions on hydrologic riparian reserve treatments to mitigate impacts and meet the Aquatic Conservation Strategy objectives.

1.6 Decision Framework

Given the purpose and need, the responsible official will review the proposed action, the other alternatives, and the environmental consequences to determine whether to implement the proposed action as described, to select a different action alternative, or to take no action to make changes to existing conditions in the Jess project area. Alternative 2 (modified proposed action) is considered the preferred alternative at this time.

1.7 Management Direction and Additional Guidance

The Forest Plan provides Forest-wide and Management Area direction for project-level projects. The project area is primarily within Partial Retention and Riparian Reserves, with smaller areas of Recreational River, General Forest, and Late Successional Reserve (Table 1-3). A summary of relevant Forest Plan goals is included in Table 1-3.

Table 1-3. Summary of Forest Plan goals by Management Area within the project area.

Management Area	Acres in project area	% of project area	Pages in Forest Plan*	Goals Pertinent to This Proposal
Late Successional Reserve (Management Area -5)	170	2	4-83	The objective of LSRs is to protect and enhance conditions of late-successional and “old growth” forest ecosystems, which serve as habitat for late- successional and "old growth"-related species including the northern spotted owl. These reserves are designed to maintain a functional, interacting, late-successional and “old growth” forest ecosystem.
Riparian Reserves** (Management Area -10)	2,735	32	4-106	Maintain and restore riparian-dependent structures and functions of intermittent streams. Provide benefits to riparian-dependent and associated species other than fish, enhance habitat conservation for organisms that are dependent on the transition zone between upslope and riparian areas, improve travel and dispersal corridors for many terrestrial animals and plants and provide for greater connectivity of the watershed. Provide connectivity corridors among the LSRs. Be consistent with Aquatic Conservation Strategy goals.
Recreational River (Management Area -13)	485	6	4-121	Protect and enhance the outstandingly remarkable value(s) for which the river(s) are or would be designated, while providing for public recreation and resource uses that do not adversely impact or degrade those values.

Management Area	Acres in project area	% of project area	Pages in Forest Plan*	Goals Pertinent to This Proposal
Partial Retention (Management Area -15)	4,810	56	4-126	Provide an attractive, forested landscape where management activities remain visually subordinate to the character of the landscape. Manage human activities so they are subordinate to the character of the landscape. Manage for a sustained yield of wood products in areas capable, available, and suitable for timber production. Maintain stand health as well as resilience to wildland fire, insect, disease, and other damage.
General Forest (Management Area-17)	335	4	4-131	Provide a programmed, non-declining flow of timber products, sustainable through time. These levels may vary from year to year, based on ecological processes. Maintain conifer stocking levels and high growth rates commensurate with the capability of the site to produce wood fiber. Intensively manage young regenerated stands to maximize growth potential. Maintain stand health, as well as resilience to wildland fire, insect, disease, and other damage. Emulate ecological processes and stand and landscape patterns where possible. Within harvest units, maintain appropriate structure, composition, and ecological functioning of the area.

*Page numbers are from the Forest Plan accessed online March 1, 2015. Note: There are about 200 acres of private lands within the Jess project boundary; these will not be treated.

**Total acres including hydrologic and unstable lands riparian reserves.

The northeastern section of the project area is within the 2012 northern spotted owl Critical Habitat designation (USDI Fish and Wildlife Service 2012). The Revised Northern Spotted Owl Recovery Plan (USDI, Fish and Wildlife Service 2011) provides recommendations for northern spotted owl Critical Habitat improvements (page III-21), including actions that should focus on landscape-scale, science-based restoration needed to conserve northern spotted owl habitat. Further, the recovery plan calls for proposals to be designed in a manner that enables the forest to recover from past management measures and to become resilient to large-scale disturbance.

This project is authorized under the Health Forest Restoration Act pf 2003 (HFRA) and complies with local and regional management plans as defined below.

- The proposed action was developed to address threats to ecosystem components due to epidemic levels of mistletoe infection in white fir and Douglas-fir stands in the project area. The project is designed to re-establish the ecosystem's ecologic integrity by using silvicultural methods to reduce the dwarf mistletoe rate of

infection and stand health so the forest stands can better respond to dwarf mistletoe presence (HFRA, Sec (102 (a)(4)).

- The project is proposed on National Forest System Lands within the Wildland Urban Interface for the community of Sawyers Bar, California. The Jess project includes the entire watershed that supplies the municipal water for the community. The Community Wildfire Protection Plan identifies Sawyers Bar as a community-at-risk to wildfire and the municipal watershed as at high risk to wildfire. The project addresses the threat of wildfire to the community of Sawyers Bar, California and its municipal water source (Jessups Gulch). The project is designed to reduce the risk of wildland fire by improving the defensibility of the project area by treating ridgetops, improving the safety of ingress/egress, and providing maintenance to existing control features already on the landscape (HFRA, Sec. (102 (a)(2) and Sec. (102 (a)(3))).
- Six public meetings focused on collaboration on the project where the Forest encouraged the exchange of information and the voicing of concerns with the project (HFRA, Sec. (104(f))). See appendix E for details on the collaborative effort.
- The project is consistent with the Forest Plan and HFRA (Sec. 102(b)) in that the project is not located (a) within a component of the National Wilderness Preserve System, (b) on Federal land on which the removal of vegetation is prohibited or restricted by Act of Congress or Presidential proclamation, or (c) within a Wilderness Study Area (HFRA, Sec. 102 (d)).

The interdisciplinary team designed the project to be consistent with all applicable law, regulation, policy, and Forest Plan direction. In addition, the interdisciplinary team considered mid-level assessments or guidance documents, including North Fork Salmon Watershed Analysis (USDA Forest Service 1995d) and the Sawyers Bar Community Wildfire Protection Plan (Salmon River Watershed Restoration Council 2004) when developing the proposed action and alternatives.

1.8 Public Involvement

The Forest has been working collaboratively on Jess project planning with local landowners, government agencies, and interested parties. All collaborative meetings have been held in Sawyers Bar, California. A summary of how the collaborative effort influenced the project can be found in appendix E. The first collaborative meeting was held on January 25, 2012, with a focus on introducing the project and the collaborative concept. The primary discussion during the next meeting on March 15, 2012, was on the purpose of and need for the project. A field trip was held on June 21, 2012, to review potential treatment areas and discuss the extent of the mistletoe infestation.

The project was first published to the Schedule of Proposed Actions and the project website on July 1, 2012.

On April 26, 2013 a scoping letter was sent to interested and affected parties, including other public agencies, tribes, adjacent property owners, and interested groups and individuals. On May 5, 2013, a legal notice of scoping was published in the Siskiyou Daily News. On May 6, 2013, a notice of intent to prepare an environmental impact statement for the Jess project was published in the Federal Register, asking that comments on the proposed action be received by June 20, 2013, and beginning the formal scoping process that guided the development of the draft environmental impact statement (draft EIS). Comments received as a result of public scoping, and their disposition, are in appendix G of the draft EIS.

Six participants attended a public meeting on July 27, 2013, in Sawyers Bar, California, including a USDI Fish and Wildlife Service representative, local landowners, and interested parties. The meeting resulted in clarification of previously received scoping comments. The interdisciplinary team met and reviewed the scoping responses on July 16, 2013.

A public meeting was held in Sawyers Bar, California on February 5, 2014. There were six participants including a USDI Fish and Wildlife representative, local landowners, and interested parties. The meeting focused on remaining concerns that collaborators had regarding the project. A public field trip on April 2, 2014, was attended by ten collaborators including a representative from the USDI Fish and Wildlife Service and the interested public. The field trip focused on areas of concern identified during the February 5, 2014, meeting.

The Forest is actively consulting with the USDI Fish and Wildlife Service, the National Oceanic and Atmospheric Administration (National Marine Fisheries Service), the California State Historic Preservation Office, the Karuk Tribe, and the Quartz Valley Indian Reservation.

1.9 Issues

The Forest received 160 comments by means of five letters during public scoping. The comments were grouped into 45 subject categories. Comments from the public and other agencies were used to formulate issues concerning the proposed action (appendix G of the draft EIS). The Forest Service separated the issues into two groups: Relevant and Other Issues. Relevant Issues were defined as those directly or indirectly caused by implementing the proposed action. Other Issues were identified as those: 1) outside the scope of the proposed action; 2) a procedural concern already decided by law, policy or regulation; 3) a procedural concern that is addressed through project design or analysis; or 4) conjectural and not supported by scientific or factual evidence.

The Council on Environmental Quality (CEQ) NEPA regulations explain this delineation in Sec. 1501.7, "…identify and eliminate from detailed study the issues which are not significant or which have been covered by prior environmental review (Sec. 1506.3A

discussion of the ways in which issues and concerns other than Relevant Issues were considered is presented in appendix G of the draft EIS.

There were a total of seven relevant issues identified by the interdisciplinary team. There were five relevant issues identified during the public scoping process. Two of the relevant issues were used to develop Alternative 3; these issues and indicators for comparing how alternatives address issues are displayed in Table 1-4.

Table 1-4. Relevant issues that resulted in alternatives analyzed in detail and associated indicators.

Relevant Issue #1:	There is a disagreement about the effects of logging on northern spotted owl habitat and increasing barred owl competition. Alternative 3 responds to this issue by reducing the acres treated in northern spotted owl suitable habitat and minimizing the removal of foraging habitat.
Indicators:	• Acres of northern spotted owl habitat downgraded or removed immediately after treatment. • Acres of Critical Habitat downgraded or removed immediately after treatment. • Northern spotted owl habitat components present 30 years after implementation. • Increase in Barred Owl competition
Relevant Issue #2:	There is a disagreement about the effects of logging and fuels treatments within riparian reserves on canopy cover and wildlife habitat connectivity. Alternative 3 responds to this issue by eliminating treatments in riparian reserves.
Indicators:	• Acres of riparian reserve with project activities proposed. • Changes to shade on perennial and late-flowing intermittent streams. • Acres of dispersal habitat (represents connectivity).

The three other relevant issues identified during scoping were recommendations for alternatives that were considered but eliminated from detailed study (alternatives A, B and C in Table 1-5) for reasons detailed in Section 2.3. The two additional relevant issues were raised during the collaborative process. The fourth alternative suggested but eliminated from detailed study (alternative D) was developed in response to comments made during the public meeting held on February 5, 2014 (Table 1-5 and Section 2.3). The fifth alternative suggested by eliminated from detailed study (alternative E) was developed in response to an alternative recommendation made during the public field trip held on April 2, 2014 (Table 1-5 and Section 2.3). Reasons for eliminating these alternatives are provided in Section 2.3 of this final EIS.

Table 1-5. Recommended alternatives considered but eliminated from detailed study.

Recommended Alternative	Responding Alternative Considered but Eliminated from Detailed Study (Section 2.3)
#3: A recommendation made during public scoping for an alternative that treated fuels along the Sawyers Bar Road.	Alternative A

Recommended Alternative	Responding Alternative Considered but Eliminated from Detailed Study (Section 2.3)
#4: A recommendation made during public scoping for an alternative that retains all large mistletoe-infected trees	Alternative B
#5: A recommendation made during public scoping for an alternative that retains 60% canopy, excludes riparian reserves from treatment, and concentrates on plantation thinning and fuels reduction.	Alternative C
#6: A recommendation made during the public meeting on February 5, 2014 for an alternative that would use multiple entries of harvest to meet project goals.	Alternative D
#7: A recommendation made during public meeting on April 2, 2014 for an alternative that uses smoke from prescribed burning to manage dwarf mistletoe.	Alternative E

Chapter 2: Alternatives, Including the Proposed Action

2.1 Introduction

This chapter describes and compares the alternatives considered for the Jess project. Federal agencies are required to "rigorously explore and objectively evaluate all reasonable alternatives, and for alternatives which were eliminated from detailed study, briefly discuss the reason for their having been eliminated" (Code of Federal Regulations (CFR) part 40, 1502.14). This chapter includes a description of each alternative considered in detail. It also includes alternatives considered but eliminated from detailed study and the reason for their elimination. Maps of each alternative considered in detail are available in appendix B.

This chapter also presents the alternatives considered in detail in comparative form, sharply defining the differences between alternatives and providing a clear basis for choice among options by the decision maker and the public. Some of the information used to compare the alternatives is based upon the design of the alternatives (i.e., acres treated by methods) and some of the information is based upon the environmental, social and economic effects of implementing each alternative (i.e. acres of habitat modified or jobs created).

The interdisciplinary team developed the proposed action (modified as Alternative 2) to respond to the purpose and need of the project. The other action alternative (Alternative 3) responds to public comments on the Notice of Intent. Although HFRA projects normally include only the proposed action and the no action alternative, this project analyzed one additional action alternative because it was raised by the public and meets the purpose and need for the project. Alternative 3 was developed to minimize impacts to habitat for the northern spotted owl and disturbance to riparian reserves that may be related to treatments.

A "no action" alternative (Alternative 1), required by both NEPA and HFRA, is analyzed to provide a baseline for consideration of the effects of the proposed action and another action alternative. Four additional alternatives responding to public comment are considered but eliminated from detailed study for reasons cited below.

2.2 Alternatives Considered in Detail

2.2.1 Alternative 1

Alternative 1 is the continuation of the current level of management and use. There will be no project-related treatment with this alternative. Alternative 1 (taking no action) provides reviewers a baseline to compare the magnitude of environmental effects of the action alternatives.

2.2.2 Alternative 2

The interdisciplinary team, in conjunction with the informal collaborative group composed of local interested parties, inventoried the project area to identify resource concerns and develop management activities (proposed activities to achieve the purpose and need) for the Jess project. The following proposed activities have been identified to move the project area from the existing condition toward the desired condition; these activities are combined into a proposed action. Project design features and best management practices (BMPs) are incorporated into this proposed action. The Forest Service proposes the following treatments on about 1,950 acres within the 8,535 acre project boundary (for a full description of the proposed action see Section 1.5 of this final EIS):

- Commercially harvest about 810 acres, including natural stands and plantations, with about 120 acres proposed for skyline and 690 acres of ground-based yarding;
- Treating fuels on strategic ridge tops on about 165 acres, including 95 acres of thinning, hand-piling, and burning and 70 acres of mastication;
- Reducing roadside fuels on about 615 acres along more than 15 miles of National Forest Transportation System roads;
- Prescribed underburning about 250 acres;
- Planting rust-resistant sugar pine on scattered acres throughout the project area;
- Enhancing meadows around Mud Lake and other locations in the project area; and
    - Masticating and hand-piling/burning brush on about 150 acres for stand health.
    - Non-commercial thinning of six acres within the genetics progeny site for maintenance.

2.2.3 Alternative 3

This alternative was developed in response to relevant issues 1 and 2 (Section 1.9) to address the disagreements about effects of logging on northern spotted owl habitat and effects of treatments within riparian reserves. Treatments in Alternative 3 are identical to Alternative 2 with the exception of the differences described below and listed in Table 2-2 of Section 2.5 (see Figure B-4 in appendix B):

- There are about 1,505 acres proposed for treatments (compared to about 1,960 acres in alternative 2).
- Commercial treatments will occur on 210 acres.
- There will be no commercial harvest in the hydrologic riparian reserves. Hand-piling and underburning will occur in the hydrologic riparian reserves with restriction provided by watershed project design features (Table 2-1 of section 2.2.4). There will be 165 acres of riparian reserves receiving roadside fuels treatments with project design features to mitigate impacts and meet the Aquatic Conservation Strategy objectives (Table 2-1 of section 2.2.4).

- Roadside fuels treatment will occur on 775 acres; and strategic ridgetop treatments on about 215 acres, including 90 acres of thinning and hand-piling, 40 acres of fuel break maintenance and burning, and 85 acres of mastication.

2.2.4 Project Design Features Common to All Action Alternatives

Standard mitigation measures are applied to all projects to minimize negative environmental effects. Project design features specific to this project, developed prior to and after scoping, will be used as a part of all action alternatives to minimize or eliminate negative effects to resources in the project area. Specific best management practices (BMPs) that will be followed are listed in appendix D of this document. Interim riparian reserve widths from the Forest Plan are used for this project because these are determined to be sufficient for resource protection in the project area.

Design features in Table 2-1 are listed under the resource for which they are intended to mitigate effects. Design features are applicable to alternatives in which these units are being treated.

Table 2-1: Project design features.

Resource	Project Design Feature	Applicable Unit/Area
Air Quality-1	Native surface roadways will be watered to suppress dust and maintain fine material on road surface.	All Areas
Air Quality-2	Ignition will only take place on permissive burn days as determined by California Air Resources Board and the Siskiyou County Air Pollution Control District.	All Areas
Air Quality-3	Notices of burning will be issued to advise the public and local residence when burning may occur and areas that might be affected by smoke.	All Areas
Botany-1	The boundary of each population of *Cypripedium fasciculatum* – clustered lady's slipper and *Cypripedium montanum* – mountain lady's slipper will be flagged as buffer areas for avoidance. No heavy equipment will operate within flagged buffer areas.	105, 113, 120, 121, 122, 129,and 130
Botany-2	Within the flagged buffer areas for *Cypripedium fasciculatum* – clustered lady's slipper and *Cypripedium montanum* – mountain lady's slipper, handwork may be allowed provided that habitat characteristics will be maintained including shade (primarily provided by overstory conifers), hardwood and shrub components, and duff layer.	105, 113, 120, 121, 122, 129, and, 130
Botany-3	Within the flagged buffer areas for *Cypripedium fasciculatum* – clustered lady's slipper and *Cypripedium montanum* – mountain lady's slipper, small diameter fuels may be removed by hand and piled outside of the flagged buffer area provided that design feature Botany-2 is met. Consultation with the District Botanist is required prior to implementation of fuels treatment to determine the needs of each individual population.	105, 113,120, 121,122, 129, and 130
Botany-4	No project activity will occur within the flagged buffer boundary for *Cypripedium fasciculatum* – clustered lady's slipper and *Cypripedium montanum* – mountain lady's slipper.	Roadside fuels treatment on road 40N46 and 39N27, unit 70, and all under- burning activities

Resource	Project Design Feature	Applicable Unit/Area
Botany-5	To maintain potential host species for *Otidea leporina*, retain a large tree component distributed throughout the stand and healthy conifer and hardwood species that exist in the stand including, sugar pine, ponderosa pine, Douglas fir, madrone, and black oak.	110
Botany-6	To protect *Otidea leporina* habitat, minimize soil compaction and soil disturbance by maximizing use of existing skid trails for project implementation.	110
Botany-7	At the end of project activities, maintain a layer of duff over 50% of the unit area to retain surface organic matter and moisture retention for *Otidea leporina* population.	110
Engineering-1	National Forest Transportation System roads will be maintained, as needed, and prior to and during harvest activities. Maintenance activities include the clearing of brush and small trees within the road prism, surface blading to provide a smooth road surface, water drainage control, and dust abatement.	All National Forest Transporta-tion System roads
Engineering-2	All temporary roads on existing road beds used for this project will be closed immediately following operations. Road closure will include any, all, or a combination of the following activities: (1) placing boulders, earth, or log mound barriers to prevent vehicle traffic; (2) sub-soiling and out-sloping the road surface; (3) installing water bars and other drainage structures; and (4) mulching with native materials (logging slash) or certified weed-free straw.	All temporary roads on existing roadbeds Temporary road B. will be blocked above the progeny site.
Engineering-3	For more effective road closures, no trees will be removed within 50 feet of the entry of any temporary roads on existing road beds used for project access, where it intersects a National Forest Transportation System road. Exceptions to this restriction include the removal of hazard trees and a few trees to provide equipment access.	All temporary roads on existing roadbeds
Engineering-4	When multiple entries are necessary for project completion, roads used by contractors will be closed in between each entry.	All temporary roads on existing roadbeds and National Forest Transportation System roads
Heritage-1	Heritage sites will be flagged and avoided by all project actions during implementation of the project.	All Areas
Heritage-2	All skid roads, road improvements, landings, and burn pile areas will be designated on a map and reviewed by the district archaeologist prior to project implementation.	All Areas
Heritage-3	If any late discoveries of human remains or heritage resources sites not previously recorded are identified during the project implementation, work within the area of potential affect will immediately stop and the district archaeologist and Heritage Program Manager will be consulted to determine how best to proceed.	All Areas
Noxious Weeds-1	If landings are needed within an infestation of *Isatis tinctoria* (Dyer's woad), consult with the district botanist to determine the best location. If a landing is placed in a location that is infested with Dyer's woad, equipment will be used to push the top layer of soil with the seed bank into a pile away from where equipment and vehicles will be operating prior to use of the landing. All Dyer's woad infestations will be flagged prior to implementation.	101, 105, 106, 107, 118, and 121

Resource	Project Design Feature	Applicable Unit/Area
Noxious Weeds-2	Avoid parking equipment and vehicles in locations infested with *Isatis tinctoria* (Dyer's woad).	101, 105, 106, 107, 118, 121, 43, 71, and Roadside Fuels Treatments on roads 39N27, 39N41, 39N60, and 38N22
Noxious Weeds-3	No burn piles will be created directly within noxious weed infestations of *Isatis tinctoria* (Dyer's woad). Fuels may be removed by hand from within the infestation and piled outside the flagged area.	43 and 71, Roadside Fuels Treatments on roads 39N27, 39N41, 39N60, and 38N22
Noxious Weeds-4	Equipment will be cleaned of soil, seeds vegetative matter, and other debris that could contain or hold seed prior to moving to the project area, after operating within an area with a known site, and after leaving the project area.	Entire Project Area
Noxious Weeds-5	Wherever seed and/or straw is used to restore areas of ground disturbance, certified weed-free seed and straw will be required and specified in the contract.	Entire Project Area
Noxious Weeds-6	There will be no parking or project activity within the infestation of *Centaurea maculosa* (spotted knapweed) that is adjacent to Unit #145. The district botanist will inventory unit #145 prior to project implementation to determine if the Whites Fire suppression activities spread this infestation into the treatment unit. If spotted knapweed is discovered within this treatment unit the infestation will be flagged for project avoidance.	145
Recreation-1	Only cut trees consistent with Region 5 Hazard Tree guidelines that are within the 100-foot buffer of dispersed sites 54D013, 54D013A, and 54D014.Establish 100-foot "no-cut buffer" around dispersed recreation sites 54D013, 54D013A, and 54D014. Hazard trees will be removed.	107 and 102
Recreation-2	Locate skid trails and landings away from and out of sight of the above dispersed areas. If skid trails or landings are required within sight of dispersed sites, remove or pile and burn all slash, debris, dirt piles and berms, and rehabilitate area.	107 and 102
Watershed-1	When working in hydrologic riparian reserves, if there is a 30% chance of rain in the next 24 hours the Timber Sale Administrator will be on site to insure that winterization or erosion control procedures are implemented in a timely manner and shutdown procedures are implemented. Operations will not resume until suitable weather, soil, and forecast conditions exist, as determined by the Timber Sale Administrator.	102, 103, 104, 106, 107, 108, 110, 111, 113, 118, 119, 121, 122, 129, and 138
Watershed-2	Cable corridors will be placed on the landscape in order to minimize disturbance to inner gorges and avoid disturbance of active landslides and landslide toe zones.	Units 125, 128, 109, 110, 112, 120, 122, and 138
Watershed-3	No silvicultural treatments will occur on unstable lands and ground-based equipment will be excluded from active landslides and landslide toe zones.	128 and 122

Resource	Project Design Feature	Applicable Unit/Area
Watershed-4	Trees directly rooted into the banks or otherwise and obviously integral to the stability of the channel bank will not be removed.	102, 103, 104, 106, 107, 108, 110, 111, 113, 118, 119, 121, 122, 129, and 138
Watershed-5	Skidding equipment will be restricted to slopes less than 35%. Skid trails that connect benches in dormant landslide terrain can have minor portions of the skid trails on slopes greater than 35%.	All Commercial Ground-based Harvest Units
Watershed-6	To maintain existing coarse woody debris, ground-based equipment will avoid larger diameter logs to the extent practical. Coarse woody debris consists of downed wood within a terrestrial environment.	All Commercial Ground-based Harvest Units
Watershed-7	Limit equipment disturbance within 20 feet on either side of swales by minimizing equipment crossings and avoiding running trails up the axis of swales (swales are shallow ephemeral channels that do not meet the definition of a riparian reserve because they lack annual channel scour).	All Commercial Ground-based Harvest Units
Watershed-8	Existing skid trails will be reused whenever possible. Designation of new skid trails will be approved by the Timber Sale Administrator.	All Commercial Ground-based Harvest Units
Watershed-9	No skid trails will cross intermittent stream, except when the stream is dry and the use and location is designated by the Timber Sale Administrator. Perennial streams will not be crossed.	103, 104, 106, 107, 108, 110, 111, 113, 118, 119, 121, 122, 129, and 138. The wet area in unit 102 may be crossed by the road.
Watershed-10	When the Timber Sale Administrator designates the use of skid trails across dry intermittent streams or dry swales, the crossing will be restored before any storm (with reasonable chance of causing off-site sediment movement) Restoration of crossings will be immediate following use consisting of removing excess soil, reshaping and waterbarring former approaches, and spreading slash on the former crossing.	102, 103, 104, 106, 107, 108, 110, 111, 113, 118, 119, 121, 122, 129, and 138
Watershed-11	Slash or water bars will be applied to skyline corridors where necessary to minimize the concentration of surface runoff and where the ground cover is below 50%.	All Commercial Skyline Harvest Units
Watershed-12	Place skyline yarding corridors that are parallel to stream channels outside stream riparian reserves.	125, 128, 130, and 136
Watershed-13	Where ground-based yarding/endlining is used to retrieve logs from riparian reserve equipment exclusion zones and if gouging occurs that creates a trough for overland flow to enter the channel, waterbars will be installed or slash applied to the area.	102, 103, 104, 107, 108,106, 110, 111, 113, 118, 119, 121, 122, 129, and 138

Resource	Project Design Feature	Applicable Unit/Area
Watershed-14	Construct new landings outside of both stream-course and unstable-land riparian reserves and away from locations where sediment is likely to enter streams (areas that have a hydrologic connection to streams).	All Commercial Ground-based and Skyline Harvest Units
Watershed-5	Existing landings will be used to the extent possible. Existing landings within 50 feet of the slope break to a stream channel or inner gorge with the exception of four landings analyzed for effects to resources (in units 108, 110, 118, 119).	All Commercial Ground-based and Skyline Harvest Units
Watershed-16	All skyline yarding stands will use one end suspension. Full suspension over stream channels is desired where possible.	All Commercial Skyline Harvest Units
Watershed-17	Once project activities are completed, hydrologically stabilize landings by re-establishing natural runoff patterns to protect water quality.	All Commercial Ground-based and Skyline Harvest Units
Watershed-18	Material will not be side casted (i.e. fill material will not be pushed downslope of landing) during the reconstruction of any landing.	All Commercial Ground-based Harvest Units and all Commercial Skyline Harvest Units
Watershed-19	At project completion, permanent operating water bars will be installed and/or repaired and slash will be scattered along all skid trails as needed.	All Commercial Ground-based Harvest Units
Watershed-20	Hazard trees that have fallen or are felled within hydrologic riparian reserves will generally be left on site. Fallen or felled hazard trees may be removed from hydrologic riparian reserves if: Trees must be removed to provide safe road passage or campground access and function; OR Those trees would pose a substantial risk to the Forest road drainage system integrity.	All Riparian Reserves in the Project Area
Watershed-21	The project is proposed to take place during the normal operating season that is defined as April 15 to October 15 and in dry periods outside the Normal Operating Season with Line Officer approval. Actions will be restricted during periods of wet weather during the Normal Operating Season.	Entire Project Area
Watershed-22	The proposed temporary roads on existing roadbeds will be outsloped, covered with slash if needed, and blocked after the harvest season (and prior to the first winter after use) (see Engineering-2 and Engineering-3). The temporary roads will be decommissioned (hydrologically restored) at project completion. Decommissioning includes the removal of culverts and fills at stream crossings, out-sloping of road surfaces, and obliteration (re- contouring) of temporary road segments.	All Temporary Roads on Existing Roadbeds

Resource	Project Design Feature	Applicable Unit/Area
Watershed-23	Improvements on the existing National Forest Transportation System roads to the project area will not over-steepen the road cuts, will minimize sidecasting, and will maintain the ditches and cross drains or any out-slope of the roadway.	All National Forest Transporta-tion System Roads
Watershed-24	Spot rocking will be used as needed in wet areas where damage to the roadbed may occur and adversely create rills which may move sediment into stream channels.	All National Forest Transporta-tion System Roads
Watershed-25	Use erosion control methods on access and/or main roads that are treated for dust abatement to prevent any water leakage from causing stream sedimentation.	All Temporary Roads on Existing Roadbeds and all System Roads
Watershed-26	When drafting from streams occupied by Chinook and Coho salmon: *National Oceanic and Atmospheric Administration (NOAA) Fisheries Water Drafting Specifications:* When in habitat potentially occupied by Chinook and Coho salmon, intakes will be screened with 3/32" mesh for rounded or square openings, or 1/16" mesh for slotted openings. When in habitat potentially occupied by steelhead trout, intakes will be screened with 1/8" mesh size. Wetted surface area of the screen or fish-exclusion device shall be proportional to the pump rate to ensure that water velocity at the screen surface does not exceed 0.33 feet/second (The use of a National Oceanic and Atmospheric Administration approved fish screen will ensure the above specifications are met.) Fish screen will be placed parallel to flow. Pumping rate will not exceed 350 gallons-per-minute or 10% of the flow of the anadromous stream drafted from. Pumping will be terminated when tank is full. Additional applicable specifications: Water drafting by more than one truck shall not occur simultaneously. Water drafting sites located within fish-bearing stream segments may not be modified, except rocking the approach to prevent sedimentation	Drafting Sites in Chinook and Coho salmon Habitat.
Watershed-27	When drafting from streams that are not occupied by Chinook or Coho salmon: Drafting rate should not exceed 350 gallons per minute for stream flow greater than or equal to 2.0 cubic feet per second. Drafting rate should not exceed 50 percent of surface flow. Drafting should cease from when bypass surface flow drops below ten gallons per minute. Drafting by more than one truck shall not occur simultaneously. Water drafting sites located in non-fish-bearing waters <u>only</u> may include minor in-stream modification, such as fine sediment removal and building of board/plastic dams Rock and gravel drafting sites as needed to prevent stream sedimentation.	Drafting Sites outside of Chinook and Coho Habitat.
Watershed-28	Draft water only at designated water drafting sites.	All Drafting Sites

Resource	Project Design Feature	Applicable Unit/Area
Watershed-29	Activities which require culvert replacement or removal will occur during the least critical periods for water and aquatic resources: when streams are dry; during low-water conditions; and/or in compliance with spawning and breeding season restrictions. Low-water/dry conditions for the project area occur generally between July and October, depending upon snowpack and individual drainage characteristics. The district fish biologist or hydrologist will be consulted for appropriate timing at specific locations.	Legacy Sites
Watershed-30	No fueling or servicing of vehicles used will take place within riparian reserves. No fueling/refueling of mechanical equipment will occur within 100 feet of any flowing watercourse or intermittent drainage. All spills will be reported and clean-up initiated in accordance with applicable State and Federal laws, rules and regulations. The Forest Hazardous Materials Coordinator's name and phone number will be available to Forest Service personnel who are administering or managing the use of petroleum-powered activities. NOAA Fisheries will be notified for emergency consultation in the event that a spill may affect federally listed aquatic species.	Entire Project Area
Watershed-31	A spill containment kit will be available at the location of any refueling or servicing.	Entire Project Area
Watershed-32	Limit the operation of track-mounted masticators to slopes of less than 45%.	All Mastication Units
Watershed-33	Fuel treatment prescriptions will be designed to maintain post-treatment soil cover ranging between 50% and70%, depending on slope steepness and fuel reduction treatments (see Soils Resource Report for unit details).	All Units
Watershed-34	Masticators will not operate within 100 feet of perennial and/or intermittent streams and not operated within break in slope of inner gorge. Crossings of dry intermittent channels may occur at locations designated by the Timber Sale Administrator.	42, 48, 70 and 73
Watershed-35	Hand piles will be placed in a checkerboard pattern whenever possible (not one pile directly above another). Hand piles will be six feet or less in diameter.	All Units
Watershed-36	Use of mastication equipment will follow Forest Wet Weather Operations Standards.	Entire Project Area
Watershed-37	Burn piles will not be placed within 30 feet of perennial stream channels greater than one foot wetted width, or within 15 feet of intermittent stream or perennials less than one foot wetted width.	102, 103, 104, 106, 107, 108, 110, 111, 113, 118, 119, 121, 122, 125, 128, 129, 138 and underburn.
Watershed-38	When underburning is prescribed, avoid the construction of handlines within riparian reserves closer than 25 feet to a watercourse and/or within riparian vegetation as possible.	102, 103, 104, 107, 108,106, 110, 111, 113, 118, 119, 121, 122, 125, 128, 129, 138 and underburn
Watershed-39	Handlines will be mitigated (waterbarred and covered with organic material) immediately following prescribed burning and under safe conditions.	All Units

Resource	Project Design Feature	Applicable Unit/Area
Watershed-40	When underburning within riparian reserves, maintain at least 90% of the large woody debris (both standing and on the ground) as unburned or not consumed.	102, 103, 104, 106, 107, 108, 110, 111, 113, 118, 119, 121, 122, 125, 128, 129, 138 and underburn
Watershed-41	Within riparian reserves, prescribed fire effects will mimic a low intensity backing fire and ignition will usually not occur there. Hand piles may have higher fire intensity in order to consume pile material.	102, 103, 104, 106, 107, 108, 110, 111, 113, 118, 119, 121, 122, 125, 128, 129, 138 and underburn
Wildlife –1	Marking crews will coordinate with a wildlife biologist to ensure “skip” areas are clearly marked as to not receive commercial treatment.	102, 103, 104, 107, 108, 110, 111, 112, 116, 118, 119, 120, 121, 122, 125, and 128
Wildlife–2	When burning in spring, smoke is managed so that light to moderate dispersed smoke may be present within a canyon or drainage but dissipates or lifts within 24 hours. When spring (February 1 to July 9) burning is conducted within 0.25 mile and uphill of an NSO activity center or 0.25 miles of un-surveyed suitable habitat (NR&F), smoke is managed as described above, and ignition should be discontinued if heavy, concentrated smoke begins to inundate suitable habitat late in the afternoon.	Underburn Unit 147. Fuels treatment burning in all activity units.

Resource	Project Design Feature	Applicable Unit/Area
Wildlife–3	In 2016 and 2017, NSO surveys will follow protocol except that three rounds of nighttime call routes and AC searches will be completed prior to implementation and three nighttime call routes will be completed concurrently with implementation. In 2018 and 2019, the NSO surveys will be completed to protocol without deviation. This pattern of NSO survey strategy will be followed for the life of the project. If NSO are detected, then an LOP from February 1 to July 9 will be applied to activities that create noise above ambient levels within 0.25 mile of an occupied site. If NSO nesting activity is determined or suspected, then the LOP will be extended to September 15.	LOP of 2/1 thru 7/9. Units 145, 142 (1acre), 125, 128, 130, 136, 101, 102, 103, 104, 105, 106, 107, 108, 109, 110, 111, 112, 113, 114, 116, 117, 118, 119, 120, 121, 129, 137, and 138. All Roadside Units. LOP of 2/1 thru 9/15. Units M1, 42, 43, 44, 45, 46, 47, 48, 70, 73, 71, 100,,101, 102, 103, 104, 105, 106, 107, 108, 109, 110, 111, 112, 113, 114, 115, 116, 117, 118, 119, 120, 121, 125, 128, 129, 130, 136, 137, 138. 140, 144, 141, 142, 143, 145, 146, 147, All Roadside Units.
Wildlife–4	Surveys will follow regionally approved protocol or as agreed upon by local Level One Team.	All Units
Wildlife–5	Mark and avoid treatment in a portion of units identified to be consistent with Recovery Actions.	Unit 116 (approx. 1 acre on the inside edge of KL1034 core) and roadside unit 40N46 (end of unit on the both sides of the edge of KL0233 core. Approx. 2 acre).
Wildlife-6	No known bald eagle nest trees, perch trees, or roost trees will be removed or destroyed as a result of prescribed fire or fuels reduction treatments.	Project Area
Wildlife–7	To minimize smoke effects on bald eagles, prescribed burning will not be implemented within 0.5 mile of a known or suspected nest territory from January 1st to August 31st, or a known or suspected winter roost area from November 1st to March 31st. If survey demonstrates that nest sites are not active, no seasonal restrictions are required.	Project Area

Resource	Project Design Feature	Applicable Unit/Area
Wildlife–8	Actions that create noise above ambient levels within 0.25 miles of active or suspected bald eagle nests, or be implemented within 0.5 mile line- of -sight of such nests, will be seasonally restricted from January 1st to August 31st. If surveys demonstrate that bald eagles nest sites are not active, no seasonal restriction required.	Project Area
Wildlife–9	Actions that create noise above ambient levels within of an active or suspected bald eagle roost will be seasonally restricted from November 1st to March 31st. If surveys demonstrate that roosts are not active, no seasonal restrictions are required.	Project Area
Wildlife–10	If an occupied northern goshawk nest sites is located, no burning or use of heavy equipment will be implemented within 0.25 miles of the nest site between March 1st and August 31st. If protocol surveys are conducted and the site is found to be unoccupied, proposed actions may proceed.	Project Area
Wildlife–11	Retain an average of five to 20 of the largest available logs on the ground in treatment units.	All Commercial Harvest Units
Wildlife–12	Where present, retain the largest hardwood snags. These provide valuable habitat components for many species, including fisher and marten.	All Commercial Harvest Units
Wildlife–13	Where possible retain pre- existing large snags greater than 14- inches dbh distributed across the project landscape.	All Commercial Harvest Units
Wildlife–14	Retain at a minimum two to five snags on an average per acre where available. This is to be assessed on a landscape level. Snag retention may not be met equally on every acre but will be met at a landscape scale. Retain snags in clump or groups, situated around the largest and live trees where possible. Select snags with broken tops as first priority.	All Commercial Harvest Units
Wildlife - 15	Use protection buffers of known Survey and Manage species sites to minimize impacts to these species.	105, 112, 125, 140, 147, 40N46, 39N44, 39N27, and 39N21

2.3 Alternatives Considered but Eliminated from Detailed Study

Federal agencies are required to rigorously explore and objectively evaluate all reasonable alternatives and to briefly discuss the reasons for eliminating any alternatives that were not developed in detail (40 CFR 1502.14). Public comments received in response to the Proposed Action (as scoped) provided suggestions for alternative methods for achieving the purpose and need. Some of these alternatives may have been outside the scope of the need for the proposal, duplicative of the alternatives considered in detail, or determined to be components that would cause unnecessary environmental harm.

Therefore, a number of alternatives were considered, but eliminated from detailed study for reasons summarized below.

- **Alternative A:** An alternative was suggested during public scoping that included fuels reduction along the Sawyers Bar Road from the Forest Boundary to Sawyers

Bar (Relevant issue #3 (section 1.9 of this final EIS and appendix G of the draft EIS)). The activity suggested is outside of the project boundary. Since this suggested alternative is outside of the scope of the project, it is eliminated from detailed study.

- **Alternative B:** An alternative was suggested during public scoping to retain all of the large mistletoe-infected trees in the project area (Relevant issue #4 (section 1.9 of this final EIS and appendix G of the draft EIS)). One aspect of the purpose and need for this project is to restore ecological processes that build resiliency to high intensity disturbance. The project area has epidemic levels of mistletoe infection which has led to decreased vigor and increased mortality in the Douglas-fir and white fir; this decreased vigor and increased mortality interrupts the ecological function of the project area. Mistletoe spreads by dropping its seeds from a higher tree into adjacent and lower trees. Therefore, leaving the larger and taller infected trees will not interrupt this uncharacteristically high infection rate and will be counter to the purpose and need of the project. Therefore, the alternative is eliminated from detailed study for this reason.
- **Alternative C:** An alternative was suggested during public scoping that retains 60% canopy cover in all stands, excludes riparian reserves from treatment, concentrates on thinning small diameter trees in plantations, and uses fuels treatments to protect old- growth and northern spotted owl habitat. This is in response to relevant issue #5 (section 1.9 of this final EIS and appendix G of the draft EIS). Alternative 3 analyzes the exclusion of riparian reserves from treatments. The purpose and need of the project is to restore ecological processes that build resiliency to high intensity disturbance caused by wildfire and insect and disease infestation. The project area has epidemic levels of mistletoe infection which has led to decreased vigor and increased mortality in the Douglas-fir and white fir; decreased vigor and increased mortality interrupts the ecological function of the project area. Mistletoe spreads by dropping its seeds from a higher tree into adjacent and lower trees. As noted in the discussion of alternative B, retaining canopy cover of 60% and only removing small trees in plantations will not allow for the removal of the larger and taller infected trees. Retaining canopy cover of 60% will keep the Douglas-fir stands relatively dense, allowing the unnaturally high infection rates to continue, and therefore, will not meet the purpose and need of the project. Although there may be indirect protection to communities from strategic fuels treatments specifically targeted to protect old-growth and northern spotted owl habitat, this alternative will not fully meet the purpose and need of this project. Since alternative C meets only a portion of the purpose and need of this project, it was eliminated from detailed study.
- **Alternative D:** An alternative was suggested during the collaborative public meeting on February 5, 2014, that uses multiple entries of small volume harvest, about five to ten years apart, to mitigate impacts such as increased brush response and a decrease in tree canopy from commercial thinning. However, research indicates that the partial removal of forest overstory that is heavily infected by dwarf mistletoe can increase mistletoe seed production and infection rates in the newly recruited trees (Knutson and Tinnin, 1980). Since the increase in mistletoe

rates and negative effects on newly recruited trees that will result from this alternative are counter to the project's purpose and need, and a multiple- entry approach will not meet the Regional Forester's direction to design projects so they meet stand density objectives for at least 20 years after implementation (USDA Forest Service 2004), this alternative is eliminated from detailed study.

- **Alternative E**: An alternative was suggested during the collaborative field trip on April 2, 2014, that uses smoke from prescribed fire to control the mistletoe infection rate in the project area. Exposure to smoke has been shown to inhibit dwarf mistletoe specific to ponderosa pine, limber pine and lodge pole pine seed germination (Zimmerman and Laven, 1987). The inhibition of seed germination is dependent on the moisture of the fuels and the time exposed to smoke. Smoke will only impact the germination of seeds, not the dwarf mistletoe itself. To be effective, smoke exposure will have to occur every year for decades during the seed germination period under the correct fuel moisture regimes. The probability of permissible burn days overlapping with these conditions every year for decades is improbable. This alternative is infeasible, and is eliminated from detailed study.

2.4 Monitoring

As thinning of larger trees (of a size to be sold commercially, usually greater than ten inches in dbh) and of smaller trees (also known as non-commercial) is implemented, projects are monitored by Forest Service personnel as part of normal operating procedures. Forest Service employees monitor timber marking of harvest units to ensure that prescriptions and marking guides are being followed. Forest Service sale administrators monitor the harvest to assure that Forest Plan standards and guidelines, best management practices, and project design features are being implemented. Forest Service personnel monitor non-commercial thinning as it is being accomplished to determine if objectives are being achieved and make sure thinning specifications are being followed.

As fuels treatments are implemented, projects are monitored as part of normal operating procedures. Prior to prescribed burning, burn plans are developed. Burn plans for prescribed fire require monitoring of the burning to ensure that project objectives are being achieved.

The application of project design features that are identified for wildlife species are monitored in implementation and effectiveness monitoring. Assumptions made pertaining to effects to species are validated. The USDI Fish and Wildlife Service will continue involvement through project implementation by meeting with the Forest representatives, designated marking crews and contractors before and during project activities within 0.5 miles of northern spotted owl core areas to ensure that agreed-upon marking guidelines and protection measures are implemented. Post-project surveys for northern spotted owl will be conducted to evaluate pair occupancy and barred owl presence.

Post-project monitoring for the spread of non-native invasive species (noxious weeds) will occur as part of Forest Plan monitoring. Results will be documented in the Forest annual monitoring reports.

Best Management Practices Evaluation Program monitoring will occur on a sample of the BMPs appropriate for this project which are listed in appendix D. Since many project treatments do not occur within the same year, they will be included in Best Management Practices Evaluation Program monitoring pools for up to a decade as needed. The Forest Sediment Monitoring Plan (USDA Forest Service 2013c) and Shade Monitoring Plan (USDA Forest Service 2011a) will be implemented for Total Maximum Daily Load compliance as displayed in the North Coast Region Basin Plan (North Coast Region Water Quality Control Board 2011).

Monitoring to assess the implementation and effectiveness of project design features to meet soil Standard and Guidelines in the Forest Plan may occur in the Jess project. Field investigations of soil cover, soil compaction, and impacts to soil organic matter will occur on a minimum of five percent of activity areas forest wide, as described in Chapter 5 of the Forest Plan. Units will be selected randomly from all activity areas across the Forest where soil disturbing activities take place; the Jess project will be included in the sampling pool for soil monitoring. Results will be documented in the Forest annual monitoring reports.

2.5 Comparison of Alternatives

This section provides a summary of the treatments in each alternative and a comparison of the effects of implementing each alternative. Table 2-2 displays a comparison of the acres of fuel and silvicultural treatments in each alternative considered in detail.

Table 2-2. Comparison of thinning and fuels treatments by alternatives in acres treated.

Treatment Type		Alternative 1 (acres)	Alternative 2 (acres)	Alternative 3 (acres)
Total Treatment Footprint (includes overlapping treatments)		0	1,960	1,505
Total Treatment Acres (if treatments laid out side by side)		0	2,000	1,535
Ridgetop Fuels Treatments	Handpile	0	85	90
	Mastication	0	70	85
	Fuel Break	0	30	40
	Underburning	0	250	250
	Total Ridgetop Treatment Area	0	435	465
	Ground-based	0	690	180
	Skyline	0	120	30

Treatment Type		Alternative 1 (acres)	Alternative 2 (acres)	Alternative 3 (acres)
Commercial Silvicultural Treatment	Total Commercial Treatment Area	0	810	210
Non-commercial Silvicultural Treatments	Mastication	0	60	45
	Non-commercial treatment with handpiling and burning	0	70	65
	Total Non-commercial Treatment Area	0	130	110
Roadside Fuels Treatment		0	615	740
Meadow Treatment		0	10	10

Table 2-3 displays a comparison of alternatives on how each meets the purpose and need components for the project. The project is managing fuel loading along ridges and on existing fuel breaks/control points so that the community of Sawyers Bar and its municipal watershed are defensible against wildfire.

Table 2-3. Summary of alternative effects related to purpose and need of the project.

Purpose and Need	Measurement Indicator	Alternative 1	Alternative 2	Alternative 3
Improve defensibility against wildfire to municipal watershed and nearby communities.				
Reduced risk to community and municipal watershed	Acres of limited fuel continuity and reduced fuel loads	0	1,960	1,535
Safety of Ingress/Egress	Acres of fuels treatments	0	615	740
	Miles of road with fuels treatments	0	15	15
Improved defensibility against wildfire	Acres of fuel breaks/control points maintained (includes underburned block, hand piling and mastication)	0	435	465
Improve compositional, structural, and functional attributes of biologically diverse forest ecosystems by restoring ecological processes that build resiliency to high-intensity wildfire and insect and disease.				
Resilience to Disturbance	Acres with Stand Density Index of less than 55% after 30 years	0	810	210
Dwarf Mistletoe Infection	Change in % of trees per acre infected with dwarf mistletoe after 30 years	Douglas-fir +285%	Douglas-fir -54%	Douglas-fir +103%
		White fir +1,800%	White fir -73%	White fir +764%
Species Composition	Acres with a change in species composition toward desired condition	0	810	210

Purpose and Need	Measurement Indicator	Alternative 1	Alternative 2	Alternative 3
Structural Diversity	Areas with an increase in opening frequency and size	0	810	210
Fuel Loading	Tons per acre of fuel loading after 30 years	44	31	40
Provide a broad range of ecosystem services, including wood products, rural economic health, biodiversity, and the beneficial uses of water.				
Economic Health	Number of jobs created	0	73	17
Wood Products	Volume of lumber (in hundreds of cubic feet)	0	13,325	3,800
Biodiversity	Acres treated	0	1,960	1,505
Beneficial Uses of Water	Municipal watershed protected	No	Yes	Yes

Table 2-4 displays a comparison of how each alternative addresses the relevant issues identified during public scoping.

Table 2-4. Comparison of alternative indicators related to relevant issues.

Response Consideration	Measurement Indicator	Alternative 1	Alternative 2	Alternative 3
Relevant Issue #1: *There is a disagreement about the effects of logging on northern spotted owl habitat and increasing barred owl competition.*				
Effects to northern spotted owl habitat	Acres Downgraded or Removed: Nesting/Roosting	0	0	0
	Acres Downgraded or Removed: Foraging	0	535	15
Effect to Critical Habitat for northern spotted owl	Acres Downgraded or Removed: Nesting/Roosting	0	0	0
	Acres Downgraded or Removed: Foraging	0	44	0
Northern spotted owl habitat components present	Estimated Average Percent Canopy Cover	60%	40%	50%
	Trees greater than 26 inches dbh per acre	17.9	11.9	15.8
Barred Owl Impacts	Change in barred owl competition	none	none	none
Relevant Issue #2: *There is a disagreement about the effects of logging and fuels treatments in riparian reserves on canopy cover and wildlife habitat connectivity.*				
Disturbance in Riparian Reserves	Acres of Commercial Harvest in Riparian Reserves	0	60	0

Response Consideration	Measurement Indicator	Alternative 1	Alternative 2	Alternative 3
Shade	Change in Canopy Cover on late-flowing intermittent and perennial streams.	None	None	None
Connectivity	Acres of Dispersal Habitat removed	0	30	27
	Total acres of dispersal in the project area	3063	3033	3036

Information in Table 2-5 is focused on environmental effects on resources where different levels of effects of outputs can be distinguished qualitatively or quantitatively among alternatives. For all resources in all action alternatives, negative effects are minimized or eliminated by application of project design features. This table displays the potential environmental effects of alternatives themselves, not the cumulative effects of the alternatives plus current and reasonably foreseeable actions. Cumulative effects are disclosed in Chapter 3 in the disclosure of the environmental effects on each resource.

Table 2-5. Comparison of effects of alternatives by resource.

Resource	Alternative 1	Alternative 2	Alternative 3
Vegetation	No changes from current management activities; the levels of dwarf mistletoe will increase by 285% for Douglas-fir and 1800% for white fir by 2042. The average Stand Density Index will be about 420 by 2042.	The levels of dwarf mistletoe will be reduced by 54% for Douglas-fir and 73% for white fir by 2042. Resiliency to disturbance, stand diversity and structural complexity will be improved on 810 acres. The average Stand Density Index will be about 271 by 2042.	The levels of dwarf mistletoe will be increased by 103% for Douglas-fir and 764% for white fire by 2042. Resiliency to disturbance, stand diversity and structural complexity will be improved on 210 acres. The average Stand Density Index will be about 365 by 2042.
Fuels	No changes from current management activities; there will be no improvement to the defensibility to the municipal watershed or the community of Sawyers Bar; there will be 0 acres or miles of improved control features. Fuel loading will be 44 tons per acre in 2042.	The defensibility will be improved for the municipal watershed and the community of Sawyers Bar. There will 435 acres of improved control features and 15 miles of roads receiving roadside fuels treatments. Fuel loading will be 31 tons per acre in 2042.	The defensibility will be improved for the municipal watershed and the community of Sawyers Bar. There will 465 acres of improved control features and 15 miles of roads receiving roadside fuels treatments. Fuel loading will be 40 tons per acre in 2042.

Resource	Alternative 1	Alternative 2	Alternative 3
Wildlife	No changes from current management activities; Northern spotted owl: There will be a reduction in stand resiliency, species diversity and structural complexity in the project area over the long-term (greater than 20 years). Pacific fisher: Habitat connectivity will remain high (excluding portions of the Olsen Creek Watershed); home range potential will remain unchanged.	Northern spotted owl: There will be 535 acres of foraging habitat removed or downgraded; there will be 810 acres of long-term stand improvements (increased resiliency to disturbance, species diversity and stand complexity). Pacific fisher: Habitat connectivity will remain high (excluding portions of the Olsen Creek Watershed); home range potential will remain unchanged.	Northern spotted owl: There will be zero acres of foraging habitat removed or downgraded; there will be 210 acres of long-term stand improvements (increased resiliency to disturbance, species diversity and stand complexity). Pacific fisher: Habitat connectivity will remain high (excluding portions of the Olsen Creek Watershed); home range potential will remain unchanged.
Fish	No changes from current management activities; there will be no effect to fish habitat.	Sediment producing activities will be at least 2 miles away from fish habitat. The alternative is not likely to adversely affect fish.	Same as alternative 2.
Botany	No changes from current management activities; there are no Threatened or Endangered plants in the project area. There will be no effect to Sensitive plant species in the project area.	The alternative may affect individual (Sensitive plants) but is not likely to result in a trend towards Federal listing.	Same as alternative 2.
Non-Native Invasive Species	No changes from current management activities; there is a low risk of weed introduction and spread.	The risk of weed introduction and spread will remain low with implementation of project design features.	Same as alternative 2.
Geology	No changes from current management activities; there is a moderate landslide risk in Eddy Gulch and a high landslide risk in Olsen Creek, Shiltos Creek and Jessups Gulch.	The cumulative watershed effects model (GEO) will increase in Jessups Gulch by 8%; the landslide risk will not increase.	The cumulative watershed effects model (GEO) will increase in Jessups Gulch by 2%; the landslide risk will not increase.
Air Quality	No changes from current management activities; there will be no criteria pollutants or greenhouse gases emitted.	There will be about 19 tons/year of nitrogen oxides emitted; this is in compliance with the Conformity Rule and the Clean Air Act; and 20,300 metric tons of greenhouse gas emissions.	There will be about 15 tons/year of nitrogen oxides emitted; this is in compliance with the Conformity Rule and the Clean Air Act; and 15,900 metric tons of greenhouse gas emissions.
Soils	No changes from current management activities; 88% of the analysis area has undisturbed soils.	The estimated percent of the treatment area not meeting desired conditions for soil stability, soil organic matter, and soil structure is 2.3%, 4.4%, and 2.1%, respectively.	The estimated percent of the treatment area not meeting desired conditions for soil stability, soil organic matter, and soil structure is 1.1%, 2.1%, and 1.0%, respectively.

Resource	Alternative 1	Alternative 2	Alternative 3
Water Quality	No changes from current management activities; decrease in stand health will impact riparian reserve function.	There will be 60 acres of riparian reserve commercially treated. Shade and stream temperature will not be reduced in the short term; treatments will increase stand health within the riparian reserve in the long term.	There will be no riparian reserves commercially treated. Shade and stream temperature will not be reduced in the short term.
Society and Culture	No changes from current management activities. Safety for community residents, firefighters, forest workers and visitors will continue to be a concern in the event of wildfire.	Positive effects of creation of 73 jobs with no unequal distribution among racial and ethnic groups or older residents; no effect to civil rights or environmental justice. Safety will be improved by roadside and ridgetop treatments.	Positive effects of creation of 17 jobs with no unequal distribution among racial and ethnic groups or older residents; no effect to civil rights or environmental justice. Safety will be improved by roadside and ridgetop treatments.
Economics	No changes from current management activities; no jobs will be created and there will be no costs or benefits from management activities.	73 jobs created; about $1.5 million of timber to market.	17 jobs created; about $500,000 of timber to market.
Scenery and Recreation	No changes from current management activities; there will be no scenic disturbances in the short term but may be negative impacts from tree mortality in the long term.	The scenic character will not be impacted and visual quality objectives will be met. The scenic integrity of the Salmon River as a Wild and Scenic River will be maintained.	Same as alternative 2.
Cultural Resources	No changes from current management activities; no negative effects expected.	Potential effects to cultural resources from activities on 1,960 acres. No actual negative effects will occur.	Potential effects to cultural resources from activities on 1,505 acres. No actual negative effects will occur.

Chapter 3: Affected Environment and Environmental Consequences

This chapter summarizes the physical, biological, social and economic environments that may be affected by the proposed action and alternatives on the environment (affected environment) and the effects on that environment that will result from implementation of alternatives (environmental consequences). It also presents the scientific and analytical basis for the comparison of alternatives presented in Chapter 2.

Analysis methods are discussed for each resource, followed by a description of the affected environment. The affected environment section describes the existing, or baseline condition against which environmental effects are evaluated and from which progress toward the desired condition can be measured (represented by the "no action" alternative). The environmental consequences section discusses the potential effects to the resource associated with the implementation of each alternative. This forms the scientific and analytic basis for comparison of the alternatives, including the modified proposed action. This section discloses direct, indirect, and cumulative effects on the resource and discusses the potential for significance of these effects. Effects are quantified where possible; qualitative discussions are included where appropriate. The proposed action and one action alternative (hereafter grouped as action alternatives) include the project design features which were developed to minimize negative effects. Therefore, the effects of the action alternatives are analyzed based on design features being in place.

Effects are defined as (1) direct effects that are caused by an action and occur at the same place and time as the action; (2) indirect effects that are caused by an action but are later in time, or removed in distance, from the action; and (3) cumulative effects that result from the incremental impact of an action when added to other past, present, and reasonably foreseeable future actions, regardless of what agency or person undertakes such actions. Direct and indirect effects of an action are often discussed together.

Cumulative effects are discussed separately. They can result from individually minor, but collectively significant, actions taking place over a period of time. Past, present, and reasonably foreseeable future actions are assessed along with the effects of the proposed action and alternatives to determine whether significant cumulative effects may occur.

This analysis is consistent with the CEQ memorandum (CEQ, 2005) which is incorporated by reference and states: "…agencies can conduct an adequate cumulative effects analysis by focusing on the current aggregate effects of past actions without delving into the historical details of individual past actions." Past actions are treated similarly in the recently published Forest Service direction for implementing NEPA (Forest Service Handbook (FSH) 1909.15, 15.1). For these reasons, the analysis of past actions in this final environmental impact statement is based on current environmental

conditions (affected environment). The cumulative effects analysis in this final environmental impact statement is also consistent with Forest Service NEPA Regulations (36 CFR 220.4(f)) that state, in part:

CEQ regulations do not require the consideration of the individual effects of all past actions to determine the present effects of past actions. Once the agency has identified those present effects of past actions that warrant consideration, the agency assesses the extent that the effects of the proposal for agency action or its alternatives will add to, modify, or mitigate those effects. The final analysis documents an agency assessment of the cumulative effects of the actions considered (including past, present, and reasonably foreseeable future actions) on the affected environment. With respect to past actions, during the scoping process and subsequent preparation of the analysis, the agency must determine what information regarding past actions is useful and relevant to the required analysis of cumulative effects.

Cataloging past actions and specific information about the direct and indirect effects of their design and implementation could in some contexts be useful to predict the cumulative effects of the proposal. The CEQ regulations, however, do not require agencies to catalogue or exhaustively list and analyze all individual past actions. Simply because information about past actions may be available or obtained with reasonable effort does not mean that it is relevant and necessary to inform decision-making (40 CFR 1508.7).

Analysis areas for determining environmental effects vary by resource, as do the other actions included in each cumulative effects analysis. Cumulative effects in an analysis area may include estimated effects from past, present, and reasonably foreseeable future private or public vegetation treatments, road construction, grazing, and wildfire suppression or lack of same. A list of such potential actions is included in appendix C of this document.

Separate resource reports provide background for the analysis summarized in this final environmental impact statement. These reports use resource data housed in the geographic information system (GIS) and other relevant sources. The reports are summarized in this chapter and incorporated by reference; they are available on the project website.

3.1 Vegetation

3.1.1 Analysis Indicators and Methodology

Field data were collected from proposed harvest units during the fall of 2011 and summer of 2012 by a two person inventory crew. A silviculturist completed stand diagnosis and developed site-specific prescriptions. Stand dynamics are modeled using the Forest Vegetation Simulator. The modeled results from Forest Vegetation Simulator are not intended to be absolute values; rather they display relative trends in stand development

after a prescribed treatment or no treatment. The model is run for the general treatment across a stand. While the outputs are developed from actual stand data, they represent averages of the stand and do not necessarily display the within-stand variability. The methodology is described in detail in the Silviculture Report, incorporated by reference and available on the project website.

3.1.2 Analysis Indicators

- Stand structure is represented by (1) the average size of trees, and (2) the number or percentage of "large" trees in a stand. To illustrate the change in stand structure with or without treatment, the analysis of the average size of trees uses Quadratic Mean Diameter, the diameter of the tree of average basal area in the stand. Stand structure measured by the number or percentage of "large" trees in a stand addresses concerns raised by the public regarding retention of "large" trees. Although there are various tree diameters discussed in literature relative to what defines a large tree, this project uses 26 inches dbh as recommended by the U.S. Fish and Wildlife Service (USDI 2009, page 49). Stand structure also includes the number of snags and coarse wood component of a stand; both of these are related to tree mortality.
- Stand Density is measured by the Stand Density Index which is a relative measure of stocking levels. Stand density affects stand health and the ability of trees to respond to disturbance. Although Stand Density Index is species-specific, it can be generally categorized for each stand as low density (0-24 percent of Stand Density Index maximum), moderate density (25 percent to 34 percent of Stand Density Index maximum), high density (35 percent to 55 percent of Stand Density Index maximum) or extremely high density (greater than 55 percent of Stand Density Index maximum). Once a stand reaches high density tree diameter growth declines. Extremely high density stands have high mortality of trees induced by active competition with other trees. Mortality related to density will have the greatest effect on the intermediate and suppressed trees. Trees heavily infected with mistletoe will prematurely die.
- Forest health is primarily represented by maintaining an endemic level of disease. This is measured by amount of dwarf mistletoe infection, quantified as number of trees infected with mistletoe per acre, as modeled. Although dwarf mistletoe is an endemic disease which is always present to some degree in conifer forests, an epidemic level of dwarf mistletoe indicates that the forest health is compromised and there is a reduction in resiliency to disturbance. Dwarf mistletoe is a host-specific parasitic seed plant. Evidence of mistletoe infection is found in the major conifer species that are present in the project area (Douglas-fir, white fir, incense cedar, ponderosa pine, sugar pine, and red fir) which is an indicator that several different dwarf mistletoe species are present at epidemic rates (see Table 1-2 in Section 1.2 and USDA Forest Service 2013a). Dwarf mistletoe is completely dependent on its host for support, including all water and nutrients. The pathological results of dwarf mistletoe infection are seen as reductions in reproduction, growth, and longevity in host trees. The nature and magnitude of these effects are determined by the mistletoe and host species involved, infestation

severity and vigor of the host (Geils and Hawksworth, 2002). Forest health is also measured by the amount of dead vegetation in a stand. Stands with larger amounts of dead vegetation are less resilient to disturbances including wildfires as well as insects and disease. Fuel loading trends through time are a metric of stand health. Tree mortality can increase ground fuel loading which can decrease the resilience of the stand to wildfire.

- Species Composition is measured by the different species (or types) of trees that exist in an area. Historically, much of the project area was pine-dominated, both by ponderosa and sugar pine, with sugar pine being the dominant species. Some stands were also historically Douglas-fir dominated. White fir now occupies the majority position primarily due to past partial-cutting practices and exclusion of natural wildfires. The effects of project alternatives are measured by the maintenance or change in species composition in the treatment area (whether or how much the alternative moves the treatment area toward a historic range of species composition).

3.1.3 Spatial and Temporal Context

Spatial bounding for direct and indirect effects will be limited to the treatment units within the project area because stand structure and density, species composition and forest health defined as an endemic level of disease will be evident primarily in treatment areas. Harvest prescriptions and subsequent analysis are applied specifically to the stands designated as units. The analysis is completed at the timber unit scale and averaged for the treatment area. While trees can be affected by conditions that occur at the landscape level, for example, an insect epidemic, they are most substantially affected by what occurs within tens of feet from their current location. The cumulative effects analysis area for forest health includes the project area and adjacent areas for which treatments may affect the treatment units. Short-term temporal bounding includes effects within ten years. Long-term temporal bounding for effects extends out to 30 years following inventory conditions (2012). Treatments are projected in the years 2014 and 2015 with post- treatment analysis ending in the year 2042.

3.1.4 Affected Environment

All stands proposed for treatment have been harvested at least once to three times dating from ten to more than 50 years ago. Fire suppression beginning in the 1920s in the Salmon River drainage has allowed the development of second and third stories of vegetation within historically more open stands. Partial harvest encouraged regeneration of openings and development of understory trees to produce uneven-aged conditions. Past regeneration harvest units were planted to ponderosa and Jeffrey pine that are now eight to 20 inches in diameter at breast height; smaller inclusions of naturally regenerated white fir, incense-cedar and Douglas-fir also populate these units. The current high stand density of these pine stands has resulted in mortality from pine beetles. The Jess project area overlaps some of the prescribed underburning units from the 2000 Glassups Timber Sale.

This underburning has caused mortality pockets in Jess project Units 112 and 117 and a clean, “park-like” understory in most of Unit 112.

Vegetation varies due to widely varying composition and condition of soils. There are old slump deposits with deep, productive soils in some units, and less developed, more skeletal soils in units that are dominated by live oak and huckleberry oak. There are talus, rocky slopes and some boulder fields. A dry meadow bordered by well stocked 100 year-old Douglas-fir exists in Unit 121. Unit 115 has an inclusion of fire-adapted Brewer oak on a rocky ridge. There is a wet meadow within Unit 107.

Stand density, species composition, and stand structure (tree sizes, species and ages) are all highly variable within each unit, with the exception of the planted pine stands. In terms of stand structure, the average of the current quadratic mean diameter of the units being proposed for commercial harvest is 11.7 inches. In terms of stand density, basal areas range from zero square feet to more than 400 square feet per acre with stand density indices of greater than 55 percent of Stand Density Index, which affects the ability of trees to respond to disturbance. Forest health is compromised by epidemic levels of disease due to dwarf mistletoe infestation. Fuel loadings in treatment areas are currently low, due to recent management activities including the Glassups Timber Sale and underburn.

Currently, there is an average of 12 dwarf mistletoe-infected trees per acre in the project stands proposed for treatment. Openings created by skid trails, harvest of large old trees and mortality from insects or disease result in variable tree densities and crown closures which largely influence stand structure and average tree size. In terms of species composition, hardwoods range from large live oak with scattered conifers to patches of black oak, madrone and chinquapin that are overtopped by conifers including Douglas-fir, white fire, red fir, incense-cedar, ponderosa pine, and sugar pine.

In August of 2014, the Whites Fire, part of the July Complex, resulted in fire suppression activities within the Jess Project boundary. Contingency lines were constructed on key ridges that impacted the following units proposed for commercial harvest: 105, 102, 112, 110, 111, 113, 122, 129, 137, 101, and 116. Stand structure was affected slightly in those areas where vegetation was removed. The amendment to the Silviculture Report can be found in the project record and summarizes which units require an addition to the original prescription and what the prescribed course of action will be in order to mitigate for the construction of contingency lines.

3.1.5 Environmental Effects

Alternative 1

Direct and Indirect Effects

In Alternative 1, no direct effects to vegetation will occur but there are numerous indirect effects. Long-term effects to stand structure will include an increase in the diameter of

trees; by 2042, the average quadratic mean diameter will be 19.1 inches. This change in diameter is primarily from the mortality of small diameter trees due to competition and to infestation of insects and diseases, not to the growth of trees in the stands. This alternative has the highest number of trees per acre greater than 26 inch dbh compared to the other alternatives in 2022 because these trees will not be directly removed. However, the modeling shows a fivefold increase in trees greater than 26”dbh that are likely to die over the next thirty years if left untreated. So over the long-term, there will be fewer trees greater than 26 inch dbh in the project area if left untreated.

Stand density, and density-related mortality in all size classes will continue with most of the stands having a Stand Density Index greater than 55 percent of maximum. Increased competition for sunlight, nutrients and water leads to reduced tree growth, increased susceptibility to insects and disease and eventually to mortality. Density-induced mortality will continue unabated for the next 30 years.

In terms of forest health, disease levels of dwarf mistletoe will continue to increase and will add to the density-related mortality that is occurring. In just seven years, trees per acre infected by mistletoe will increase from 12 to 17.9 if this alternative is implemented.

Increasing disease levels also reduces growth rates of infected trees and will diminish the number of trees that will reach larger diameters before they die. Large trees will die and the smaller, younger trees will not grow to become large because of the heavy dwarf mistletoe infection. Small-tree mortality will increase the amount of dead vegetation. In terms of species composition, the prevalence of historically dominant species, ponderosa and sugar pine, will continue to decline for two reasons. First, there will be fewer pine seed trees remaining to contribute to reforesting those species. Second, white fir (a shade-tolerant tree) will repopulate the continually-occurring small openings resulting from tree mortality as has been happening for several decades. Hardwood presence will also continue to decline as conifers continue to overtop them and eventually shade them out of the stands.

Without treatment, there will likely be an increase in fuel loading from increased mortality of mid to late-seral trees and an increase in the snag component, particularly of larger diameter trees infected with mistletoe and blister rust. Infected understory trees will also succumb to their diseases, and likely at an accelerated rate if drought conditions and overstocking persist. Hardwoods in tree form will be less prevalent on the landscape as they are shaded out by conifers, and conifer species diversity will be reduced as the more shade-tolerant white fir will continue to dominate stands. Canopy structure will be lacking in many stands and the next generation of mid-seral trees will be at a disadvantage for achieving size and contributing to future canopy structure. Overall, forest health will continue to diminish and stand conditions will be receptive to stand replacing wildfire, especially as drought conditions persist and the ability for stands to be resilient are compromised.

Cumulative Effects

Cumulative effects of Alternative 1 include the indirect effects mentioned above combined with the effects of other projects in the area. The Glassups Timber Sale underburn overlaps the spatial bounds of the Jess project and the Eddy Late Successional Reserve Habitat Restoration project is adjacent to numerous treatment units. The combined effects of Alternative 1 and the underburning accomplished in the Glassups Timber Sale will not substantially affect stand health of the Jess project area. Similarly, adding the effects of the Eddy project to the effects of no treatments in the Jess project and treatment area will not substantially affect forest health in the Jess area. Taking no action within the Jess project, when combined with the effects of the treatments in the Eddy Late Successional Reserve Habitat Restoration project, will not produce substantial cumulative effects on forest health in the Jess treatment or project area.

Alternative 2

Direct and Indirect Effects

The proposed treatment in this alternative results in accelerating average quadratic mean diameter growth across the stands by 10 percent over the 30-year projection period resulting in maintenance of a large tree component on the landscape. Although removal of trees across all diameters is prescribed, the trees retained in most stands are able to take advantage of the reduced competition and match or exceed the predicted growth in Alternative 1 without the excess accumulation of fuel loading associated with natural mortality. In less than ten years after treatment, the modeling indicates there will be an equal number of trees with greater than 26” dbh compared to current condition. The reduction in disease throughout treatment units is also substantiated as the modeling shows a fivefold increase in trees with greater than 26”dbh that are likely to die over the next 30 years if left untreated.

Stand density, measured by Stand Density Index, is decreased by an average of 35 percent across all stands. One third of the stands will remain below density-induced mortality levels for the next 30 years and the remaining stands will be below those levels for at least 20 years prior to additional treatments being needed.

There will be a reduction in mistletoe infection in all treated stands. Overall, an average of 54 percent reduction in Douglas-fir infections and 73 percent reduction in white fir infections are predicted at the end of the 30-year period. This reduction improves the quality of forest health by promoting survival and longevity of understory species and restoring endemic levels of mistletoe infestation in the treatment area.

Reducing stand densities and removal of diseased and dying trees will reduce the levels of mortality and limit future recruitment of snags and downed logs. However, the strategic location of treatment units provides many acres of untreated stands on the landscape that will continue to provide these essential ecosystem components. With a reduction in stand

density, there is less competition for resources, resulting in increased growth and vigor of the trees that remain. Removal of severely mistletoe-infected trees in the overstory will reduce the spread of infection to uninfected trees. Removal of trees from these stands also results in a 30 percent reduction in future dead vegetation.

Species composition is affected by prescribing retention of historically-dominant species and by planting openings with rust-resistant sugar pine, where appropriate. In Units 105, 108, 109, 110, 111, 112 and 113, mapped as historically sugar pine dominant (Wieslander 1935, digitized according to Thorne et al. 2008) modeling shows increases in the pine component following treatment. Qualitative interpretation of the prescriptions, in conjunction with the trends indicated in the model, shows that the species composition will shift towards historic range of variability over time, restoring more fire-resilient and drought-tolerant species. Douglas-fir is also mapped as a historically dominant species in stands that are currently dominated by white fir or planted with pine. With the exception of units where Douglas-fir is heavily infested with dwarf mistletoe, proposed treatments modeled in Forest Vegetation Simulator show increased prevalence of Douglas-fir at the end of the 30-year period. In several stands and across the landscape, the hardwood component is diminishing; this is true primarily for hardwoods greater than eight inches dbh. Prescriptions in several stands will retain hardwoods that will persist over time and restore the function of these limited hardwood ecosystems.

It is reasonable to expect that within 30 years of treatment, stand composition would have a variety of ages and diameter classes of healthy, vigorous, relatively disease-free trees.

There would be widely spaced, fire- resistant pines and other large diameter trees with interspersed gaps present on the landscape. Additionally, the hardwood component would be enhanced through the reduction of competition from overstory conifers. Canopy cover and canopy openings would be representative of historic conditions on the upper third of slopes. Mid canopy and understory trees will consist of vigorous, mistletoe-free conifers and include a variety of species including incense cedar, Douglas-fir, sugar pine, ponderosa pine and white fir. Overstory species will be diverse with some mistletoe present, but overall in vigorous form. Spacing between trees throughout stands will be varied and include clusters of vigorous, large diameter trees, patches of dense stands, and areas of widely spaced trees to represent the mosaic-like historic condition across the landscape. Smaller diameter understory trees will be thinned at a spacing to optimize their ability to grow into mid-canopy level trees.

Cumulative Effects

The direct and indirect effects when combined with the effects of the Glassups Timber Sale underburn and Eddy Gulch LSR Habitat Restoration project will create a landscape with increased vegetative health and vigor. Treatment units are placed such that over time, and immediately following treatment, dead vegetation will be reduced and unintentional

wildfire spread will be minimized. Restoration will be initiated by setting stands on a trajectory to increase growth, retain species diversity, and increase resilience to natural and human-caused disturbances such as insects and disease.

Alternative 3

Direct and Indirect Effects

Alternative 3 results in accelerating average quadratic mean diameter of trees within treatment units by 2.7 percent by the end of the 30-year modeling period. This represents a small gain in maintenance of a large tree component in isolated patches across the landscape. Average stand density is reduced by 11.9 percent, allowing trees greater capacity to respond to disturbance agents. The number of trees with greater than 26 inches dbh in 2022 will be between the number in Alternative 1 and Alternative 2. The stands that will be treated in Alternative 3 will have an equal number of trees with greater than 26 inches dbh. In the stands that are left untreated, the trees with greater than 26 inches dbh are more likely to die than in the stands that are treated.

Much of the landscape will continue to have elevated levels of mistletoe infection which will continue to diminish tree vigor and growth. Overall, stand averages under Alternative 3 show a 103 percent increase in mistletoe in Douglas-fir and a 764 percent increase in mistletoe in white fir with related increased tree mortality. Accumulated dead vegetation will be decreased by 10 percent over 30 years. Species composition will be affected minimally since most units that are focused on restoring historically-dominant species will not be treated under Alternative 3. Hardwoods will continue to be overtopped by conifer species and sugar pine will not be restored to historic levels of prevalence.

Cumulative Effects

The direct and indirect effects when combined with the effects of the Glassups Timber Sale underburn and Eddy Late Successional Reserve Habitat Restoration project will create a landscape with somewhat increased vegetative health and vigor. Treatment units are placed such that, immediately following treatment and over time, a minor amount of dead vegetation will be reduced and unintentional wildfire spread will be minimized. The integrity of the strategic placement of units will be reduced by limiting vegetative treatments to the roadside strips. Restoration will be minimally achieved. Eleven stands would be set on a trajectory to increase growth, retain species diversity, and increase resilience to natural and human-caused disturbances such as insects and disease. The remaining untreated stands will continue to incur mortality due to stand density and dwarf mistletoe infection will not be reduced.

Summary of Effects

Effects on vegetation from each of the alternatives 30-years after treatment are shown in Table 3-1.

Table 3-1. Summary of effects on vegetation analysis indicators by alternative.

Analysis Indicator	Unit of measure	Alternative 1	Alternative 2	Alternative 3
Stand Structure after 30 years	Average % increase in Quadratic Mean Diameter	0%	10%	2.7%
Stand Structure after 10 years	Average # of trees per acre >26 inch dbh	17.9	11.9	15.8
Stand Density after 30 years	Average Stand Density Index	420.3	271.5	356.9
Forest Health after 30 years	% increase or decrease of trees per acre infected with dwarf mistletoe	Douglas-fir +285% White fir +1,800%	Douglas-fir -54% White fir -73%	Douglas-fir+103% White fir +764%
Species Composition after 30 years	Acres treated to encourage historic tree species composition	0	810	225

3.1.6 Compliance with Law, Policy, Regulation, and the Forest Plan

Action alternatives comply with law, policy, regulation and the Forest Plan in regard to effects to vegetation. Prescriptions (in appendix B of the Vegetation (Silviculture) Resource Report) comply with the Forest Plan and the National Forest Management Act as described in the Vegetation Management forest-wide and management area goals, standards and guidelines. Alternative 1 does not fully meet management goals to maintain stand health or resilience to insect and disease as well as the action alternatives in the long term. Alternative 2 will lead to meeting management goals for stand health on treated acres. Alternative 3 will meet goals on a smaller number of acres than Alternative 2. See the Forest Plan Consistency Checklist for additional information on compliance with the Forest Plan.

3.2 Fuels and Fire

3.2.1 Analysis Indicators and Methodology

The focus of this analysis is on the ability to defend the project area against wildfire and protect the nearby community and the municipal watershed. Defensibility against wildfire was measured using two components. The first is fire behavior which is broken into two measures: (1) flame length; and (2) rate of spread of the fire. Fire behavior was modeled using the BehavePlus fire model. The output is a measure of fire behavior (fuel model) that represents an average flame length and rate of spread of a wildfire given stand conditions. The combination of flame length and rate of spread can be used to define a fire behavior as being very low, low, moderate, high and very high, as shown in Table 3-2.

Any fire behavior above moderate has a decreased defensibility because wildfires cannot be attacked safely using direct methods completed by hand crews.

Table 3-2. Qualitative assessment of fire behavior based on rate of spread and flame length.

Fire Behavior	Rate of Spread (chains/hour)	Flame Length (feet)
Very Low	0-2	0-1
Low	2-5	1-4
Moderate	5-20	4-8
High	20-50	8-12
Very High	50-150	12-25
Extreme	>150	>25

The second indicator is fire risk (the probability of a wildfire occurring in the project area); this is based on historic fire records and measured by fire return intervals. Fire risk is influenced by the amount of fuel (usually dead or dying vegetation) in the project area. Tree mortality and the associated fuel loading are discussed in Section 3.1.1.

3.2.2 Spatial and Temporal Context

The analysis area is the project area plus adjacent 7th field watersheds to encompass the potential for wildfires to come from outside the project area boundary. The short term effects are three to five years because effects of treatments are visible in that time frame. Long term effects are from five to 20 years.

3.2.3 Affected Environment

The community of Sawyers Bar, California is a community at risk to wildfire as discussed in the Sawyers Bar Community Wildfire Protection Plan (Salmon River Watershed Restoration Council, 2004). Access to routes for people leaving the area if wildfire occurs (egress) and for firefighters entering the area (ingress) is listed as a risk due to the high fuel loading along the escape routes (Salmon River Watershed Restoration Council, 2004, pg. 9). Jessups Gulch (the municipal watershed) is designated as being at risk from wildfire by the Community Wildfire Protection Plan (Salmon River Watershed Restoration Council, 2004, pg. 9) and is considered a high value resource (Salmon River Watershed Restoration Council, 2004, pg. 11).

Approximately 1,570 acres have burned within the project boundary during the period for which records have been kept (since 1925); no wildfire has occurred since 1987. Forty-three fire starts have occurred since 1925 and 15 fires have started in a 30 year span (1976-2006). Approximately one fire start has occurred per two years on average. Forty percent of the fire starts have been human-caused. The mean historic fire return interval within the project boundary has ranged from approximately ten years to 55 years,

depending on biophysical setting. As depicted in Table 3-3, approximately 99 percent of the landscape supported vegetation at or below a 30-year fire return interval.

Table 3-3. Acres of project area in fire return intervals.

Historic Fire Return Interval	Acres
Less than 16 years	3,452
16 to 30 years	4,282
More than 30 years	75

About 75 percent of the project area would support flame lengths of less than four feet. This includes approximately 43 percent of the units (units with trees greater than ten inches in diameter at breast height that are identified as potentially commercial harvest units) are modeled as having flame lengths less than four feet and a low rate of fire spread (less than five chains per hour). Fire behavior is characterized as low in these areas. Thirty seven percent of similar units are modeled as having flame lengths at about five feet, a rate of spread about eight chains per hour, and moderate fire behavior. A majority of the remaining similar units are modeled as having slightly longer flame lengths and rates of fire spread but also moderate fire behavior. Fuel loading is within desired conditions throughout most of the project area.

There are several natural and manmade fuel breaks along the ridges of the Jessups Gulch watershed. Many of the manmade features were built during the 1987 wildfire season.

These features are in various stages of maintenance. The fuel break identified as Unit 140 in the alternatives has had recent maintenance and is currently in fully-functioning condition. Other areas have had some ladder fuel accumulation and are in need of treatment to be used efficiently during a wildfire.

During the summer of 2014 the Whites fire occurred in the North Fork drainage of the Salmon River. This fire did not enter into the Jess project area. Although the wildfire did not enter the project area some contingency suppression activities did take place in and around the project (See Figure B-5 in Appendix B). Contingency lines were strategically placed based on similar criteria (i.e., flame length/rates of spread and fire history) to the strategic placement of the Jess proposed fuel breaks and activity fuels treatments. In total the contingency line within project boundary was 8.7 miles (See Figure B-5 in Appendix B). Overall the contingency line added to estimated tons per acre of slash yet did not change the designated fuel model for any of the units. The contingency line has been re-habilitated under the suppression team’s repair plan and will have no substantial effects on fuels treatments. The Whites fire itself occurred outside of but adjacent to the project area, reducing fuels and therefore affecting fire behavior spreading into the project area. (USDA 2014)

3.2.4 Environmental Effects

Alternative 1

Direct and Indirect Effects

Under Alternative 1, no management activities are planned. As noted in Section 3.1.4, fuels will continue to accumulate due to mortality resulting from insect infestation and disease attacks. In the long-term, increased fuel loading will create a condition that will increase fire behavior in the event of an ignition; this decreases the probability of rapid suppression of a wildfire and increases the risk to the community of Sawyers Bar and the municipal watershed. By 2022, 37 percent of the modeled units will exhibit flame lengths less than four feet and a rate of fire spread less than five chains per hour (low fire behavior). By 2032, only 14 percent of the modeled units will exhibit these characteristics. The modeled units move toward moderate fire behavior with this alternative. Tree mortality due to stand health issues such as epidemic dwarf mistletoe rates, high stand density, and drought will increase snags and fuel loading. This decreases the defensibility of the project area due to the increased overhead hazard and fire behavior over the next 30 years.

Surface and ladder fuels will continue to accumulate and hazard trees will remain on ridgetops; this will increase flame lengths and rate of spread of wildfire along the ridges of Jessups Gulch. Access into and out of the project area will continue to be at risk because of high fuel loading along the routes. The existing fuel break in Unit 140 has sparse ladder fuels and light fuel loading; however, flame lengths and rates of spread will increase if this fuel break is not maintained for more than five years. Features such as ladder fuels and concentrations of brush on other fuel breaks will continue to accumulate hazardous fuels; the fuel breaks will become less effective at modifying fire behavior.

Cumulative Effects

The Salmon Salvage project, Eddy Late Successional Reserve project, and underburning in the Glassups project are within or in adjacent watersheds. Therefore, the effects of these projects are added to the effects of Alternative 1 to disclose cumulative effects. The Salmon Salvage project will have little effect on fire behavior and adding the effects of that project to the effects of Alternative 1 in Jess will not have any cumulative effect on the fuels behavior in the Jess project. The Eddy Gulch LSR Habitat Restoration project, adjacent to the Jess project area, is designed to reduce fuels on more than 25,000 acres. This will reduce the fire hazard in the affected analysis area surrounding Jess and will reduce the risk of wildfire moving through the Eddy Gulch LSR Habitat Restoration project area and into the Jess project area. However, adding the effects of Eddy to the effects of taking no action on Jess (Alternative 1) will result in no additional beneficial effects to the Jess project area. Adding the effects of Glassups Timber Sale underburning to the effects of Alternative 1 will have a minor effect on reducing fire behavior in Jess project area. The Westside Fire Recovery Project includes strategic ridgetop fuels

treatments and roadside fuels treatments along ridgelines that could have effects to the defensibility of the Jess project area. These treatments will enhance future fire management activities including fire suppression and prescribed fire. Treatments also include expanding ingress/egress routes in the Westside Fire Recovery Project area.

Alternative 2

Direct and Indirect Effects

Alternative 2 will have some effects over time (30 years) in reducing fire behavior. The modeling of units shows a trend toward increased brush between harvest and 2022. Some of this modeled brush will in fact be small seedlings regenerating in the openings created by treatment. The fire behavior for conifer seedlings is not the same as for dormant brush. These regenerated conifer stands often have higher live fuel moistures than brush fields and as a result will have lower flame lengths and rates of spread. This makes it more likely to experience low/moderate fire behavior and it will be easier to fight safely and effectively than brush patches. The patchy distribution of brush that does respond is unlikely to accelerate or change fire behavior in the project area. However, if the brush response does become continuous and modify fire behavior, treatments will be implemented to mitigate the risk (see Section 2.2.2). Flame lengths are expected to be less than four feet and elevated rates of spread will be limited to these patches.

Fuels treatments (acres on which prescribed fire is introduced and acres of other treatments that reduce fuels) will provide control lines, anchor points and safety zones for fire fighters. Ridgetop and roadside fuels treatments will rearrange surface and ladder fuels; this rearrangement is intended to slow the rate of fire spread and decrease flame lengths. The ridgetop and roadside fuels treatments will improve the effectiveness and safety of fighting wildfires. The removal of trees likely to prematurely succumb to the stresses of dwarf mistletoe infection, stand density and drought will mitigate snag creation making direct attack of a wildfire safer and more likely. There will also be a 30 percent reduction in ground fuel accumulation thereby maintaining the desired fuels condition for a longer period of time.

The fire behavior will be low for the 380 acres of the modeled units. The remaining 430 acres of modeled units are likely to experience moderate fire behavior overall; ladder and crown fuels will be reduced through thinning of the stands. The reduction of surface fuels will reduce the potential flame lengths within the proposed treatment areas. Combined with the raising of the canopy base heights by reducing ladder fuels, this will reduce the ability of fire to transition into a crown fire. As a result, anticipated flame lengths and rates of spread in treated units will be reduced.

Cumulative Effects

The Salmon Salvage project, Eddy Gulch Late Successional Reserve Habitat Restoration project and Glassups underburning are within the Jess project area or in an adjacent watershed. Therefore, the effects of these projects are added to the effects of Alternative 2 to disclose cumulative effects. The Salmon Salvage project will have little effect on reducing fuel hazards and adding the effects of that project to the effects of Alternative 2 in Jess will have only a minor cumulative effect on the fire behavior in the Jess project area. The Eddy Gulch LSR Habitat Restoration project, adjacent to the Jess project area, is designed to reduce fuels on more than 25,000 acres. This will reduce the fire behavior and increase defensibility in the affected analysis area surrounding Jess and will reduce the risk of wildfire moving through the Eddy Gulch Late Successional Reserve Habitat Restoration project area and into the Jess project area. Adding the effects of Eddy Gulch Late Successional Reserve Habitat Restoration project to the effects of Alternative 2 will result in an increase in defensibility for the community of Sawyers Bar and the municipal watershed. Adding the effects of Glassups Timber Sale underburning to the effects of Alternative 2 will reduce fire behavior in the Jess project area and contribute to the project having a low fire behavior and the infrastructure needed for direct attack of wildfires by hand crews. The cumulative effects of Alternative 2 and other projects will reduce flame lengths, rates of spread, and increase defensibility against wildfire. The Westside Fire Recovery Project includes strategic ridgetop fuels treatments and roadside fuels treatments along ridgelines that could have effects to the defensibility of the Jess project area. These treatments will enhance future fire management activities including fire suppression and prescribed fire. Treatments also include expanding ingress/egress routes that will tie in to similar treatments proposed in the Jess Project area further meeting the Sawyers Bar CWPP. Adding the effects of the Westside project to those of Alternative 2 will produce positive cumulative effects to fire and fuels.

Alternative 3

Direct and Indirect Effects

The effects of Alternative 3 are similar to those of Alternative 2. The main difference is due to the reduction in commercial treatments and the increase in fuels treatments. The interpretation of the modeling is that if no treatment occurs in a commercial harvest unit planned in Alternative 2, in Alternative 3 it will have the same effects as Alternative 1. The reduction in commercial treatments means there are fewer acres with increased brush by 2022. However, by 2032 the area has a higher percent of the treatment area with high fire behavior and 12 percent of the treatment area is trending toward increased brush. In brush- related fuels, fires carry throughout the shrub layer where foliage is more flammable but this requires moderate winds, greater than eight miles per hour at mid-flame height. Fire will drop to the ground at low wind speeds or at openings in stands. A broad range of shrub conditions is covered in brush-related fuels. Fuel situations that will be considered include intermediate stands of oak brush and snow brush. There will be

more areas with increased snag densities compared to Alternative 2 but decreased compared to alternative1. Fuel loading will be reduced by 10 percent compared to that in Alternative 1.

The fire behavior (Table 3-2) will be low for about 230 acres of the commercial units with low fire behavior. The remaining 580 acres of commercial units (includes units treated in Alternative 2 but not Alternative 3) are likely to experience moderate fire behavior. The ridgetop and roadside fuels treatments will greatly improve the effectiveness and safety of fighting wildfires directly.

Cumulative Effects

The cumulative effects of adding the effects of current and reasonably foreseeable future projects to the effects of Alternative 3 are similar to those of Alternative 2. The infrastructure for direct firefighting that contributes to defensibility will be the same as in Alternative 2. However, there will be few acres treated for stand health so the fire behavior will be moderate over more area (versus low) and future fuel loading is expected to be higher; this will reduce the cumulative benefits from surrounding and adjacent treatments in the Eddy Late Successional Reserve Habitat Restoration project and the Glassups Timber Sale underburn to the project area. The Westside Fire Recovery Project includes strategic ridgetop fuels treatments and roadside fuels treatments along ridgelines that could have effects to the defensibility of the Jess project area. These treatments will enhance future fire management activities including fire suppression and prescribed fire. Treatments also include expanding ingress/egress routes that will tie in to similar treatments proposed in the Jess Project area further meeting the Sawyers Bar CWPP. Adding the effects of the Westside project to those of Alternative 3 will produce positive cumulative effects to fire and fuels.

3.2.5 Compliance with Law, Policy, Regulation, and the Forest Plan

The treatments of all action alternatives meet the Forest Plan as displayed in the Forest Plan Consistency Checklist on the project website.

The proposed fuels treatments in action alternatives were designed in part to meet the Comprehensive Strategy incorporated in the Forest Service Manual; this strategy also provides management direction for this project to which action alternatives comply.

3.3 Terrestrial Wildlife

3.3.1 Analysis Indicators and Methodology

For all terrestrial federally-listed, Forest Service Sensitive, Survey and Manage, and Management Indicator Species (MIS), analysis indicators include the effects to habitat quantified by acres affected, or to individuals if known. Species may be federally-listed as endangered, threatened, or proposed for listing; effects to these species are disclosed in

this section of the final environmental impact statement and in the Terrestrial Wildlife Biological Assessment.

Threatened and endangered species (northern spotted owl) and critical habitat

Analysis indicators for federally-listed species will be acres of nesting/roosting, foraging, and dispersal habitat maintained or improved, degraded, downgraded, and removed because the only federally-listed species in the project area is the northern spotted owl. Effects to critical habitat for the owl will also be indicated as acres of habitat affected.

Fisher (proposed for Federal listing)

Analysis indicators for the pacific fisher measure connectivity of habitat and change in home range.

Connectivity of Habitat: Connectivity will be assessed by measuring the change in gap distance between areas that provide the necessary cover to avoid predation:

1. High level of connectivity is when the average gap distance is less than 160 feet; there is sufficient habitat to provide cover for fisher, marten, and wolverine moving within a 7th field watershed.
2. Moderate connectivity is when the average gap distance is between 160 and 460 feet; there is some challenge to the species moving within a 7th field watershed and this increases the risk to mortality and requires extra expense of energy to deviate around large openings.
3. Low connectivity is when the gap distance is between 460 and 600 feet; this presents a great challenge because species are likely to shift their territory to a more contiguous placement of habitat or move through areas with little to no cover.
4. Very low connectivity is when gap distance is more than 600 feet; this represents a situation where openings exceed the gap distance that would let these species move through a 7th field watershed; risk to survival is substantially increased.

Change in Home Range: The amount of habitat existing in each 7th field watershed is assessed in its current condition. If more than 50 percent of the watershed contains denning/resting or foraging habitat, and more than 80 percent of the watershed contains denning/resting, foraging and movement habitat, the 7th field watershed contains a viable home range. If the watershed does not meet these criteria, it is assumed that the 7th field watershed does not contain a home range. The effect of a loss of a home range is difficult to estimate in terms of population viability. Habitat loss is difficult to replace and it may take many years before the area develops into habitat again. However, this analysis doesn't use true home ranges; rather, the analysis provides a metric to display the potential effects of activities. The loss of one home range may not have large effects on the population but the loss of several home ranges can result in large effects to the population.

Forest Service Sensitive, Survey and Manage, and Management Indicator Species, and for Migratory Birds

Forest Service Sensitive species are identified as such by the Pacific Southwest Regional Forester; effects to these species are disclosed in this section of the final environmental impact statement and in the Wildlife Biological Evaluation.

Analysis indicators for sensitive species will be acres of habitat maintained or improved, degraded and removed or lost. A display of habitat conditions for federally-listed and sensitive species in the project area is provided in Table 3-4 in Section 3.3.3. Management Indicator Species are identified in the Forest Plan; effects to these species are disclosed in this section of the environmental impact statement and as part of the Management Indicator Species Report, Parts I and II. Analysis indicators for Management Indicator Species will be acres of habitat maintained or improved and acres lost. For Survey and Manage species, analysis indicators will be acres of habitat maintained or improved, and acres disturbed. Information on all of these species, plus migratory birds and Survey and Manage species, and methodology used for this analysis are detailed in the Survey and Manage Compliance Review. All of these reports are incorporated by reference and are available on the project website.

3.3.2 Spatial and Temporal Context

The analysis area for effects on wildlife varies by species and reflects the area within which the species could be directly and indirectly affected by the proposed action and alternatives.

Threatened and endangered species (northern spotted owl) and critical habitat

The analysis area consists of the project area plus a distance representing a median home range in the California Klamath Province. The project area is defined by the area that contains all the proposed activities within the Whites Gulch and Olsen Creek 6th field watersheds and considers the effects of the 2014 Whites Fire in the baseline of habitats. The analysis area was established by a 1.3-mile buffer around treatment units plus all northern spotted owl home ranges that intersect the treatment unit buffers. The treatment area is the area in which actions will occur. The short-term temporal bound is the time during implementation (about 5 years). Temporal bounds for long-term effects are up to 30 years following inventory which was completed in 2012 (thus the 30-year period ends in 2042).

Fisher (proposed for Federal listing)

Connectivity of Habitat: The spatial boundary is the 7th field watersheds that overlap the project area. The fisher's average home range is 4.7 to 36 square miles, depending on whether it is male or female (USDI FWS 2014). The 7th field watersheds in the analysis area range in size from six to 13 square miles.

Change in Home Range: The spatial boundary is the potential home ranges within the 7th field watersheds that overlap the project area. The representative home ranges are separated by size (home ranges are about 5,000 acres in size) and natural division in the landscape such as ridges and streams/rivers.

The short-term temporal bound is the time during implementation (about 5 years). The long-term is more than 20 years to represent the time it takes for the treatment effects to be fully realized in stands.

Forest Service Sensitive, Survey and Manage, Management Indicator Species, and Migratory Birds:

For species with larger home ranges such as northern spotted owl and goshawk the analysis area consists of the project area plus a distance representing a median home range in the California Klamath Province. For other species, the analysis area consists of the area of potential treatment. The short-term temporal bound is the time during implementation (about 5 years). Temporal bounds for long-term effects are up to 30 years following inventory which was completed in 2012 (thus the 30-year period ends in 2042).

3.3.3 Affected Environment

Threatened and endangered species (northern spotted owl) and critical habitat

Part (11,595 acres) of Subunit KW-8 (Klamath West Modeling Region) of the northern spotted owl Critical Habitat Unit 9 is located in the Jess analysis area (USDI Fish and Wildlife Service 2011; USDI Fish and Wildlife Service 2012). The analysis area for northern spotted owl contains approximately 2,317 acres of older forest (nesting/roosting habitat), 9,618 acres of mid- seral forest (foraging habitat), 2,550 acres of open mid-seral forest (dispersal habitat), and 5,450 acres of early seral forest (non-habitat). Hardwoods are a dominant feature in the understory of all seral stages but hardwood-dependent habitat is minimal due to hardwoods being suppressed by a lack of sunlight. The highest quality suitable habitat for northern spotted owl is mostly on the lower 2/3 of the slopes; little foraging and nesting/roosting habitat exists on the upper 1/3 of slopes.

The northeast corner of the analysis area was affected by the Whites Fire in 2014. About 24 acres of nesting/roosting, 36 acres of foraging, and 143 acres of dispersal habitat were degraded by the fire but the habitat will remain functional at its pre-fire habitat type. About four acres of nesting/roosting, two acres of foraging, and 54 acres of dispersal were possibly removed by the fire. The fire didn’t enter northern spotted owl critical habitat in the analysis area. Fire suppression actions (about 13 miles of dozer and five miles of hand-line) affected northern spotted owl habitat. Approximately 18 miles of fire line were created in the analysis area during the suppression of the Whites fire. Hand-line is about 10 feet wide and dozer-line can vary in width and most of the lines that were constructed in the Jess project area were about approximately 16 feet wide. Given the

narrow width of the hand-line, hand-lines are not expected to appreciably affect northern spotted owl habitat. Dozer-line, however, typically creates openings in the canopy and removes the understory structure which lowers the quality of habitat. For analysis purposes, a 25-foot buffer (50-foot width) was used on all the dozer-lines in the analysis area to account for some uncertainty of the dozer-line width; this was overlaid on the northern spotted owl habitat layer. The analysis resulted in about 78 acres of nesting/roosting, foraging, and dispersal habitat that overlapped the dozer-line buffer. Even though the dozer lines were created along the ridge-lines where northern spotted owl habitat is not likely to be high quality and the dozer lines typically leave enough canopy cover to provide some foraging habitat value to northern spotted owls, the assumption used for this analysis is that the habitat in the dozer-lines was removed.

Most the project area contains a mix of size classes of trees, large logs and snags, and conifer and hardwood diversity but, in general, units identified for potential commercial thinning are very dense and heavily stocked with early or mid-successional trees; these stand conditions can affect current and future suitable habitat quality for northern spotted owls. Four northern spotted owl home ranges exist within the analysis area.

Fisher (proposed for Federal listing)

Connectivity of Habitat: The Olsen Creek watershed currently has moderate habitat connectivity. The watershed is a compound watershed, meaning that the watershed is on both sides of the North Fork Salmon River. Connectivity was affected by the Salmon Complex Fires (in 2013) on the north side of the river within the Olsen Creek Watershed. The high fire severity created large openings between habitat patches resulting in the northern portion of the watershed having very low connectivity. However, in the southern portion of the watershed, there are large contiguous patches of high quality habitat creating high habitat connectivity. Shiltos Creek watershed was also affected by the Salmon River Complex but it didn’t receive as much high severity fire. Despite the fire effects to the fisher habitat, the Shiltos Creek watershed has high fisher habitat connectivity. The Jessups and Eddy Gulch watersheds also have high habitat connectivity.

Change in Home Range: Both of the representative fisher home ranges analyzed in this document have more than 70 percent denning, resting, and foraging habitat and less than 10 percent non-habitat. Given this large proportion of habitat, both home ranges have the habitat proportions to be fisher home ranges.

Gray wolf

The species was added to the FWS species list for the Klamath National Forest after the GPS-collared wolf known as OR-7 dispersed from Oregon into California, but OR-7 has returned to Oregon. While OR-7’s dispersal event suggests that unmarked wolves may occur in California without our knowledge, OR-7 was the second recorded wolf in

California since 1924. OR-7 was never recorded to have interacted with potential unmarked individuals in California. Additionally, OR-7's GPS data, although limited due to time span between locations, did not cross through or near the project area. The second known wolf detection was observed near Mt Shasta >50 miles from the project area.

Although the wolf is not known to occupy the project area, the species could occur in or near the project area and not yet be detected. If a wolf were present in the project area, it would be most likely a dispersing individual. Wolves are generalist predators and if present in the project area, a wolf could find enough food to survive. Despite many reported observations of wolves in recent years made to the California Department of Fish and Wildlife, there has been no confirmed presence of the species, no den sites and no rendezvous sites recorded anywhere in or near the project area. In addition, wolves generally avoid areas of concentrated human use such as the project area. If a wolf was present in the project area, the wolf would likely not be near any project activity that may create measurable effects to the species. Therefore, we conclude the project will have "**no effect**" on the gray wolf and will not be further discussed in this document.

Forest Service Sensitive, Survey and Manage, Management Indicator Species, and Migratory Birds

Four northern goshawk territories, and approximately 11,935 acres of suitable habitat, overlap the analysis area as defined by northern spotted owl analysis area. High quality habitat is primarily limited to the lower slope positions. Two of the four territories are greater than one mile from the nearest proposed activities and will likely not be affected. One Goshawk Management Area (defined by the Forest Plan) is within the Jess project area but nesting activity has not been recorded in the management area since the late 1990s. The fourth territory has not been recorded as active since 1991; both territories within the project area will be surveyed prior to implementation.

For the American marten, about 1,492 acres of potential habitat occurs in the analysis area. For other sensitive species, such as the pallid bat, Townsend's big-eared bat, western bumble bee and fringed myotis, suitable habitat is available but no known locations occur (no sightings of individuals have been reported).

The following table provides information on the species in the analysis area, their status, and general habitat description.

Table 3-4: Federally-listed, Forest Service Sensitive, and Survey and Manage Species in or adjacent to the project area based on known occurrences.

Species	Status	Known to Occur in Analysis Area?	General Habitat Description
Northern spotted owl	Federally -listed as Threat-ened	Four 1.3-mile radius northern spotted owl home ranges overlap project area of which three 0.5-mile radius nest cores are in the project area. 2012 designated Critical Habitat is within project area.	Nests in complex forested habitats with multi-layered canopies, large overstory trees, snags, and downed wood.
Bald eagle	Forest Service Sensitive	No known nest sites, but have been observed roosting and foraging along the North Fork Salmon River.	Nests in conifer forests containing old- growth components typically within one mile of water.
Pacific fisher	Forest Service Sensitive	No known locations (den sites) but suitable habitat is present.	Same habitat as for northern spotted owl. [plus requires multiple rest sites that are often tree cavities, squirrel/raptor nests, mistletoe platforms or brush piles]
California wolverine	Forest Service Sensitive	No known locations (den sites) but suitable habitat is present.	Use meadows, forests, riparian habitats and montane chaparral; mature, structurally complex high elevation conifer and mixed conifer- hardwood forests.
Northern goshawk	Forest Service Sensitive	One Goshawk Management Area occurs within the project area; four territories within the analysis area.	Nests in dense, mature and late successional conifer forests.
American marten	Forest Service Sensitive	No known locations but suitable habitat is found above 4,500 feet in elevation.	High-elevation true fir stands; use large logs, snags and live trees for denning/resting.
Fringed myotis	Forest Service Sensitive	No known locations, but potential habitat is available in analysis area.	Utilizes a variety of arid or wooded habitats often in association with caves; will use caves, large trees, mines, buildings and bridges for roosting.
Western bumble bee	Forest Service Sensitive	No known locations but suitable habitat is present.	The species is associated with meadows and openings in forested areas. Habitat includes flowering plants for foraging and rodent burrows for nesting.
Townsend's big-eared bat	Forest Service Sensitive	No known locations but suitable habitat is present.	Uses a variety of arid and wooded habitats often in association with caves; will use caves, large trees, mines, buildings and bridges for roosting.
Pallid bat	Forest Service Sensitive	No known locations but suitable habitat is present.	Uses a variety of arid and wooded habitats often in association with caves; will use caves, large trees, mines, buildings and bridges for roosting.

Species	Status	Known to Occur in Analysis Area?	General Habitat Description
Northwest pond turtle	Forest Service Sensitive	No known locations but suitable habitat is present. Treatments are not proposed within suitable habitat.	Aquatic habitats of ponds, lakes, streams; require emergent basking sites; use adjacent terrestrial habitat for overwintering and nesting.
Willow flycatcher	Forest Service Sensitive	No known locations but suitable habitat is present. Treatments are not proposed within suitable habitat.	Nests in river valleys or lush meadows in willows or other riparian tree/shrub species.
Foothill yellow-legged frog	Forest Service Sensitive	No known locations but suitable habitat is present. Treatments are not proposed within suitable habitat.	Associated with rocky streams and are rarely found far from permanent water
Cascade frog	Forest Service Sensitive	No known locations but suitable habitat is present. Treatments are not proposed within suitable habitat.	Associated with montane aquatic habitats including lakes, small streams, and ponds.
Del Norte Salamander	Survey and Manage	Known locations in project area. Protection buffers for known sites will be used.	Associated with older forest with high amount of canopy closure with cool, moist microclimate and rocky cobble size substrate
Hooded Lacetooth	Survey and Manage	Known locations in project area. Protection buffers for known sites will be used.	Associated with moist forested sites in either upland or riparian habitat with perennial subsurface dampness
Klamath shoulderband	Survey and Manage	No known locations but suitable habitat is present.	Associated with deciduous tree species in mixed hardwood/conifer stands and rock refugia
Yellow-based sideband	Survey and Manage	Known locations in project area. Protection buffers for known sites will be used.	Found in late-successional conifer forests with high canopy closure with woody debris and talus
Tehamana chaparral	Survey and Manage	No known locations but suitable habitat is present.	Associated with deciduous leaf litter near limestone caves, talus, or outcrops within mature forest

3.3.4 Environmental Effects

Alternative 1

Direct and Indirect Effects

Alternative 1will result in no changes and, therefore, no direct effects to individual wildlife species or wildlife habitats (Threatened, Endangered, and Sensitive Species, Survey and Manage Species, Management Indicator Species, and migratory birds) are anticipated. The indirect effects expected will be those effects related to the continued increase of tree mortality and disease. Tree disease levels will continue to increase and

add to the mortality that is occurring. Increasing disease levels also reduce growth rates and reduce the number of trees that will reach a larger diameter. Habitat conditions would remain as described in the existing condition with a trend toward less healthy stand conditions through 2042 (see Vegetation section of this chapter). Overall, effects to wildlife and wildlife habitats of no action will result in reduced availability and distribution of stands that could develop into suitable habitat for late successional habitat-related species (northern spotted owl and all Survey and Manage species). There will be reduced availability and development of hardwood-related wildlife species habitat in the understory as hardwoods are outcompeted by the continuing encroaching conifers. The encroachment of small diameter white fir on the small openings in the untreated stands will result in a decreased quality of wildlife habitat (dense small diameter understory with few openings for stand diversity). For the fisher, habitat connectivity is high (excluding one portion of the Olsen Creek 7th field watershed) in the analysis area. The lack of treatment will likely continue to provide high connectivity for the short- and long-term in the absence of natural disturbance like fire. Fire in the project area will likely result in the loss of many acres of habitat based on the current and projected fuel loads. Even without fire, the habitat conditions are expected to change as the large, older trees die from the current disease and the younger, diseased trees that were expected to replace the older trees are not capable of doing so because of the poor tree health. The lack of treatment will not reduce the amount of tree disease in the project area. The Jess project area currently contains abundant habitat that is likely to support a female and offspring. The lack of treatment will likely continue to provide high quality habitat in the short- and long-term. The dense canopy cover and abundant denning and resting sites are likely to continue to provide for foraging, resting, and reproduction. However, these conditions are only likely to continue in the absence of fire.

Cumulative Effects

Cumulative effects to wildlife habitat are related to effects of vegetation which is analyzed in Section 3.1. The project area would benefit indirectly from the fuels reduction and stand health benefits from the Eddy Late Successional Reserve Habitat Restoration project and the Glassups Timber Sale underburning. However, these projects will not aid in reducing the overall trend of epidemic dwarf mistletoe rates in the project area and associated impacts to stand health. There is no expected degradation, downgrading, or removal of suitable habitat as a result of the Salmon Salvage project. Eddy Late-Successional Reserve Habitat Restoration, the Glassups Timber Sale, the Sawyers Bar Underburn project and the Salmon Reforestation project will not affect fisher connectivity. There is about 20 acres of Westside Fire Recovery project fuels treatments that overlap into Eddy Gulch. The fuels treatments may degrade fisher habitat but it won’t remove any habitat. The Salmon Salvage project includes harvesting fire injured and killed trees. This analysis assumes that the Salmon Salvage project removed fisher habitat where it overlapped with salvage units, about 27 acres of denning/resting habitat,

three acres of foraging and 35 acres of movement habitat. The removal of habitat leads to a small change in the distance between habitat patches in Olsen Creek and Shiltos Creek. This change was not enough to change the category of connectivity for any of the watersheds. The Glassups Timber Sale underburning and the Eddy Late Successional Reserve Habitat Restoration project are in the home range analysis area. Underburning effects small trees and brush but may harm few large trees contributing to canopy cover. There may be some degrading of habitat but no downgrading or removal will occur due to Glassups Timber Sale underburn or the Sawyers Bar Underburn project so there are not cumulative effects to the home range potential. Adding the effects of Alternative 1 in the Jess project to the effects of these projects will not produce sizeable cumulative effects.

Alternative 2

Direct and Indirect Effects

Threatened and endangered species (northern spotted owl) and critical habitat

Alternative 2 will maintain and not degrade, downgrade, or remove suitable nesting/roosting northern spotted owl habitat. All acres of nesting/roosting habitat will be maintained; no acres of nesting/roosting habitat will be degraded, downgraded, or removed within 0.5-mile northern spotted owl core areas. Proposed treatments will not remove or downgrade northern spotted owl habitat within 1.3-mile home ranges that are deficient in habitat.

The analysis area contains about 2,317 acres of nesting/roosting, 9,918 acres of foraging, and 2,550 acres of dispersal habitat. No nesting/roosting habitat will be treated and will remain in its current habitat quality. Treatments will degrade about 532 acres of foraging habitat, but the habitat will retain its current function. About 535 acres (254 acres downgraded and 281 acres removed) of foraging habitat will no longer function as its current habitat type after treatment, but 254 acres of these acres will retain the stand characteristics and function of dispersal habitat. The 535 acres of foraging habitat removed or downgraded represents about five percent of the foraging habitat that occurs in the analysis area. About 3,063 acres of dispersal habitat occurs in the analysis area.

Treatments will degrade about 115 acres of dispersal habitat, but this habitat will retain its function. About 30 acres of dispersal habitat will be removed (changed to non-habitat) after treatment. Foraging and dispersal habitat that will be removed or degraded exists on the upper 1/3 of slopes where spotted owl use is uncommon.

Foraging and dispersal habitat will remain well distributed throughout the landscape. Negative effects are likely to be greatest during the short-term while the younger and healthier trees grow and fill in the canopy. In the long-term, some of the removed habitat from treatment may increase in quality to dispersal habitat, but the habitat will likely still lack moderate level of canopy cover. However, the treatment will benefit northern spotted

owl habitat by creating an environment with less disease and allow for healthier stands that are more resilient to disturbance. These treated stands of trees will increase in stand diversity and complexity and eventually development of multi-aged stands.

The Jess analysis area contains about 4,409 acres of spotted owl critical habitat and about 266 acres is proposed for treatment. About 145 acres of commercial thinning are proposed and 44 acres will no longer provide suitable forage habitat after treatment. However, these treatments will only represent less than two percent of the available foraging habitat in critical habitat in the project area. The commercial treatments reduce foraging habitat, but the treatments will also aid in improving defensibility of the project area from wildfire. This will indirectly protect the remaining suitable habitat on the lower two- thirds of the slope from wildfire impacts.

Alternative 2 will result in a net increase of 426 acres of dispersal habitat. Commercial harvest on the upper 1/3 of the slope will reduce foraging habitat, but foraging and nesting/roosting habitat remain on the lower 2/3 of the slopes. This will provide suitable habitat available for use by northern spotted owls therefore the project is not expected to negatively impact barred owl/northern spotted owl interactions.

Many studies have found negative correlations between northern spotted owls and barred owls where they co-occur. However, there is limited data to explain how land management will affect these interactions, but management recommendations focus on maintaining and increasing large patches of contiguous nesting/roosting habitat. The Jess project will not degrade, downgrade, or remove nesting/roosting habitat. Therefore, the proposed activities will not reduce the current number of nesting/roosting habitat acres and there is no strong evidence that indicated changes to NSO habitat will result in increasing barred owl and spotted interactions.

Effects on prey species for northern spotted owl will occur in the short-term by providing more understory structure. As the young trees fill in the gaps between the older trees, the stand structure will likely favor woodrats which is an important food source for spotted owls. In the long-term, as the tree canopy fills in and becomes more connected, flying tree squirrels will likely increase in numbers as the woodrats will likely decline.

Secondary prey species such as deer mice and red-backed voles will likely occur in high numbers particularly with woody debris. The treatments will affect the prey number and composition in the short-term, but the changes will still provide sufficient food for a spotted owl in foraging habitat that was treated. Spotted owls may benefit from increased number of woodrats as a result of the treatment especially along the transition area between the resulting non-habitat and foraging habitat.

Treatment areas will retain snags and coarse woody debris in stream-course riparian leave areas; large snags will be retained as long as snags do not pose a safety hazard, but if

felled, snags will be left in the treatment unit as woody debris. Other large snags will be retained with live trees in areas called "skip areas."

Fisher (proposed for Federal listing)

Fisher Habitat Connectivity: The non-commercial treatments are assumed to degrade habitat. There is about 350 acres of denning/resting habitat that is within non-commercial habitat, 100 acres of foraging and 405 acres of movement habitat. This degrading will not affect habitat connectivity since the areas will remain in their current habitat category. Not all commercial treatments will affect habitat. About 45 acres of denning/resting, 16 acres of foraging, and 202 acres of movement habitat will be degraded by commercial treatments. Alternative 2 increases the average distance between habitat patches by one foot for Olsen Creek watershed, eight feet for Jessups Gulch and two feet for Eddy Gulch. There is no change in the Shiltos Creek watershed. These changes do not affect the habitat connectivity. The Olsen Creek watershed continues to have a moderate connectivity and Shiltos Creek, Jessups Gulch, and Eddy Gulch continue to have high connectivity.

Change in Home Range Potential: As a result of Alternative 2, there will be 312 fewer acres of denning/resting habitat in the Jessups Gulch/Eddy Gulch potential home range. This shift increases the foraging habitat by 205 acres and the movement habitat by 103 acres. There is an increase of 5 acres of non-habitat as a result of Alternative 2. There is a change of 11 acres of denning/resting habitat in the Olsen Creek/Shiltos Creek potential home range which is downgraded to foraging habitat. These changes do not change the home range potential for either representative home range.

Forest Service Sensitive, Survey and Manage, Management Indicator Species, and Migratory Birds

Due to the proposed action of Alternative 2 either not occurring in known species range or not affecting any habitat, there are no expected direct, indirect, or cumulative effects on the following species: bald eagle, great gray owl, foothill yellow-legged frog, Cascade frog, and Tehama chaparral snail.

Suitable northern spotted owl nesting, roosting and foraging habitat is used as a proxy to evaluate potential wolverine and northern goshawk habitat. Other habitat types may be used by wolverine and goshawk especially when occurring as a mosaic with more mature stands. This alternative will downgrade and remove approximately 535 acres of potential wolverine, and northern goshawk habitat. This habitat will be removed or downgraded mostly on the upper 1/3 of slopes where stands of trees are high in disease and fuel loadings and are at risk to stand replacing wildfires.

The commercial treatment in the Goshawk Management Area will result in degradation of two acres of foraging habitat; however, foraging habitat function will be maintained after

treatment. Within the project area, existing goshawk and wolverine foraging habitat will be reduced by 535 acres but no nesting or denning habitat will be treated.

Because this loss of 535 acres of habitat represents about five percent of the available habitat for these species, the effects of implementing Alternative 2 may affect wolverine and northern goshawk but not lead to a trend towards federal listing of these species. The proposed pre-commercial thinning, fuels treatments, underburning, and roadside treatments are not expected to have any effect on these species since these actions are either not going to occur in suitable habitat or will not measurably alter habitat conditions.

Suitable northern spotted owl nesting, roosting and foraging habitat is used as a proxy to evaluate potential American marten where it occurs above 4,500 feet (an estimate of 1,492 acres). Alternative 2 will degrade or remove approximately 88 acres of potential marten habitat on the upper 1/3 of slopes. Because this loss of habitat represents about five percent of the available habitat for this species, the effects of implementing Alternative 2 may affect the American marten but not lead to a trend towards federal listing of this species. The proposed pre-commercial thinning, fuels treatments, underburning, and roadside treatments are not expected to have any effect on this species since these actions are either not going to occur in suitable habitat or will not measurably alter habitat conditions.

With the implementation of snag-related project design features, and due to the limited activities proposed in older forested habitat, Alternative 2 will not limit the availability of large snag distribution for the pallid bat, fringed-tailed myotis, Townsend's big-eared bat, or the snag-associated Management Indicator Species in the analysis area.

With the implementation of project design features related to riparian reserves, and due to the limited activities proposed in riparian habitat, Alternative 2 will not limit the availability of riparian habitat conditions for the willow flycatcher, northwestern pond turtle, or the riparian-associated Management Indicator Species in the analysis area.

With the implementation of hardwood-related project design features, and due to implementing treatment prescriptions that will enhance hardwoods, Alternative 2 will not limit the availability of hardwoods for migratory birds and hardwood-associated Management Indicator Species in the analysis area.

Cumulative Effects

The direct and indirect effects when combined with the effects of the Glassups Timber Sale underburn Eddy Gulch Late Successional Reserve Habitat Restoration project are largely beneficial by creating a landscape with increased vegetative health, vigor and defensibility against wildfire. Treatment units are placed such that the stands are more resilient to disturbances such as disease, wildfire and drought in the long-term.

Restoration will be initiated by setting stands on a trajectory to increase growth, retain species diversity, and increase resilience to natural and human-caused disturbances such as insects and disease and wildland fire. Other cumulative effects are increased protection for natural resources by increasing acres where the disease rate is reduced and the future fuel loading is decreased. Community protection is enhanced by increasing continuity of ingress/egress roadside treatments. Connectivity of natural stands adjacent to Eddy Late Successional Reserve Habitat Restoration project is retained while working towards restoring species composition and function to desired conditions. There is no expected degradation, downgrading, or removal of suitable habitat as a result of the Salmon Salvage project. Treatment areas will retain snags and coarse woody debris in stream-course riparian leave areas; large snags will be left as individual trees distributed as “skip areas.” For the fisher the Eddy Late-Successional Reserve Habitat Restoration, the Glassups Timber Sale, the Sawyers Bar Underburn project and the Salmon Reforestation project will not affect fisher connectivity. There are about 20 acres of the Westside Fire Recovery project fuels treatments that overlap into Eddy Gulch. The fuels treatments may degrade fisher habitat but it won’t remove any habitat. The Salmon Salvage project includes harvesting fire injured and killed trees. This analysis assumes that the project removed fisher habitat where it overlapped with salvage units. This project will remove about 27 acres of denning/resting habitat, 3 acres of foraging and 35 acres of movement habitat. The removal of habitat lead to a small change in the distance between habitat patches in Olsen Creek and Shiltos Creek. This change was not enough to change the category of connectivity for any of the watersheds. The Salmon Salvage project does not overlap with the home ranges defined for this analysis. So there are no cumulative effects for the home range indicator. Adding the effects of Alternative 2 in the Jess project to the effects of these projects will not produce sizeable cumulative effects.

Table 3-5: Summary of findings for Threatened/Endangered species and Forest Service Sensitive Species.

Species	Status	Determination of Effects
Northern spotted owl	Federally-listed as Threatened	Is likely to adversely affect northern spotted owl and northern spotted owl Critical Habitat
Gray wolf	Federally-listed as Endangered	No effect
Bald eagle	Forest Service Sensitive	No effect
Northern goshawk	Forest Service Sensitive	May affect individuals, but is not likely to lead to a trend towards Federal listing
Willow flycatcher	Forest Service Sensitive	No effect
Northern wolverine	Forest Service Sensitive	May affect individuals, but is not likely to lead to a trend towards Federal listing
Fisher	Forest Service Sensitive (Proposed for Federal listing)	May affect individuals, but is not likely to lead to a trend towards Federal listing

Species	Status	Determination of Effects
American marten	Forest Service Sensitive	May affect individuals, but is not likely to lead to a trend towards Federal listing
Pallid bat	Forest Service Sensitive	No effect
Townsend's big-eared bat	Forest Service Sensitive	No effect
Fringed-tailed myotis bat	Forest Service Sensitive	No effect
Northwestern pond turtle	Forest Service Sensitive	No effect
Foothill Yellow-legged frog	Forest Service Sensitive	No effect
Cascade frog	Forest Service Sensitive	No effect
Tehama chaparral snail	Forest Service Sensitive	No effect
Western bumble bee	Forest Service Sensitive	No effect

Alternative 3

Direct and Indirect Effects

Threatened and endangered species (northern spotted owl) and critical habitat

The effects of Alternative 3 will be the same as those of Alternative 2 in that no nesting and roosting habitat for northern spotted owl will be treated. Unlike in Alternative 2, all acres of foraging habitat will also be maintained; none will be removed. About 744 acres of foraging habitat will be degraded and remain as foraging habitat. About 15 acres of foraging habitat will be downgraded to dispersal habitat. About 27 acres of dispersal habitat will be reduced to non-habitat and 317 acres of dispersal habitat will be degraded but will remain functioning as dispersal habitat. Unlike in Alternative 2, all acres of critical habitat will be maintained and none lost in Alternative 3. Effects to prey species will be the same for both action alternatives, but the number of acres affected is less in this alternative thus the overall effects is less compared to Alternative 2.

Fisher (proposed for Federal listing)

The effects for Alternative 3 are the same as for Alternative 2 except there are about 90 more acres of denning/resting, six acres more of foraging, and 42 acres of movement habitat degraded due to non-commercial treatments compared to Alternative 2. There are 43 fewer acres of denning/resting habitat, 16 fewer acres of foraging habitat and 134 fewer acres of movement habitat degraded by commercial treatments compared to Alternative 2. The Jessups Gulch watershed has an increase in distance between habitat patches of four feet instead of the eight feet in Alternative 2. The effects to home range potential for Alternative 3 are the same as for Alternative 2 except there is a loss of 85 acres of denning/resting habitat in Jessups Gulch/Eddy Gulch which is 230 acres fewer

than Alternative 2. There is an increase in foraging habitat of 29 acres and 53 acres of movement habitat. There is an increase in non-habitat by three acres.

Forest Service Sensitive, Survey and Manage, Management Indicator Species, and Migratory Birds

Treatments in Alternative 3 will degrade about 744 acres of potential wolverine, marten, or northern goshawk habitat. About 15 acres of habitat will be degraded to the point where it will no longer function as foraging habitat. Otherwise, the effects of Alternative 3 will be similar as those of Alternative 2 but will occur on fewer acres of habitat. Effects of Alternative 3 to other sensitive species, Survey and Manage species, Management Indicator Species, and other migratory birds will be similar to those of Alternative 2 but will occur on fewer acres of habitat.

Cumulative Effects

The cumulative effects for Alternative 3 are similar to those of Alternative 2. There will be less habitat removal and downgrading as a result of this alternative in the short-term. The project area will be placed on a trajectory toward healthier forest stands and improved defensibility but over a smaller area than in Alternative 2.

3.3.5 Compliance with Law, Policy, Regulation, and the Forest Plan

All action alternatives will comply with the Forest Plan and Survey and Manage Guidelines aimed at minimizing short-term impacts to individuals and providing for long-term wildlife population persistence as noted in the Wildlife Resource Report, Terrestrial Wildlife Biological Assessment, Terrestrial Wildlife Biological Evaluation, Management Indicator Species Report, Parts I and II, and the Forest Plan Consistency Checklist. The design of this project is consistent with Recovery Actions described in the 2011 Northern Spotted Owl Recovery Plan, the 2012 northern spotted owl critical habitat designation, and the Migratory Bird Treaty Act as well as Forest Service Sensitive Species direction.

3.4 Fish

3.4.1 Analysis Indicators and Methodology

Methodology for the analysis includes field review, literature and current research review, Geographic Information System analysis, and local expertise for the consideration of direct, indirect, and cumulative effects of the proposed action and alternatives. This methodology is described in more detail in the Aquatic Resources Report, available on the project website. Effects to fish species and habitat are related to water quality (hydrology); additional information on water quality is provided in Section 3.10 of this chapter (Water Quality). An explanation and results of Cumulative Watershed Effects models used to estimate effects to water quality are provided in the Water Quality (Hydrology) Resource Report, also available on the project website. Analysis indicators of potential effects to

fish and their habitat, taken from indicators in the "Analytical Process for Developing Biological Assessments for Federal Actions Affecting Fish within the Northwest Forest Plan Area" (USDI, USDA, and NOAA 2004) are used in this project. Effects to indicators are used to assess the affected environment of anadromous systems, with each indicator labeled as to if it is "Properly Functioning," "Functioning- At-Risk," or "Not Properly Functioning" for streams within the project area. Using the analytical process, effects of the project on the indicators may be neutral (no effect), discountable (extremely unlikely to occur), insignificant (effects are not able to be meaningfully measured, detected, or evaluated), or significant (effects able to be measured); these are defined as "significant" of "insignificant" by definitions used by the Endangered Species Act, not the National Environmental Policy Act. Furthermore, effects may be either positive or negative. Since analyzed species have overlapping needs and habitat, the same methods and indicators are used to indicate effects to federally-listed, Forest Service Sensitive and Management Indicator [fish] Species (MIS). After the appropriate indicators have been evaluated, the resulting information is used to determine overall effects on aquatic species, including Coho Critical Habitat and Essential Fish Habitat.

Analysis Indicators

There are seventeen indicators of anadromous fish habitat conditions (see Aquatic Resources Report). Ten of the indicators will not be affected by the project and were not analyzed for the Jess project. The seven indicators that may be affected are temperature, sediment/substrate, turbidity, disturbance history and regime, peak/base flow, drainage network, and riparian reserves. Critical Habitat and Essential Fish Habitat are analyzed using the same indicators as impacts to fish.

- Temperature is evaluated by considering the estimated change in shade on perennial and late flowing intermittent streams and change in water quantity from drafting.
- Sediment/Substrate is evaluated using the Universal Soil Loss and geology models and field survey data.
- Turbidity is analyzed using professional judgment following observation of conditions after high water events, amount of substrate fines, condition of riparian reserves, and Cumulative Watershed Effects models.
- Disturbance History and Regime is analyzed using the Cumulative Watershed Effects models. Professional judgment considering road density and location, fire history and regime, vegetation, and private property development may also be used.
- Peak/Base Flow is considered using Equivalent Roaded Area, road density, and vegetation and riparian reserve condition.
- Drainage Network effects are evaluated using the road density, number of road crossings and number of features that have the potential to become hydrologically

connected to the existing drainage network. The overall Equivalent Roaded Area risk ratio is also considered.

- Riparian Reserves analysis includes impacts to shade, large wood recruitment and changes to the Cumulative Watershed Effects models.

Project design features, including Best Management Practices and implementation timing limitations, are utilized to minimize effects of the proposed project on Threatened, Endangered, and Forest Service Sensitive Species.

3.4.2 Spatial and Temporal Context

The effects to aquatic resources are analyzed at the site-specific and watershed-scales. Watersheds used in this analysis are at the 5th and 7th field watershed levels.

Site-specific analysis focuses on water drafting sites on the North Fork Salmon River (i.e., within the range of fish). Other proposed treatments in the project area are outside the distribution of analysis species, habitat is not present, and/or distance to occupied/suitable habitat is too distant for an effect to occur. Additional elaboration is provided in the Aquatic Resources Report to explain why effects at the site scale will not translate to impacts to fish or fish habitat. The temporal context includes short-term effects expected to occur within the first year following implementation and long-term effects occurring after one year following implementation.

3.4.3 Affected Environment

The Southern Oregon/Northern California Coasts Coho salmon (*Oncorhynchus kisutch*), including Critical Habitat, is the only threatened or endangered fish species in or around the project area. Forest Service Sensitive fish species for the Klamath National Forest in the project are the Upper Klamath-Trinity Rivers Chinook (*Oncorhynchus tshawytscha*), Klamath Mountains Province Steelhead (*Oncorhynchus mykiss*), Klamath River lamprey (*Entosphenus similis*), and Pacific lamprey (*Entosphenus tridentatus*) Both steelhead and resident rainbow trout (*Oncorhynchus mykiss*) are Management Indicator Species. Additionally, Essential Fish Habitat designation is associated with Coho salmon and Chinook salmon.

The Jess project area includes several fish-bearing streams in or near the project boundary: North Fork Salmon River, Eddy Gulch, and Jones Gulch. There are also several streams that do not have fish, the largest of which are Glasgow Gulch, Jessups Gulch, and Shiltos Creek. Table 3-6 displays the streams or rivers within 5th and 7th field watersheds that are either occupied by federally-listed, Forest Service Sensitive, or Management Indicator [fish] Species, have the potential to be occupied by fish, or provide thermal refugia.

Table 3-6. Summary of actual and potential occupancy by analysis species of creeks/rivers within 7th and 5th field watersheds

Species	7th Field					5th Field
	Glasgow Gulch	Eddy Gulch	Jones Gulch	Shiltos Creek	Jessups Gulch	North Fork Salmon River
Coho (federally-listed)	N	T	T	T	T	X
Chinook (sensitive)	N	X, T	T	T	T	X
Steelhead (sensitive and MIS)	N	X, T	P, T	T	T	X
Resident Rainbow Trout (MIS)	N	X	X	N	N	X
Pacific Lamprey (sensitive)	N	P	N	N	N	P
Klamath River Lamprey (sensitive)	N	P	N	N	N	P

X = confirmed presences; **P** = potential presence; **T** = thermal refugia (for species existing in the North Fork Salmon River; thermal refugia may not be provided in streams themselves but fish species rely on tributary outflow from these streams); and **N** = does not provide thermal refugia and no confirmed or potential presence.

Temperature

Information is available only for the Eddy Gulch stream (a managed stream) within the project area. Stream temperatures slightly warmer than the 16 degrees celsius threshold for support of beneficial uses for core juvenile rearing exist in the Eddy Gulch stream but it is still within the range to be considered "Properly Functioning." During the warm summer months when water temperatures in the Salmon River approach 20 degrees celsius , anadromous and resident fish rely upon cooler water habitat within tributary creeks and their confluence zones (thermal refugia). Project area creeks, Eddy Gulch, Jessups Gulch, Jones Gulch, and Shiltos Creek provide thermal refugia that juvenile salmonids rely upon when stream temperatures in the North Fork, Salmon River are elevated.

Sediment/Substrate

As noted in the Aquatic Resources Report, limited data are available within the project area to determine the sediment indicator rating. Jones Gulch is evaluated to be "Properly Functioning" with modeled values for Universal Soil Loss Equation and geology model below threshold and substrate composition as expected for a high gradient, low-order stream. Eddy Gulch is "Functioning at Risk" with embeddedness higher than desired and elements of substrate composition not fully meeting reference conditions even though modeled values for Universal Soil Loss Equation and geology model are below threshold. Finally, general river conditions for North Fork Salmon River place it as "Functioning at

Risk" although modeled values for Universal Soil Loss Equation and geology model are below threshold.

Turbidity

Turbidity within the Project area is likely "Properly Functioning". Modeling of soil loss and risk of mass wasting in the cumulative watershed effects analysis is under the threshold of concern. Although sediment composition may be of some concern for both Eddy Gulch and NF Salmon River, suspended fine sediment (less than 2 mm) condition appears to be properly functioning. Observations following rain events and during spring run-off have not raised concerns about lingering turbidity, as water within the Project area clears quickly, within three days.

Disturbance History/Regime

All creek drainages within the project area are considered to be "Properly Functioning", except Eddy Gulch. Section 3.10 (Water Quality) of this chapter and the Hydrology resource report provide additional information about Cumulative Watershed Effects models. Eddy Gulch is rated "Functioning at Risk". Although all Cumulative Watershed Effects models are below threshold of concern for Eddy Gulch, mining history, human-caused channel impacts, and location of roads within the drainage factor into the determination.

Peak/Base Flow

Jones Gulch – "Properly Functioning" – The Equivalent Roaded Area model is below the critical threshold, road density is low, and riparian vegetation is considered to be in good condition.

Eddy Gulch – "Functioning at Risk" – Although the Equivalent Roaded Area model is below critical threshold, the existing road density is moderately high. Due to the history of mining in the drainage, there are both existing and abandoned roads, as well as multiple existing/abandoned crossings upon the Eddy Gulch main stem and tributaries. Riparian vegetation is good, but is likely also still recovering from past impacts.

North Fork Salmon River – "Properly Functioning" – The Equivalent Roaded Area model is below critical threshold, overall road density is low, and riparian reserves are considered to be functional. Although there have been large floods (in 1964 and 1997) which have caused channel rearrangement, the amount of Wilderness in the drainage suggests that these peak flows were most likely from natural processes rather than watershed disturbance. However, it is possible that legacy effects from past mining activity may have contributed to flood damage.

Drainage Network

Due to the complex history of the Project area, it is not possible to exactly determine how human-caused impacts have increased the drainage network over pre-European

conditions. Based upon cumulative watershed effects modeling and professional judgment, the drainage network for watersheds in the Project area is considered “Properly Functioning”.

Riparian Reserves

Riparian reserves provides the degree of functionality required to support aquatic analysis species and their habitat, including Coho salmon. Functionality for indicators for anadromous fish-bearing streams in the project area is shown in Table 3-7 below.

Table 3-7. Baseline for analysis indicators for anadromous fish-bearing streams in the project area.

Stream/River	Temperature	Substrate	Turbidity	Dist. History/Regime	Peak/Base Flows	Drainage Network	Riparian Reserves
Eddy Gulch	P	FAR	P	FAR	FAR	P	P
Jones Gulch	P	P	P	P	P	P	P
North Fork Salmon River	FAR	FAR	P	P	P	P	P

P - "Properly Functioning", FAR - "Functioning-at-Risk", NF - "Not Properly Functioning"

The Whites fire (of the July Complex) did not burn within the footprint of the Jess project but contingency dozer lines (8.7 miles) were constructed on ridgetops within the project boundary. These lines crossed project units and used existing roads and existing roadbeds where appropriate. Following containment of the fire, all contingency lines were rehabilitated. Within the project area, aquatic resources were minimally affected by the Whites fire or fire-associated activities. Therefore, description of current conditions existing pre-fire remains valid post-fire. Any fire effects which led to modification to the existing environment are expected to resolve at the landscape scale (7th field and 5th field watersheds) and will be discussed within the “Disturbance History/Regime” indicator subsections.

3.4.4 Environmental Effects

Alternative 1

Direct and Indirect Effects

Under Alternative 1, no management actions will be taken so there will be no direct or indirect effects.

Cumulative Effects

There will be no cumulative effects to fisheries from Alternative 1 because there are no direct or indirect effects.

Alternative 2

Direct and Indirect Effects

Potential direct effects to aquatic species can result from water drafting (sucking fish into equipment, mobilizing sediment); these are minimized or eliminated through the use of project design features. By using appropriate project design features and considering the mobility of fish, water drafting in fish-bearing areas is likely to have only minor direct effects on aquatic species, including habitat, with no long-term effects. Other project elements will not produce direct impacts to fish or fish habitat because no instream work is planned where analysis species are present within the project boundaries.

Temperature

The effects of drafting to water temperature will be minimal due to implementation of project design features. Project design features and the input of additional cold water from tributaries below drafting sites will minimize any reduction in temperature caused by the reduction in stream flows. Buffers, project design features, and site specific treatment prescriptions in riparian reserves ensure effective shade over water will not be reduced by project activities. Additionally, vegetation treatments proposed within riparian reserves are associated with fishless creeks greater than two miles from fish habitat. Therefore, there is not likely to be a biologically meaningful effect to stream temperatures in fish-bearing habitat. See Section 3.10 (Water Quality) for further discussion on project effects to stream temperature.

The project will have a minor, short-term effect to stream flow during water drafting operations; however, the effects are not likely to have any detectable change to stream temperature in fish-bearing reaches or have any meaningful impact to fish habitat. Drafting from the North Fork Salmon River will not measurably affect temperature due to the stream’s relatively large size and flow volume; and drafting will not occur within thermal refugia. Drafting from fishless water sources will also not have any detectable effect to stream temperature due to distance from occupied fish habitat and downstream input of cold water. All drafting utilizes project design features to minimize potential impacts.

Sediment/Substrate

Risk of sediment mobilizing at the site scale is low/moderate, with no to low risk of sediment moving past the reach scale (300 feet of stream channel) (Section 3.10, Water Quality). Furthermore, project design features which include a 100-foot equipment exclusion zone for most treatment units aligns with the general recommended buffer width for effectively filtering sediment. Therefore, any sediment which is mobilized is

expected to remain localized near to the site of disturbance. Due to the location of the project on the landscape, neither fish nor their habitat are found in stream segments adjacent to project activities (i.e., not present at site or reach scale). Additionally, the risk ratio for the Equivalent Roaded Area model for all of the watersheds in the project area will remain under the threshold of concern and the watersheds will remain functioning at their current level. Sediment will not be conveyed to fish-occupied waters in a sizeable, discernible quantity over existing background variability and habitat will not be affected by changes in the sediment regime.

Turbidity

Turbidity created by work on stream crossings to address legacy sediment sources will occur primarily while the work is being done and is minimized by the project design features. These crossings are at least two miles away from fish habitat and sediment generated from these activities is not likely to be detectable more than 300 feet downstream of the site. Therefore, there will not be turbidity effects to fish or their habitat from stream-crossing site improvements. Impacts to turbidity due to drafting activities in fish-bearing streams have been observed to be localized and quickly dissipating to background conditions. Effects only occur when drafting is actively happening. There will be no measurable impact to fish habitat beyond the drafting site and negative effects to fish will not occur because they are expected to avoid areas where and when drafting is occurring. Water drafting in non-fish bearing streams will not affect fish habitat.

Disturbance History/Regime

Cumulative Watershed Effects models, while increased by the project, will remain under the threshold of concern and over-threshold models will not be elevated (Section 3.10 Water Quality). There will be no sizeable effects to aquatic habitat from project activities.

Constructing and reoccupying existing landings and skid trails will increase the risk to the drainage network. Road systems can have a major impact to the drainage network.

The project design features will minimize impacts of risk to the drainage network. The impacts will be upslope from fish habitat, localized and short-term. The impacts to fish habitat will be discountable.

Peak/Base Flows

The effects of water drafting to fish or fish habitat due to changes in stream flows are not sizeable because appropriate resource protection measures will be used. In larger, fish-bearing systems, such as North Fork Salmon River, flows are not measurably affected by drafting operations due to the relatively short time required to fill a water tender. Water drafting at upslope sites where no fish are present may result in localized flow alteration but these will not be discernable at occupied habitat downstream.

There will be no measurable watershed scale changes to peak/base flows due to the upslope position, localized impacts, and functioning buffering capacity of intervening riparian reserve habitat. See Section 3.10 (Water Quality) for additional discussion on peak/base flows.

Drainage Network

There will be a minor short-term increase to the drainage network, followed by a small long-term beneficial decrease. Constructing and reoccupying existing landings and skid trails temporarily increases risk to the local drainage network. Effects will be short-term and confined to treatment units in upslope areas. Skid trails will not cross perennial streams and intermittent streams will only be crossed while dry and at pre-approved locations. Additionally, placement of temporary roads on existing roadbeds will minimize increases in the drainage network. In the long-term, there will be no increase in the drainage network from landings, skid trails, or temporary roads because they will be rehabilitated. Hydrologic stabilization of temporary roads will impart a long-term benefit because roadbeds will be left in a better state than their current condition. Moreover, legacy site repair will correct adverse hydrologic issues.

Riparian Reserves

Except for water drafting in the North Fork Salmon River, no activities are proposed within riparian reserves associated with occupied fish habitat. Riparian reserves elsewhere in the project area may experience short-term impacts due to proposed activities and their interrelated actions. However, project design features ensure long-term riparian reserve character of shade and other elements will be preserved.

Water drafting will use existing accesses. Maintenance of access roads and approaches, including brushing, will have effects on riparian reserves that will remain confined to road prisms and immediately adjacent vegetation. There will be no alteration to effective canopy shade. Overall, water drafting may have small localized effects, but will not affect the existing functional level of the riparian reserve.

There will be neutral effects to Coho Critical Habitat and Essential Fish Habitat. Except for water drafting, all project activities will occur in association with or adjacent to fishless headwater systems distant from occupation by anadromous species. All indicators for effects to Critical Habitat will be neutral, discountable, or changed to a small degree by the project. Where changes to indicators occur, they are not to the magnitude where the functioning ability of any of the Habitat Indicators is changed. The determination of effects on Threatened, Endangered, Sensitive or Management Indicator Species are summarized in Table 3-8.

Table 3-8. Summary of findings for Threatened/Endangered species, Sensitive Species, and Management Indicator Species.

Species	Special Status	Determination
Fishes		
Coho Salmon	Federally-listed as Threatened	May Affect, Not Likely to Adversely Affect
Coho Salmon Critical Habitat	N/A	May Affect, Not Likely to Adversely Affect
Chinook Salmon (Spring/Fall runs) (Upper Klamath-Trinity Rivers)	Forest Service Sensitive	May affect individuals, will not lead toward a trend to listing
Steelhead Trout (Klamath Mountains Province)	Forest Service Sensitive and Management Indicator Species	May affect individuals, will not lead toward a trend to listing or loss of viability
Rainbow Trout	Management Indicator Species	May affect individuals, will not lead toward a loss of viability
Pacific Lamprey	Forest Service Sensitive	May affect individuals, will not lead toward a trend to listing
Klamath River Lamprey	Forest Service Sensitive	May affect individuals, will not lead toward a trend to listing
Other Habitat		
Essential Fish Habitat (Coho/Chinook)	N/A	**May adversely affect

**The project is consistent with the Magnuson-Stevens Act for Coho and Chinook salmon. This act requires federal agencies to consult with the National Marine Fisheries Service on actions that may adversely affect Essential Fish Habitat (EFH). An analysis of project effects on EFH is included in the Fisheries Biological Assessment through the evaluation of effects of Coho, Chinook and steelhead habitat. The habitat analyzed as EFH is identical or contained within designated Coho salmon critical habitat. However, the effects determination for EFH is different in that any effect to this habitat (even effects so minor as to be insignificant and discountable under ESA) is considered an “adverse effect to EFH” as defined by the Magnuson-Stevens Act. The analysis presented in the Fisheries BA found that the project is not likely to adversely affect critical habitat for Coho. However, during consultation, the National Marine Fisheries Service described the lower threshold for adverse effects under the Magnuson-Stevens Act and determined that the project will adversely affect EFH. Due to project design, including specific prescriptions for treatments in riparian reserves, project design features and best management practices, the National Marine Fisheries Service provided no additional conservation recommendations. As documented in the Letter of Concurrence (April 1, 2014), the selected alternative is compliant with the Magnuson-Stevens Act and does not threaten a violation of law or requirements for the protection of the environment.

Cumulative Effects

In summary, there will be minimal cumulative impacts to aquatics from current and reasonably future foreseeable projects within the vicinity of the Jess project. Cumulative impact occurs when the effects of one project overlaps with or compounds the effects of another. In the Jess project area, although projects may overlap project boundaries (Glassups Timber Sale, Eddy Gulch LSR) or else share a common watershed without physical boundary overlap (Westside Fire Recovery, Salmon Salvage, Salmon Re-forestation), there will be no sizeable cumulative effects to aquatic habitat indicators by adding the effects of these projects to the effects of Alternative 2 of the Jess project.

Adding the effects of legacy site treatments in Alternative 2 to the effects of road work to be completed by the Lower North Fork Roads Storm-proofing project will cumulatively reduce sediment delivery to stream systems. Cumulative Watershed Effects models either remain below the threshold of concern, or are not exacerbated, when the effects of all current and future foreseeable projects are added to the effects of Alternative 2 in the model (see Section 3.10 Water Quality)

Alternative 3

Direct and Indirect Effects

Effects of Alternative 3 will be the same as for Alternative 2 except impacts will be slightly smaller since there will be decreased ground disturbance and less disturbance of riparian vegetation. There will be less impact on peak flows (Equivalent Roaded Area modeled risk will be less). Any risk of overland transport of sediment to streams as a result of harvest will also decrease because of the 170-foot no-equipment/no-entry riparian reserve buffer for all commercial harvest units. Small beneficial effects due to treatment of legacy sites and rehabilitation of temporary roads will remain as described for Alternative 2.

Cumulative Effects

Cumulative effects will be the same as described under Alternative 2.

3.4.5 Compliance with Law, Policy, Regulation, and the Forest Plan

Alternatives will meet Forest Plan Standards and Guidelines as noted on the Forest Plan Consistency Checklist, available on the project website. Alternatives will also be in compliance with the Endangered Species Act (ESA), Magnuson-Stevens Fishery Conservation and Management Act, and all other relevant regulations, laws, and policies. An agreed-upon Biological Assessment to meet the requirements of the Endangered Species Act Section 7 consultation was completed with the National Marine Fisheries Service for the preferred alternative, and a letter of concurrence was received on April 1, 2014.

3.5 Botany

3.5.1 Analysis Indicators and Methodology

This section evaluates the Jess project in sufficient detail to determine its effects on federally-listed Endangered, Threatened, Proposed, Forest Service Sensitive, and Survey and Manage plant species. The Jess Botany Biological Assessment/Biological Evaluation, Survey and Manage Review, and Pre-field documents: Appendices A-1, A-2, and A-3 are summarized below, incorporated by reference and available on the project website.

The analysis indicators for measuring the effects of the Jess project are based on law, policy, and direction related to plant species. Section 7 of the Endangered Species Act of 1973, as amended, and Forest Service Policy direct Federal agencies to ensure that any action authorized, funded, or permitted by such agencies is not likely to jeopardize the continued existence of 1) species listed, or proposed to be listed as Endangered or Threatened by the U.S. Fish and Wildlife Service, and 2) species listed as Sensitive by the Regional Forester of the Pacific Southwest Region, or to cause a trend to federal listing for species listed as Sensitive. Analysis indicators of the effects of the project are (1) changes in plant species population viability, and (2) change or maintenance of habitat characteristics and microclimate conditions at the site of these plant species and of species of concern identified as Survey and Manage species (see the Survey and Manage Review for detailed information). The significance of management activities upon plant species viability depends upon many factors, including the size of known populations, the wider geographic range of known plant populations outside of the project area, and the degree of species sensitivity to short-term and long-term habitat modification. The alternatives are evaluated in terms of how they would affect plant species viability in the context of these factors.

3.5.2 Spatial and Temporal Context

The spatial boundary is the population boundary and surrounding stand components that contribute to the habitat characteristics within the population. Short-term effects are those that occur at the time of implementation and up to three years thereafter. Long-term effects may occur more than three years after implementation.

3.5.3 Affected Environment

A pre-field and preliminary field review determined that this project is not within the documented range or habitat of any federally-listed species that is Threatened, Endangered, or Proposed for federal listing. The preliminary field review of the project area indicated that ten Forest Service Sensitive and/or Survey and Manage plant species are within range and potentially habitat of the Jess project area. After field review and survey it was determined that the Sensitive species *Cypripedium fasciculatum, Cypripedium montanum, Boletus pulcherrimus, Cudonia monticola, Dendrocollybia racemosa,* and *Phaeocollybia olivacea* are either present or will require a habitat evaluation for the Jess project. One Survey and Manage species, *Otidea leporina*, is present in the project area. Project specific surveys were conducted in 2011, 2012, and 2013 to confirm the findings of the pre-field and preliminary field review; populations of three species of concern were discovered or re-inventoried in these surveys (Table 3-9). Field surveys conducted for the Jess project were adequate to determine presence of Threatened, Endangered, Sensitive, and Survey and Manage plant species. No known sites of Forest Service Sensitive fungi are known to exist in the project area; however a habitat evaluation was completed in the Biological Evaluation because survey for these species

was not practical. Bear grass (*Xerophyllum tenax)*, a species of cultural significance, occurs in scattered populations within the project area, primarily on ridge tops, and within patches of open canopy and rocky ultramafic soils.

Table 3-9: Plant species of concern for which populations are present in the project area.

Species	Status
Cypripedium fasciculatum	Sensitive/Survey & Manage
Cypripedium montanum	Sensitive/Survey & Manage
Otidea leporina	Survey & Manage
Xerophyllum tenax	Species of Cultural Significance

The Whites fire itself occurred outside the Jess project analysis area for botanical resources of concern; however, suppression lines were constructed within the analysis area for botanical species of concern. The suppression lines that were constructed within the project area had no effect on Threatened, Endangered, Proposed, or Sensitive plant species within the project boundary because no line construction took place within known populations of these species. Fire suppression line was constructed near, and potentially within, a known population of the Survey & Manage species *Otidea leporina.* Due to the growth habit of this fungi species occurring mostly as a network of mycelium underground, it is likely that this population will persist at this site. The necessary habitat components that the species requires to persist have been removed within the suppression line itself; however, outside of the suppression line there are adequate habitat components remaining and it is likely that this will remain a viable population in the long term. Existing project design features will apply to this population and the surrounding habitat (Botany-5, Botany-6, and Botany-7 in Table 2-1 of Section 2.2.4). (See the Amendment to Botanical Resources Report in the project record for further analysis of the Whites fire and construction of suppression lines in the Jess project area).

3.5.4 Environmental Effects

Alternative 1

Direct and Indirect Effects

There may be indirect effects to Forest Service Sensitive and Survey and Manage plant species and their habitat due to the changes in habitat characteristics over time because of epidemic levels of dwarf mistletoe leading to increased conifer mortality. This will most likely not affect populations to the extent that there will be a loss of species viability.

There will be no direct effects on Sensitive plants from Alternative 1.

No federally-listed threatened, endangered, or proposed plant species will be affected by this alternative. Under Alternative 1, the Jess project may affect individuals but is not

likely to result in a trend toward federal listing or a loss of viability for the Sensitive species for which populations or habitat exist in the project area: *Cypripedium fasciculatum, Cypripedium montanum, Boletus pulcherrimus, Cudonia monticola, Dendrocollybia racemosa,* and *Phaeocollybia olivacea.* No direct or indirect effects to the Survey and Manage species *Otidea leporina* from Alternative 1 are likely. High quality habitat for this species will persist within the documented sites in the project area. The bear grass will not be affected by this alternative.

Cumulative Effects

Adding the minor effects of this alternative to the effects of underburning as part of the Glassups project will not lead to a loss of plant species viability. Previous and ongoing management actions have addressed fuels conditions adjacent to the Survey and Manage species habitat within the project area, leaving the habitat less vulnerable to stand-replacing fire. Adding the effects of this alternative to the effects of ongoing and reasonably foreseeable future actions will not negatively affect high quality habitat for *Otidea leporina.* There is no direct or indirect effect to bear grass so there will be no cumulative effects.

Alternative 2

Direct and Indirect Effects

There may be direct effects to a few Forest Service Sensitive plant species individuals as a result of removing small diameter fuels by hand from within known sites; this is not likely to affect the species viability within the population. Project design features will be incorporated into this alternative to protect known populations of Forest Service Sensitive plant species. There will be no change to species' viability within the project area, on the Forest, or throughout the range of the species due to this alternative.

No federally-listed threatened, endangered, or proposed plant species will be affected by this project. Under Alternative 2, the Jess project may affect individuals but is not likely to result in a trend toward federal listing or a loss of viability for the Forest Service Sensitive plant species for which populations or habitat exist in the project area: *Cypripedium fasciculatum, Cypripedium montanum, Boletus pulcherrimus, Cudonia monticola, Dendrocollybia racemosa,* and *Phaeocollybia olivacea.* In this alternative there will be no direct effect to Survey and Manage plant species individuals because there are no proposed activities within the known population of *Otidea leporina* and there will be no indirect effect to populations or habitat with the incorporation of project design features. For the Forest Service Sensitive fungi species of concern, project design features included in this project will protect Sensitive fungi if they occur within a treatment unit. Specifically, the Forest Plan Standards and Guidelines for woody material retention will be implemented to maintain Sensitive fungi habitat components and implementation of the

Aquatic Conservation Strategy Standards and Guidelines will maintain Sensitive fungi habitat components of riparian habitat (Section 2.2.4, Watershed-40).

Bear grass, a species of cultural significance occurs within the project area. In particular, there is a large population of bear grass in tractor unit 103. Past management activities including commercial thinning have occurred within this unit. In unit 103, the bear grass is located within a young plantation and along old skid roads indicating that it responds well to activities that open the canopy. Observations in timber harvest areas within Oregon and Washington indicate that bear grass does not respond well to clear cutting activities primarily due to soil compaction (Hummel et al. 2012); however, the activities proposed in the Jess project are thinning prescriptions with Best Management Practices (appendix D) and project design features (Section 2.2.4) incorporated into the proposed action to minimize soil disturbance and compaction. Thinning activities within this unit and other units in the Jess project will have minimal negative impacts to the species viability within the project area. Based on the location and abundance of bear grass within units that have been managed in the past, the Jess project may have the beneficial effect of creating habitat into which the plant populations can expand. Fire is well known to have beneficial effects to bear grass populations and has been used as a tool to enhance bear grass by Native American tribes (Hummel et al. 2012) and by the Forest in other locations. Prescribed burning within the bear grass populations in the Jess project area will not impact species viability, and will most likely be beneficial to these populations.

Cumulative Effects

The only on-going project in the analysis area that impacts Sensitive plant species or Bear Grass is the Glassups Timber Sale underburning. The underburning in the Glassups Timber Sale is designed to minimize impacts on the currently viable populations of *Cypripedium fasciculatum, Cypripedium montanum, Boletus pulcherrimus, Cudonia monticola, Dendrocollybia racemosa,* and *Phaeocollybia olivacea*. The effects of the two projects together will not result in a trend toward federal listing or compromise the viability of the populations. There are no effects to the Survey and Manage species so there are no cumulative effects. The burning in Glassups Timber Sale underburn will improve habitat for bear grass, so when added to Alternative 2 there will be a benefit to bear grass habitat.

Alternative 3

Direct and Indirect Effects

The effects of this alternative on all Forest Service Sensitive plant species are the same as for Alternative 2 even though fewer acres will be treated and treatments in riparian reserves are more restrictive. Project design features will be incorporated into this alternative to protect known populations of Sensitive plant species. The effects to Survey and Manage plant species (specifically *Otidea leporina*) are the same as for Alternative 2

even though acres of treatment and types of treatments in riparian reserves are different. The project design features described in the Survey and Manage Review will be incorporated into this alternative if chosen. The effects to bear grass are the same as in Alternative 2.

Cumulative Effects

The cumulative effects will be the same as for Alternative 2.

3.5.5 Compliance with Law, Policy, Regulation, and the Forest Plan

The Jess project complies with Forest Service Policy and with Forest Plan Standards and Guidelines for Forest Service Sensitive plant species as displayed in the Forest Plan Consistency Checklist, available on the project website. The Jess project complies with the 2001 Record of Decision and Standard and Guidelines for Amendments to the Survey and Manage, Protection Buffer, and other Mitigation Measure Standards and Guidelines (USDA Forest Service, USDI Bureau of Land Management, 2001).

3.6 Non-Native Invasive Species

3.6.1 Analysis Indicators and Methodology

This section evaluates the Jess project in sufficient detail to determine the risk of introducing or spreading non-native invasive plant species (noxious weeds). The Jess project Weed Risk Assessment is summarized below, incorporated by reference and available on the project website.

The analysis indicators for measuring the effects of the Jess project on noxious weeds species of concern are based on policy, and direction. Factors other than the project that affect the introduction or spread of non-native invasive plant species are

- Presence of noxious weed in or adjacent to the project area;
- Habitat vulnerability; and
- Non-project dependent vectors.

Analysis indicators of the effects of the project are:

- Habitat alteration expected as a result of the project; and
- Risk of introducing or spreading weeds based on these alterations.

Forest Service Manual 2900 Invasive Species Management (USDA Forest Service, 2011b) includes a policy statement calling for a risk assessment for noxious weeds to be completed for every project. Management includes reducing management related introduction and spread of noxious weeds on the Forest (USDA Forest Service, 2001). Forest Plan includes Forest-wide Standards and Guidelines for vegetative management that calls for all silvicultural practices to consider how to best prevent introducing noxious

or alien weeds (Forest Plan, page 4-50). Additional direction is found in Executive Order #13112.

Inventory in the project area was conducted from 2002 to 2013 by the Forest Noxious Weed program. Project-specific surveys were conducted in 2011, 2012, and 2013.

Surveyors were trained in the identification of the target species.

3.6.2 Spatial and Temporal Context

The spatial boundary is the project area and adjacent access roads. The short-term temporal boundary is directly after project implementation and long-term is the time required for disturbed areas to recover, five to ten years.

3.6.3 Affected Environment

Six infestations of the noxious weed species Dyer's woad (*Isatis tinctoria*, also known locally as Marlahan mustard) exist in the project area as discovered during inventories. Monitoring data show that these sites are expanding even though these infestations have been treated by hand pulling methods in past years. Public comments on the draft EIS brought to attention the discovery of one infestation of the noxious weed species spotted knapweed (*Centaurea maculosa)* in the project area in a location that may be affected by project activities. This infestation occurs adjacent to mastication Unit #145, and may have been spread into this unit as a result of contingency lines that were constructed as part of the 2014 Whites fire suppression effort. Field surveys will be conducted prior to implementation to determine the extent of the spread of this infestation. If spotted knapweed is discovered in the treatment unit, project design features (Table 2-1 of Section 2.2.4) will be implemented to prevent further spread of the infestation. Fire suppression activities associated with the 2014 Whites fire likely had an effect on some of the Dyer's woad infestations within the project area. Project design features are incorporated into the action alternatives to mitigate any additional impacts as a result of project implementation. (See the Amendment to Botanical Resources Report in the project record for further analysis of the Whites fire and construction of suppression lines in the Jess project).

3.6.4 Environmental Effects

Alternative 1

Direct and Indirect Effects

Implementation of Alternative 1 will result in no increase in suitable habitat for noxious weeds from project-related activities since no such activities will be implemented.

Suitable habitat for weeds decreases with full canopy closure; lack of disturbance and maintenance of the canopy will continue to discourage the establishment of weeds, allowing native plant species to occupy the majority of the habitat in the project area.

Other factors that contribute to the introduction and establishment of weeds, such as transport on vehicles travelling through the project area, livestock and wildlife spread of weeds, and spread of existing roadside noxious weeds will continue as will efforts to contain these infestations.

There is an overall low risk of noxious weed introduction and spread from this alternative.

Cumulative Effects

Adding the minor effects of Alternative 1 to the effects of ongoing and reasonably foreseeable future actions will not provide substantial cumulative effects.

Alternative 2

Direct and Indirect Effects

In this alternative, the risk factors combined have a moderate potential for new weed introduction and existing weed spread within the project area. Alteration of habitat in the short-term and long-term, and presence of known weed occurrences in the project area, can provide opportunities for weeds to spread or become established. Noxious weed habitat can be created when soil is disturbed, competing vegetation is removed and bare soil is exposed. Noxious weeds have developed strategies that allow them to out-compete native species by germinating and occupying land faster than native species under environmental conditions that are not as well tolerated by native species. Underburning may affect the introduction of noxious weeds by reducing protective duff and making bare soil available or by releasing seeds. Areas of pre-established weed infestation will be at the greatest risk of spread since the seed is already present in the soil.

Implementing project design features has a high level of effectiveness in preventing weed establishment and spread, as displayed in the Forest Plan monitoring reports (USDA Forest Service, 2013b); these design features will be implemented in this alternative as will Forest efforts to contain infestations. The overall potential for direct and indirect effects on weed-spread within the project is low when project design features are implemented as displayed in the Weed Risk Report. The post-project implementation of weed monitoring and treatment of existing weed locations will prevent the spread of weeds to new locations. Quickly treating these sites by hand pulling methods has a high probability of preventing new weed sites from establishing.

Cumulative Effects

The ongoing and reasonably foreseeable future actions that will affect the spread of weeds are Glassups project underburning, the Eddy Gulch Late Successional Reserve Habitat Restoration project and the Lower North Fork Road Decommissioning and Stormproofing projects. The environmental effects of these projects on weed-spread are disclosed in the separate environmental analyses; project design features minimize negative effects of

these projects to the spread of weeds. Adding these effects to the effects of Alternative 2 will not add up to measureable effects. The risk of weed introduction and spread remains low in the project area.

Alternative 3

Direct and Indirect Effects

The risk of noxious weed introduction and spread will be somewhat less than Alternative 2 (low risk) because Alternative 3 proposes a reduced amount of commercial treatment within the project area. This treatment reduction eliminates the overlap of tractor Unit #105 and one infestation of Dyer's woad. Noxious weeds project design features will not be necessary for unit 105 in this alternative (Section 2.2.4, Noxious Weeds-2 and Noxious Weeds -3).

Cumulative Effects

Cumulative effects of this alternative, added to the effects of ongoing and future actions, are the same as for Alternative 2 although slightly less because of fewer acres treated in Alternative 3.

3.6.5 Compliance with Law, Policy, Regulation, and the Forest Plan

Forest Service Manual 2900 and Forest Plan Standards and Guidelines require that all projects be evaluated for the risk of noxious weed introduction and spread as a result of project activities. In addition, projects must be designed to reduce the risk of weed introduction or spread. In the action alternatives, project design features have been incorporated into the actions which are expected to reduce the risk of weed introduction and spread. Forest Plan Standards and Guidelines and Manual direction will be met as noted in the Forest Plan Consistency Checklist, available on the project website.

3.7 Geology

3.7.1 Analysis Indicators and Methodology

The Forest Service Manual Chapter 2880 (Geologic Resources, Hazards and Services) requires the assessment of the risk of loss of life, property and natural resources from both naturally-occurring and management related landslides. The risk must be minimized or mitigated when possible. The Forest Plan directs the interdisciplinary team to manage vegetation on unstable lands to maintain or enhance slope stability (Forest-wide Standard and Guideline 2-1, page 4-18). Project-level review of the unstable lands is required to validate the current mapping (Forest-wide Standard and Guideline 2-2, page 4-18).

Unstable lands are defined as active landslides, inner gorges, toe zones of dormant landslides and severely-weathered and dissected granitic lands. These features are considered riparian reserves (Forest Plan Standard and Guideline MA10-2, page 4-108).

Field reviews were completed to validate existing geomorphic mapping and to determine if treatment on unstable lands was appropriate to maintain or enhance slope stability.

Landslide rates are affected by vegetation management activities by the concentration of surface water on hillslope, reduction in root support and reduction in interception of precipitation by vegetation. Landslide rate is indirectly affected by some forest management activities and is difficult to measure directly due to the complex and stochastic nature of landslide events. The analysis indicators are proxies for such processes. A landslide event is defined for this analysis as a large-scale, extensive episode resulting in several landslides that can interrupt ingress/egress, modification of fluvial processes on 3rd to 5th order streams or damage major infrastructure across a 7th field watershed. Details on the methods and analysis are in the Geology Resource Report which is incorporated by reference and available on the project website.

Analysis Indicators

Landslide volume is estimated by the Cumulative Watershed Effects Geology (GEO) model (Geology Resource Report) and represents the magnitude of a landslide event. This indicator uses the empirical mathematical GEO Cumulative Watershed Effects model to estimate the volume of sediment delivered to the mouth of a 7th field watershed due to all types of landsliding during a ten-year storm event. The coefficients in the mathematical equation were developed in the Salmon River basin and the model assumes the geomorphic landforms react identically regardless of elevation. The indirect effects will be analyzed using the landslide volume estimates attributed to the alternative relative to the existing condition volume estimates. The contingency lines in the Jess project area from the Whites fire suppression activities are included in the CWE modeling.

Landslide risk is the chance of effects of injury or loss as a measure of the probability and adverse consequences to safety, property or natural resources (see appendix A of Geology Resource Report). Landslide likelihood is determined by geomorphic landform, disturbance, landslide modeling, and road density. The analysis uses existing geomorphic mapping, bedrock mapping and historical landslide information to determine the likelihood of landsliding. The consequences of a landslide are based on the impacts to Elements at Risk. The Elements at Risk for this analysis are dispersed campsites, ingress/egress, Sawyers Bar municipal water source (Jessups Gulch), fish habitat and water quality in a Key Watershed (North Fork Salmon River 5th field watershed).

The GEO model risk ratio is used in indicating cumulative effects of this project and other ongoing or reasonably foreseeable future actions; it is calculated as two times the “background” landslide volume over the current landslide volume. The threshold of concern for the risk ratio is 1.0. A risk ratio greater than or equal to 1.0 is a yellow flag and calls for a closer look at mitigation opportunities. See Cumulative Watershed Effects: the Abridged Version (USDA Forest Service, 2012).

3.7.2 Spatial and Temporal Context

The spatial scale for analysis is the 7th field watershed scale. The models used for analysis are calibrated at a 7th field scale. The temporal scale is from immediately after project implementation to ten years after for short-term and more than ten years for long- term. Elevated landslide rates due to forest management in northern California have been shown to begin to decrease around seven to 12 years after the disturbance.

3.7.3 Affected Environment

The project area is within four 7th field watersheds, Eddy Gulch, Jessups Gulch, Shiltos Creek and Olsen Creek. The current landslide volumes estimated for the analysis area are about 16,200 cubic yards per decade, 20,800 cubic yards per decade, 17,200 cubic yards per decade, and 83,200 cubic yards per decade for Eddy Gulch, Jessups Gulch, Shiltos Creek, and Olsen Creek respectively. Ninety-eight percent, 88 percent and 85 percent of the landslide volume from past management activities in Eddy Gulch, Jessups Gulch and Shiltos Creek respectively are related to the existing road system. The 2013 Salmon River Complex wildfire is the reason for almost 75 percent of the landslide volume modeled by the GEO model. The Whites fire only burned 2 acres and 46 acres respectively of the Eddy Gulch and Jessups Gulch 7th field watersheds and did not burn into the project area at all.

For Eddy Gulch and Jessups Gulch, a landsliding event is likely. The likelihood of a landsliding event is highly likely for Shiltos and Olsen Creek. Shiltos Creek has a high road density and Olsen Creek has an elevated GEO risk ratio due to the 2013 Salmon River Complex. All of the watersheds have ingress/egress, fish habitat and water quality (not related to potable water) as Elements at Risk. Jessups Gulch also is a municipal watershed (potable water). There are a few dispersed campsites in the analysis area but they are set off from stream channels and are not likely to be affected by landsliding. The landslide risk under current conditions is moderate in Eddy Gulch and high in the other three watersheds.

The risk ratios for Eddy Gulch, Jessups Gulch and Shiltos Creek are under the Threshold of Concern. Olsen Creek; however, has a risk ratio of 1.73 which is over the Threshold of Concern of 1.0. The elevated risk ratio is due to the effects of the 2013 Salmon River Complex that occurred on the northern half of the 7th field watershed, outside of the project area.

3.7.4 Environmental Effects

Alternative 1

Direct and Indirect Effects

Under this alternative no management actions will occur. There are no direct or indirect effects to landslide volume or risk.

Cumulative Effects

There are no direct or indirect effects for this alternative; therefore, there are no cumulative effects.

Alternative 2

Direct and Indirect Effects

The landslide volume for Alternative 2 is increased by less than 1 percent for Eddy Gulch, Shiltos Creek and Olsen Creek 7th field watersheds. The landslide volume is increased by almost eight percent for Jessups Gulch. The modeling does not account for implementation of the project design features (Section 2.2.4) prescribed to minimize the impacts of the project on riparian reserves. The treatments in inner gorges are limited by the commercial harvest and equipment exclusion zones. There is also a decrease in the road-related landsliding volume as a result of the hydrologic stabilization of the temporary roads on existing roadbeds.

The percent of headwaters with harvest or prescribed burning, and the Cumulative Watershed Effects Model risk ratios, are increased by the alternative but not enough to increase the overall landslide risk in any of the 7th field watersheds. The temporary roads on existing roadbeds are included in the current road per mile calculation for this analysis because in their current condition they influence landslide rates in the watershed. System road density does not change at all by this alternative. However, the miles of non-system roadbeds contributing to the landslide rate will be decreased by two miles because of the hydrologic stabilization that will occur.

Jessups Gulch, Shiltos Creek and Olsen Creek have high landslide risk. According to the risk matrix (appendix A of the Geology Resource Report) mitigations need to be prescribed to mitigate impacts. There are 45 project design features prescribed in Section 2.2.4 of this document (Watershed-1 through Watershed-45) that are intended to minimize impacts to watershed health and landslide rates.

Cumulative Effects

Cumulative effects of the Jess project are estimated by adding the effects of Alternative 2 to recent past and current actions in the project area and reasonably foreseeable future actions. The recent past and current actions include the North Fork Roads Stormproofing project, Eddy Gulch LSR Habitat Restoration project, Glassups Timber Sale and the road work done under the Burned Area Emergency Response. The future action analyzed for cumulative effects is the Salmon Complex Fire Salvage. The model assumes no

measureable impact to slope stability as the result of salvage logging so there is no additional landslide volume as a result of the future action.

Eddy Gulch, Jessups Gulch and Shiltos Creek are under the threshold of concern (risk ratio greater than 1.0) for the GEO model. The watersheds are not likely to experience adverse impacts to the landslide rates as a result of the addition of the proposed and future actions. Olsen Creek is over the threshold of concern with a risk ratio of 1.73. The portion of the watershed on the north side of Salmon River (outside of project area) was affected by the Salmon Complex Wildfire. The elevated Cumulative Watershed Effects risk ratio does imply that the likelihood of landsliding during a ten-year storm event is highly likely. However, the cumulative risk of landsliding will remain in the high category because of the nature of the Elements at risk in the watershed. Adding the effects of Alternative 2 to the effects of other projects will not increase the landslide risk for the watersheds analyzed.

Alternative 3

Direct and Indirect Effects

The footprint of Alternative 3 is smaller than Alternative 2 and, therefore, it has similar but smaller effects on landslide volume and landslide risk.

The landslide volume for Alternative 3 is increased by less than 0.1 percent for Eddy Gulch, Shiltos Creek and Olsen Creek 7th field watershed. The landslide volume is increased by only two percent for Jessups Gulch. The modeling does not account for implementation of the project design features (Section 2.2.4) prescribed to minimize the impacts of the project on riparian reserves.

Just as in Alternative 2, the percent of headwaters with harvest or prescribed burning and the Cumulative Watershed Effects model risk ratios are increased by the alternative but not enough to increase the overall landslide risk in any of the watersheds. The overall landslide risk for the 7th field watersheds remains the same in Alternative 3 as Alternative 2.

Cumulative Effects

The cumulative effects of Alternative 3 are the same as in Alternative 2 except the risk ratio for Jessups Gulch is 0.48 in this alternative instead of 0.68 as in Alternative 2.

3.7.5 Compliance with Law, Policy, Regulation, and the Forest Plan

Existing mapping was field-verified by the Forest Geologist; unstable lands are removed from treatment areas where slope stability is not benefitted by treatment. The landsliding magnitude and risk were analyzed for all of the alternatives in the project. The risks associated with the project are minimized by implementation of project design features.

Action alternatives are in compliance with law, policy, regulation and the Forest Plan as displayed in the Forest Plan Consistency Checklist, available on the project website.

3.8 Air Quality

3.8.1 Analysis Indicators and Methodology

Siskiyou County is identified as attainment or unclassified for carbon monoxide, sulfur oxides, lead, and respirable particulate matter for both state and federal standards.

Siskiyou County is in "non-attainment/transitional" status for the state 8-hour ozone standards. Therefore, compliance with the General Conformity Rule for nitrogen oxides must be analyzed for this project. Prescribed burning activities release greenhouse gas including carbon dioxide and methane into the air which could contribute to climate change. Currently, there are no thresholds for greenhouse gas emissions for prescribed burning activities. The Council on Environmental Quality recommends that Federal agencies disclose in the NEPA analysis the effects of climate change for actions that are estimated to emit more than 25,000 metric tons of carbon dioxide equivalents annually.

The emissions for the criteria pollutants nitrogen oxides, sulfur oxides, and particulates for mobile sources are estimated using an emissions factor model. Emissions of nitrogen oxides, sulfur oxides, particulates, carbon dioxide and greenhouse gases from prescribed burning were estimated using the First Order Fire Effects Model. First Order Fire Effects Modeling is recognized by the Forest Service Pacific Southwest Region as being the most current and accurate analysis tool available for emissions prediction.

The criteria pollutant emissions are presented as U.S. tons per year for ease of comparison to the General Conformity Rules *de minimis* thresholds. Greenhouse gases are presented in metric tons of carbon dioxide equivalent per year which is the standard metric for presenting greenhouse gases.

Analysis Indicators

- Estimated emissions of Criteria Pollutants (nitrogen oxides, sulfur oxides, and particulates) for each alternative.
- Estimated effects on greenhouse gas emissions for each alternative.

3.8.2 Spatial and Temporal Context

Emissions from mobile sources such as logging trucks and tractors, as well as from prescribed burning, are transient and the impacts are short-lived. Along with this, the air quality regulations are in terms of one-year emissions. In light of this, the temporal analyses are on an annual basis and this is considered short-term. Impacts are considered long-term if they persist for more than a year. The cumulative effects of the mobile source emissions, fugitive dust and smoke emission will be addressed on the 6th field watershed scale.

3.8.3 Affected Environment

According to the California Air Resource Board's website (www.arb.ca.gov) the ambient air in portions of the Siskiyou County Air Quality Management District exceeds the State particulates standard during many of the winter months. Siskiyou County is identified as attainment or unclassified for carbon monoxide, sulfur oxides, lead, and particulates for both state and federal standards. Therefore the project is exempt from conformity determination for these pollutants. The Air Management District is in "non-attainment/transitional" status for eight-hour ozone, a product of volatile organic compounds or nitrogen oxides.

The project area is located adjacent to Sawyers Bar, California, in Siskiyou County. The project area consists primarily of forested federally-managed lands with no substantial human-caused emission sources within the area other than emission and fugitive dust from logging and recreation. Other emission contributions are smoke and haze from seasonal wildfires and prescribed fires from both within and outside the county. The area-wide sources, primarily from prescribed forest burning, account for a majority of the carbon dioxide and particulate matter emitted in the county. The nitrogen oxide emissions are primarily from heavy-duty diesel trucks. The sulfur oxide emissions for 2015 are expected to be driven by wildfire (natural source) emissions. The project area is approximately 1.5 miles south of the Marble Mountain Wilderness, which is a Class I wilderness and is protected under the Regional Haze Rule.

3.8.4 Environmental Effects

Alternative 1

Direct and Indirect Effects

Under Alternative 1, there will be no new emissions of criteria pollutants or greenhouse gas from activities because there are no project-related actions.

Cumulative Effects

There are no direct or indirect effects to criteria pollutants or greenhouse gases; therefore, there are no cumulative effects.

Alternative 2

Direct and Indirect Effects

Alternative 2 will produce criteria pollutant and greenhouse gas emissions from the exhaust of mobile sources and hauling activities. These emissions may impact visibility and air quality for the community of Sawyer Bar and the surrounding area. The criteria and greenhouse gas emissions from prescribed burning may impact visibility and air quality in Sawyers Bar and possibly in the Marble Mountain Wilderness during

implementation. The emissions are not anticipated to exceed the General Conformity Rule *de minimis* values for nitrogen oxides.

The alternative will emit an estimated 20,300 metric tons of carbon equivalents. However, the areas treated with prescribed fire are likely to not only re-sequester the carbon released during treatment but be able to surpass unmanaged stands in the amount of additional carbon stored in the long-term (Hurteau and North, 2010).

Cumulative Effects

The cumulative effects on ozone will comply with the General Conformity Rule and will remain under the regulatory standard. Greenhouse gas emissions are estimated to be 30,360 metric tons of carbon equivalent per year from the future actions. When added to the 20,300 metric tons of carbon equivalents the cumulative emissions is 50,660 metric tons of carbon equivalents. The cumulative effects of Alternative 2 on air quality are expected to be minimal with the oversight of the Siskiyou County Air Pollution Control District (Section 2.2.4, Air Quality-2). Criteria pollutant and greenhouse gas emissions will not degrade air quality cumulatively with activities occurring in the surrounding area. These emissions are expected to be minimal and able to disperse readily.

Compliance with Burn Day, Marginal Burn Day, and No Burn Day designation, and coordination with and permitting from the Siskiyou County Air Pollution Control District, will minimize cumulative effects of prescribed fire. Adding the effects of Alternative 2 to the effects of other projects will comply with the Conformity Rule and will have minimal impacts to visibility in Sawyers Bar and the Marble Mountain Wilderness.

Alternative 3

Direct and Indirect Effects

The effects of Alternative 3 are the same as for Alternative 2. There will be slightly fewer emissions due to the fewer acres of burning. The alternative will emit an estimated 16,000 metric tons of carbon equivalents.

Cumulative Effects

The cumulative effects of Alternative 3 are similar to Alternative 2. The cumulative greenhouse gas emissions from Alternative 3 and the future actions will be about 46,360 carbon equivalents per year. Since there are slightly few tons/year emitted from Alternative 3 than Alternative 2, the emission from this alternative added to cumulative emissions are smaller. Adding the effects of Alternative 3 to the effects of other projects will comply with the Conformity Rule and will have minimal impacts to visibility in Sawyers Bar and the Marble Mountain Wilderness.

Comparison of Effects

Cumulative emissions for criteria pollutants with the action alternatives are compared in Table 3-10 below.

Table 3-10. Estimated cumulative emissions for criteria pollutants.

Criteria Pollutant	Future Action (tons/year)	Alt 2 + Future (tons/year)	Alt. 3 + Future (tons/year)
Particulates	495.2	723.1	678.6
Carbon monoxide	5473.7	7858.3	7397.0
Nitrogen oxides	12.9	33.9	29.3
Sulfur dioxide	21.9	35.9	33.0

3.8.5 Compliance with Law, Policy, Regulation, and the Forest Plan

Alternatives 2 and 3 are not anticipated to result in an adverse impact to air quality. Therefore, the current attainment status for all but ozone within Northeast Plateau Air Basin is expected to continue. The emissions are not anticipated to exceed the General Conformity Rule *de minimis* values for nitrous oxides. Therefore, the project complies with the General Conformity Rule and with the Forest Plan, as displayed in the Forest Plan Consistency Checklist, available on the project website.

3.9 Soils

3.9.1 Analysis Indicators and Methodology

The analysis of effects of individual management activities on the soil resource (soil productivity and soil ecosystem functionality) is guided using the Forest Plan Standards and Guidelines and Forest Service Manual 2500, Chapter 2550, Supplement 2500-2012-1. Three indicators were chosen that best address relevant soil-related issues in the project and measure compliance with Forest Plan Standard and Guidelines. The indicators include soil stability, soil organic matter, and soil structure.

The unit measures for each indicator are acres not meeting desired conditions. Soil stability desired conditions are not met when major portions of the area lack soil cover and/or lack effective erosion control measures. Soil organic matter desired conditions are not met when major portions of the area have had the upper soil layer displaced or removed to a depth and area large enough to affect productivity for the desired plant species. Soil structure desired conditions are not met when major portions of the area have reduced infiltration and permeability capacity indicated by soil structure and macro-porosity changes.

The proposed activities for the project were categorized into similar activity types. For example, all of the various silviculture treatments that use ground-based equipment were lumped into “Ground Based Tractor Logging with Associated Landings.” The projected acres not meeting desired conditions for each indicator and activity type were determined

from data collected from previous projects on the Forest using the National Forest Soil Disturbance Monitoring Protocol. Details on the methods and analysis can are in the Soil Resource Report which is incorporated by reference and available on the project website.

3.9.2 Spatial and Temporal Context

For all three soil indicators, the analysis area is bounded by the project activity units where soil-disturbing activities take place. The analysis is further bounded in time by the foreseeable future period during which effects of this project can persist as detectable, substantial effects. Short-term effects can be seen immediately after project implementation. In the longer term, soil cover, as it affects soil stability, can recover quickly as needles and other organic debris are deposited on the forest floor. The temporal boundary for soil stability is five years. Soil organic matter can take from years to decades to rebuild after it is lost through displacement or erosion. The temporal boundary for soil organic matter is 30 years. Once compacted, structure can remain affected for decades. The temporal boundary for soil structure is 30 years.

3.9.3 Affected Environment

The majority of soils in the project area developed from metavolcanic parent material. The soils found on dormant landslide deposits are deep (up to 200 inches) gravelly loams that have moderate productivity. The soils outside dormant landslide deposits are more shallow (40 inches deep) extremely gravelly loams with low soil productivity. Found in small pockets throughout the project area are soils developed from serpentine parent material. These soils are deep (up to 200 inches) gravelly loams with moderate soil productivity.

Erosion hazard rating is a relative measure of the sensitivity of soils to erosion processes. Soil disturbance has the potential to increase the erosion hazard because soil cover is generally reduced. Erosion hazard rating was calculated for each of the treatment units to estimate the potential erosion hazard for a given soil type. First, a maximum erosion hazard rating was calculated for soil that is completely bare to determine the risk of soil loss in areas without protection from soil cover. The maximum erosion hazard rating for all treatment areas is high. The erosion hazard rating for the current conditions of treatment areas was then calculated using data collected on existing conditions of soil cover. Current soil erosion hazard ratings for soils in treatment areas, based on existing conditions, are low.

Using a unit selection strategy based on soil sensitivity and type of management activities planned, 13 units were selected for survey of existing soil conditions. The selected units are all proposed for ground based equipment harvest. The average slope within these units ranges from 23 percent to 40 percent with an overall average of 30 percent. Average existing total soil cover ranges from 77 percent to 100 percent and averages 92 percent.

Existing coarse woody debris (logs greater than 20 inches in diameter) in the sampled units ranges from 0.8 to 13.6 logs per acre and averages 5.6 logs per acre.

Using the National Forest Soil Disturbance Monitoring Protocol, approximately 88 percent of the surveyed units were rated as disturbance class 0 (undisturbed), five percent were rated as class 1, seven percent were rated as class 2, and 0 percent rated as class 3. The types of disturbances found include topsoil displacement on old full bench constructed skid trails, rutting on old skid trails, and compaction on old skid trails and landings. Desired conditions for soil stability are met across the entire project area because soil cover levels are very high and no signs of erosion are found. Desired conditions for soil organic matter and soil structure are met on an average of 95 percent of the project area.

Subsequent to the project area survey, changes to the affected soils environment have occurred as a result of the fire suppression activities during the Whites Fire in the summer of 2014. Within the project area boundary, approximately 8.7 miles of tractor contingency firelines were created. Assuming a 16 feet average width of the tractor firelines, only 0.2 percent of the 8,535 acres in the project area have been affected. Due to the soil compaction and displacement caused by tractor line construction, soil desired conditions for soil organic matter and soil structure have not been met on these firelines. However, desired conditions for soil stability have been met as a result of post-fire repair which included installing waterbars and pulling slash placement.

3.9.4 Environmental Effects

Alternative 1

Direct and Indirect Effects

Direct effects of Alternative 1 will be no effect on the soils, as soil-disturbing project activities will not take place. Soil cover for erosion protection will not change in the project area. Soil organic matter will continue to accumulate faster than decomposition rates with no additional benefit to soil fertility. Soil structure conditions will remain the same in the short-term, with very slow long-term natural recovery of old skid trails and landings. Indirect effects of Alternative 1 will be an increased accumulation of organic matter in terms of surface and ladder fuels with a corresponding continual increase in fire hazard.

Cumulative Effects

Past actions including timber harvest and thinning are evident on the landscape in the project area and are reflected in the discussion of the affected environment. The Glassups Timber Sale underburn is an ongoing action that will occur in the project area. With project design features in place to limit burning to low and moderate intensities, and minimum guidelines for post-project soil cover levels, the Glassups Timber Sale

underburn is not expected to affect desired conditions for soil stability, soil organic matter, or soil structure. Since there are no other ongoing or reasonably foreseeable future actions that will occur in the project area that have an effect on soils, there will be no cumulative effects from adding the effects of the Glassups Timber Sale underburn to the effects of Alternative 1.

Alternative 2

Direct and Indirect Effects

With treatments in this alternative, the number of acres that will not meet desired conditions for soil structure, soil organic matter, and soil structure is minor in relation to the total treatment area, and is reduced to the extent possible with project design features (Section 2.2.4).

Ground-based tractor logging in some units with associated landings will result in reduced levels of soil cover on skid trails and landings but implementation of project design features will reduce the potential for soil erosion. A combination of increased compaction, reduced soil cover, and soil displacement will lead to a loss of nutrients on the skid trails and landings in units where ground-based tractor logging takes place.

Project design features, including slope limitations, minimizing impacts to coarse woody debris and the high priority of using existing skid trails, will minimize impacts to soil erosion and productivity. Skyline cable logging in other units will result in small amounts of soil displacement in the yarding corridors from the tail end of the log dragging on the soil surface. This log dragging usually does not occur over the entire corridor length and, when properly water barred, no substantial erosion will leave the harvest units. Soil compaction and reduced soil porosity from commercial harvest will be minimal to none.

Machine mastication will maintain the high levels of existing cover by cutting the existing live and dead standing material into smaller pieces and letting it fall to the soil surface. Machine mastication will have a slight impact on soil organic matter because fine surface fuels will be increased but there will be minimal disturbance to the topsoil. Slight increases in compaction will occur in travel access corridors around the unit.

Roadside hazard tree removal will cause small amounts of soil displacement in the yarding corridors for each felled tree. Existing high levels of soil cover will function to minimize soil exposure. Desired conditions for soil stability, soil organic matter, and soil structure will be met for roadside hazard tree removal treatments.

The impacts of prescribed fire on fuel loads and surface soil conditions can vary considerably depending on fuel characteristics and loading, soil climatic conditions at the time of burning, and resulting soil burn severity. Following soil cover guidelines, soil stability desired conditions are expected to be met for prescribed fire and pile burning treatments.

Temporary roads on existing roadbeds will be cleared and graded, reducing soil cover levels during project operations. Temporary roads will be hydrologically stabilized and closed after project completion, mitigating long term erosion in the project area.

Monitoring from previous projects has shown that, with the implementation of project design features, ground-based and skyline harvest, mastication, prescribed burning and temporary road use meet desired soil conditions greater than 90 percent of the time. Alternative 2 will maintain adequate soil cover, protect soil organic matter, and maintain soil structure at levels sufficient to protect soil productivity and prevent soil erosion. A full description of how the proposed activities may impact soil function can be found in the Soil Resource Report, available on the project website.

Cumulative Effects

Past actions including timber harvest and thinning are evident on the landscape in the project area and are reflected in the discussion of the affected environment. The Glassups Timber Sale underburn is an ongoing action in the project area. With implementation of project design features in place to limit burning to low and moderate intensities, and minimum guidelines for post-project soil cover levels, the Glassups Timber Sale underburn is not expected to impact desired conditions for soil stability, soil organic matter, or soil structure. Since there are no reasonably foreseeable future actions that will occur in the project area that have an effect on soils, adding the effects of the Glassups Timber Sale underburn to the effects of Alternative 2 will not have a measurable cumulative effect.

Alternative 3

Direct and Indirect Effects

The proposed activities that have a potential to impact soil stability, soil organic matter, and soil structure are the same as for Alternative 2. The acreage treated with ground-based tractor and skyline logging is less than that of Alternative 2 while acres of roadside fuels treatments are increased compared to Alternative 2. The overall effects of Alternative 3 on soils are similar to those of Alternative 2.

Cumulative Effects

The cumulative effects of Alternative 3 are the same as Alternative 2.

3.9.5 Compliance with Law, Policy, Regulation, and the Forest Plan

Forest Plan Standards and Guidelines for soils will be met for all alternatives as displayed in the Forest Plan Consistency Checklist, available on the project website.

3.10 Water Quality

3.10.1 Analysis Indicators and Methodology

The effects of the Jess project were analyzed through field visits, Geographic Information System reports and modeling. All streams were evaluated for shade and overall health of the stream. Units that may potentially be thinned were selected for field review if current stream layers indicated that streams were within or adjacent to units, or units included or were adjacent to other landforms such as inner gorges and terrain subject to landslides because these situations may create water quality concerns. Project design features were developed based on stream channel characteristics and slope breaks determined during field visits. In addition, the Forest Road Sediment Source Inventory was used to inventory legacy sediment sources and to assess the risk to water quality.

Information was collected to allow analysis of the compliance of the project alternatives with the North Coast Regional Water Quality Control Board Waiver of Discharge requirements (North Coast Regional Water Quality Board, 2010).

Cumulative Watershed Effects models are used to evaluate the risk associated with action alternatives. Three models are used. The Equivalent Roaded Area (ERA) model is used to estimate changes in peak runoff flows influenced by ground-disturbing activities in action alternatives. The geological cumulative watershed effects model (GEO) compares the landslide sediment production of action alternatives to the production if the watershed was undisturbed. The Universal Soil Loss Equation (USLE) model estimates sediment delivered to a stream channel. The modeled risks are based on the effects of actions or events and do not take into account the project design features that minimize negative effects to sediment delivery, landslide potential, or peak flows.

Details regarding the methods, analysis and the Cumulative Watershed Effects Modeling can be found in appendix A of the Water Quality Resource Report, available on the project website.

Analysis Indicators

- Sediment delivery to streams (estimated by both geologic and Universal Soil Loss Equation models)
- Changes in peak flow/base flow (estimated by the Equivalent Roaded Area model)
- Changes to temperature (estimated by stream shade or canopy cover)
- Channel condition (estimated by potential change in conditions)

Impacts to beneficial uses for watersheds and riparian areas within the project area will be determined using these analysis indicators.

3.10.2 Spatial and Temporal Context

The watershed spatial scales include the 5th field, 6th field and 7th field watersheds. The North Fork Salmon River 5th field watershed is composed of six 6th field watersheds and twenty five 7th field watersheds. The Jess project is located within four of the twenty-five 7th field watersheds. Effects are measured or estimated at the following spatial scales: (1)

Site (effects are located in stream channels adjacent to or near treatment areas and do not extend downstream); (2) Reach (effects extend downstream for less than 100 meters); and (3) Watershed (effects can be measured in the response reach of a 7th field watershed).

The temporal scale may be either short- or long-term in duration. Short-term effects are usually evident in one to three years but can be evident for up to ten years after project implementation. Long-term effects are those that persist for more than ten years.

3.10.3 Affected Environment

As a tributary to the Klamath River, North Fork Salmon River is listed in the 303(d) Clean Water Act for stream temperature impairment as discussed in the Water Quality Resource Report. Beneficial uses that are considered impaired include cold freshwater habitat; rare, threatened, and endangered species habitat; migration of aquatic organisms; spawning, reproduction, and/or early development of fish. As a result of 303(d) listing, the Klamath River Stream Temperature Total Daily Maximum Load was developed to (1) reduce and prevent excess sediment inputs that influence stream temperature and (2) maintain and restore site potential stream shade in an effort to decrease water temperatures. To help implement these goals, a waiver of waste discharge requirements for non-point sources on federal lands (waiver) was developed that includes (1) treatment of legacy sediment sources and (2) maintenance or improvement of stream shade. A stream sediment and temperature monitoring program is required to document existing conditions, develop reference conditions and track recovery of water bodies. Stream monitoring for sediment and temperature on a Forest-wide sample of “managed” and “reference” streams is displayed in annual monitoring reports as noted in the Water Quality Resource Report for Jess.

The only stream within the project area that is included in the Forest-wide monitoring is Eddy Gulch (a managed stream) which approximated or met reference conditions for sediment and temperature. However, it is possible that some beneficial uses of this stream may be impaired because the subsurface sediment size is on the margin of not meeting reference conditions and stream temperature during one of the monitored years is slightly warmer than the desired temperature for core juvenile salmonids.

All watersheds within the project area are currently modeled as below the Threshold of Concern for Cumulative Watershed Effects except one 7th field watershed (Olsen Creek-North Fork Salmon River; Table 3-11). Olsen Creek is a “compound” watershed consisting of drainages north and south of the North Fork Salmon River; the drainages are not physically connected to each other. Elevation of this watershed above the Threshold of Concern is linked to events that occurred on the north drainage; the Jess project is in the south drainage.

The 7th field watersheds within the project are characterized by well-confined, steep-gradient, high-energy, low-order streams. These streams carry large sediment along the

bed of the channel. The monitoring of the Eddy Gulch stream channel indicates that it is within the natural range of variability for pool depth and substrate composition (USFS, 2013d).

Wildfires during the summer of 2014 minimally affected the Jess project area. The only watershed that was affected by the Whites wildfire is Jessups Gulch-North Fork Salmon River. About 20 acres of low intensity burned on the southwest side of the watershed which is outside of the Jess project boundary; however, contingency lines were installed within the Jess project area. All contingency lines were hydrologically stabilized after completion. The effects of the Whites wildfire have been incorporated into the Cumulative Watershed Effects (CWE) models.

Table 3-11: Modeled current conditions (risk ratios) by watershed with risk ratios over Threshold of Concern in bold.

Watersheds	Current Risk Ratio		
	USLE[1]	GEO[2]	ERA[3]
7th field Watershed			
Eddy Gulch	0.97	0.76	0.49
Jessups Gulch-North Fork Salmon River	0.40	0.59	0.45
Olsen Creek-North Fork Salmon River	0.52	**1.73**	0.37
Shiltos Creek-North Fork Salmon River	0.66	0.67	0.27
5th Field Watershed			
North Fork Salmon River	0.33	0.73	0.34

[1] USLE risk ratios are calculated by dividing accelerated sedimentation values due to surface sediment erosion by an inference point value of 400 percent. Accelerated sedimentation is figured as "percent over background," which is calculated from 'current' model-estimated sediment delivery less background divided by background values.

[2] GEO risk ratios are calculated by dividing accelerated sedimentation values due to mass-wasting by an inference point value of 200 percent. Accelerated sedimentation is figured as "percent over background," which is calculated from 'current' model- estimated sediment delivery less background divided by background values.

[3] ERA risk ratios are calculated by dividing ERA values by an inference point value equal to the Threshold of Concern.

3.10.4 Environmental Effects

Alternative 1

Direct and Indirect Effects

Alternative 1 will not actively move existing conditions towards desired conditions. Most of the fill material contained in legacy sites will still be available to be delivered to tributaries of North Fork Salmon River during a large storm event; this may result in adverse effects to water quality. Without treatment in this alternative, the five legacy sites that have not been treated by other projects will continue to produce soil erosion and increase the potential for landslides. Alternative 1 will not result in any short- or long-

term improvements to watershed condition. Although modeled risk ratios will slowly recover, stream sediment measured in response reaches is expected to remain the same or increase as untreated legacy sites continue to chronically or catastrophically fail over time.

Under Alternative 1, fuels will continue to accumulate due to tree mortality as a direct result of insect infestation and disease attacks as noted in the Vegetation section of this chapter. This will lead to decreased shade on late-flowing intermittent and perennial streams in the project area and increase temperatures, impairing downstream beneficial uses.

Cumulative Effects

Adding the effects of this alternative (no action) to the effects of ongoing and reasonably foreseeable future actions will not measurably affect stream temperature or shade as measured by cumulative watershed effects modeling. None of the risk ratios will change measurably as displayed in the Water Quality Resource Report. The effects to water quality of not treating five legacy sites, when added to the effects of treating 20 legacy sites by other projects (Lower North Fork Salmon roads decommissioning and stormproofing project), may be measurable at the site or reach scale but are not large enough to affect risk ratios at the watershed scale. Effects of this alternative on channel conditions in the future, added to the effects of ongoing or reasonably foreseeable future actions, will not produce substantial cumulative effects on this indicator.

Alternative 2

Direct and Indirect Effects
Sediment Regime

All project activities, including temporary road on existing roadbed, hydrologic stabilization and legacy site mitigation, will increase the likelihood of sediment delivery at the site scale to stream channels in the short term. In the short-term, there will be an estimated increase in sediment delivery to stream channels and landslide potential as a result of Alternative 2 of about 10 percent for the Jessups Gulch-North Fork Salmon River 7th field watershed and less than one percent for the other 7th field watersheds. The effects to the sediment regime at the site scale in the long-term, and at the watershed scale in the short and long term, will not be discernible. The mitigation of legacy sites and the hydrologic stabilization of temporary roads on existing roadbeds will reduce the potential sediment delivery by 9.5 cubic yards per year and landslide potential by 901 cubic yards per decade. There will be some short-term increase in sediment at the site-scale where existing landings in riparian reserves are being used (units 108, 110, 118 and 119).

However, in the long-term there will be a benefit to the sediment regime because reusing the existing landings means that there will be four fewer acres of landings in the watershed.

Peak/Base Flow

In the short, summer low flows and annual water yield will be slightly increased from the reduction in evapotranspiration at the site and reach scale but not be affected at the 7th field watershed scale (due to the overall small area in which activities will take place in proportion to the size of the watershed). Peak flows are expected to increase less than 10 percent in the short-term, an amount which is less than is measurable during an average year. The effects to peak flow and base flow in the long-term will be neutral. The vegetation will quickly respond to the vegetation management and evapotranspiration will be back at pre-project levels in less than ten years.

Temperature

The thinning proposed in the outer 70 feet of riparian reserves occurs mainly in intermittent streams that do not flow past July most years. However, the treatment on the late-flowing intermittent and perennial stream channels will not reduce shade in streams in the short-term. The topography is such that trees more than 100 feet from the channel are not providing a measurable amount of shade to the streams. Prescribed fire is expected to remove less than five percent of the canopy (see the Fuels and Fire section of this chapter and the Fuels and Fire Resource Report, available on the project website) and there is limited burning in riparian reserves. In the long-term, canopies of the young vigorous trees will regenerate within a decade. The increase in large trees in the riparian reserve, along with the decrease in mistletoe infection rates, will improve stand health within the riparian reserves.

Channel Conditions

Short-term effects to channel geomorphology from skidding logs across ephemeral and intermittent streams will directly affect channel conditions in the short-term at the site-scale only. Implementation of Best Management Practices and project design features will minimize negative effects. Treatments designed to retain coarse woody debris in riparian reserves and ensure future recruitment will help maintain channel geomorphology as will treatments and project design features to ensure large woody debris recruitment to streams. There is not expected to be an increase in landslide risk (see Section 3.7.4) so there are no changes to the channel expected from debris flows or landslides.

Riparian conditions in the watersheds are expected to improve. Riparian reserve conditions in the Jessups Gulch-North Fork Salmon River 7th field watershed will be improved by a reduction in road density from 2.71 miles per square mile to 2.37 miles per square mile; road density will not change in any other watersheds within the project area. One stream crossing will be removed. Riparian reserves will benefit from the improved stand health due to the treatments that decrease mistletoe infection, reduce tree mortality, and encourage the growth of more large trees per acre.

Beneficial Uses

The beneficial uses will be neutrally affected in the short-term. Sediment will be increased by less than 10 percent, there is no measureable affect to peak or base flow, stream shade will not be reduced, and with project design features there will be only local impacts to channel condition. In the long-term, improved tree growth in the riparian reserves and the increased stand health will increase stream shade in the treatment units. As a result of addressing the legacy sites and the hydrologic stabilization of temporary roads on existing roadbeds, there will be a reduction of the potential of sediment delivery to stream channels in the 7th field watersheds.

Cumulative Effects

The other projects in the analysis area will have long-term beneficial impacts to forest and watershed health. The Eddy LSR will improve forest health in the Eddy Gulch watershed. Glassups Underburning, an on-going project in Jessups Gulch, will continue to reduce the fuel loading in portions of the watershed helping to keep the fire behavior less severe. The Burned Area Emergency Response road work in the Olsen Creek watershed and the North Fork Roads Storm-proofing project will improve watershed health by treating roads for diversion potential, undersized culverts and other drainage issues.

The elevated risk ratios do not change for Eddy Gulch or Olsen Creek from Alternative 1 (Table 3-12); therefore the proposed action will not affect sediment regimes for those watersheds. All other watersheds are well below the Threshold of Concern. The sediment regime and flow regime will not affect beneficial uses.

Table 3-12: Alternative 2's influence on cumulative watershed effects risk ratios (numbers in parentheses indicate the increase in risk ratio from no action).

Watershed	Risk Ratio after treatments (Increase in Risk Ratio)		
	USLE	GEO	ERA
7th Field Watershed			
Eddy Gulch	0.97 (0)	0.77 (0.01)	0.54 (0.05)
Jessups Gulch-NF Salmon River	0.47 (0.07)	0.68 (0.09)	0.89 (0.44)
Olsen Creek-NF Salmon River	0.52 (0)	1.73 (0)	0.40 (0.03)
Shiltos Creek-NF Salmon River	0.66 (0)	0.67 (0)	0.36 (0.09)
5th Field Watershed			
North Fork Salmon River	0.33 (0)	0.73 (0)	0.36 (0.02)

Alternative 3

Direct and Indirect Effects

Effects of Alternative 3 are the same as for Alternative 2 with the following exceptions:

For sediment regime, there is an estimated decrease in sediment delivery to stream channels as a result of Alternative 3 of about six percent for the Jessups Gulch-North Fork Salmon River 7th field watershed and less than one percent for the other 7th field watersheds in the short-term. The sediment potential due to legacy site treatments and hydrologic stabilization of the temporary roads on existing road beds over the long-term will be reduced similarly to Alternative 2.

There will be no treatments in the riparian reserve. Tree growth will remain slow and mortality increased because of the epidemic mistletoe levels. Large woody debris recruitment to streams will be delayed and large tree enhancement will take longer to achieve.

Cumulative Effects

Cumulative effects of Alternative 3 will be nearly identical to Alternative 2 except the risk ratios are slightly lower because of the reduction of acres treated (Table 3-13).

Table 3-13: Alternative 3's influence on cumulative watershed effects risk ratios (numbers in parentheses indicate the increase in risk ratio from no action).

Watershed	Risk Ratio after treatments (Increase in Risk Ratio)		
	USLE	GEO	ERA
7th Field Watershed			
Eddy Gulch	0.97 (0)	0.76 (0)	0.50 (0.01)
Jessups Gulch-NF Salmon River	0.41 (0.01)	0.57 (0.02)	0.57 (0.12)
Olsen Creek-NF Salmon River	0.52 (0)	1.73 (0)	0.39 (0.02)
Shiltos Creek-NF Salmon River	0.66 (0)	0.67 (0)	0.32 (0.05)
5th Field Watershed			
North Fork Salmon River	0.33 (0)	0.73 (0)	0.34 (0)

3.10.5 Compliance with Law, Policy, Regulation, and the Forest Plan

The conditions in the Waiver of Waste Discharge Requirements for Nonpoint Source Discharges Related to Certain Federal Land Management Activities on National Forest System Lands in the North Coast Region are met for this project as detailed in the Water Quality Resource Report. Meeting the Waiver requirements equals compliance with the Clean Water Act. Forest Plan standards are met by consistency with the Aquatic Conservation Strategy, as displayed in appendix F and the Forest Plan Consistency Checklist, available on the project website.

3.11 Society and Culture

3.11.1 Analysis Indicators and Methodology

Qualitative indicators normally used to evaluate the effects of projects on the social environment include changes in community capacity, lifestyles, values and beliefs. For this project, an important social indicator is community safety as discussed in the Sawyers Bar Community Wildfire Protection Plan (Salmon River Watershed Restoration Council, 2004) and safety of firefighters, forest workers and visitors. Quantitative indicators include employment (number of full-time jobs) and income. Indicators of any disproportionate effects on segments of the population (including racial and ethnic composition), employment, and poverty are used to estimate effects on civil rights and environmental justice.

Because most jobs related to the project will come from the activities related to vegetation management, job creation resulting from implementation of the proposed action and alternatives is estimated based on the predicted volume output from sale of the timber as described in Section 3.12.4.

3.11.2 Temporal Context

One area used for analyzing social effects of projects is any local community within or adjacent to the project area, based on zip code. However, margins of error are large in the demographic information; the zip code (96097) includes the town of Etna as well as the local community of Sawyers Bar so information is not available at the local community scale. A larger area, for which more data are available, is Siskiyou County, California.

When information is not available for local community, Sawyers Bar is assumed to be similar to the county as a whole; where specific information is available, effects of the Jess project will be displayed for the local area. Short-term effects are those which occur during implementation of the project because effects on quantitative measures can be seen during this time. Long-term effects occur after project implementation with decreasing effects over time.

3.11.3 Affected Environment

Like Siskiyou County, Sawyers Bar has seemed to maintain relatively steady social and economic indicators in the past two decades. Siskiyou County's population in 2012 was 44,154 people, decreasing by less than one percent since 2000 (U.S. Census Bureau 2013).

Employment in the county was also relatively constant over the last decade, decreasing from 17,704 workers in 2000 to 16,510 workers in 2012 (US Department of Labor Bureau of Labor Statistics 2012). Adjusted to 2010 dollars, personal income per capita from 2006-2010 was $22,179 (compared to $29,188 for California as a whole) (U.S. Census Bureau 2012). In Sawyers Bar, as in the county, personal income consists of labor and non-labor income. Non-labor income includes dividends, interest, and rent (money earned from investments) and transfer payments (payments from governments to individuals such as Medicare, Social Security, unemployment compensation, disability

insurance payments and welfare). Approximately 50 percent of income in Siskiyou County is from labor sources and 50 percent is non-labor income. The proportions of labor and non-labor income in Siskiyou County have fluctuated slightly over the years but have not substantially changed since 1995 (US Department of Commerce Bureau of Economic Analysis 2009). The percentage of non-labor income coming from transfer receipts has increased somewhat with a decrease in the percentage from dividends, interest and rent; non-labor income from transfer receipts was 51 percent in 2000 and 59 percent in 2007 (US Department of Commerce Bureau of Economic Analysis 2009).

Unemployment in Siskiyou County since has ranged from 12.2 percent in 1990 to 16.6 percent in 2011 (Department of Labor Bureau of Labor Statistics 2012). Sawyers Bar is likely to have experienced similar unemployment although statistics are not available for the local community.

Lifestyles, attitudes, beliefs and values of Sawyers Bar and Siskiyou County residents are similar to those of rural residents in other counties in the western United States. Many local residents depend on the environment to support them, both professionally and personally; this, in turn, affects their lifestyles and attitudes. “The Code of the West: the Realities of Rural Living” (Siskiyou County 2005) sheds light on some of the conventions of living in Siskiyou County. “The right to be rural” is a fundamental theme among residents. The rugged terrain of the Forest contributes to the isolation of many communities, and further promotes a rural lifestyle. Self-reliance, interdependence between neighbors, and close interaction with the outdoors are important benefits of living in Siskiyou County. This theme directly relates to the use of Forest resources, and to the desire among many residents to see the Forest resources being used to economically benefit the County. The Siskiyou County Comprehensive Land and Resource Management Plan (Siskiyou County 1996) emphasizes the use of natural resources.

The ability of these communities to respond to stresses and take advantage of opportunities to meet community needs (known as community capacity) is fluid. According to researchers who studied the Mid-Klamath communities (communities near but not adjacent to the project area), the infrastructure (underlying framework) is limited (Doak and Kusel 1997, Charnley et al. 2006). In the Sawyers Bar area, however, the community has coalesced to develop the Community Wildfire Protection Plan that emphasizes the need for short- and long-term safety, indicating an increased community capacity.

Environmental Justice and Civil Rights

All federal actions are required to consider the potential of disproportionate effects on minority and low-income populations by the Executive Order 12898. The principles of environmental justice require agencies to address the equity and fairness implications associated with federal land management actions. The estimated racial distribution of

Siskiyou County consists of Caucasians, American Indians and Alaskan Natives, Blacks or African Americans, Asians or Pacific Islanders, and other races.

The racial distribution of Siskiyou County is mostly Caucasian, with almost 88 percent identifying themselves as White persons; 95 percent of the population identify themselves as one race and approximately five percent identify themselves as being of two or more races (U.S. Census Bureau 2013). American Indian and Alaskan Native, Black or African American, and Asian/Pacific Islanders are the other races identified. Approximately 80 percent identify themselves as non-Hispanic and 1one percent as Hispanic or Latino (of any race). Only American Indian and Alaskan Natives are present in a larger percentage in the county (four percent) than in California as a whole (one percent). Nineteen percent of Siskiyou County residents are below the poverty line (U.S. Census Bureau 2013).

The American Indian and Alaska Native (also known as Native American) population is greater in percentage (four percent) than its percentage of the population in California (one percent). Since the number of Native American people is greater in the County than in the State, the Jess project assesses the effects on Native Americans to determine compliance with Executive Order 12898. Siskiyou County also has a greater percentage of persons 65 years and older (almost 20 percent) than the State (11 percent) so effects to older persons are also analyzed.

Nineteen percent of residents in Siskiyou County from 2008-2012 were living below poverty level (U.S. Census Bureau 2013). Comparable figures for the State of California as a whole are about 15 percent (U.S. Census Bureau 2013). Since the number of people below the poverty level is greater in the county than in the State, the Jess project assesses the effects on low income populations in Siskiyou County to determine compliance with Executive Order 12898.

The civil rights policy of USDA requires each agency to analyze the civil rights impact(s) of its decisions. This socioeconomic analysis substitutes for a civil rights impact analysis in that the possible adverse or disproportionate impacts of this project on individuals based on their membership in a protected group are disclosed. Protected groups are defined in law and include common characteristics including race, gender, national origin, age, disability and others. Siskiyou County is similar to other counties in California except for proportion of Native Americans, persons below poverty level, and persons 65 years old and over; therefore, civil rights analysis and disclosure focuses impacts on these groups to determine compliance with civil rights law and the USDA civil rights policy.

3.11.4 Environmental Effects

Alternative 1

Direct and Indirect Effects

The effects on the social environment of Siskiyou County from taking no action (Alternative 1) are a continuation of the current situation in terms of employment and distribution of jobs among racial and ethnic groups, older and low-income residents. Effects on community capacity, lifestyles, values, and beliefs will not change. Although the project area is not likely to experience a high-severity wildfire in the short term, in the long term increased mortality in the project area will affect the safety of local residents, firefighters, forest workers and visitors. The magnitude of effects on private property cannot be accurately estimated.

Cumulative Effects

The added effects of Alternative 1 plus the effects of reasonably foreseeable future actions including the North Fork Roads Stormproofing project, Eddy Gulch Late Successional Reserve Habitat Restoration project, Glassups Underburning, Salmon Salvage project, and Burned Area Emergency Rehabilitation work on the social environment will not be measureable or cumulatively substantial. Reasonably foreseeable projects may have a minor effect on job creation and other economic factors; this is addressed in the environmental analysis for these projects. However, the cumulative effects of these projects plus the effects of Alternative 1 on the social environment are minor.

Alternative 2

Direct and Indirect Effects

Alternative 2 is estimated to add 73 full-time jobs, most likely within Siskiyou County, with no unequal distribution of jobs among racial and ethnic groups, or older residents. See Section 3.12.4 for additional detail on the types of jobs that will be created. Changes in lifestyles, values, attitudes and beliefs due to implementation of the Jess project are likely to be immeasurable due to the small size of effects from the project. However, safety will increase with implementation of Alternative 2 due primarily to an increasing continuity of ingress/egress roadside treatments. Changes in community capacity due to the Jess project are not likely to be measurable due to the small influence of the project and the larger impact of other activities on the community capacity of the county; however, some positive effects on community capacity of Sawyers Bar are likely from the implementation of some priorities from the Community Wildfire Protection Plan.

There will be no negative effect on civil rights or environmental justice; there will be no disproportionate effects on Native Americans, low-income persons, or older persons.

Cumulative Effects

The added effects of Alternative 2 with the effects of reasonably foreseeable future actions including the North Fork Roads CE (road storm-proofing), Eddy Gulch project, Glassups Timber Sale underburning, Salmon Salvage project, and Burned Area Emergency Response work on the social environment will not be measureable or cumulatively

sizeable. Although the cumulative job creation from Eddy Gulch project (estimated 96 jobs) and the Jess project (estimated 73 jobs) will provide a temporary benefit to the local community, the magnitude of overall effects is not substantial in the long term. The effects of Alternative 2, added to the effects of reasonably foreseeable projects, will have a minor effect on job creation and other social factors within the county.

Alternative 3

Direct and Indirect Effects

Alternative 3 is expected to add 17 full-time jobs, most likely within Siskiyou County, with no unequal distribution of jobs among racial and ethnic groups. The direct and indirect effects of Alternative 3 will be the same as for Alternative 2 except that the number of jobs created related to timber removed will yield a reduced benefit.

Cumulative Effects

The cumulative social effects of Alternative 3 will be the same as for Alternative 2.

3.11.5 Compliance with Law, Policy, Regulation, and the Forest Plan

Alternative 1 will not improve the economic conditions of Sawyers Bar, as encouraged by the Forest Plan, nor improve safety for Sawyers Bar. All action alternatives are in compliance with law, policy, regulation and the Forest Plan.

Overall Forest Plan direction and guidance relevant to the social environment includes a Forest-wide goal of managing for the long-term, broad-scale stability of local communities (Forest Plan, Environmental Health and Community Stability, page 4-4). Action alternatives will move the project area toward this goal.

3.12 Economics

3.12.1 Analysis Indicators and Methodology

Several steps were taken to estimate the logging costs and economic viability of the project.

1. Plot data were gathered to determine the number, size and species of trees within each unit boundary.
2. Data were input into Access database for use in the Forest Vegetation Simulator which calculates volume estimates for both standing volume and harvest volume.
3. Forest Vegetation Simulator provided output regarding tree species breakdown by unit and estimated harvest volume based on unit prescriptions by volume and species. The volumes provided in the Forest Vegetation Simulator output were adjusted based on professional judgment of the relationship between the system's numerical output and what exists on the ground. The number of jobs created is determined based on estimates of volume to be harvested.

4. Logging system information was derived from a combination of on-the- ground field evaluation and the use of orthophotography. The ArcMap Geographic Information System was utilized to estimate number of corridors for skyline systems, skid roads for ground-based systems and landing locations.
5. Information derived from Forest Vegetation Simulator and ArcMap were input into the LogCost spreadsheet to estimate the stump-to-truck logging costs. Similar inputs were also put into the Sale Economic Evaluation spreadsheet. The intended use of this spreadsheet is to estimate the economic viability of planned Federal timber sales (residual value method). The user inputs the data necessary to make the determination in various tables. The summary table displays items such as the advertised rate, base rate, timber value, whether or not the unit and/or sale is estimated to be deficit or not, and the estimated value the sale is above (or below) base rates. The evaluation is based on the residual value appraisal methodology.

Analysis Indicators

- Timber Value - The analytical or residual value appraisal method determines fair market value by subtracting all manufacturing and harvesting costs and an allowance for profit and risk from the value received for the end products produced. Appendices A and B of the Economics Resource Report, available on the project website, show the details of inputs for calculating this value.
- Stump-to-Truck costs - The cost of harvesting standing timber is an indicator of the economic viability of the project. Stump- to-truck logging costs are calculated using the LogCost version 14.0 program to determine the economic viability of the project. Appendices C and D of the Economics Resource Report show the summary of values for each alternative.
- Jobs Created - The number of jobs created is an indicator that addresses specific concerns about effects on the local timber dependent communities within the region. Although this number is not likely to reflect new job creation, it is sustaining employment for those already working in the industry over the duration of the project. Appendix H of the Forest Plan estimates state-wide employment effects of changes in harvest levels. Ten to twenty person- years of employment per million board-feet or 180 hundred cubic feet of timber harvested are estimated to be generated as a result of timber harvest activity.

3.12.2 Spatial and Temporal Context

The spatial boundary for the analysis of jobs created is the county of Siskiyou. Although resources may come from outside this boundary, it is likely that most of the economic impact will take place within the county or the effects will comparable in adjacent counties. The spatial boundary of analysis of timber value is limited to the project area since many factors contributing to timber value are relative to location and specific site characteristics.

The short-term duration of the project may vary from three to ten years, providing employment opportunities for logging, planting, noncommercial thinning, masticating, and monitoring. It is during this time period that economic effects of the project

(especially job creation) are most likely to be noticeable in county-wide data. Economic effects beyond ten years are not likely to be noticeable.

3.12.3 Affected Environment

The Jess project is located entirely within Siskiyou County, a large, remote rural county located in inland Northern California adjacent to the Oregon border. See the description of the affected environment in the Society and Culture section of this chapter for additional information on employment, income, and economic aspects of the county.

3.12.4 Environmental Effects

Alternative 1

Direct and Indirect Effects

Under this alternative no vegetation or fuels management activities will occur. The economic effects of taking no action are a continuation of the current situation in terms of distribution of jobs among racial and ethnic groups. No new jobs will be created from this alternative. The economic effect of taking no action contributes to the decrease of manufacturing (which includes forest products) jobs in the county, which decreased from 1,843 in 1990 to 1,672 in 2000 (US Department of Commerce Bureau of Economic Analysis, 2012) and to 736 in 2010 (US Department of Commerce Bureau of Economic Analysis, 2012). This statistic includes lumber mills and logging operations. The continuation of the county's economic situation is dependent upon a continuous supply of raw material to manufacture products. Implementation of Alternative 1 will neither support nor add to the demand for employment in this sector.

The economic effects of taking no action are a continuation of the current situation in terms of employment and distribution of jobs among racial and ethnic groups and those below the poverty level.

Cumulative Effects

Adding the effects of reasonably foreseeable future actions in the project area to the direct and indirect effects of taking no action in the Jess project will not be cumulatively substantial because the scale of effects of all projects added together will still be small.

Alternative 2

Direct and Indirect Effects

The proposed action estimates 13,325 hundred cubic feet will be available for harvest. Using the metric described above, Alternative 2 is estimated to add 73 full-time jobs, most likely within Siskiyou County. Implementing Alternative 2 will help to slow the decline in the manufacturing sector. Local saw mills, timber purchasers, and contractors tend to appreciate the values that a small number of jobs can bring to rural communities. With

that, contractors and purchasers more often use a local work force for the logging and hauling. The timber value is estimated to be 1.46 million dollars, bringing positive economic effects to the county.

Cumulative Effects

Implementation of Alternative 2a, added to the economic effects of reasonably foreseeable future actions will result in a steady supply of wood commodities over several years in addition to providing job opportunities in the short term. There will be a temporary and minor reduction in unemployment in Siskiyou County and a minor positive cumulative impact of this project on economic well-being in Siskiyou County.

Alternative 3

Direct and Indirect Effects

Alternative 3 estimates 3,800 hundred cubic feet will be available for harvest. Treatments in Alternative 3 are expected to add 17 full-time jobs, most likely within Siskiyou County. Timber value is estimated to be 429,270 dollars. The effects of Alternative 3 are the same as Alternative 2, although to a lesser degree due to the reduced area of treatment proposed for harvest and fewer cubic feet of timber removed.

Cumulative Effects

The cumulative effects of Alternative 3 are similar to those of Alternative 2 although slightly less positive.

3.12.5 Compliance with Law, Policy, Regulation, and the Forest Plan

Programmatic management direction for the Forest is provided by the Forest Plan which Forest Plan standards and guidelines direct the Forest to promote economic stability of local communities through timber harvest and wood fiber extraction to the extent possible and c consistent with other goals, objectives and standards (Forest Plan, Social and Economic Environment, page 4-9) to the extent possible. Action alternatives are consistent with law, policy, regulation and the Forest Plan as displayed in the Forest Plan Consistency Checklist, available on the project website.

3.13 Recreation

3.13.1 Analysis Indicators and Methodology

Field site visits were conducted during the summer of 2012, including visits to the Red Bank campground and to two of the four dispersed camp sites within the project boundary. The Recreation Opportunity Spectrum Field Guide (USDA Forest Service, 1990) emphasizes the general direction for recreation management including recreation site management, hazard reduction and vegetation management (Forest Plan, page 4-38). It provides a framework for understanding how management decisions may affect the

recreation experience of the forest visitor, and the degree to which certain types of management are compatible with Recreational Opportunity Spectrum classes. Each class has limits of acceptable change within the following seven setting indicators: Access, Remoteness, Naturalness, Facilities, Social Encounters, Visitor Impacts and Visitor Management; these determine the levels of management that are either *Fully Compatible*, *Normal*, *Incompatible*, or *Unacceptable* within that class. When analyzing vegetation and fuels projects, the *Naturalness* setting indicator is used to determine the amount of perceptible disturbance that is consistent with the Recreational Opportunity Spectrum class.

The 2008 Forest Recreation Facility Analysis and Forest Recreation Settings Map are used to determine the Recreation Setting specific to a part of the Forest. Different settings represent different priorities and functions of an area, and are used to analyze the consistency of actions with maintenance of the visitor experience and protection of resources.

Analysis Indicators

- Amount of perceptible disturbance to *Naturalness* of views from recreational sites.
- Consistency with maintaining access to the recreational use.

3.13.2 Spatial and Temporal Context

The project area is the spatial context for the analysis of recreational opportunities. Recreational sites within one mile of a treatment unit are expected to be affected by project actions. The effects can be short-term (less than one year) or long-term (up to ten years).

3.13.3 Affected Environment

There are four dispersed campsites and one concentrated use area, the Blue Ridge Lookout, within the project area as well as the Red Bank campground. More information on these sites is available in the Recreation Resource Report, available on the project website.

The recreation sites within one mile of proposed treatment areas are within the Rural Recreational Opportunity Spectrum class with the exception of fewer than 40 acres of proposed roadside fuels treatment. The Rural class includes recreation settings with visual evidence of management processes (Forest Plan, page 4-34).

The Jess project area is within the “Salmon River Country” Forest Area Setting. Key activities in this setting include whitewater rafting and kayaking on the Salmon River, hiking and equestrian travel, and hunting and fishing. The dispersed sites within this project area are most likely used as hunting camps due to their locations and road access.

Three of the sites lack other specific attractions nearby but the site near Mud Lake (54DO17) has the added benefit of a scenic meadow and lake.

The Blue Ridge Lookout, constructed by the Civilian Conservation Corps in 1934, is considered a concentrated use site. It is visited for its panoramic views of the Salmon River drainages. The lookout itself is not accessible to visitors since the first flight of stairs has been removed.

The 2014 White's Fire burned over portions of the East Fork of White's trail, Tanners Peak trail, the Deacon Lee trail, the Music Creek trail and portions of the Pacific Crest Trail in the Russian Wilderness. These impacts will likely have the effect of reducing recreation opportunities in the area (hiking and equestrian) and may increase recreation pressure on unburned areas nearby that contain trails.

3.13.4 Environmental Effects

Alternative 1

Direct and Indirect Effects

There will be no direct or indirect effects to the recreation resources in the Jess project area with this alternative because no project actions will be implemented. There will be no changes made to the recreation sites, concentrated use site or the affected area in general.

Cumulative Effects

There are no direct or indirect effects to the visual quality of recreational sites or access to recreational sites in Alternative 1. Therefore, there are no cumulative effects.

Alternatives 2 and 3

Direct and Indirect Effects

Effects of alternatives 2 and 3 are discussed together because the effects of these alternatives on recreation are similar.

The proposed vegetation and fuels treatments in the project area have the potential to have positive and negative effects on the recreation resources, namely the four dispersed sites and the Blue Ridge Lookout. Although the Red Bank campground is within the project area, it is not within the vicinity of the proposed treatment areas so effects to the *Naturalness* of views from this campground are not analyzed. The effects of activities such as skid roads, landings, slash, stumps, etc. on the landscape are analyzed to see if they maintain the characteristics of the Recreational Opportunity Spectrum class. One aspect of this is whether vegetation is left, when possible, to provide visual screening around dispersed campsites so that visitors are able to feel secluded from other people and activities. No action is proposed in the immediate vicinity of the Blue Ridge lookout so there will be no effect on *Naturalness*. Scenic impacts are discussed further in the Scenery

section of this document and the Scenery Resource Report, available on the project website.

Direct effects of action alternatives include effects of logging operations and fuels treatments that take place during typical recreation peak months of July – October. Public access may be hindered by roads that are closed during active thinning, and any haul routes on Forest system roads may be avoided by the public as well. If skid trails are located near any dispersed sites there will be potential for those activities to disrupt a recreation opportunity. Burning will likely occur outside of the peak recreational season (June through September) so it is unlikely that burning activities will have an impact on the recreation opportunities in the area. Notices of burning will be issued (see Table 2-1) to allow recreationists to avoid areas potentially impacted by smoke.

Indirect effects include potential long-term visual impacts to the area, particularly evidence of log landings, skid trails and slash piles that may be within view from recreation sites. Reduction of good screening-vegetation around sites will reduce the recreation opportunities in the area. Hazard trees, as identified in the Region 5 Hazard Tree Guidelines, around dispersed sites are removed as part of the normal Forest program of work but any additional potential hazard tree removal in the area will make for a safer recreation setting further into the future than simply following the Regional guidelines and removing the most imminent hazards. Drivers on the Salmon River road who are viewing scenery may experience increased log truck traffic during any hauling.

Recreation project design features 1-3 (Section 2.2.4) serve to mitigate the direct and indirect negative impacts of this project by maintaining non-hazardous vegetation around dispersed sites and locating skid trails and landings away from them.

This project will have no effect on hikers, equestrians or boaters who are in the area to use recreational trails or waterways because there is no proposed activity near any trails, trailheads or river access points.

Cumulative Effects

The cumulative effects of action alternatives plus the effects of the adjacent Eddy Gulch Late Successional Reserve Habitat Restoration project and other projects in the area will be minor. Due to the historic low levels of dispersed recreation use on the Forest, it is unlikely that there will be inadequate access to recreation opportunities in the Salmon River area. In other words, anyone who may be displaced by the Jess project, the Eddy Gulch project and other projects can easily find recreational opportunities close by.

The 2014 White’s Fire has had a negative impact on some recreation opportunities (hiking and equestrian opportunities described in the affected environment section) though the increased pressure on unburned trails described above is unlikely to take place within the Jess project area as there are no system trails present. Therefore, recreation

opportunities and quality are not likely to be diminished cumulatively due to either Alternative 2 or 3.

3.13.5 Compliance with Law, Policy, Regulation, and the Forest Plan

Action alternatives comply with law, policy, regulation and the Forest Plan. Applicable Forest Plan Forest-wide Standards and Guidelines will be met by the Jess project as displayed in the Forest Plan Consistency Checklist, available on the project website.

3.14 Scenery

3.14.1 Analysis Indicators and Methodology

This evaluation applies current National Forest Landscape Management methodology in conjunction with existing Forest Plan direction on scenery. It relies heavily on previous field studies of similar types of projects, as well as field observations from sensitive viewpoints and consideration of public preferences for scenic quality. The general process for a scenery evaluation follows:

- Determine high or moderate sensitivity viewpoints located within or adjacent to the project area from which the project may be visible. These are identified in an inventory maintained in the Forest Supervisor's office.
- Review project descriptions and maps; assessing project activity locations (orientation, slope position, distance from viewer, etc.), logging systems, combined with on-the-ground knowledge of topography and vegetation.
- Conduct field reviews conducted of critical units proposed in this project, focusing on project activities located in Partial Retention Visual Quality Objectives areas.
- Evaluate individual project activities for their visibility from high or moderate sensitivity routes. Evaluate noticeable changes from project activities to existing landforms and vegetation in terms of form, line, color, and texture contrasts. Using professional expertise, compare the overall visual dominance and degree of noticeable contrast to the existing scenic character against the Visual Quality Objectives which define levels of acceptable visual change.

Analysis Indicators

- Consistency with Visual Quality Objectives.
- Visual impacts to Wild and Scenic River designation.

3.14.2 Spatial and Temporal Context

The spatial analysis boundaries for visual resource management (scenery) include the viewsheds from sensitive viewing locations as required by the Forest Plan (Forest-wide Standard 11-1, page 4-35). Temporal bounding is three years for short-term effects, at which time projects are required to meet their assigned Visual Quality Objectives, as required by the Forest Plan's Standards and Guidelines. Long term effects are ten years or longer.

3.14.3 Affected Environment

The project area is either within the Partial Retention Visual Quality Objective, in which management activities may be noticeable but are subordinate to the characteristic landscape, or within the Modification Visual Quality Objective in which management activities may dominate but reflect natural features. “Viewing Natural Features” and “Viewing Wildlife” are, respectively, the second and third most popular recreation activities of visitors to the Forest, and scenic quality of the project area is important to those activities.

In terms of Scenic Character (the overall visual impression or image that gives a geographical area its identity) the North Fork Salmon River drainage, including the project area, is isolated, vast, and rugged with lush forest vegetation and beautiful rushing mountain streams with unbelievably clear, cold water. Eddy, Jessups, Glasgow, and Jones Gulches and Shiltos Creek are flanked by mid-elevation, very steep, rugged mountainous terrain which is bisected by numerous smaller side drainages. There are numerous breaks in the forest canopy from previous wildfires, older harvest units, roads, rock outcrops, and meadows. In the background, more open higher elevation ridges and peaks provide a visual backdrop. Vegetation is diverse in both pattern and species as described in Section 3.1.3 and in the Scenery Resource Report. Dense vegetation not only obstructs in-canopy views to the forest floor but also provides ladder fuels for wildfires (as discussed in Section 3.2.3) and increased tree mortality when combined with epidemic levels of insect and disease infestation (Section 3.1.3); both of these can be adverse to valued landscape character attributes. Streams display extremely high water clarity and air quality is high, with coastal moisture occasionally adding clouds and haze to the typical clear views under bright blue skies.

In terms of scenic character expectations of current user groups (sense of place) both the very low population density and the distance from larger human population centers contribute to an independent, rural residential lifestyle as described in Section 3.11.3.

Scenic integrity (the relative degree of natural appearance displayed by a landscape) in the project area is characterized by limited evidence of existing roads, fire breaks, plantations, and past logging units. Across the project area as a whole, alterations are minor and generally a near-natural appearance dominates. Vegetation and/or topography screen most of these management activities except when in the immediate vicinity of the activity. Therefore, the project area has Moderate Scenic Integrity and meets a Partial Retention Visual Quality Objective.

More recent fire suppression activity during the 2014 Whites Fire has resulted in more loss of scenic integrity within the project area. Fuels reduction and fireline preparation, consisting mostly of roadside mastication or cutting and piling of brush, was done in the vicinity of Blue Ridge Lookout. Approximately 15 miles of contingency fire breaks on ridgetops and sub ridges were constructed by heavy equipment such as bulldozers. These

fire breaks were repaired after the fire was contained (hydrologically stabilized and covered up to 50 percent with scattered vegetation) though are still partially visible from Cow Ridge Trail, and are quite evident in the vicinity of the Blue Ridge Lookout.

Table 3-14 represents a list of all the *potential* viewpoints located in or near the project area, their visual sensitivity, and the viewer position from which project activities will be visible. The visual assessment of project activities uses these viewpoints.

Sensitive viewpoints include the community of Sawyers Bar, a Wild and Scenic River, one Forest highway, a fire lookout, and a dispersed camping area.

Table 3-14: Potential viewsheds, visual sensitivity levels, and viewer position

Potential Viewpoint(s)	Visual Sensitivity Level	Viewer Position
Sawyers Bar	High	Inferior
North Fork Salmon River (Wild & Scenic River)	Moderate	Inferior
Forest Highway 102 (North Fork Salmon River Road)	Moderate	Inferior
Blue Ridge Lookout	Moderate	Superior
Red Bank Campground	Moderate	Inferior
Cow Ridge Trail	Moderate	Superior

Along streams, lakes, meadows, and high elevation ridges, the scenic attractiveness of the landscape is Distinctive – A; on the mid-slopes, scenic attractiveness is Common - B.

Wild and Scenic River:

The North Fork Salmon River is a segment of the Klamath Wild and Scenic River which was designated in 1981 to protect and enhance its free-flowing condition, water quality and fishery values. The Wild and Scenic River Act and Forest Plan (pages 4-120 through 4-122) also include protection requirements for the river's aesthetic, scenic, historic, archaeological and scientific features. The North Fork Salmon River has a "recreational" Wild and Scenic River classification to accommodate the river's accessibility by roads and inclusion of some development along its shoreline.

3.14.4 Environmental Effects

Alternative 1

Direct and Indirect Effects

Under this alternative, current management plans will continue to guide management of the project area. There will be no commercial or noncommercial vegetation treatment, no roadside treatments, and no fuels treatment (such as hand piling, mastication, and underburning) and no meadow enhancement. The noticeability of existing disturbances will gradually decrease over time through natural vegetative recovery (growth) and screening but may be disturbed again by unforeseen future disturbances such as wildfire.

Increased tree mortality due to epidemic levels of insect and disease will lead to long-term decreases in the number of large trees (see discussion in Section 3.1.4). There will be no substantial effects to the Visual Quality Objectives in the short term.

The Recreation and Scenic Integrity conditions will preserve the Recreational River in a free-flowing condition. The river's water quality and fisheries values are in good condition and will not be affected.

Cumulative Effects

Adding the minor effects of Alternative 1 to the effects of ongoing and reasonably foreseeable future actions will result in minor cumulative effects. Past management actions have been incorporated into the affected environment and their effects accounted for there. The project area will continue to meet Partial Retention Visual Quality Objectives.

Alternative 2

Direct and Indirect Effects

The short-term visual impacts from underburning will create brown vegetation, red tree crowns, blackened duff layer, scorched trunks, and minor disturbance from fuel break construction. Recovery times of three years will allow re-vegetation or "greening up" of many of the burn effects. At that point, any residual effects from the underburn will appear as a natural occurrence, consistent with the many wildfires that have occurred throughout this area. Underburning will create long-term positive effects such as the creation of more open stands where forest visitors can look into stands, larger trees and wildlife and greater species diversity can be seen, and stands will have increased resiliency to wildfire. The Partial Retention Visual Quality Objective will be met; this alternative will help move the project area toward meeting the Forest-wide standard to perpetuate the Forest's ecologically established landscape character (Forest Plan standard 11-4, page 4-35).

The proposed commercial and non-commercial treatments will create more open stands of varying densities with some small openings and some un-thinned areas in small patches, and enhance the growth of hardwoods. These treatments will create long-term positive effects where forest visitors can look into more open stands, observe larger trees (where present after treatments reduce insect and disease-related tree mortality), and see greater species diversity and spatial variety.

It is probable that many of the commercial units will be visible from Cow Creek trail at a background distance zone (less than four miles). These units will mimic other more open stands found in the area, will appear near-natural in the long term and meet a Partial Retention Visual Quality Objective.

Thinning of small diameter conifers in the ridgetop fuels treatments will reduce ladder fuels, encourage large tree growth, increase fire resiliency and visually "open up" the ridgetops, appearing as a natural occurrence by mimicking similar ridges in the characteristic landscape. It is probable some of these treatments will also be visible from isolated locations in Sawyers Bar.

Because a masticator grinds and chops up small diameter trees and brush in place, leaving behind crushed vegetation (limbs, brush, trees) which partially cover bare soil, masticated areas will appear lighter in color and more open in the short term; this increases textural contrasts with adjacent trees or brush. It is probable that some of the masticated areas will be visible from Cow Creek trail and Blue Ridge lookout. However, a recovery time for Partial Retention Visual Quality Objective of three years will allow re-vegetation or "greening up" so long-term effects are at acceptable levels. The visual changes in color and texture will appear near-natural occurrences within three years.

Removal of small diameter conifers and brush along roads will also open up visibility into the forest. Some of these treatments will be visible to visitors traveling to Blue Ridge lookout. Three years of re-vegetation or "greening up" will reduce color and texture changes, and minimize visibility of stumps, so that long-term effects are at acceptable levels. The treatments will be near-natural appearing occurrences within three years and easily meet their assigned Visual Quality Objective of Partial Retention or Modification.

Since meadow enhancement involves the removal of small encroaching conifers and planting of willows as needed, this activity will restore the meadow to more natural conditions and perpetuate the Forest's ecologically established landscape character (Forest Plan Standard 11-4, page 4-35). Project activities will be natural or near-natural appearing and meet the Partial Retention Visual Quality Objective. Meadow restoration will create positive long-term scenery effects by eliminating conifer encroachment and maintaining high scenic quality. This activity will not be visible from any sensitivity viewpoint.

Field review determined that because of topographic and/or vegetative screening, no project activities will be visible from three sensitivity viewpoints: the North Fork Salmon River Road; the North Fork Salmon River; and the Red Bank campground. Consequently there will be no effect to these viewpoints.

The project's vegetation enhancement treatments will reverse adverse ecosystem trends and support all Wild and Scenic River values. The river's free-flowing condition will be protected, while water quality and fisheries values will be enhanced through the project's many short- and long-term ecosystem diversity improvements. The current risk of adverse and uncharacteristic wildfire and erosion impacts due to impaired ecosystem conditions will be reduced. Wild and Scenic River recreation settings and scenic integrity will be enhanced immediately after project completion and for several decades thereafter through creation of more attractive vegetation conditions that are resilient to large scale

disturbance. The project's Wild and Scenic River effects will be fully consistent with all applicable Forest Plan Wild and Scenic River direction.

Cumulative Effects

The effects from past vegetative alterations in the project area have slightly diminished scenic quality over the years. The Glassups project underburn and the Eddy Gulch Late Successional Reserve Habitat Restoration project are anticipated to meet Visual Quality Objectives. Some of the past, present and reasonably foreseeable activities have revegetated (or are partially visible or invisible) because of topographic and/or vegetative screening from sensitive viewpoints. Adding the effects of this alternative to the effects of past, ongoing and reasonably foreseeable future actions, when viewed from multiple viewpoints, will be natural or near-natural appearing and cumulatively appear visually subordinate to the characteristic landscape. All viewsheds will meet the Partial Retention Visual Quality Objective. Recent fire suppression activity related to the 2014 Whites fire has likely created the most substantial negative impact to the scenic integrity of the area. Adding the effects of Alternative 2 to the effects of suppression of the Whites fire is still not likely to produce sizeable cumulative effects to scenery.

Alternative 3

Direct and Indirect Effects

A reduction from Alternative 2 of approximately 400 acres of total treatments will create fewer acres of positive scenery effects from more open stands, observing larger trees (where present), seeing greater species diversity and spatial variety, and increased resiliency to wildfire. Indirect effects will be fewer opportunities for wildlife viewing.

Cumulative Effects

All of the cumulative scenery effects are the same as Alternative 2.

3.14.5 Compliance with Law, Policy, Regulation, and the Forest Plan

All alternatives are in compliance with law, policy and regulation including the Wild and Scenic Rivers Act. Action alternatives will help achieve the Forest-wide standard (Forest Plan, 11-4, page 4-35) to perpetuate ecologically established scenery, minimize visible disturbances (meet Forest Visual Quality Objectives), and maintain scenic opportunities.

3.15 Cultural Resources

3.15.1 Analysis Indicators and Methodology

The Forest is required to take into account the effects of all Forest undertakings on historic properties pursuant to Section 106 of the National Historic Preservation Act and the *Programmatic Agreement among the USDA. Forest Service, Pacific Southwest Region (Region 5), California State Historic Preservation Officer, Nevada State Historic*

Preservation Officer, and Advisory Council on Historic Preservation Regarding the Process for Compliance with Section 106 of the National Historic Preservation Act for Management of Historic Properties by the National Forests of the Pacific Southwest Region (Regional PA).The following summarizes the effects of implementation of the Jess project on historic properties located within the project.

The methods used for analysis are primarily guided by two parameters. The first is determining the area within which implementation of an alternative has the potential to have an effect. The second is establishing whether or not there are historic properties present within this area which may be affected by project implementation.

Establishing the area within which there was potential to have an effect resulted in the development of the Area of Potential Effect. The Area of Potential Effect was developed primarily based upon the actions associated with proposed alternatives. The Area of Potential Effect was also used to guide efforts associated with historic property identification.

Identification of historic properties within the Area of Potential Effect forms the second parameter of analysis. This effort involved three steps: pre-field research, field surveys, and consultation. Pre-field research consists of a thorough review of existing and available information on known historic properties within the Area of Potential Effect. Field surveys are conducted within the Area of Potential Effect to locate and identify any previously unknown historic properties. Consultation efforts include soliciting information on historic properties from tribal organizations, the general public, and within the forest service.

Analysis Indicators

Affects are assessed using criteria defined by regulations for Protection of Historic Properties (36 CFR Part 800). If an action could change in any way the characteristics that qualify the resource for inclusion on the National Register of Historic Places, it is considered to have an effect. An effect is either direct or indirect and is characterized by their level of relative intensity.

- **Negligible:** The effect on archaeological sites would be at the lowest levels of detection—barely measurable with any perceptible consequences.
- **Minor:** The effect on archaeological sites would be measurable or perceptible, but it would be slight and localized within a relatively small area for a site or group of sites.
- **Moderate:** The effect would be measurable and perceptible. The action would change one or more character-defining features of a resource, but it would not diminish the integrity of the resource to the extent that its National Register of Historic Places eligibility would be jeopardized.

- **Major:** The effect on archaeological sites would be substantial, noticeable, and permanent. For National Register of Historic Places eligible or listed archaeological sites, the action would change one or more character defining features of an archaeological resource, diminishing the integrity of the resource to the extent that it no longer would be eligible for listing in the National Register of Historic Places.

3.15.2 Spatial and Temporal Context

The spatial bounding of the analysis area for the Jess project is the Area of Potential Effect. The Area of Potential Effect is defined as any area within the project in which activities are proposed to occur, as well as areas utilized in support of those activities. The Area of Potential Effect differs from the more general project area in that it specifically refers to localized areas in which project-related activities are proposed. The Area of Potential Effect is used for effects analysis rather than the project area because archaeological sites are static resources at fixed locations, and an action has to occur at or near that location to cause an effect. Thus, the Area of Potential Effect refines the analysis to only those areas that are identified for project actions.

Temporal bounding of the analysis is composed of two effects classifications: short and long term. Short-term effects occur during or up to the first five years following implementation. Long-term effects occur after the five year period following implementation. Effects are classified as short and long term in order to distinguish between those effects associated with project implementation, and those considered under resource management.

3.15.3 Affected Environment

The Jess project is located within an area known to have both prehistoric and historic archaeological sites. Two prehistoric sites and eight historic sites have been identified within the Area of Potential Effect. Archaeological sites are irreplaceable resources; damage or destruction of sites is permanent and irreversible.

No traditional cultural properties, traditional or contemporary use areas, or specific areas of spiritual significance have been identified within the Area of Potential Effect of this project.

3.15.4 Environmental Effects

Alternative 1

Direct and Indirect Effects

There will be no measureable direct or indirect effects in the short or long term to archaeological sites from Alternative 1 because no management actions will be taken. Therefore, implementation of this alternative will not result in direct or indirect adverse effects to sites.

Cumulative Effects

Since implementation of this alternative will not result in either direct or indirect effects, there are no cumulative effects.

Alternative 2

Direct and Indirect Effects

Alternative 2 includes actions which have the potential to effect archaeological sites. However, employing Standard project design features will prevent any direct effects to historic properties. Project design features used for this undertaking include physical demarcation (flagging) and identification of historic properties to planners and implementers, for the purposes of avoidance during implementation (Section 2.2.4).

Indirect effects of Alternative 2 may result even with the application of project design features. Use of project design features may promote conditions where indirect effects are more likely to occur, e.g., increased visibility of sites in areas avoided by project activities, and higher vegetative fuel loading within sites as compared to surrounding areas.

An increase in site visibility increases the likelihood that sites may be subjected to looting and vandalism. The effects from these types of impacts are difficult to analyze foras they are specific to each site and situation. They are also difficult to anticipate because looting and vandalism are difficult to predict. Potential indirect affects from looting/vandalism may range from negligible to major through the short and long term.

Higher fuel loads left within a site increases the risk that the site will burn more intensely during a wildfire than does the surrounding area. Intense fire may damage or destroy combustible artifacts or permanently alter materials susceptible to heat or flame within a site. The effects from fire are difficult to analyze since they are specific to individual sites, fire behavior, and fuel conditions. Fire effects are also difficult to anticipate because it is not known where, when, or under what conditions they might occur. Potential indirect effects from wildfire may range from negligible to major through the short and long term.

Alternative 2 will not necessarily result in the indirect effects described above. However, it may increase the potential for these effects to occur by creating conditions which give rise to a higher probability of such effects occurring.

Cumulative Effects

Because effects to archaeological sites are location specific, adding the implementation of past, present, and reasonably foreseeable future actions associated with other projects to the effects of Alternative 2 will not result in cumulative effects to sites within the Area of Potential Effect for the Jess project unless those actions occur within site boundaries. Under Alternative 2, there are no actions proposed within the boundaries of sites in the

Jess Area of Potential Effect. Therefore, there will be o cumulative effect on archaeological sites within the Area of Potential Effect.

Alternative 3

Direct and Indirect Effects

Alternative 3 would result in similar direct and indirect effects as those described for Alternative 2. Project design features will be employed to avoid direct effects to sites; there may be a higher probability for indirect effects due to increased site visibility and higher fuel loading within sites.

Cumulative Effects

The cumulative effects of Alternative 3 are similar to those discussed for Alternative 2.

Comparison of Effects

Implementation of Alternative 1 will result in no direct, indirect, or cumulative effects to archaeological sites within the Area of Potential Effect. Implementation of Alternative 2 or 3 will not result in any direct or cumulative effects to sites but may result in an increased potential for indirect effects over the short and long term. Because implementation of Alternative 2 or 3 only increases the potential for these effects, the nature and extent of such effects cannot be effectively analyzed. Therefore, indirect effects from alternatives 2 and 3 are not fully understood as these effects, if they were to occur at all, will result from unanticipated or uncontrolled events occurring independently of management decisions.

3.15.5 Compliance with law, policy, regulation and the Forest Plan

Regardless of the alternative selected, historic properties identified within the project area will be managed in accordance with the guidelines set forth in the *Programmatic Agreement Among the U.S.D.A. Forest Service, Pacific Southwest Region (Region 5), California State Historic Preservation Officer, Nevada State Historic Preservation Officer, and the Advisory Council on Historic Preservation Regarding the Process for Compliance with Section 106 of the National Historic Preservation Act for Management of Historic Properties by the National Forests of the Pacific Southwest Region* (Regional PA). Management of historic properties according to the provisions set forth in the Regional PA is consistent with Forest Plan direction, as displayed in the Forest Plan Consistency Checklist, and is in compliance with the National Historic Preservation Act. Therefore, implementation of the project is consistent with Forest Plan direction and in compliance with law, regulation, and policy.

3.16 Climate Change

Increasingly, the relationships between human-caused emissions, climate change, and the role of the forests as carbon sinks are being documented (Intergovernmental Panel on Climate Change 2007). Although uncertainty exists in quantifying the impact of emissions on climate, a global warming of 1.4 to 5.8 degrees centigrade is projected by 2100 (Intergovernmental Panel on Climate Change 2007). Adapting to climate change and its potential impacts poses challenges and opportunities of managing resources.

Forests and rangelands are seen as part of the solution to reducing atmospheric carbon dioxide and other greenhouse gases. However, the magnitude of the opportunity for carbon storage is not well quantified or thoroughly understood.

The use of future climate scenarios and ecological models suggests that the impact of climate change on ecosystems in the United States may include increases in ecosystem productivity in the short term and shifts in the distribution of plants and animals in the long term (Joyce and Birdsey 2000). As climate changes advance, there are some indications that there will be increases in disturbances such as wildfires, drought, and insects (Intergovernmental Panel on Climate Change 2007). Based on the relevant science, it is still speculative to factor any specific ecological trends or substantial changes in climate into the analysis of environmental impacts of individual projects. For example, changes in wildlife ranges and habitat in forested environments due to climate change are not well understood. Therefore, such issues are outside the scope of this project. Currently, the relevant science concerning climate change is not adequate to support reliable predictions about ecological interactions and trends at the local project level.

In general, based on predictions of a warming climate and increases in disturbances such as wildfire and insect infestations, it is expected that treatments proposed in the action alternatives for this project will benefit forests through thinning and fuel-reduction treatments designed to reduce stress on remaining trees, increase growth, promote species diversity, favor fire-resistant tree species, and reduce risk of loss due to insect and disease epidemic infestations. The contribution of this project to factors that may affect climate change such as greenhouse gas emissions is disclosed in Section 3.8.

Managing forests for carbon sequestration is a poorly understood science but active forest management is believed to be an effective method of carbon sequestration (Intergovernmental Panel on Climate Change 2007). Thinning and fuel-reduction treatments will not eliminate wildfire from the project area but can help change how wildfire can be controlled (as discussed in Section 3.2.4 and the Fuels and Fire Resource Report, available on the project website), thereby likely reducing carbon dioxide emissions resulting from wildfire.

3.17 Short-term Uses and Long-term Productivity

NEPA requires consideration of “the relationship between short-term uses of man’s environment and the maintenance and enhancement of long-term productivity” (40 CFR

1502.16). As declared by the Congress, this includes using all practicable means and measures, including financial and technical assistance, in a manner calculated to foster and promote the general welfare, to create and maintain conditions under which man and nature can exist in productive harmony, and fulfill the social, economic, and other requirements of present and future generations of Americans (NEPA Section 101).

Short-term uses and their effects are those that occur within the first few years of project implementation as discussed in resource sections of this chapter. Long-term productivity refers to the capability of the land and resource to continue producing goods and services long after the project has been implemented. Under the Multiple-Use Sustained-Yield Act, and the National Forest Management Act, all renewable resources are to be managed in such a way that they are available for future generations. Harvesting trees by thinning, and use of the timber that results from the thinning, can be considered a short-term use of a renewable resource. As a renewable resource, trees can be maintained and continue to grow on the project area if the long-term productivity of the land is maintained. This long-term productivity is maintained through the application of the design features described in Section 2.2.4, especially those applying to the soil, water, and geology resources (Watershed).

Harvesting trees through thinning in the action alternatives will reduce stocking levels (Trees per Acre and Stand Density Index), leading to reductions in density-related mortality including those from some types of insect and disease infestations. The resulting stand conditions will be more sustainable over the long term from the standpoints of vegetative diversity and ecological processes. Treatments in the action alternatives are expected to promote the development of healthier stands with endemic dwarf mistletoe infection rates rather than if left untreated as described in Section 3.1.4 and the Silviculture Resource Report.

All action alternatives will experience a period of increased fire hazard due to a potential for increases in brush as a result of the silvicultural prescriptions as described in Section 3.2.4. The degree of brush response is variable, depending on the existence of a seed bank, the amount of canopy removed, and the location of the treatments. The response will be evaluated and additional fuels treatments will be implemented to break up fuel continuity and brush concentrations as needed. All action alternatives will improve the chances of successful direct attack during suppression of a wildfire. The ridgetop and roadside treatments will improve the effectiveness and safety of fighting fires. The action alternatives will improve the defensibility of the community of Sawyers Bar and the municipal watershed against wildfire.

In the action alternatives, hydrologic stabilization of temporary roads on existing roadbed may cause short-term risks to water quality from displaced soils but these risks will be minimized by application of design features in Section 2.2.4. In the long-term, closing

temporary roads after use and hydrologic stabilization will avoid impacts of erosion and sedimentation as described in the Soils and Water Quality sections of this chapter.

All action alternatives will degrade or remove foraging habitat used by northern spotted owl by a small amount in the short term, but this is offset by reducing the density of vegetation and improving stand health and ecological processes in the long term as described in Section 3.3. Long-term beneficial effects will occur as desired tree species and currently mid-sized trees grow. Alterations in scenery will be slightly noticeable in the short term in all action alternatives but these will be minimized by the application of design features described in Section 2.2.4. In the long term, the scenery mosaic will have a substantially greater likelihood of being perpetuated by action alternatives than with taking no action.

3.18 Unavoidable Adverse Effects

Implementation of any action alternative may cause some adverse environmental effects that cannot be effectively mitigated or avoided by design features. Unavoidable adverse effects often result from managing the land for one resource at the expense of the use or condition of other resources. Some adverse effects are short-term and necessary to achieve long-term beneficial effects. In the case of this project, some negative effects from implementing the proposed treatments are necessary to obtain the benefits of restoration of ecological processes (dwarf mistletoe infection rates) and improving defensibility of the community of Sawyers Bar. Many adverse effects can be reduced, mitigated, or avoided by limiting the extent or duration of effects. The interdisciplinary process used to identify specific commercial and non-commercial thinning stands as well as fuels treatments was designed to eliminate or lessen adverse consequences (to one or more resource at the expense of other resources). Applying specific design features from Table 2-1, and following standards and guidelines from the Forest Plan including implementation of Best Management Practices, further limit the extent, severity and duration of potential adverse effects. Regardless of the use of these measures, some adverse effects will occur under all alternatives (including no action) as described in the "Short-term Uses and Long-term Productivity" section of this chapter. Full descriptions of the effects of implementing alternatives can be found in the resource sections of this chapter.

3.19 Irreversible and Irretrievable Commitments of Resources

Irreversible commitments of resources are those that cannot be regained, such as the extinction of a species or the removal of mined ore. No irreversible commitments of resources are identified for this project.

Irretrievable commitments are those that are lost for a period of time such as use of renewable resources. The temporary loss will be irretrievable but the action will not be irreversible. Under Alternative 1, there will be an irretrievable loss of forest vegetation as

the dwarf mistletoe infection rate climbs (Section 3.1.4). Under action alternatives, risk of loss of forest vegetation to epidemic infection rates of dwarf mistletoe will be reduced but not eliminated. Vegetation removed as a byproduct of restoration thinning and fuels reduction treatments will constitute loss of individual trees that are harvested but this will not result in loss of productivity of entire stands of vegetation. Functioning of forest habitats will continue and conditions are expected to improve (achieve late-successional conditions sooner) within several decades. Effects are in accordance with the goals of restoration of ecological processes, defensibility against wildfire and rural community health as described in the purpose and need for the project and disclosed in Sections 3.1, 3.2, 3.3, 3.11 and 3.12.

3.20 Other Required Disclosures

NEPA at 40 CFR 1502.25(a) directs "to the fullest extent possible, agencies shall prepare environmental impact statements concurrently with and integrated with …other environmental review laws and executive orders."

3.20.1 Clean Water Act

The Clean Water Act, as amended, regulates the dredging and filling of freshwater and coastal wetlands. Section 404 (33 USC 1344) of the Clean Water Act prohibits the discharge of dredged or fill material into waters (including wetlands) of the United States without first obtaining a permit from the U.S. Army Corps of Engineers. Wetlands are regulated in accordance with federal Non-Tidal Wetlands Regulations (Section 40). No dredging or filling is proposed as part of any action alternative considered under this project, and no permits are required. This project complies with the Clean Water Act, including the Total Maximum Daily Loads for the Salmon River which are amendments to the North Coast Region Water Quality Control Board's Basin Plan and are part of the California Water Code.

3.20.2 Clean Air Act

The Clean Air Act of 1970, as amended, provides for the protection and enhancement of the nation's air resources. No exceeding of federal or state ambient air quality standards is expected to result from any action alternative considered in this project, as disclosed in Section 3.8.

3.20.3 Environmental Justice (Executive Order 12898)

Based on the analysis of environmental effects in resource sections of this chapter, the action alternatives will have no adverse effects on human health or the environment that will disproportionally affect any group. As discussed in Section 3.11, Siskiyou County has a disproportionate number of low-income residents and a slightly larger percentage of Native Americans than the State of California. Therefore, the job creation associated with

action alternatives discussed in Sections 3.11 and 3.12 will be beneficial to low-income people who are seeking jobs.

3.20.4 Non-native Invasive Species (Executive Order 13112)

This executive order directs federal agencies to prevent the introduction of invasive species; detect and respond rapidly to and control such species; not authorize, fund, or carry out actions that the agency believes are likely to cause or promote the introduction or spread of invasive species unless the agency has determined and made public its determination that the benefits of such actions clearly outweigh the potential harm caused by invasive species; and take all feasible and prudent measures to minimize risk of harm in conjunction with the actions. Project design features minimize the environmental effects of action alternatives, as disclosed in Section 3.6, and meet the requirements of this executive order.

3.20.5 National Historic Preservation Act of 1966

The effects of this project on historic preservation are disclosed in the Cultural Resources section of this chapter. Application of design features identified in Table 2-1 will minimize or avoid the effects of action alternatives on cultural resources, both historic and prehistoric. No known properties eligible for the National Register of Historic Places will be affected by action alternatives. Consultation with the State Historic Preservation Office for the State of California is ongoing as discussed in Section 3.15.

3.20.6 Wild and Scenic Rivers Act

The effects of this project on wild and scenic rivers are disclosed in Section 3.14. Action alternatives will not adversely affect the North Fork Salmon River section of the Klamath Wild and Scenic River (designated as Recreational in the potentially affected sections).

3.20.7 Endangered Species Act

Compliance with the Endangered Species Act is disclosed in Sections 3.3, 3.4 and 3.5, and in referenced Biological Assessments. Consultation with the National Fisheries Marine Service for fisheries has been completed and a Letter of Concurrence on the effects of the Jess project received on April 1, 2014. Consultation with the U.S. Department of Interior Fish and Wildlife Service for wildlife species is ongoing as discussed in Section 3.3.

3.20.8 Energy Requirements, Conservation Potential, Depletable Resource Requirements

Consumption of fossil fuels will occur with the action alternatives during logging and hauling trees that have been cut, and during the hydrologic stabilization of temporary roads on existing roadbeds. No unusual energy requirements are included in action alternatives nor do opportunities exist to conserve energy at a large scale. Application of

standards and guidelines from the Forest Plan for soils, and of design features identified in Section 2.2.4, will conserve soil productivity. Supporting information can be found in the Soils Resource Report, incorporated by reference and available on the project website. The project is consistent with the Northern Spotted Owl Recovery Plan as disclosed in Section 3.3 and the draft Wildlife Biological Assessment.

3.20.9 Prime Farmland, Rangeland, and Forest Land

The project area does not contain any prime farmland or rangeland. Prime forest land does not apply within the National Forest System lands.

3.20.10 Possible Conflicts with Other Land Use Plans

The action alternatives are entirely on National Forest System lands. The action alternatives are not in conflict with planning objectives for Siskiyou County or local Indian tribes as discussed in Sections 3.11 and 3.15 and in referenced resource reports.

3.20.11 Incomplete or Unavailable Information

Applicable scientific information is discussed in the resource sections of this chapter and related resource reports. The unavailability of definitive scientific information is discussed in the “Climate Change” section of this chapter. Incomplete or unavailable information will not influence the disclosure of effects on other resources in this project.

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Chapter 4: Consultation and Coordination

4.1 Preparers and Contributors

The Forest Service consulted the following individuals, Federal, State, and local agencies, tribes and non-Forest Service persons during the development of the Jess environmental impact statement.

4.1.1 Interdisciplinary Team Members

Patricia A. Grantham, Forest Supervisor; responsible official for decision; Klamath National Forest

Ted McArthur, Salmon/Scott River District Ranger; responsible for managerial leadership; Klamath National Forest

Dave Hays, previous Salmon/Scott River District Ranger; responsible for managerial leadership; Klamath National Forest

Angie Bell, Geologist; responsible for geology and air quality input; Geology and Air Quality Resource Reports, and environmental impact statement preparation, Klamath National Forest

Joseph Blanchard, Soil Scientist; responsible for soils input; Soils Resource Report; Klamath National Forest

Margaret Boland, NEPA specialist, responsible for document review, Northern California Resource Center

Danika Carlson, Leader of interdisciplinary team and Botanist; responsible for team leadership, botany, and noxious weeds input; Botany and Non-native Invasive Species Resource Reports, Botany Biological Evaluation; Klamath National Forest

Jason Coats, Archeologist; responsible for cultural resources input; Cultural Resources Report; Klamath National Forest

Sam Cuenca, Wildlife Biologist; responsible for wildlife input and for the Wildlife Resource Report, Wildlife Biological Assessment and Biological Evaluation, Wildlife section of the Management Indicator Species Report; Klamath National Forest

Bill Jones, Silviculturist, responsible for silvicultural prescriptions and marking guidelines, formerly Region Office (Region 5), Northern California Resource Center.

Marissa Jones, Forester; responsible for economics and society and culture input, Economics and Society and Culture Reports; Klamath National Forest

Jeff Keiser, Roads Manager; responsible for engineering input, final coordination of project with roads; Klamath National Forest

Lauren McChesney, Environmental Coordinator, Klamath National Forest

Maija Meneks, Fisheries Biologist; responsible for aquatic resources input; Aquatic Resources Report, Fish Biological Assessment and Biological Evaluation, Fish section of the Management Indicator Species Report, Klamath National Forest

Thomas Shickle, Fuels Technician; responsible for fire and fuels input; Fire and Fuels Resource Report; Klamath National Forest

Robert Talley, Landscape Architect; responsible for scenery input; Scenery Resource Report; Northern California Resource Center

Carl Varak, Vegetation Management Officer, responsible for Silviculture Resource Report, Klamath National Forest.

Verna Yin, Hydrologist; responsible for water quality input; Water Quality Resource Report; Klamath National Forest

4.1.2 Reviewers

Chad Bell, Forest Wildlife Biologist; Klamath National Forest

Wendy Coats, Forest Environmental Coordinator; Klamath National Forest Clint Isbell, Forest Fire Ecologist; Klamath National Forest

Bobbie Miller, Forest Fisheries Program Manager; Klamath National Forest

4.1.3 Consulted Federal, State, and Local Agencies and Governments

Marcia Armstrong, Siskiyou County Board of Supervisors

Laura Finley, USDI Fish and Wildlife Service, Yreka Field Office Katherine Fitzgerald, USDI Fish and Wildlife Service, Yreka Field Office Donald Flickinger, National Oceanic and Atmospheric Administration James Munson, U.S. Environmental Protection Agency, Region IX

Thomas R. Williams, Northern California Regional Water Quality Control Board Staff

4.1.4 Consulted Tribal Chairs

Russell Attebery, Chair, Karuk Tribe of California

Harold Bennett, (Current) Chair, Quartz Valley Indian Reservation Janice Crow, Chair, Shasta Indian Nation

Roy Hall, Jr., Chair, Shasta Tribe, Inc.

Aaron Peters, (Former) Chair, Quartz Valley Indian Reservation

4.1.5 Others

Kimberly Baker, Klamath Forest Alliance and Environmental Protection Information Center

Karuna Greenberg, Sawyers Bar Fire Safe Council and Salmon River Restoration Council

George Sexton, Klamath Siskiyou Wildlands Center Richard Svilich, American Forest Resources Council

4.2 Distribution of the Environmental Impact Statement

This final environmental impact statement has been distributed to individuals who specifically requested a copy of the document and has been posted on the project website. In addition, summaries or copies have been sent to cooperators and contributors, and to the following Federal agencies, federally recognized tribes, State and local governments, and organizations representing a wide range of views.

4.2.1 Federal, State, and Local Agencies

- Advisory Council on Historic Preservation Siskiyou County Board of Supervisors Siskiyou County Fish and Game Commission
- North Coast Region Water Quality Control Board
- U.S. Army Engineer Division, South Pacific
- U.S. Coast Guard
- U.S. Navy
- USDA APHIS PPD/EAD
- USDA National Agriculture Library
- USDA National Resources Conservation Service
- U.S. DOE Office of NEPA Policy and Compliance
- U.S. Environmental Protection Agency
- USDI Office of Environmental Policy and Compliance Western-Pacific Region Federal Aviation Administration USDI Fish & Wildlife Service, Yreka Office Environmental Protection Agency, Region 9
- Federal Highway Administration
- National Marine Fisheries Service, Arcata Office State Historic Preservation Officer
- California Department of Fish and Game

4.2.2 Tribes

- Karuk Tribe of California
- Quartz Valley Indian Reservation Shasta Indian Nation
- Shasta Tribe, Inc.

4.2.3 Organizations and Individuals

- George Sexton, Klamath Siskiyou Wildlands Center Kimberly Baker, Klamath Forest Alliance
- Salmon River Restoration Council Salmon River Fire Safe Council
- Richard Svilich, American Forest Resources Council Dick Artley, Interested Party

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Acronyms, Glossary, Literature Cited, and Index

Acronyms

ACS ..... Aquatic Conservation Strategy
BMP ..... Best Management Practice
CEQ ..... Council on Environmental Quality
CFR ..... Code of Federal Regulations
DBH ..... diameter-at-breast-height
DEIS ..... draft environmental impact statement
EPA ..... U.S. Environmental Protection Agency
ERA ..... Equivalent Roaded Acres
ESA ..... Endangered Species Act
FEIS ..... final environmental impact statement
FSH ..... Forest Service Handbook
FSM ..... Forest Service Manual
GEO ..... geology model (mass-wasting)
GIS ..... geographic information system
HFRA ..... Healthy Forests Restoration Act of 2003
MIS ..... Management Indicator Species
NEPA ..... National Environmental Policy Act
NMFS ..... National Marine Fisheries Service
NOAA ..... National Oceanic and Atmospheric Administration
USDA ..... United States Department of Agriculture
USDI ..... United States Department of the Interior
USLE ..... Universal Soil Loss Equation

Glossary

Anadromous Fish: Species of fish that are born in freshwater, move to the ocean to mature, and return to freshwater to reproduce

Aquatic: Living or growing in water

Aquatic Conservation Strategy: A strategy "developed to restore and maintain the ecological health of watersheds and aquatic ecosystems contained within them on public lands"

Aquatic Conservation Strategy Objectives: Objectives that "define the context for the agency review and implementation of management activities. Complying with the Aquatic Conservation Strategy objectives means that an agency must manage the riparian-dependent resources to maintain the existing condition or implement actions to restore conditions. The baseline from which to assess maintaining or restoring the condition is developed through a watershed analysis. Improvement relates to restoring biological and physical processes within their ranges of natural variability."

Basal Area: The term used in forest management that defines the area of a given section of land that is occupied by the cross-section of tree trunks and stems at their base

Beneficial Uses: "Beneficial uses" of the waters of the state that may be protected against water quality degradation include, but are not necessarily limited to, domestic, municipal, agricultural, and industrial supply; power generation; recreation; aesthetic enjoyment; navigation; and preservation and enhancement of fish, wildlife, and other aquatic resources or preserves (from Section 13050(f) of California's Porter-Cologne Water Quality Control Act)

Best Management Practices: Measures certified by the State Water Quality Control Board and approved by the Environmental Protection Agency as effective means of reducing water quality impacts from non-point sources of pollution

Board Foot: A unit of measurement equal to an unfinished board one-foot square by one-inch thick

Canopy: Tree crowns in a stand

Capable Lands: Lands where at least 20 cubic feet of commercial wood products can be grown per acre per year

Chain: Unit of linear measure often used on public lands, particularly in measuring the rate of wildfire spread (chains per hour). One chain equals 66 feet

Coarse Woody Debris: Woody material at least 20-inches in diameter from whatever source that is dead and lying on the forest floor. Term used for terrestrial species habitat. See Large Woody Debris for aquatic species habitat

Commercial Thinning: any type of thinning producing merchantable material at least equal to the value of the direct costs of harvesting

Compacted Soils: Soils with reduced porosity

Critical Habitat: Defined in the Endangered Species Act as (1) the specific areas within the geographical area occupied by the species, at the time it is federally listed, on which are found those physical or biological features essential to the conservation of the species, and which may require special management considerations or protection; and (2) specific areas outside the geographical area occupied by the species at the time it is listed, when it is determined by the Secretary of the Interior that such areas are essential for the conservation of the species

Cumulative Effects: Those effects resulting from incremental effects of actions, when added to other past, present, and reasonably foreseeable future actions, regardless of what agency or person undertakes such other actions

Cumulative Watershed Effects Model: A model for Cumulative Watershed Effects with three components: Equivalent Roaded Acres (ERA), sediment delivery from surface erosion (USLE), and sediment delivery from mass wasting (GEO). The model quantifies disturbances and land sensitivity at the 7th field watershed scale and can calculate them at larger scales. The estimated results fall on a continuum. As disturbances increase over time and space, at some point the risk of initiating or contributing to existing adverse cumulative watershed impacts becomes a cause for concern. Concern thresholds have been identified for each component based on field observations in the Forest

Diameter Breast Height (dbh): The diameter of a standing tree at a point 4½ feet above ground level, measured from the uphill side

Direct Attack: Any treatment applied directly to burning fuel such as wetting, smothering, or chemically quenching the fire or physically separating the burning from unburned fuel

Direct Effects: Those effects occurring at the same time and place as the initial cause or action

Dispersal: The relatively permanent movement of individual animals from one location to another. Usually dispersal is the movement of young animals from where they were born to a site where they eventually settle to breed

Dwarf Mistletoe (*Arceuthobium spp.*): A host specific parasitic seed plant found in all the major conifer species (red fir, white fire, Douglas-fir and incense cedar)

Ecosystem: A dynamic community of biological organisms, including humans, and the physical environment with which they interact

Effects: Impacts; physical, biological, economic, and social results (or expected results) from implementing an activity

Embeddedness: Degree to which large streambed materials such as cobbles and gravel are surrounded or covered by fine sediment

Endangered Species: Any species that is in danger of extinction throughout all or a significant portion of its range

Environmental Justice: Executive Order 12898 requires an assessment of whether minorities or low-income populations would be disproportionately affected by proposed actions

Equivalent Road Acres (ERA): An index of average watershed disturbance expressed in road equivalent acres relative to a "threshold of concern" assigned for the watershed.

Erosion: A general term for movement of soil particles on the surface of the land initiated by rainfall and running water. This includes surface erosion and channel erosion, as opposed to landsliding

Fire Behavior: The manner in which a fire reacts to fuels, weather, and topography

Fire Return Interval: Number of years between two successive fire events in a given area

Fire Risk: The statistical probability of a fire start occurring over a ten-year period for a given thousand-acre area

Fire Suppression: All work and activities associated with extinguishing a fire

Forest Plan: The Klamath National Forest Land and Resource Management Plan, approved in 1995. The Forest Plan provides land allocations, Standards and Guidelines, and direction for management of the Klamath National Forest

Fuel Loading: The quantity of fuel per acre in a given area

Fuel Treatment: The process of removing and/or modifying natural or human created fuels to reduce fire hazard and achieve other resource objectives

Fuels: Anything within the forest that will burn; usually live and dead woody vegetation

Ground-based Equipment: Equipment that runs on the ground, like tractors, rubber tired skidders, and masticators

Ground Fuels: Loose combustible material on the soil surface, consisting of fallen leaves, twigs, bark, and small branches, as well as grasses, small plants, seedlings trees, dead branches, and logs

Hawksworth Rating System: A system developed by Hawksworth in 1977 to rate severity of infection by dwarf mistletoe in a tree or stand. The rating system forms a basis for defining management implications and recommendations

Healthy Stand (for the Project Area): Exhibits insect and disease levels such that mortality is not substantial (snag and coarse woody debris levels are within Forest standard and guidelines); endemic levels of forest pests and disease; the area maintains some structural components of older stands; trees per acre (stocking level) within the range that can be supported by the land; and conditions such that the area is defensible against wildfire with a direct firefighting techniques

Hydrologic: Dealing with the movement and properties of liquid water in environmental systems. Includes the circulation patterns of water in the biosphere from condensation and precipitation to movement both on and under the ground surface to evaporation back into the atmosphere

Impacts: Physical, biological, economic, and social results (or expected results) from implementing an activity

Incorporation by Reference: A technique used to cut down on the bulk in environmental documents without impeding agency and public review of the action. The material included as part of the document must be cited in the document and its content briefly described

Indirect Effects: Those effects occurring later in time or that are spatially removed from the activity

Inference Point: The midpoint of a zone where disturbances become great enough to cause concern about initiating or contributing to adverse cumulative watershed effects

Infiltration (soil): The movement of water through the soil surface into the soil

Interdisciplinary: The utilization of individuals representing two or more areas of knowledge and skills focusing on the same subject

Irretrievable: An irretrievable commitment of resources entails a loss of production, harvest, or use of natural resources. Such decisions are reversible, but the production opportunities foregone are irretrievable (50 Federal Register 26082)

Irreversible: An irreversible commitment of resources entails a loss of future options. This applies primarily to the effects of use of non-renewable resources such as minerals or cultural resources, or to those factors, such as soil productivity, that are renewable only over a long period of time (50 Federal Register 26082)

Issue: Point of discussion, debate, or dispute about the environmental effects of the proposed action

Land Allocation: The assignment in the Forest Plan of a management emphasis to particular land areas with the purpose of achieving goals and objectives

Late-successional characteristics: Characteristics of a stand of trees indicative of maturity, including mature and over-mature trees in the overstory; multi-layered canopy with trees of several age classes; and standing dead trees and down material

Late-successional habitat: Older forested stands with moderate to high canopy closure; often containing a multilayered, multispecies canopy dominated by large overstory trees; large trees with broken tops or other indications of old and decaying wood; numerous large snags; and moderate to heavy accumulations of large logs on the ground

Late-successional reserves (LSR): Large blocks of habitat that are distributed across the range of the northern spotted owl and spaced closely enough to facilitate dispersal of owls. Late-successional reserves are managed to provide habitat for late successional and “old growth” species

Management Area (MA): A distinct geographical area with specified objectives and prescriptions

Management Direction: A statement of multiple use and other goals and objectives, along with the associated management prescriptions and Standards and Guidelines to direct resource management

Masticator: Equipment that grinds or chews up vegetative material

Matrix: Lands outside of reserves and withdrawn areas; lands assigned a regulated timber yield

Monitoring: Process of collecting information to evaluate if objective and anticipated or assumed results of a management plan are being realized or if implementation is proceeding as planned

National Environmental Policy Act (NEPA): The act that governs how federal agencies assess impacts of management actions on public lands. The process is interdisciplinary and requires consideration of the environmental effects of alternatives and disclosure of those effects

National Forest Transportation System Road: A classified Forest road under the jurisdiction of the Forest Service. The term "National Forest System Roads" is synonymous with the term "forest development roads" as used in 23 U.S.C. 205

Noxious Weed: Any plant so designated by the Weed Control Regulations and identified on a regional district noxious weed control list. They are generally non-native and resistant to control efforts

Overstory: The portion of trees in a forest which forms the uppermost layer of foliage

Peak Flow: The greatest stream or river flow occurring in a year from a single storm event

Pre-commercial Thinning: thinning that does not produce merchantable material

Quadratic Mean Diameter: the measure of average tree diameter conventionally used in forestry. Quadratic Mean Diameter was chosen as an indicator because of its relationship to the health of trees and susceptibility to damage from fire and its relationship to calculating Stand Density Index. Quadratic Mean Diameter combined with trees per acre (TPA) also reflects the number of small diameter trees that may function as ladder fuels

Record of Decision: A document separate from but associated with an environmental impact statement that states the management decision and provides the rationale for that decision

Residual: The trees remaining after harvesting; also known as the crop trees

Resilience: An ecosystem's ability to maintain structure and patterns of behavior in the face of disturbance

Riparian: In general, characterized by being situated on the bank of a river or other body of water; in ecology, the term is applied both to species that live near streams and to the area adjacent to streams where vegetation and microclimate are influenced by the presence of the stream

Riparian Reserves: A land allocation in the Forest Plan that includes an aquatic ecosystem and the adjacent upland areas directly affecting it. It also includes unstable and potentially unstable lands that are not associated with aquatic areas. Specific Standards and Guidelines provide direction for these areas as outlined in Management Area 10 of the Forest Plan

Risk: The chance of loss

Risk Ratio (for cumulative watershed effects model): Amount of the disturbance in the watershed relative to the hydrologic or sediment inference point

Road: A motor vehicle travel way over 50 inches wide, unless classified and managed as a trail. A road may be classified (a National Forest Transportation System road) or temporary (36 CFR 212.1)

Classified Roads: Roads wholly or partially within or adjacent to National Forest System lands that are determined to be needed for long-term motor vehicle access, including State roads, county roads, privately owned roads, National Forest System roads, and other roads authorized by the Forest Service (36 CFR 212.1)

Temporary Roads: Roads authorized by contract, permit, lease, other written authorization, or emergency operation, not intended to be a part of the forest transportation system and not necessary for long-term resource management (36 CFR 212.1). For purposes of this project, temporary roads are assumed to have a ten to 15-foot-wide driving surface, with an average driving surface width of 12 feet and a 15 to 30-foot-wide road prism width, depending on steepness of slope

Unclassified Roads: Roads on National Forest System lands that are not managed as part of the forest transportation system, such as unplanned roads, abandoned travel ways, and off-road vehicle tracks that have not been designated and managed as a trail; and those roads that were once under permit or other authorization and were not decommissioned upon the termination of the authorization (36 CFR 212.1). The regulations at 36 CFR 223.37 require revegetation within ten years.

Road Maintenance: The ongoing upkeep of a road necessary to retain or restore the road to the approved road management objective

Scoping: The process used to identify the scope of issues to be addressed and to determine the relevant issues related to a proposed action

Sediment: Soil particles in water. Suspended sediment consists of small soil particles carried along by the water's turbulent flow

Silviculture: The art and science of growing and tending forest vegetation. It includes controlling the establishment, composition, and growth of forests for specific management goals

Silviculture Prescription: A site-specific operational plan that describes the forest management objectives for an area. It prescribes the method for harvesting the existing forest stand, and a series of silviculture treatments that will be carried out to establish a free growing stand in a manner that accommodates other resource values as identified

Skyline Yarding System: Moving logs from the stump to the landing either partially or fully suspended by a cable

Snag: A standing dead tree

Social Analysis: Analysis that uses social science information to determine how proposed actions would affect humans

Soil Porosity: State of having pores or holes in the soil that hold air or water; permeability

Soil Productivity: The capability of a soil to produce a specific crop such as fiber, forage, etc., under defined levels of management

Stand: A community of trees or other vegetation uniform in composition, constitution, age, spatial arrangement, or condition to be distinguishable from adjacent communities

Stand Density Index: A relative measure of the amount of stocking on a forest area. Often described in terms of stems per acre

Standard and Guideline: A principle requiring a specific level of attainment, a rule to measure against

Stocking: The degree to which trees occupy the land, measured by BA and/or number of trees by size and spacing, compared with a stocking standard; that is, the BA and/or number of trees required to fully utilize the land's growth potential. Where tree growth is inhibited due to competition from too many trees, the site is said to be overstocked

Stocking Control: See thinning

Suppression Forces: Resources used to fight a fire, consisting of firefighters with hand tools at a minimum; may also include fire engines and bulldozers, helicopters and tanker planes

Suppressed Trees: Smaller trees in the lower canopy layer

Thinning: Removing trees from a stand to redistribute the growth potential or to benefit the quality of the residual stand

Threatened Species: Any species that is likely to become an endangered species within the foreseeable future throughout all or a significant portion of its range

Torching: Ignition and subsequent flare-up of a fire, usually burning from the bottom to the top of a tree or small group of trees

Tree Crown: Leafy portion

Turbidity: Deposition of substrate material suspended in water

Understory: Vegetation (trees or shrubs) growing under the canopy formed by taller trees.

Vertical Fuels: Standing vegetation, either live or dead

Watershed: The entire land area that drains to a specific point

5th field watershed: A watershed that ranges from about 40,000 to 250,000 acres in size

6th field watershed: A watershed that ranges from about 10,000 to 40,000 acres in size

7th field watershed: A watershed or drainage that ranges from about 2,500 to 10,000 acres in size

Watershed Analysis: Watershed analysis is a systematic procedure for characterizing watershed and ecological processes to meet specific management and social objectives

Wet Weather Operations Standards: Specific information used to help determine when activities are at risk of not meeting BMPs. The guidelines are used to determine if

conditions are favorable for wet weather or winter operations, and to provide guidance as to when conditions warrant suspension of operations, when operations may begin or resume, or when and what remedy may be appropriate.

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Appendix A: Treatment Prescriptions by Unit

Table A-1. Alternative 2 treatments by unit.

Unit Number	Type of Treatment	Primary Treatment	Removal Method	Follow-up Treatment	Acres
141	Ridgetop Fuels	Handpile	N/A	Burn Piles	58
142	Ridgetop Fuels	Handpile	N/A	Burn Piles	10
143	Ridgetop Fuels	Handpile	N/A	Burn Piles	10
100	Ridgetop Fuels	Handpile	N/A	Burn Piles	6
145	Ridgetop Fuels	Mastication	N/A	N/A	17
146	Ridgetop Fuels	Mastication	N/A	N/A	53
147	Ridgetop Fuels	Underburn	N/A	N/A	233
140	Ridgetop Fuels	Handpile	N/A	Burn Piles	25
144	Ridgetop Fuels	Handpile	N/A	Burn Piles	7
M1	Meadow Treatment	Handpile	N/A	Burn Piles	4
RO	Roadside Fuels	Handpile and Hazard Tree Removal	Tractor Endlining	Burn Piles	615
43	Silvicultural	Handpile	N/A	Burn Piles	4
44	Silvicultural	Handpile	N/A	Burn Piles	5
45	Silvicultural	Handpile	N/A	Burn Piles	7
46	Silvicultural	Handpile	N/A	Burn Piles	6
47	Silvicultural	Handpile	N/A	Burn Piles	6
71	Silvicultural	Handpile	N/A	Burn Piles	38
P1	Silvicultural	Handpile	N/A	Burn Piles	6
73	Silvicultural	Mastication	N/A	N/A	10
125	Silvicultural	Commercial Harvest	Skyline Harvest	Underburn	37
128	Silvicultural	Commercial Harvest	Skyline Harvest	Underburn	51
130	Silvicultural	Commercial Harvest	Skyline Harvest	Underburn	18
136	Silvicultural	Commercial Harvest	Skyline Harvest	Underburn	12
103	Silvicultural	Commercial Harvest	Ground- based Harvest	Underburn	53
105	Silvicultural	Commercial Harvest	Ground- based Harvest	Underburn	31
104	Silvicultural	Commercial Harvest	Ground- based Harvest	Underburn	49
107	Silvicultural	Commercial Harvest	Ground- based Harvest	Underburn	36
101	Silvicultural	Commercial Harvest	Ground- based Harvest	Underburn	15

Unit Number	Type of Treatment	Primary Treatment	Removal Method	Follow-up Treatment	Acres
102	Silvicultural	Commercial Harvest	Ground- based Harvest	Underburn	48
106	Silvicultural	Commercial Harvest	Ground- based Harvest	Underburn	24
115	Silvicultural	Commercial Harvest	Ground- based Harvest	Underburn	16
116	Silvicultural	Commercial Harvest	Ground- based Harvest	Underburn	19
118	Silvicultural	Commercial Harvest	Ground- based Harvest	Underburn	10
117	Silvicultural	Commercial Harvest	Ground- based Harvest	Underburn	15
121	Silvicultural	Commercial Harvest	Ground- based Harvest	Underburn	42
112	Silvicultural	Commercial Harvest	Ground- based Harvest	Underburn	69
110	Silvicultural	Commercial Harvest	Ground- based Harvest	Underburn	77
111	Silvicultural	Commercial Harvest	Ground- based Harvest	Underburn	40
109	Silvicultural	Commercial Harvest	Ground- based Harvest	Underburn	1
108	Silvicultural	Commercial Harvest	Ground- based Harvest	Underburn	8
120	Silvicultural	Commercial Harvest	Ground- based Harvest	Underburn	11
119	Silvicultural	Commercial Harvest	Ground- based Harvest	Underburn	12
114	Silvicultural	Commercial Harvest	Ground- based Harvest	Underburn	2
113	Silvicultural	Commercial Harvest	Ground- based Harvest	Underburn	13
122	Silvicultural	Commercial Harvest	Ground- based Harvest	Underburn	43
129	Silvicultural	Commercial Harvest	Ground- based Harvest	Underburn	24
137	Silvicultural	Commercial Harvest	Ground- based Harvest	Underburn	21
138	Silvicultural	Commercial Harvest	Ground- based Harvest	Underburn	8
70	Silvicultural	Mastication/ Handpile	N/A	Burn Piles	31
42	Silvicultural	Mastication	N/A	N/A	9
48	Silvicultural	Mastication	N/A	N/A	9

Table A-2. Alternative 3 treatments by unit.

Unit Number	Type of Treatment	Primary Treatment	Removal Method	Follow-up Treatment	Acres
141	Ridgetop Fuels	Handpile	N/A	Burn Piles	57
142	Ridgetop Fuels	Handpile	N/A	Burn Piles	9
143	Ridgetop Fuels	Handpile	N/A	Burn Piles	10
144	Ridgetop Fuels	Handpile	N/A	Burn Piles	20
100	Ridgetop Fuels	Handpile	N/A	Burn Piles	6
146	Ridgetop Fuels	Masticate	N/A	N/A	53
145	Ridgetop Fuels	Masticate	N/A	N/A	29
147	Ridgetop Fuels	Underburn	N/A	N/A	233
140	Ridgetop Fuels	Handpile	N/A	Burn Piles	25
M1	Meadow Treatment	Handpile	N/A	Burn Piles	4
RO	Roadside Fuels	Handpile and Hazard Tree Removal	Tractor Endlining	Burn Piles	740
43	Silvicultural	Handpile	N/A	Burn Piles	4
44	Silvicultural	Handpile	N/A	Burn Piles	5
45	Silvicultural	Handpile	N/A	Burn Piles	2
46	Silvicultural	Handpile	N/A	Burn Piles	6
47	Silvicultural	Handpile	N/A	Burn Piles	6
71	Silvicultural	Handpile	N/A	Burn Piles	38
P1	Silvicultural	Handpile	N/A	Burn Piles	4
128	Silvicultural	Commercial Harvest	Skyline Harvest	Underburn	30
130	Silvicultural	Commercial Harvest	Skyline Harvest	Underburn	0
103	Silvicultural	Commercial Harvest	Ground- based Harvest	Underburn	24
102	Silvicultural	Commercial Harvest	Ground- based Harvest	Underburn	27
115	Silvicultural	Commercial Harvest	Ground- based Harvest	Underburn	16
117	Silvicultural	Commercial Harvest	Ground- based Harvest	Underburn	11
121	Silvicultural	Commercial Harvest	Ground- based Harvest	Underburn	14
110	Silvicultural	Commercial Harvest	Ground- based Harvest	Underburn	50
111	Silvicultural	Commercial Harvest	Ground- based Harvest	Underburn	21
120	Silvicultural	Commercial Harvest	Ground- based Harvest	Underburn	11

Unit Number	Type of Treatment	Primary Treatment	Removal Method	Follow-up Treatment	Acres
137	Silvicultural	Commercial Harvest	Ground- based Harvest	Underburn	4
70	Silvicultural	Masticate/Handpile	N/A	Burn Piles	23
73	Silvicultural	Masticate/Handpile	N/A	Burn Piles	5
42	Silvicultural	Masticate	N/A	N/A	7
48	Silvicultural	Masticate	N/A	N/A	8

Table A-3. Unit-specific riparian reserve treatments and limitations for Alternative 2.

Unit #	Treatment Type	Acres	Equipment Exclusion Distance (feet)	No Treatment Buffer Distance (feet)	Recommended Treatment	Treatment Notes
Unit 102	Tractor	13.0	100' - all streams	100' - all streams	Outer 70' riparian reserve - thin and treat for fuels; enhance large tree component	
Unit 103	Tractor	4.5	None - see notes	None - see notes	As per silviculture prescription	Outer riparian reserve is dry with pines and openings. Road separates stream from unit. Riparian reserve within unit is not functioning as riparian due to topographic configuration and disconnect by road (e.g., is not influencing sediment or temperature). See Unit 102 for prescription adjacent to stream
Unit 104	Tractor	14.80	170' - perennial 100' - intermittent	100' - all streams No treatment between the two intermittent channels	Outer 70' riparian reserve - thin and treat for fuels; enhance large tree component (No treatment between the two intermittent channels)	No treatment in between the two intermittent channels. Shade varied from 100% where water was flowing to 40% where stream is subsurface.
Unit 106	Tractor	1.78	100' - all streams	100' - all streams	Outer 70' riparian reserve - thin and treat for fuels; enhance large tree component	
Unit 107	Tractor	5.12	100' - all streams 100' meadow	100' - all streams 100' - meadow	Outer 70' riparian reserve - thin and treat for fuels; enhance large tree component	Wet meadow and spring near cabin. Spring on west side of unit. Dense fir stands lacking diversity.

Unit #	Treatment Type	Acres	Equipment Exclusion Distance (feet)	No Treatment Buffer Distance (feet)	Recommended Treatment	Treatment Notes
Unit 108	Tractor	3.48	50' – pond 50' - small stream (between pond/meadow) 50' -meadow	50' - pond 50' –stream 50' - meadow	No treatments within 50' pond, stream, or meadow	Spring pond is approximately 12'x18', runs downhill for 50'and then goes subsurface. Treatment will not affect shade.
Unit 110	Tractor	8.76	100' - all streams	100' - all streams	Outer 70' riparian reserve - thin and treat for fuels; enhance large tree component	Where contingency lines conflict with prescribed spacing, consider planting rust resistant sugar pine and/or black oak consistent with desired spacing above. Where oaks previously existed, monitor re-sprouting of oaks for cultivation. Where sprouts are non-existent, plant black oak.
Unit 111	Tractor	6.42	100' - all streams	100' - all streams	Outer 70' riparian reserve - thin and treat for fuels; enhance large tree component	
Unit 113	Tractor	0.21	None - see notes	None - see notes	As per silviculture prescription	Unit intersects very edge of riparian reserve; no water in channel; no effects to intermittent stream. Consider planting rust resistant sugar pine where contingency line created gaps and where site conditions are favorable.
Unit 118	Tractor	5.18	25' - all streams	25' - all streams	As per silviculture prescription outside 25' treatment buffer.	Conifer dominated riparian reserve, no hardwoods. Channel is ephemeral and dries out early in year - set exclusion area to average edge of "inner gorge" (~25'). Old temp road can be used for stream crossing when dry.
Unit 119	Tractor	1.98	100' - all streams	100' - all streams	100' - all streams	Mapped as perennial but is an intermittent channel. At time of visit, the channel was dry. Intermittent channel at edge of unit.

Unit #	Treatment Type	Acres	Equipment Exclusion Distance (feet)	No Treatment Buffer Distance (feet)	Recommended Treatment	Treatment Notes
Unit 121	Tractor	6.78	100' - all streams	100' - all streams	Outer 70' riparian reserve - thin and treat for fuels; enhance large tree component	SW aspect, drier site with incised stream channel. Fir encroachment.
Unit 122	Tractor	7.63	100' - all streams	100' - all streams	Outer 70' riparian reserve - thin and treat for fuels; enhance large tree component	Wetter N facing site. Springs and unstable areas.
Unit 125	Skyline	21.18	170' – perennials 100' - intermittent	170' - east perennial 100' - west perennial and intermittent	Outer 70'riparian reserve [west perennial and intermittent] - thin and treat for fuels; enhance large tree	
Unit 128	Skyline	15.26	100' - all streams	100' - all streams	Outer 70' riparian reserve - thin and treat for fuels; enhance large tree component	Steep unit; riparian on western intermittent is full of ladder fuels from dense small conifers. Recommend hand thinning small conifers and burn outside 100'.
Unit 129	Tractor	2.00	100' - all streams	100' - all streams	Outer 70' riparian reserve - thin and treat for fuels; enhance large tree component	Where contingency lines conflict with prescribed spacing and where site conditions are favorable, consider planting rust resistant sugar pine.
Unit 138	Tractor	1.63	100' - all streams	100' - all streams	Outer 70' riparian reserve - thin and treat for fuels; enhance large tree component	
Unit 42 Unit 48 Unit 70 Unit 73	Masticator	16.01	170' - all streams	170' - all streams	No treatment within 170' riparian reserve management area	

Appendix B: Vicinity and Treatment Maps

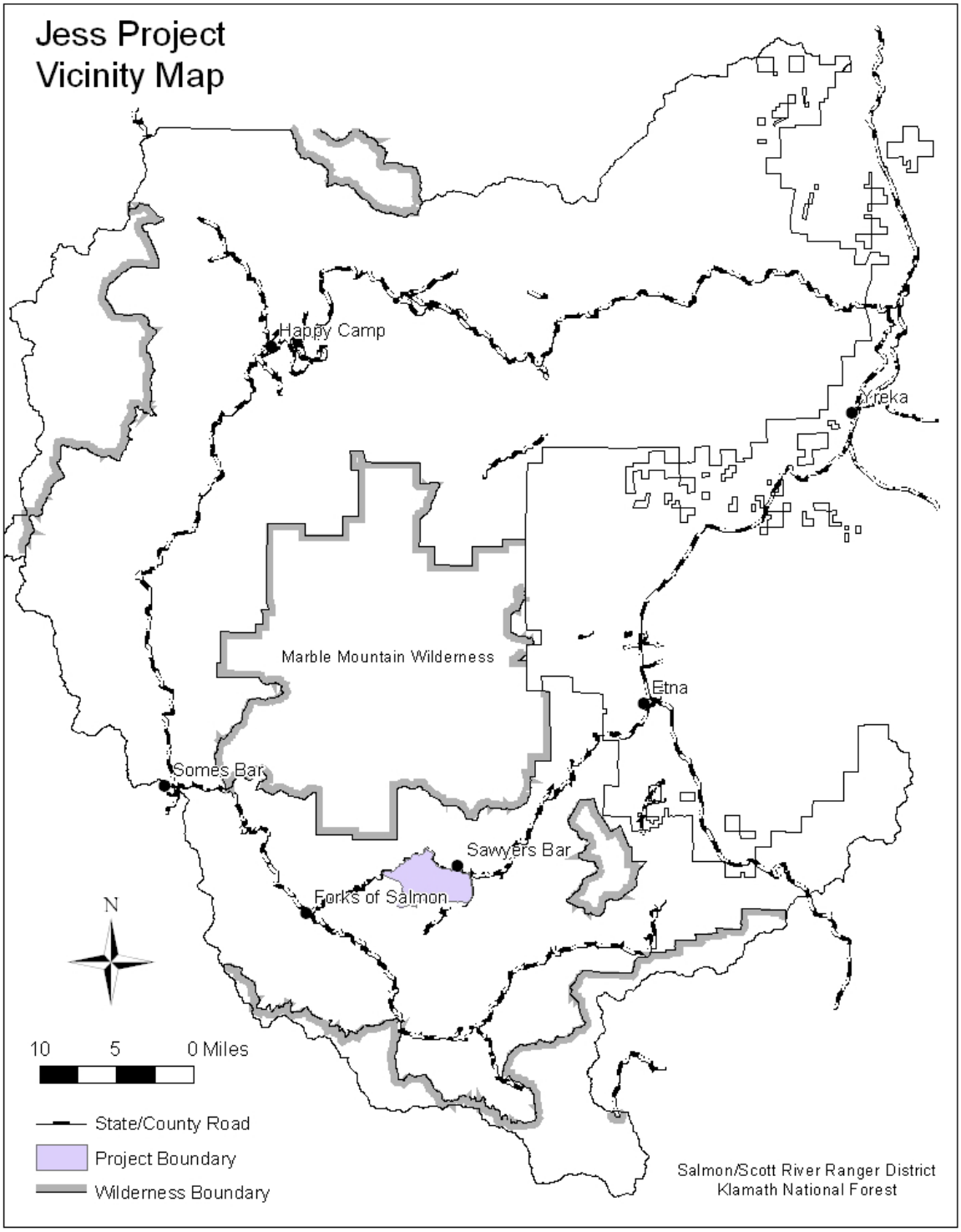

Figure B-1: Vicinity map for Jess project

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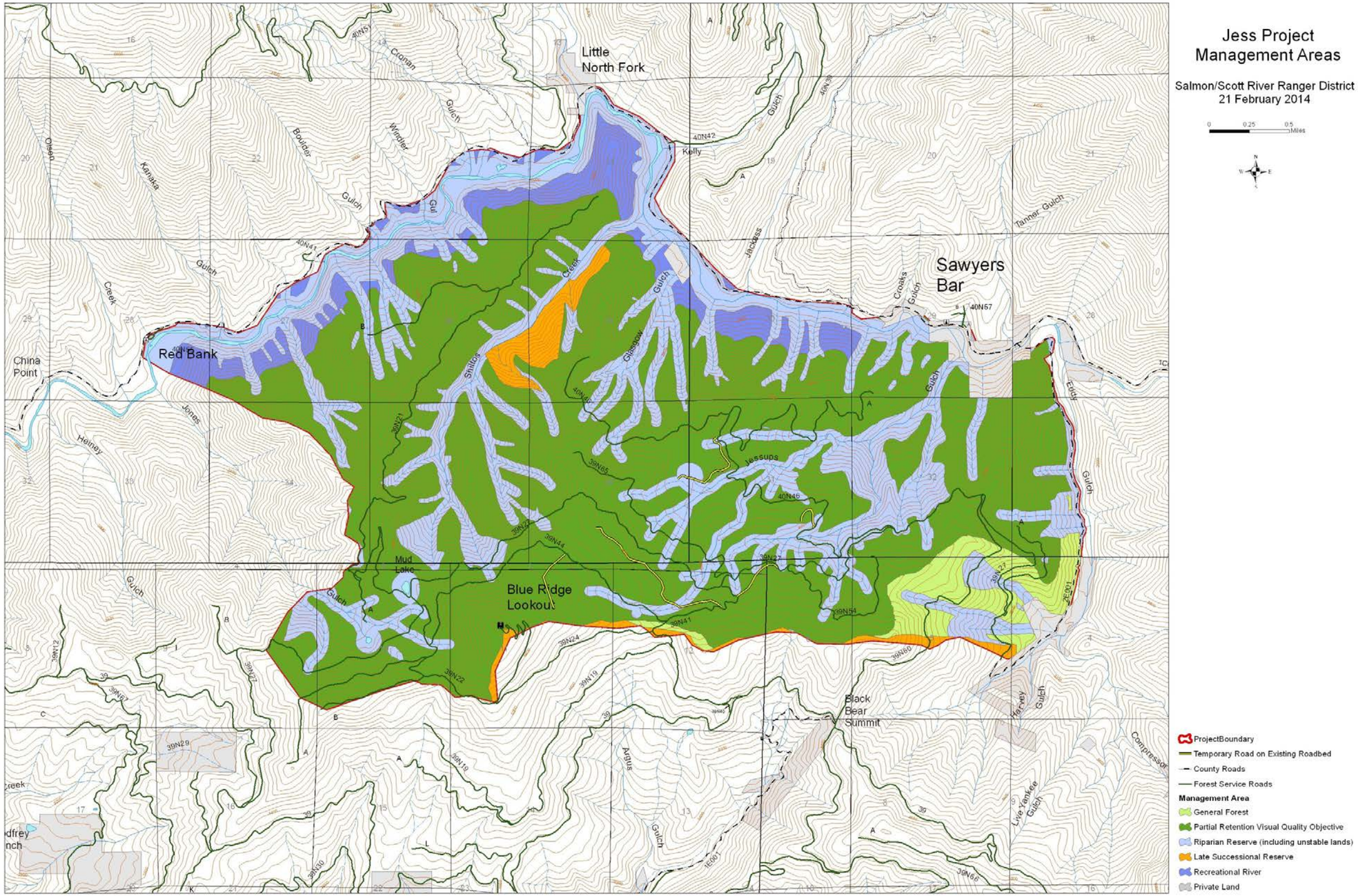

Figure B-2: Management areas in the project boundary.

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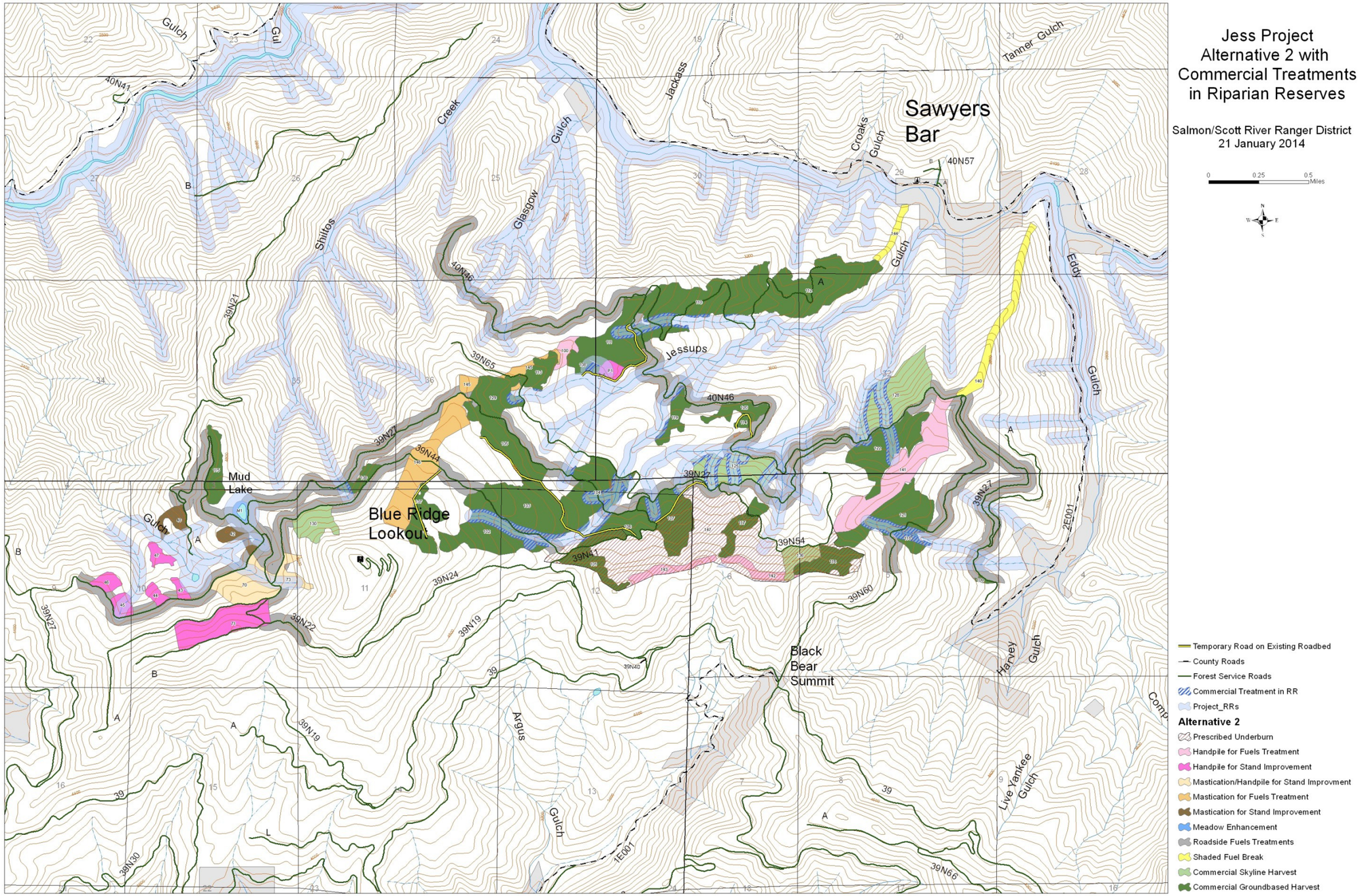

Figure B-3: Alternative 2.

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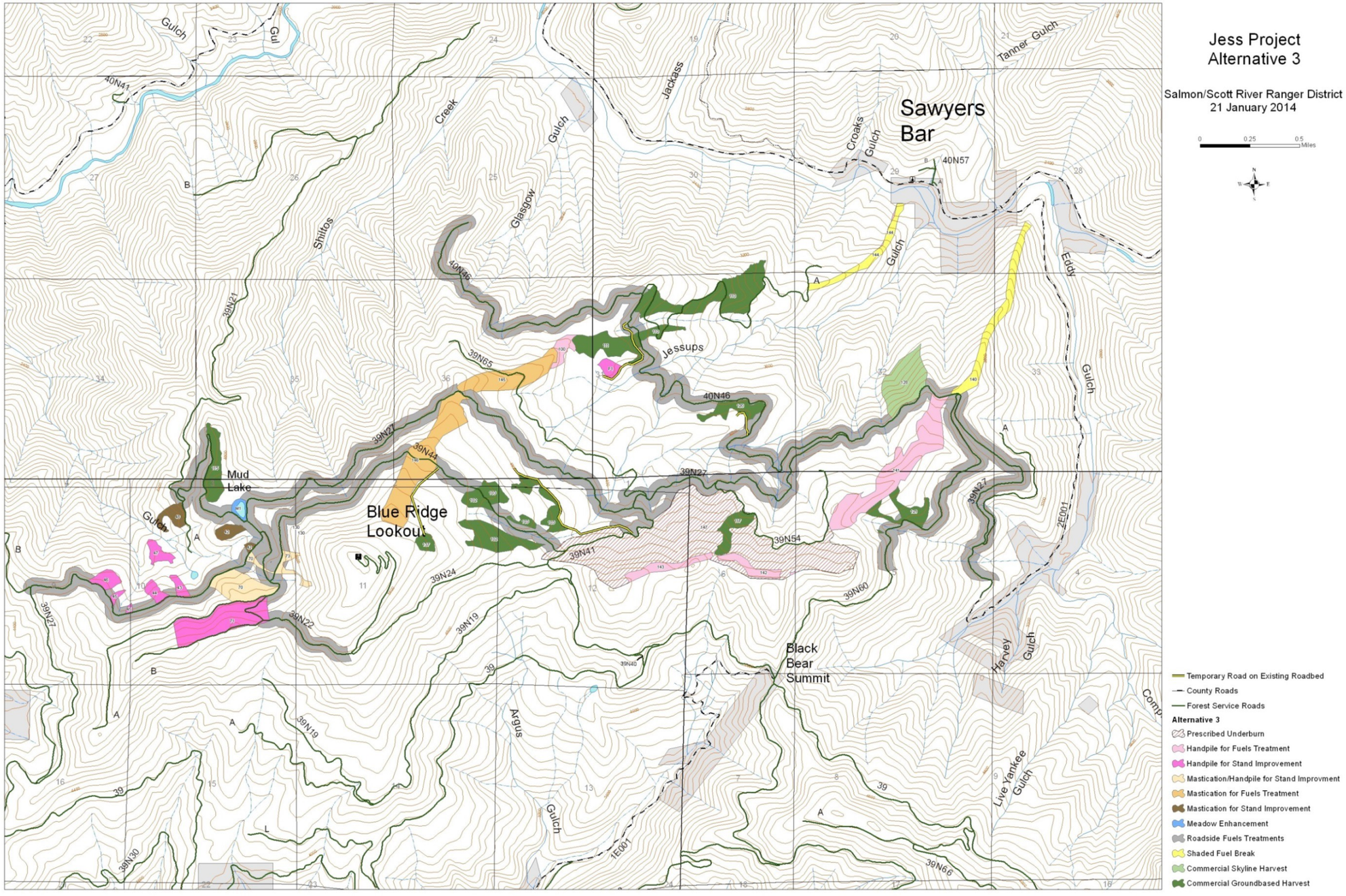

Figure B-4: Alternative 3

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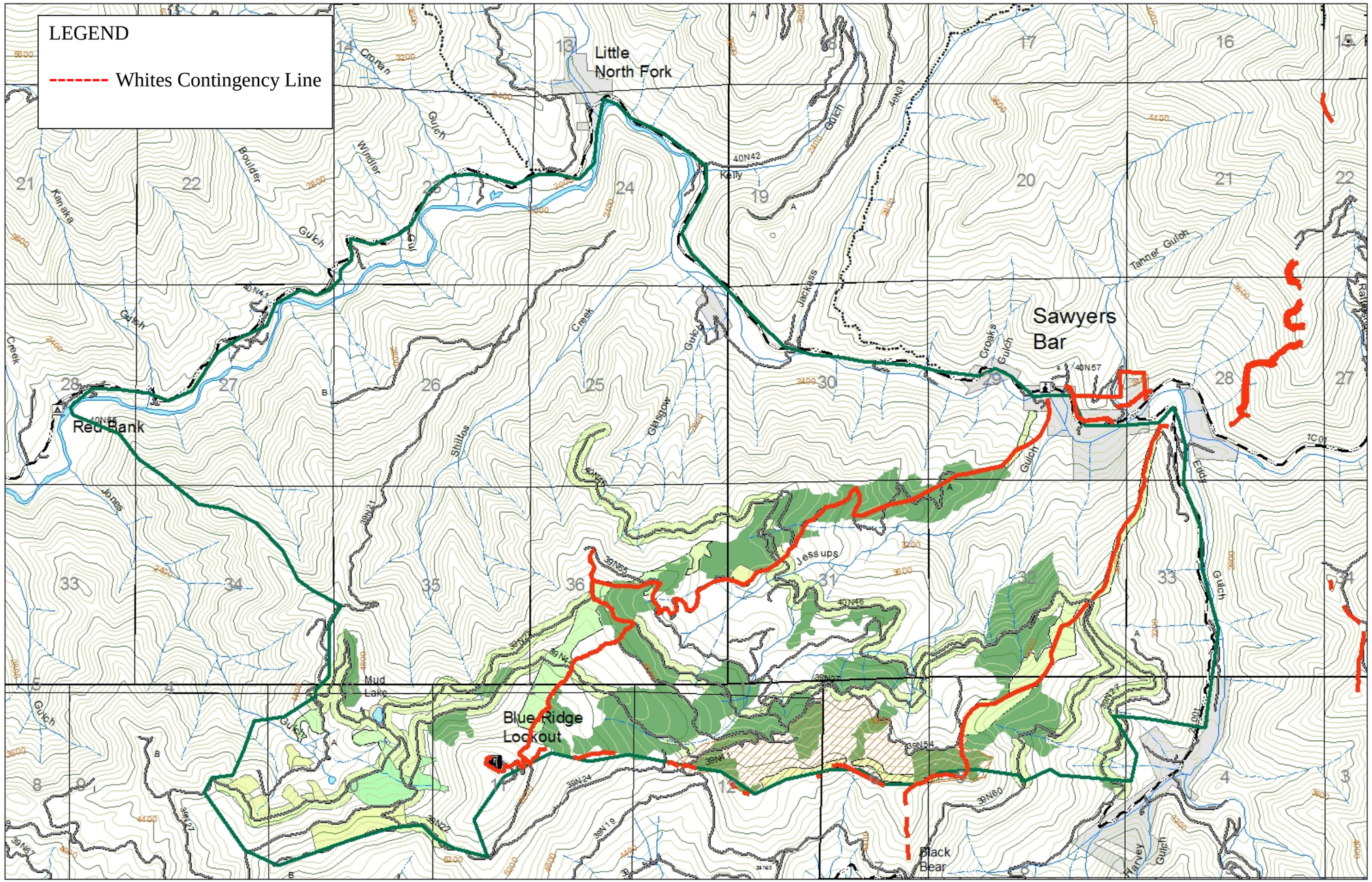

Figure B-5: Whites Fire Contingency Lines in the Jess Project

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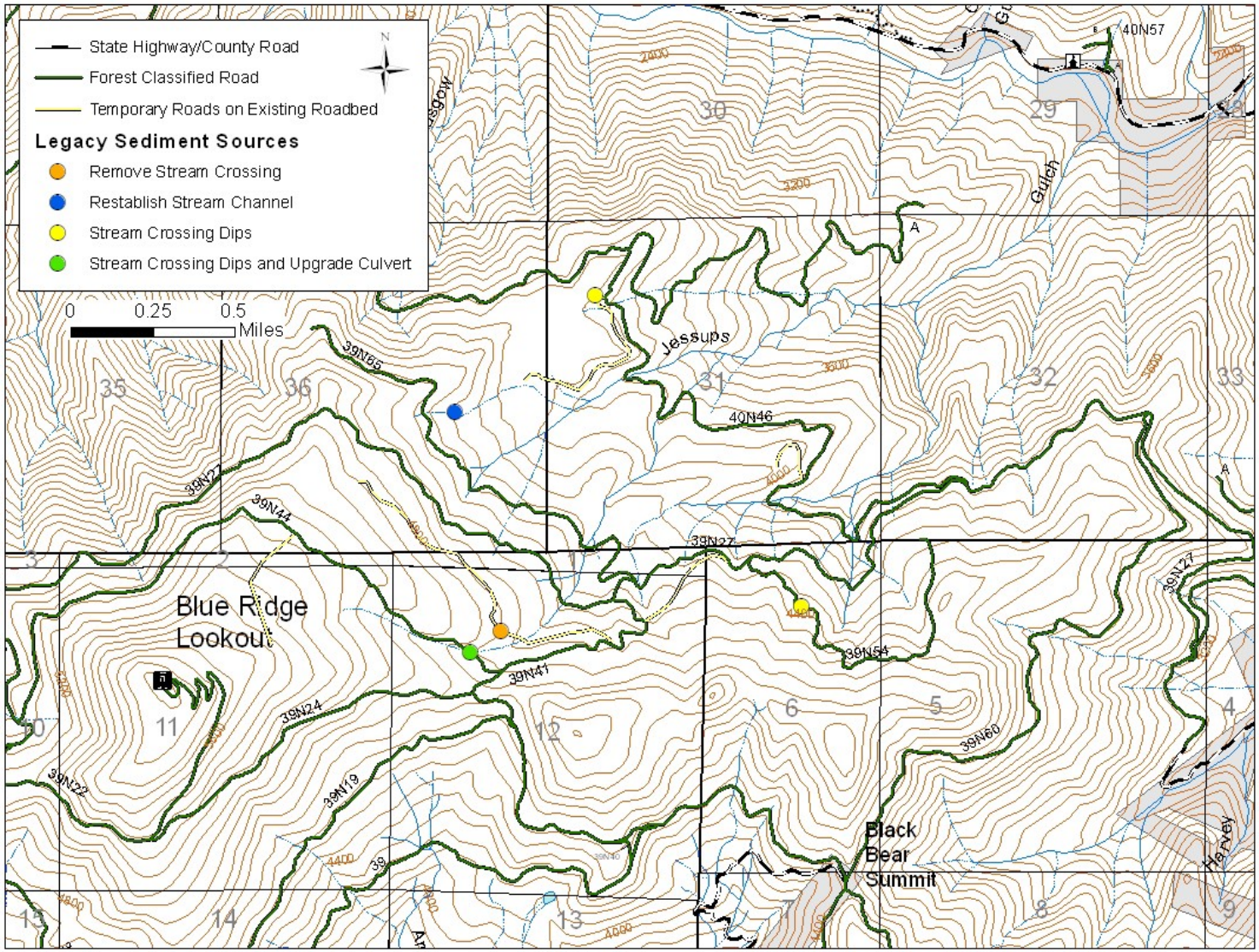

Figure B-6: Legacy sediment sources included as part of the Jess project.

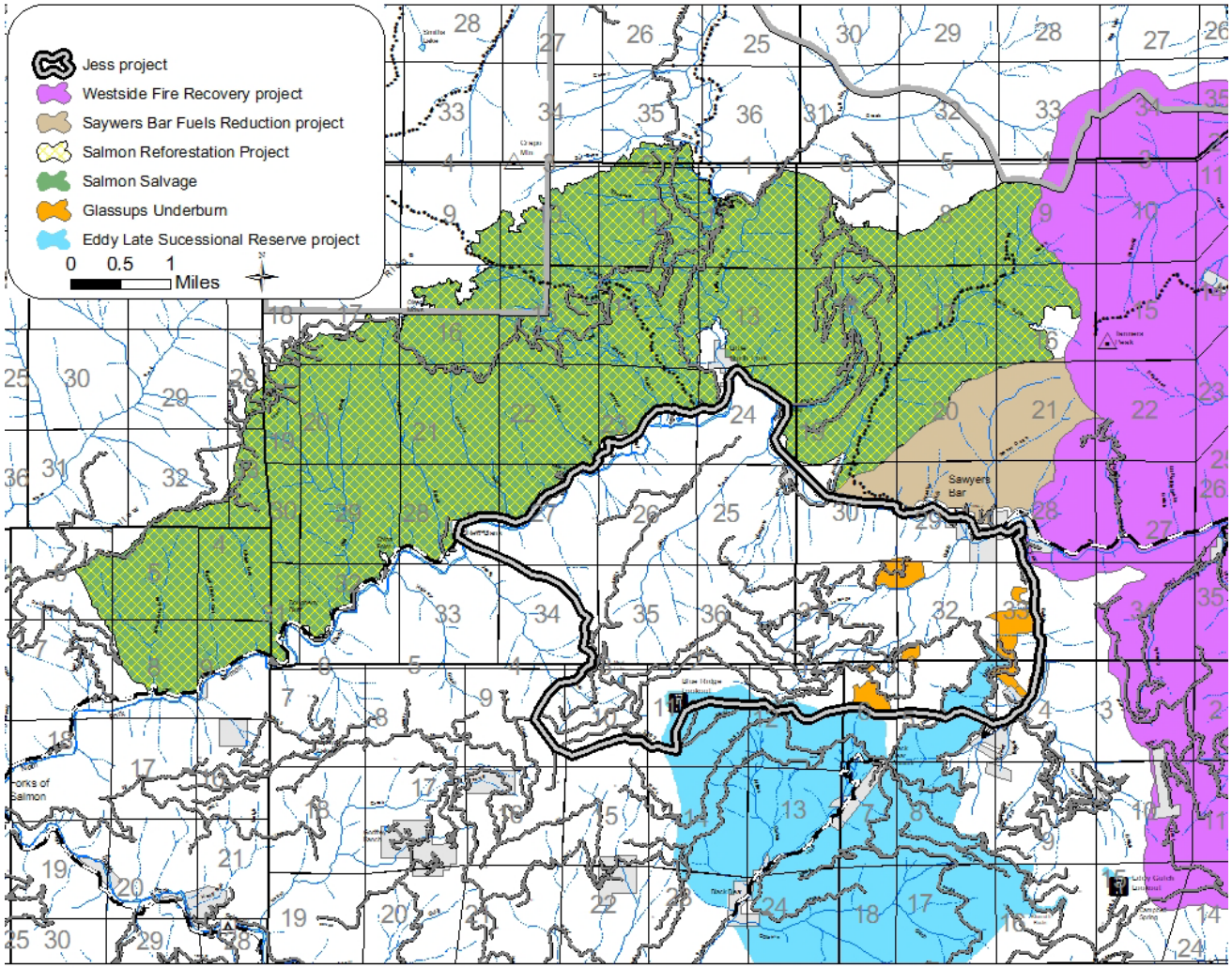

Figure B-7: Project area boundaries for actions potentially considered in cumulative effects analysis.
***North Fork Roads Stormproofing project not included.**

Appendix C: Actions Considered for Cumulative Effects

This appendix lists the current and reasonably foreseeable future actions that may be considered in addition to the proposed project; a map of the project boundaries for these projects is provided above (Figure B-6). The list of ongoing and reasonably foreseeable actions includes actions on the Forest within the Olsen Creek, Shiltos Creek, Eddy Gulch and Jessups Gulch 7th field watersheds. There were no identified ongoing or reasonably foreseeable actions on private lands in the 7th field watersheds. The present and reasonably foreseeable future actions that are considered for cumulative effects analysis may vary by resources (see Chapter 3 and resource reports for resource-specific details).

North Fork Roads Stormproofing project (Implementation ongoing) is located in Township (T) 39N, Range (R) 10W, Sections 4, 5, and 8 Mount Diablo Meridian (MDM); T39N, R11W, Sections 3-6, 10, 11, 14, 15, and 16 MDM; T39N, R12W, Sections 7-12, and 16 MDM; T40N, R10W, Sections 8, 9, 14-16, 18-23, 29-30 MDM; T40N, R11W, Sections 7, 12-13, 18-19, 26, 29, 31-36, MDM; T40N, R12W, Sections 11-17, 24-26, and 34-36 MDM; T41N, R10W, Sections 20-21, and 28-29 MDM; T41N, R11W, Sections 31, and 35 MDM; T41N, R12W, Sections 26-27, and 35 MDM; T10N, R8E, Sections 6, and 16 Humboldt Meridian (HM); T11N, R8E, Sections 28, and 31 HM; which defines the entire Jess project area for the North Fork Roads Stormproofing project. It involves about 90 miles of road stormproofing requiring blading, improving road drainage, and protecting riparian and stream systems.

Eddy Late-Successional Reserve Habitat Restoration project (Implementation is ongoing) located in; T38N, R11W, Sections 2-5, 8-10, and 17-19; T38N, R12W, Sections 1-3, 9-16, and 22-24 ; T39N, R10W, Sections 2-10, 15-21, and 29-31; T39N, R11W, Sections 1-18, 20-29, and 32-36; T39N, R12W, Sections 11-14, 23-25, and 36; T40N, R10W, Sections 3-5, 8-11, and 13-35; T40N, R11W, Sections 24-27 and 34-36; T41N, R10W, Sections 2-5, 8-17, 20-24, 26-29, and 31-34; T42N, R10W, Sections 28-29 and 32-35(all Mount Diablo Meridian). The project will treat 25,969 acres of landscape-level treatments to protect late-successional habitat and communities. Within those acres are 8,291 acres of fuel management zones that would increase resistance to the spread of wildfires to adjacent watersheds. There is also 17,524 acres of prescribed to increase resiliency to wildfires and protect habitat for the northern spotted owl and other wildlife species that are dependent on late-successional forests. There would be 44 miles of Roadside treatments along emergency access routes treated in Fuel Management Zones and underburning units and 16 miles (154 acres) of Roadside treatments outside of Fuels Reduction Zones and underburning units—a total of 60 miles of Roadside treatments along emergency access routes.

Glassups Timber Sale (Implementation ongoing) located in T40N, R12W, Sections 25, 35, and 36, and T40N, R11W, Sections 18 and 19; T39N, R12W, Sections 11 and 12; and

T40N, R11W, Sections 29-33, Mount Diablo Meridian. In the project, 206 acres of under burning remain to be completed. These treatments are follow-up activity fuels treatments from the Glassups Timber Sale in 2000.

Salmon Salvage project (Planning complete, implementation ongoing) is located at T40N R11W S7-10, 15-21, 30; T41N R12W S35; T40N, R12W S 10-24 and 27-31, Mount Diablo Meridian; T10N R8E S 4-6 and 8-9; T11N R8E S28 and 32-33, Humboldt Meridian. The 14,779-acre project area is within the area burned by the Salmon Complex in 2014. The project is intended to abate hazard trees along the roads, salvage fire-damaged trees and to aid in reforestation of the area. The project will meet the purpose and need on about 1,240 acres by salvage logging (on about 270 acres) and removing roadside hazard trees (on about 973 acres along 23 miles of road).

Salmon Reforestation project (Planning complete, implementation ongoing) is located in Township (T) 40 North (N), Range (R) 11 West (W), Sections 7-10, 15-21, 30; T41N, R12W, Section 35; T40N, R12W, Sections 10-24 and 27-31, Mount Diablo Meridian; T10N, R8E, Sections 4-6 and 8-9; T11N, R8E, Sections 28 and 32-33, Humboldt Meridian. The Salmon Reforestation project was developed to promote reforestation and reduce fuel loading on National Forest System lands burned during the Salmon Fire of 2013 (part of the Forks Complex). The Forest Service proposes to treat about 905 acres with combinations of site preparation and planting. These activities will help facilitate establishment of desired conifers in existing plantations and natural stands lost during the Salmon Fire.

Westside Fire Recovery Project (Planning stages) the total project area is divided into three subparts , part C, the Whites Fire is the only part considered for cumulative effects regarding the Jess project and is located Township (T) 39 North (N), Range (R) 10 West (W), Sections 1-11, 17, 18; T39N, R11W, Section 1 and 10-15; T40N, R8W, Sections 6, 7, 18, 19, 30; T40N, R10W, Sections 2-36; T40N, R11W Sections 1-4, 9-16, 21-28, 33-36; T41N, R10W Sections 8-11 and 27-35; T41N, R11W, Sections 24, 25, 33-36, Mount Diablo Meridian. Part C is comprised of about 34,000 acres that burned by the Whites Fire in 2014. The Westside Fire Recovery Project plans to (1) reduce safety hazards to the public and forest workers; (2) obtain the maximum economic commodity value from burned timber; and (3) increase the likelihood and speed by which burned forested areas are regenerated. The project will meet the purpose and need within part C by salvage harvest (about 1,200 acres), removing roadside hazard trees (on about 2,787 acres along 78 miles of road), hazardous fuels treatments (about 3,613 acres), and site preparation, planting, and release.

Appendix D: Best Management Practices

Best Management Practices (BMPs) were developed to comply with Section 208 of the Clean Water Act. BMPs have been certified by the State Water Quality Resources Control Board and approved by the Environmental Protection Agency (EPA) as the most effective way of protecting water quality from impacts stemming from non-point sources of pollution. These practices have been applied to forest activities and have been found to be effective in protecting water quality within the Klamath National Forest. Specifically, effective application of the Region 5 USFS BMPs has been found to maintain water quality that is in conformance with the Water Quality Objectives in the North Coast Regional Water Quality Control Board's Basin Plan (http://www.waterboards.ca.gov/northcoast/water_issues/programs/basin_plan/).

Region 5 Forest Service BMPs have been monitored and modified since their original implementation in 1979 to make them more effective. Numerous on-site evaluations by the North Coast Region Water Quality Control Board have found the practices to be effective in maintaining water quality and protecting beneficial uses.

The Forest monitors the implementation and effectiveness of BMPs on randomly selected projects each year. From 2000 to 2012, BMP implementation requirement were met on 78-100 percent (91 percent average) of sites sampled, and BMP effectiveness requirements were met on 88-100 percent (94 percent average) of the sites sampled (USDA Forest Service, 2013c). The critical BMP evaluation is *effectiveness* which is a field evaluation to determine how well the BMP worked to prevent sedimentation. The success rate for effectiveness has been in the high 80s and 90s each year since 1993.

Best Management Practices first identified and utilized by the Klamath National Forest are listed in appendix D of the Forest Plan. These basic BMPs have been revised over the years, and are currently similar to those listed in the 2012 Region 5 BMP update in Chapter 10 of the Soil and Water Conservation Handbook, which additionally includes a narrative and objective of each (USDA USFS 2012); and where there are differences, direction is to employ the newer BMP list.

BMP 1.1 – Timber Sale Planning Process: Requires the Interdisciplinary Team (interdisciplinary team) to consider methods of reducing water quality impacts during the planning phase of a project. This is accomplished during the planning process of the Timber Sale project.

- Skidding equipment will be restricted to slopes less than 35 percent and operate according to the Forest's wet weather logging guidelines. Skid trails that connect benches in dormant landslide terrain can have minor portions of the skid trails on slopes greater than 35 percent.
- Tractor skidding will occur on designated skid trails. Tractors may leave skid trails to access isolated logs if ground conditions permit.

BMP 1.2 – Timber Harvest Unit Design: Requires the interdisciplinary team to consider methods of reducing water quality impacts due to changes in unit design. This is accomplished during the planning phase of a project. Examples of design changes are restricting timing of tree removal and utilizing less impacting yarding systems.

- The interdisciplinary team reviewed all units to select harvest methods appropriate to site conditions.
- Tractor yarding equipment is generally limited to slopes less than or equal to 35 percent. This is incorporated into the unit layout.

BMP 1.3 – Use of Erosion Hazard Rating for Unit Design: Identifies high or very high erosion hazard areas and adjust management activities to prevent downstream water quality impacts; and to increase soil cover for those areas that have a high risk of contributing sediment into streams. This is done during the planning and layout phase of the project.

- Based on field review and site data (percent slope distribution, soil texture), the Forest Soil Scientist determined the surface erosion hazard rating for each treatment unit and prescribed logging systems and soil cover needs based on the erosion hazard rating.

BMP 1.4 – Use of Sale Area Maps for Designating Water Quality Protection: Identifies sensitive areas and water uses as part of the Timber Sale contract to assist operators in locating water concerns and applying protection methods. This is accomplished during contract preparation and implemented during layout of the sale.

- The Sale Area Map will include all protected stream-courses, unstable land features, springs, wetlands, meadows, water drafting sites, landings, temporary roads, and logging system for each unit.

BMP 1.5 – Limiting Operating Period of Timber Sale: To prevent soil compaction and erosion from operations during wet weather; and to ensure placement of erosion control structures prior to the onset of winter to reduce water quality impacts. This is accomplished during the timber sale operations.

- The project is proposed to take place during the normal operating season that is defined as April 15 to October 15 and in dry periods outside the Normal Operating Season with Line Officer approval. Activities will be restricted during periods of wet weather during the Normal Operating Season.
- For activities in the riparian reserves, when there is a 30 percent chance of rain in the next 24 hours the TSA will be on site to insure that winterization or erosion control procedures are implemented in a timely fashion and to initiate shutdown or resume operations. Operations will not resume until suitable weather, soil, and forecast conditions exist.
- The Klamath Wet Weather Operation Standards (USDA Forest Service 2002) will be used for all project activities (harvest, hauling, planting).
- All landing, temporary road and skid road construction, and all existing temporary road skid road reconstruction, will be conducted during appropriate periods of weather and soil moisture to insure BMP attainment and the avoidance of adverse impacts to

listed species. Forecast periods will also be of a suitable length to allow completion or winterization of the task undertaken before precipitation events occur for activities outside of the riparian reserves.

BMP 1.6 – Protection of Unstable Lands: Provides for special treatment of unstable areas to avoid triggering mass slope failure with resultant erosion and sedimentation.

- Cable corridors will be placed on the landscape as to minimize disturbance to inner gorges and to avoid disturbance on active landslides and landslide toe zones.
- No silvicultural treatments will occur on unstable lands and ground-based equipment will be excluded from active landslides and landslide toe zones.

BMP 1.8 – Streamside Management Zone Designation: Designates zones adjacent to water and/or riparian areas as zones of special management. This is accomplished during the planning and layout phase of the project.

- The riparian reserve width is one site potential tree height was designated as 170' for perennial and intermittent streams in the project.
- Sites for water drafting for dust abatement will be designated by the Forest Service and agreed to by the purchaser.

BMP 1.9 – Determining Tractor Loggable Ground: Minimize erosion and sedimentation resulting from ground disturbance of tractor logging systems.

- Skidding equipment will be restricted to slopes less than 35 percent. Skid trails that connect benches in dormant landslide terrain can have minor portions of the skid trails on slopes greater than 35 percent.

BMP 1.10 – Tractor Skidding Design: Designates a tractor skid pattern over steepened areas, designates tractor crossings, and reduces skid patterns in sensitive areas to reduce erosion and compaction. This is accomplished during the sale layout and operations phase of the project.

- Outside of riparian reserves, retain existing coarse woody debris whenever possible providing the amount of logs meets fuel management objectives. Coarse woody debris consists of downed wood within a terrestrial environment.
- Skidding equipment will be restricted to slopes less than 35 percent. Skid trails that connect benches in dormant landslide terrain can have minor portions of the skid trails on slopes greater than 35 percent.
- Maintain existing coarse woody debris by having ground-based equipment avoid the larger diameter logs to the extent practical.
- Limit equipment disturbance within 20 feet on either side of swales by minimizing equipment crossings and avoiding running trails up the axis of swales. Swales are shallow ephemeral channels that do not meet the definition of a riparian reserve because they lack annual channel scour.

- Existing skid trails will be reused whenever possible except where a less ground disturbing option is available. Designation of new skid trails will be approved by Timber Sale Administrator.

BMP 1.11 – Suspended Log Yarding in Timber Harvesting: Protect the soil mantle from excessive disturbance; maintain the integrity of the Streamside Management Zone and other sensitive watershed areas, and to control erosion on cable corridors.

- Slash or water bars will be applied to skyline corridors where necessary to minimize the concentration of surface runoff and where the ground cover is below 50 percent.
- All skyline yarding stands will require one end suspension. Full suspension over stream channels is desired where possible.
- Where ground-based yarding/endlining is used to retrieve logs from riparian reserve equipment exclusion zones and if gouging occurs that creates a trough for overland flow to enter the channel, waterbars will be installed or slash applied to the area.

BMP 1.12 – Log Landing Location: Locate new landings or reuse existing landings in such a way as to avoid watershed impacts and associated water quality degradation.

- Construct new landings will occur outside both stream-course and unstable-land riparian reserves and away from locations where sediment is likely to enter streams (areas that have a hydrologic connection to streams).
- Existing landings will be used to the extent possible, except existing landings within 50 feet of the slope break to a stream channel or inner gorge will not be used.

BMP 1.13 – Erosion Prevention and Control Measures During Timber Sale Operations: Ensures that Purchasers operations shall be conducted reasonably to minimize soil erosion. This is accomplished during the pre-operations meeting with the purchaser, and throughout the operations phase of the timber sale.

- Erosion control measures are discussed during the pre-operations meeting with the purchaser and the Forest Service. They are updated throughout the operations phase of the timber sale.
- During project implementation, final locations and design characteristics for landings and new roads will be reviewed by watershed personnel prior to construction as needed.
- The Klamath Wet Weather Operation Standards (USDA Forest Service 2002) will be used for all project activities (harvest, hauling, planting).

BMP 1.16 – Log Landing Erosion Prevention and Control: Works to reduce erosion and subsequent impacts sedimentation from log landings. Timber Sale Contract provide for erosion prevention and control measures on all landings. This is best done by design of landing drainage measures during the planning phase of the project, and implemented during the operations phase.

- Once project activities are completed, hydrologically stabilize landings by re-establishing natural runoff patterns to protect water quality.

- During construction and maintenance of any landings, material will not be sidecast (i.e., fill material will not be pushed downslope of landing).

BMP 1.17 – Erosion Control on Skid Trails: Employs preventive measures such as drainage structures to reduce water concentration and erosion. This is accomplished during the operations phase of the project. Because of the timing of this project, pre- staging of straw bales for timely construction of water bars will be called for.

- Where ground-based yarding/endlining is used to retrieve logs from riparian reserve equipment exclusion zones and if gouging occurs that creates a trough for overland flow to enter the channel, waterbars will be installed or slash applied to the area.
- At project completion, permanent operating water bars will be installed and/or repaired as necessary on all skid trails, and slash scattered on all skid trails if necessary.

BMP 1.18- Meadow Protection during Timber Harvest: The objective is to avoid damage to ground cover, soil and hydrologic function of meadows.

- Commercial thinning may occur up to the edge of wetlands or meadows, when the purpose is enhancement of meadow/wetland features. Heavy equipment will not operate on meadows. Trees felled in wetlands will be left on site.

BMP 1.19 – Streamcourse Protection: Protects the natural flow of streams and reduces the entry of sediment and any other pollutants into streams. The location of stream crossings must be agreed to by the Sale Administrator and the Hydrologist. The accomplishment of the objective of this measure is during the operations phase of the project.

- The project is proposed to take place during the normal operating season that is defined as April 15 to October 15 and in dry periods outside the Normal Operating Season with Line Officer approval. Actions will be restricted during periods of wet weather during the Normal Operating Season.
- Trees directly rooted into the banks or otherwise and obviously integral to the stability of the channel bank will not be removed.
- New skid trails and yarding corridors will be located to minimize impacts to riparian reserves.
- Perennial streams will not be crossed by skid trails.
- Intermittent channels may be crossed by skid trails when dry and at locations designated by the Forest Service.
- Skid trails that cross intermittent streams or dry swales will be restored before any storm (with reasonable chance of causing off-site sediment movement). Crossings will also be immediately restored after use is complete. Restoration generally consists of removing excess soil, reshaping and waterbarring former approaches, and spreading slash on the former crossing.
- No (downed) coarse woody debris will be removed from riparian reserve areas or stream courses with potential exceptions for hazard tree removal (see below).

- Hazard trees that have fallen or are felled within riparian reserves will generally be left on site. Fallen or felled hazard trees may be removed from riparian reserves if:
  - i. Trees must be removed to provide safe road passage or campground access and function; OR
  - ii. Those trees would pose a substantial risk to the Forest road drainage system integrity.
- Activities which require culvert replacement or removal will occur during the least critical periods for water and aquatic resources: when streams are dry; during low-water conditions; and/or in compliance with spawning and breeding season restrictions. Low-water/dry conditions for the project area generally occur July through October, dependent upon snowpack and individual drainage characteristic. The District Fish Biologist or Hydrologist will be consulted for appropriate timing at specific locations.

BMP 1.20 – Erosion Control Structure Maintenance: Requires periodic inspection of erosion control structures to assess maintenance needs and effectiveness. This is accomplished during the operations and post-operations phase of the project; this ensures the adequacy of erosion control measures.

- Erosion Control Measures will be maintained for up to 1 year post-installation.

BMP 1.21 – Acceptance of Erosion Control Measures Before Timber Sale Closure: Erosion control measures are inspected for adequacy to ensure erosion control as planned. This is accomplished during the post-operations phase of the project during the contract final inspection.

- At project completion, permanent operating water bars will be installed and/or repaired as necessary on all skid trails, and slash scattered on all skid trails if necessary.
- The Timber Sale Administrator will inspect the Erosion Control Measures for compliance with contract.

BMP 2.4 – Road Maintenance and Operations (Temporary Roads): The objective is to improve road slope stabilization by applying mechanical and vegetative measures. This is accomplished during the operations phase of the project.

- Temporary road ingresses will be obliterated or effectively blocked to vehicle access.
- The proposed temporary roads on existing road beds will be outsloped, covered with slash if needed and blocked after the harvest season (and prior to the first winter after use). The temporary roads will be decommissioned (hydrologically restored) at project completion. Decommissioning includes removal of culverts and fills at stream crossings, out-sloping of road surfaces, and obliteration (re- contouring) of temporary road segments.

BMP 2.4 – Road Maintenance and Operations (System Roads)

- Improvements on the existing National Forest Transportation System roads to the project area will not over-steepen the road cuts, will minimize sidecasting, and will maintain the ditches and cross drains or any outslope of the roadway.
- Spot rocking will used as needed in wet areas where damage to the roadbed may occur and adversely create rills which may move sediment into stream channels.
- Use erosion control methods on access and/or main roads that are treated for dust abatement to prevent any water leakage from causing streams sedimentation.

BMP 2.5 - Water Source Development Consistent with Water Quality Protection: The objective is to limit and mitigate the effects of water source development through the planning of impoundments and withdrawals.

- Draft water only at designated water drafting sites.
- Water drafting sites located within fish-bearing streams may not be modified, except rocking the approach to prevent sedimentation.
- Water drafting sites located in non-fish-bearing waters only may include minor in stream modification, such as fine sediment removal and building of board/plastic dams, at the discretion of the project Fish Biologist or Hydrologist. All boards and plastic will be removed after use. Approaches may also be rocked, as needed, to prevent stream sedimentation.
- Water drafting by more than one truck shall not occur simultaneously.
- Drafting from the two fish-occupied (anadromous) sites on the North Fork Salmon River will be allowed only from June 15th through October 15th each year. Approved drafting sites at non-fish-bearing locations elsewhere in the project area may be utilized year-round.
- For the fish-occupied (anadromous) drafting sites on the North Fork Salmon River, the *NOAA Fisheries Water Drafting Specifications* guidelines will be used. They include, but are not limited to, the following:

  i. When water drafting in habitat potentially occupied by Chinook and Coho salmon, intakes will be screened with 3/32-inch mesh for rounded or square openings, or 1/16-inch mesh for slotted openings. When in habitat potentially occupied by steelhead trout, intakes will be screened with 1/8-inch mesh size. Wetted surface area of the screen or fish-exclusion device shall be proportional to the pump rate to ensure that water velocity at the screen surface does not exceed 0.33 feet/sec. (NMFS 2001)

  ii. Fish screen will be placed parallel to flow.

  iii. Pumping rate will not exceed 350 gallons-per-minute or 10 percent of the flow of the anadromous stream drafted from.

  iv. Pumping will be terminated when tank is full.

  v. For non-fish-occupied drafting sites in the project area, drafting will be as per the text of the BMP, including:

vi. Drafting rate should not exceed 350 gallons per minute for stream flow greater than or equal to 2.0 cubic feet per second.

vii. Drafting rate should not exceed 50 percent of surface flow.

viii. Drafting should cease from when bypass surface flow drops below ten gallons per minute.

BMP 2.11 - Servicing and Refueling of Equipment: Prevent fuels, lubricants, cleaners, and other harmful materials from discharging into nearby surface waters or infiltrating through soils to contaminate groundwater resources.

- No fueling or servicing of vehicles will take place within riparian reserves.
- No fueling/refueling of mechanical equipment will occur within 100 feet of any flowing watercourse or intermittent drainage.
- A spill containment kit will be available at the location of any refueling or servicing.
- Report spills and initiate appropriate clean-up action in accordance with applicable State and Federal laws, rules and regulations. The Forest Hazardous Materials Coordinator's name and phone number shall be available to Forest Service personnel who administer or manage activities utilizing petroleum- powered equipment.
- If a spill does occur, the Hydrologist will notify the Water Board.
- In the occurrence of a spill may affect listed aquatic species, NOAA Fisheries will be notified for emergency consultation.

BMP 2.13 – Erosion Control Plan: Effectively limit and mitigate erosion and sedimentation from any ground-disturbing activities, through planning prior to commencement of project activity, and through project management and administration during project implementation.

- An Erosion Control Plan will be completed prior to project implementation.
- The Forest's Wet Weather Operations Standards are included in the Erosion Control Plan.

BMP 5.2 – Slope Limitations for Mechanized Equipment Operations: The objective is to reduce gully and sheet erosion and associated sediment production by limiting tractor use.

- Limit the operation of track-mounted masticators to slopes less than 45 percent.
- Units where a masticator is the primary treatment (Units 42, 48, 70, 73) the equipment will be exclusion zone will be 170 feet from the stream channel (the entire riparian reserve), although the arm may reach within this zone to masticate vegetation. Incidental use of masticators elsewhere in the project area the equipment will not operate within 100 feet of perennial/intermittent less than one foot wetted width and not within 100 feet of any perennial stream greater than one foot wetted width; and not operated within break in slope of inner gorge. Crossings of dry intermittent channels may occur at locations as designated by the Forest Service. No perennial streams will be crossed by masticators.

BMP 5.5 – Disposal of Organic Debris: The objective is to prevent gully and surface erosion with associated reduction if sediment production and turbidity during and after treatment.

- Fuel treatment prescriptions will be designed to maintain post-treatment soil cover ranging between 50 percent and 70 percent, depending on slope steepness and fuel reduction treatments.

BMP 5.6 – Soil Moisture Limitations for Mechanical Equipment Operations: The objective is to prevent soil compaction, rutting, and gulling that may result in increased sedimentation and turbidity.

- All ground based equipment will follow the Wet Weather Operation Standards.

BMP 6.3 Protection of Water Quality from Prescribed Burning Effects: The objective is to maintain soil productivity; minimize erosion; minimize ash, sediment, nutrients, and debris from entering water bodies.

- Hand piles will be placed in a checkerboard pattern whenever possible (not one pile directly above another). Hand piles will be small in size, six feet or less in diameter.
- Burn piles will not be placed within 30 feet of perennial stream channels greater than one foot wetted width, or within 15 feet of intermittent stream or perennials less than one foot wetted width. Treatment should not occur on granitic soils, where sideslopes exceed 35 percent, or where existing ground cover is less than 50 percent.
- When underburning is prescribed, avoid as possible the construction of handlines within riparian reserves closer than 25 feet to a watercourse and/or within riparian vegetation.
- Handlines will be mitigated (waterbarred and covered with organic material) immediately following prescribed burning and under safe conditions.
- When underburning within riparian reserves, maintain at least 90 percent of the coarse woody debris (both standing and on the ground) as unburned or not consumed.
- Within riparian reserves, prescribed fire effects will mimic a low intensity backing fire and ignition will usually not occur there. Hand piles may have higher fire intensity in order to consume pile material.

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Appendix E: Collaborative Effort

The purpose of this appendix is to summarize the changes to the Jess project made during the planning of the project as a result of collaboration efforts and internal review. The focus of the collaboration effort for the Jess project is to identify common interests and bridge disagreements over natural resource management; the effort will include examinations of scientific literature, potential actions and environmental concerns (including the human environment). The process is intended to encourage and facilitate the use of natural resource principles to promote ecosystem health, diversity, and economic and community well-being.

The objectives of collaboration efforts include to:

- Improve transparency of the planning process;
- Foster cooperative information exchange;
- Develop stakeholder support for the project;
- Provide for early recognition and resolution of issues; and
- Provide for a well-informed decision by the Forest

At the initiation of the project treatments on the lower 1/3 of the slope were included. The focus was on forest health and resiliency (Figure B-7). In March 2011, the Regional Forester (Region 5) asked the Forests to incorporate ecological restoration into projects where it would be beneficial. The Forest felt that the Jess project fit this bill. The Forest initiated the collaborative efforts for the Jess project in January 2012 to incorporate comments/concerns about the project into the planning process, to make the process more transparent and to foster information exchange. Throughout the planning process, Fish and Wildlife Service worked with the District Biologist to adjust habitat typing after field verification.

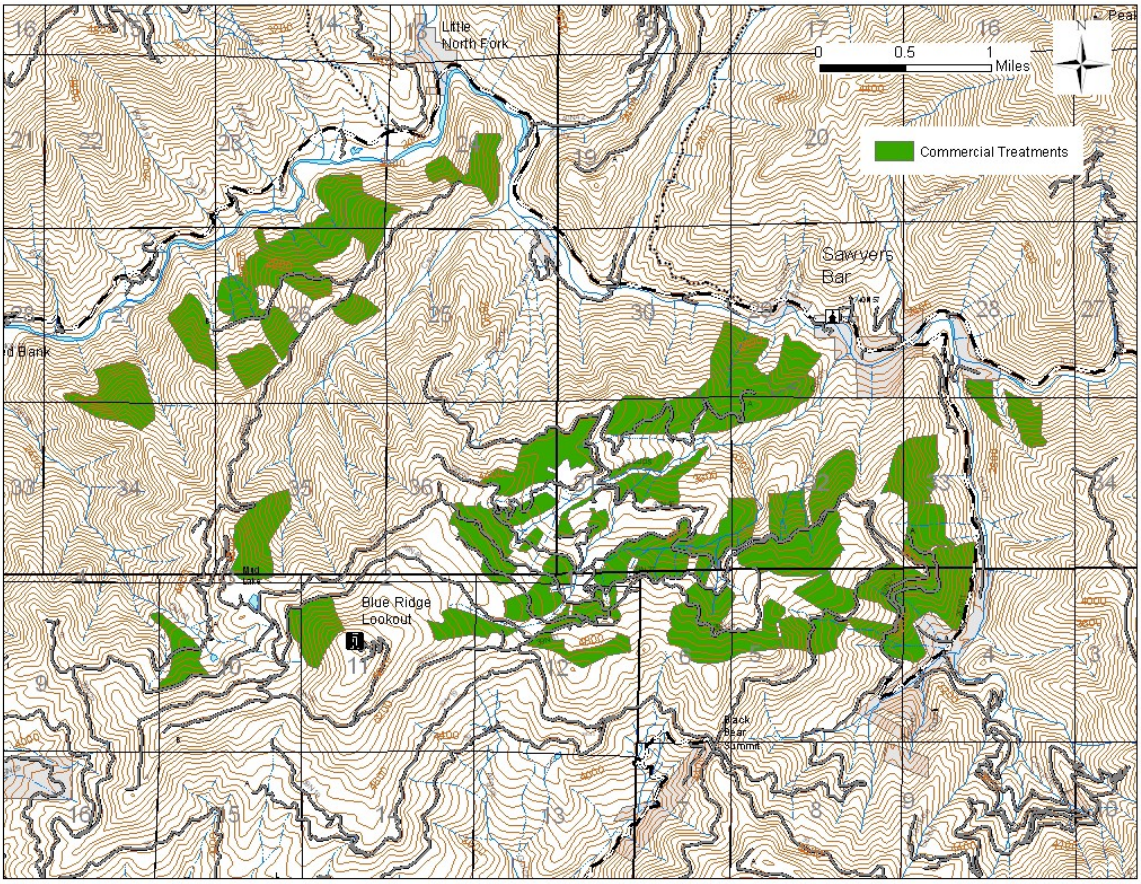

Figure E-1: Initial commercial treatments considered by the Forest for treatment in the Jess project prior to incorporating Ecological Restoration into the purpose and need.

The project was presented to the collaborators at the meetings on January 25, 2012 and March 15, 2012. As a result of the comments at these two meetings (Figure E-2):

- Community protection was added to the purpose and need for the project.
- The fuels strategy was developed minimizing handpiling were possible and placing treatments strategically on the landscape.
- Units that needed new temporary roads were dropped from the project.
- The term “sustainable yield” was removed from the purpose and need and rural economic health was added.
- Most of the commercial treatments on the lower 1/3 of the slope were dropped and treatments on the ridge became the focus, to better align with the Community Wildfire Protection Plan (Salmon River Watershed Restoration Council, 2004) and the restoration concept.
- Roadside treatments were included to improve safety of ingress/egress for the public and firefighters as suggested by the Community Wildfire Protection Plan (Salmon River Watershed Restoration Council, 2004).

- The non-system roads that will be used in the project were field reviewed for consideration for hydrologic stabilization (decommissioning).
- Meadow and hardwood retention treatments were included in the treatment considerations to improve diversity and to retain the unique ecologic features on the landscape.

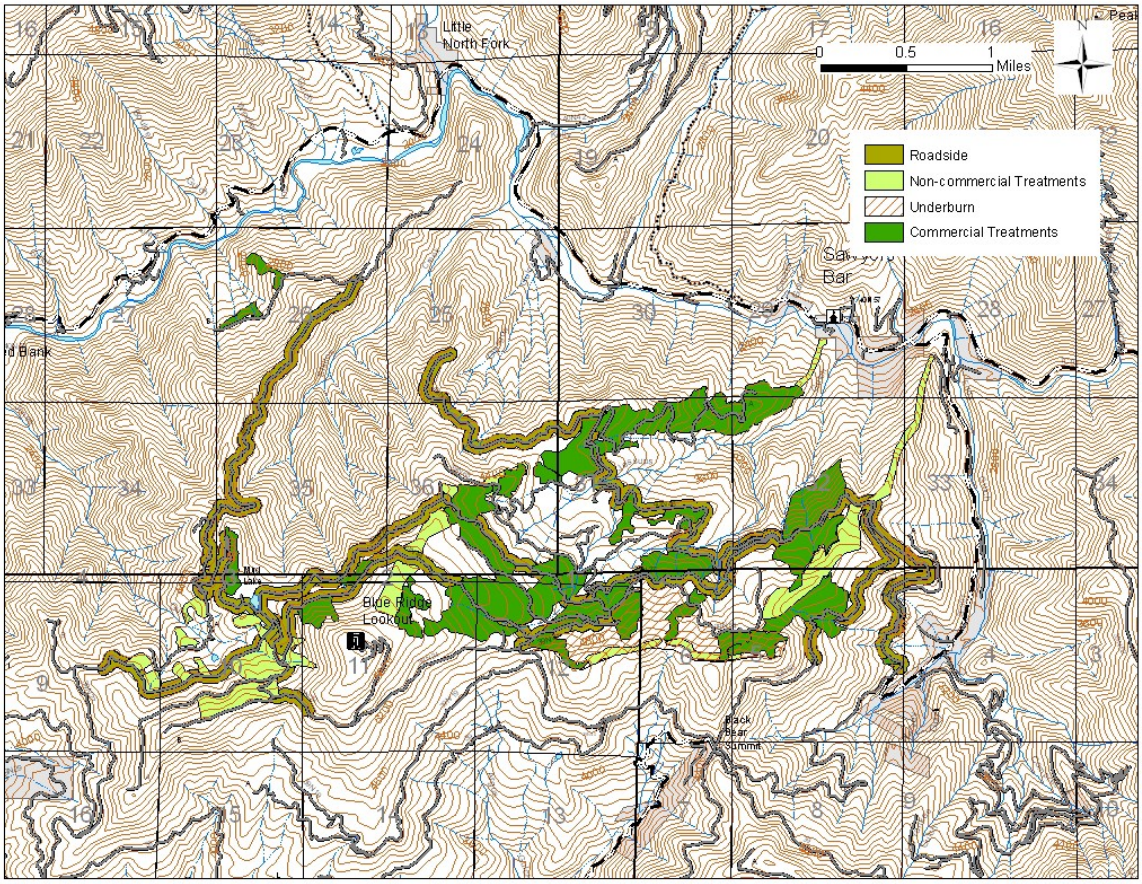

Figure E-2: Commercial treatments considered after incorporating changes from the January 25, 2012 and March 15, 2012 collaborative meetings.

As a result of the field trip on June 21, 2012 a more defined collaborative process was developed by the Forest. The Forest began to put together a restoration concept for the project as suggested by the collaborators. The concept is rooted in the idea that ecosystem function is related to the pattern of trees on the landscape (Larson and Churchill, 2012).

There are four ecosystem functions that are the focus of the concept for the Jess project 1) Resilience to disturbance; 2) Species and structural diversity; 3) Defensibility against wildfire; and 4) Beneficial uses of water. The Weislander mapping done in the 1940s (Weislander, 1935) was used to look at historical distribution of trees on the landscape to further inform the restoration concept (Figure E-2). More details on the concept were

presented at the February 5, 2014 meeting and can be found in the attached PowerPoint presentation.

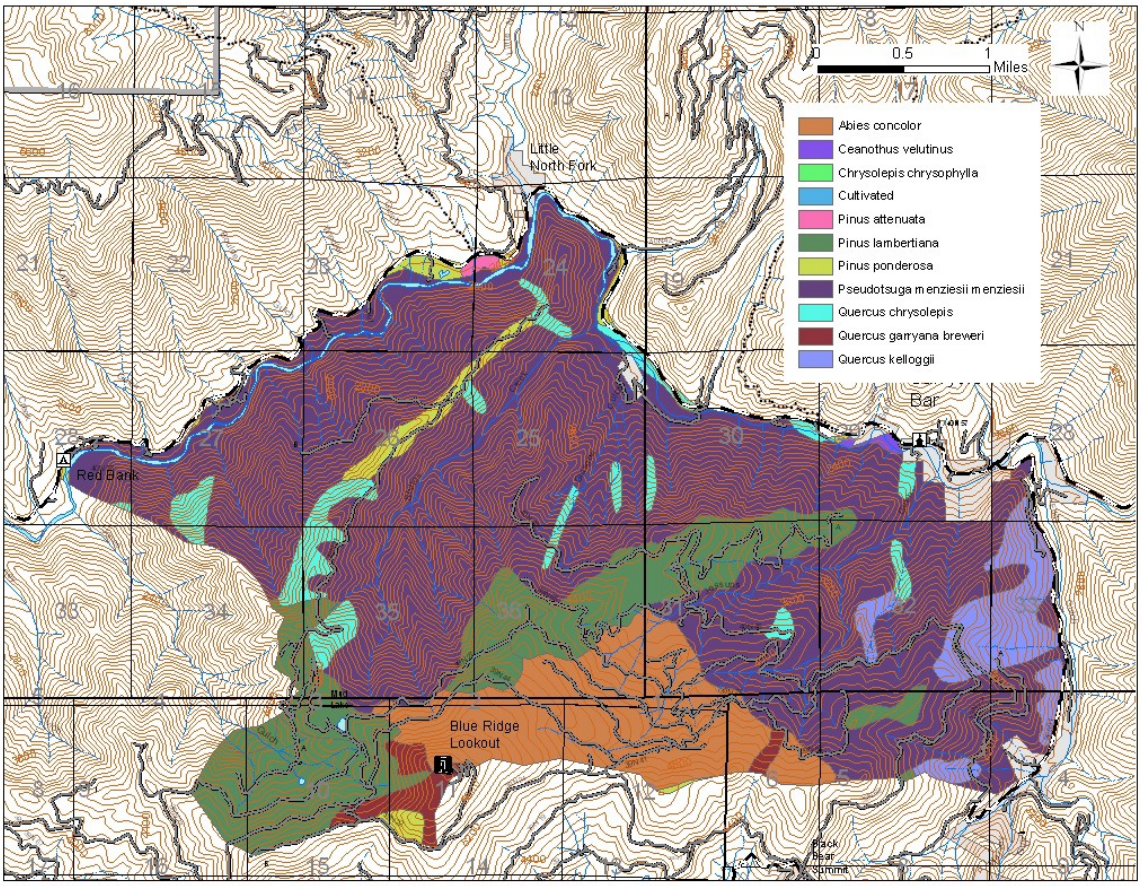

Figure E-3: Historical Weislander mapping circa 1940 for the Jess project area.

Large tree retention was discussed at the field trip. The Forest has incorporated large tree retention where it meets the purpose and need of the project, specifically where preferred or historically dominant species exist, where tree characteristics indicate health and vigor, and spacing is favorable for fire resilience. The fuels specialist included an analysis on flame length and rate of spread to analyze for the effects of the project on fire behavior.

A result of the meeting on June 27, 2013 was the development of prescriptions (in Alternative 2 -Table A-3) for each riparian reserve (including no treatment) by the hydrologist.

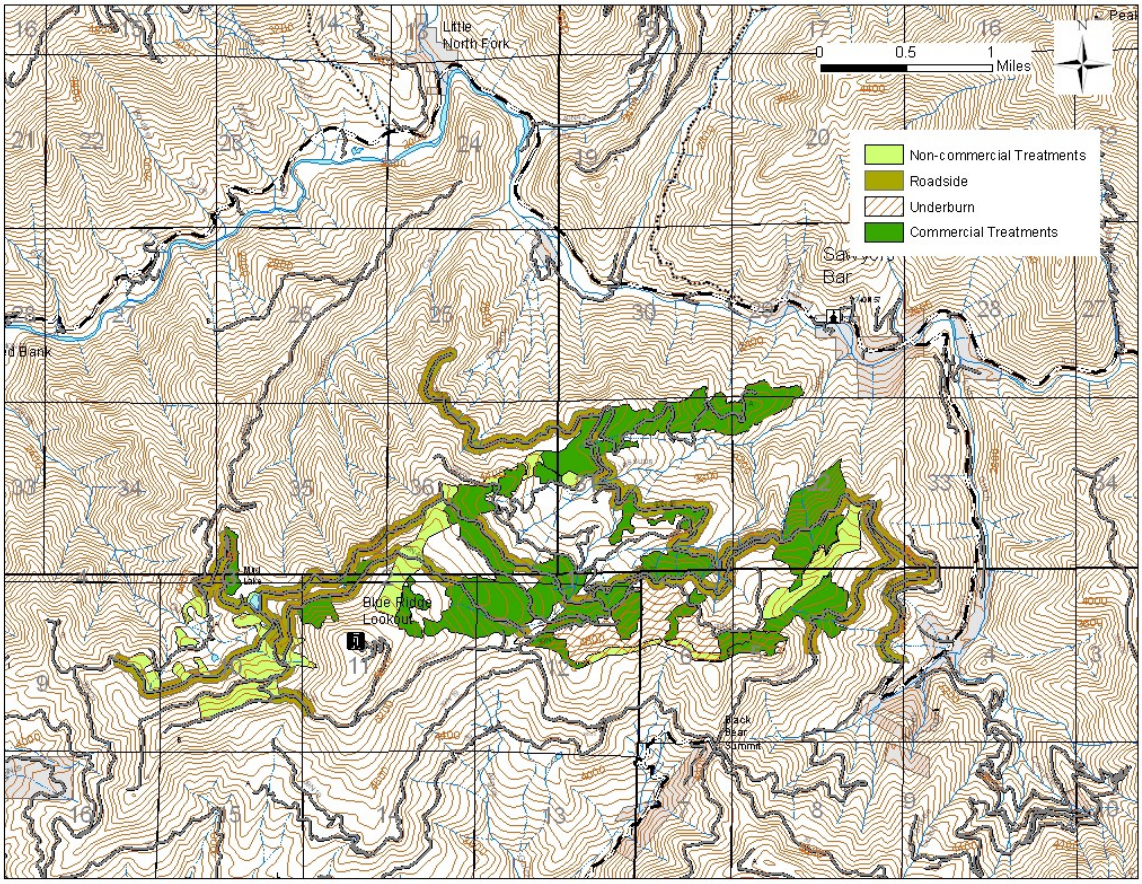

Figure E-4: Alternative 2 of the Jess project, showing prescriptions.

The meeting on June 27, 2013 was immediately after the scoping period had ended for the Jess project. Many of the comments received during this meeting were also reflected in the scoping comments the Forest received. Alternative 3 was developed in response to the issues raised during scoping. The changes included removing units where treatment would remove or downgrade northern spotted owl habitat and removing treatments in the riparian reserves (Figure E-5). Altering prescriptions to maintain suitable habitat was considered, but was not likely to achieve the desired degree of restoration because of density requirements.

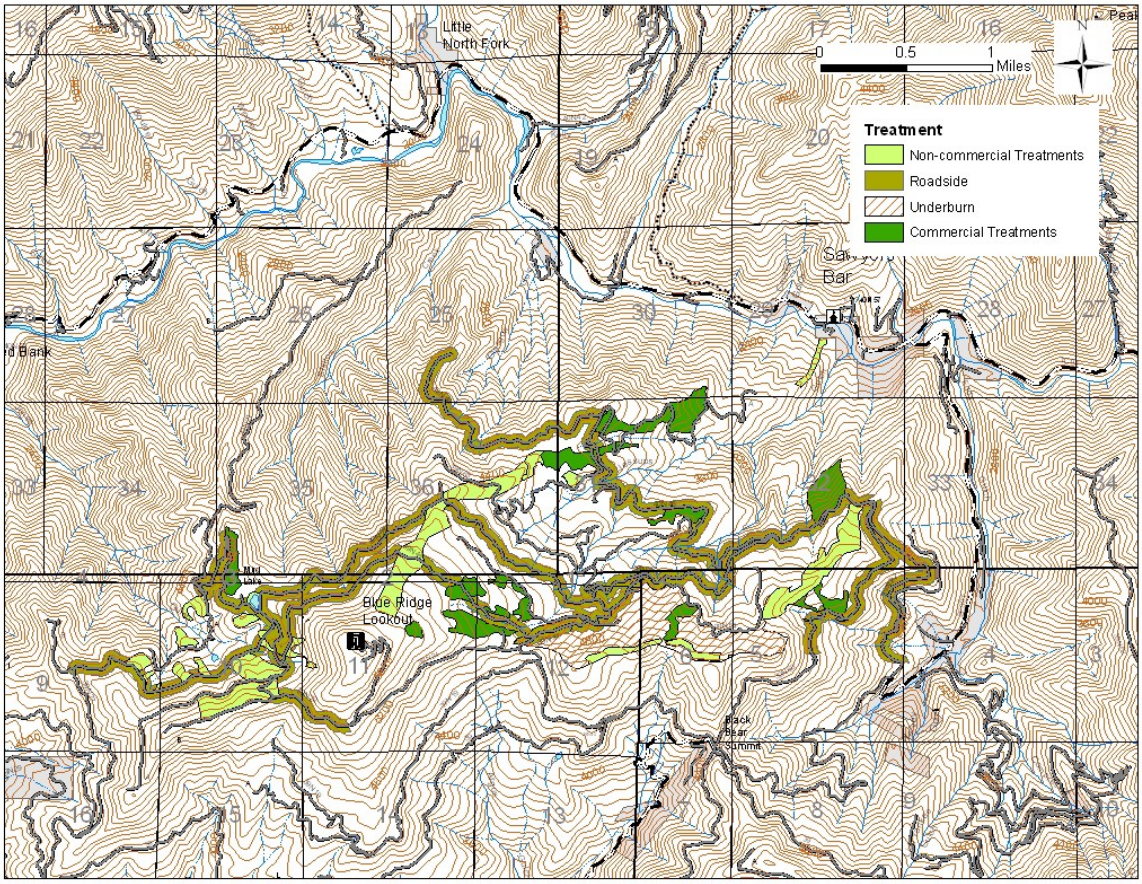

Figure E-5: Alternative 3 for the Jess project developed in response to issues raised during the scoping process.

There were many comments regarding the retention of 60 percent canopy or greater and the retention of large trees to meet habitat needs and the recommendations in the CWPP. The discussion on large trees did not lead to a definite diameter that the group considered a large tree. Instead, the discussion led to the concept that there is a need to retain trees that have old-growth characteristics such as large limbs, thick bark, and deformities for habitat. The Forest considered an alternative that would retain greater than 60 percent canopy and would not remove any large trees. Only 47 percent of the units had 60 percent or greater canopy under inventory conditions. The finding of the interdisciplinary team was that the alternative would not put the project on a trajectory toward ecosystem restoration especially regarding the need to reduce the high mistletoe infection rates, create openings to allow regeneration of pine species or retain desirable species depending on site characteristics (i.e. hardwoods) in the project area. Since it did not meet the restoration concept, the alternative does not meet the purpose and need of the project.

The focus of the public meeting on February 5, 2014 was for the Forest to share the alternatives being analyzed and to discuss any remaining or unresolved concerns from

collaborators. The concerns raised regarding the alternatives were the potential brush response in the commercial harvest units, the intention of the mistletoe treatments, effects on bear grass and fuels treatment options. As a result the Forest added fuels treatments to all commercial harvest units to mitigate any potential fuels response. The road fuels treatments widths were clarified. They are 200 feet on either side of the road. The marking crew is getting training on which mistletoe-infected trees are the most beneficial to wildlife and are considering potential damage to hardwoods while marking the units. The botanist completed additional analysis on the effects of the project on bear grass. The recommendation for changing the project to use multiple harvest entries, instead of one as is currently planned, was considered but eliminated from detailed study (see alternative D, Section 2.3). The Forest has Regional direction to implement projects with 20 to 30 year effectiveness. A project that requires multiple entries over a shorter period of time does not meet this guidance.

There was a public field trip offered on April 2, 2014 in response to requests made at the February 5, 2014 meeting. The purpose of the field trip was to look at the areas brought up as of concern during the February 5, 2014 meeting with the collaborators. Four commercial units were visited. The Forest considered all of the points of discussion and shared the responses with the collaborators on May 3, 2014. The discussion led to an additional alternative considered but eliminated from detailed study (Alternative E, Section 2.3).

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Appendix F: Aquatic Conservation Strategy

The Forest Plan contains the components, objectives and standards and guidelines for consistency of projects with the Aquatic Conservation Strategy (ACS). The Record of Decision for the Forest Plan (USFS, 1995c) is the guiding document for Forest projects; the Forest ROD incorporates the Aquatic Conservation Strategy standards and guidelines from the ROD for Amendments to Forest Service and Bureau of Land Management Planning Documents within the Range of the northern spotted owl (commonly known as the Northwest Forest Plan) (USDA Forest Service and USDI Bureau of Land Management 1994b). The Forest Plan lists four components of the Aquatic Conservation Strategy, as stated on pages 4-25 through 4-27 of the Forest Plan: "1) Riparian Reserves, 2) Key Watersheds, 3) Watershed Analysis and 4) Watershed Restoration" (USDA Forest Service 1995). The Jess project addresses these components as follows:

Riparian Reserves:

Some proposed activities in the Jess project will occur in riparian reserves. Proposed treatments in riparian reserves are developed to thin these areas (appendix B) and reduce fuels. Although the purpose of the Jess project is not to restore watersheds, treatment prescriptions for units within riparian reserves are developed with input from wildlife and fish specialists and earth scientists to insure that Best Management Practices from the Pacific Southwest Region Water Quality Management for Forested Lands in California: Best Management Practices and Water Quality Management Handbook are followed. Project-specific Best Management Practices (appendix D) and project design features (Table 2-1) are developed to reduce negative effects of the project and meet the requirement of the Forest Plan (p. 4-106) to prohibit and regulate activities in riparian reserves that can retard or prevent attainment of the Aquatic Conservation Strategy Objectives.

Key Watersheds:

The Jess project is a Key Watershed so standards and guidelines related to key watersheds are addressed in this project.

Watershed Analysis:

Initial watershed analysis was completed for the Jess area and is entitled Klamath National Forest North Fork Watershed Analysis (USDA Forest Service, 1995d); information from this analysis is used when locating and designing proposed activities for the Jess project. Recommendations from the watershed analysis related to the purpose and need of this project are considered in developing treatments, prescriptions and project design features.

Watershed Restoration:

Watershed restoration, including fish passage improvement, removing and upgrading roads, and restoration of large trees in riparian reserves, is an ongoing program on the Forest but not part of the purpose and need for the Jess project. However, proposed treatments in the project contribute to watershed restoration, especially repairing the legacy sites. These include thinning of small trees in the plantations that currently exist in riparian reserves to encourage the growth of larger trees by reducing competition from small trees. These treatments will also reduce the amount of watershed degradation that can occur from a high intensity wildfire by changing vegetative condition classes to reduce the extent and intensity of wildfire.

Legacy site repairs include getting rid of diversion potentials, installing rolling dips thereby reducing fills, upgrading culverts to pass 100-year floods, and re-establishing a channel that has been diverted due to a road. Temporary roads used in the project will be hydrologically restored after use. Alternatives for the project are evaluated to determine the effects to riparian reserves at the site, reach, and 7th and 5th field watershed scales in the short and long term to determine effects on water quality, and on anadromous fish and their habitat. Both stream-course riparian reserves and those on unstable and potentially unstable areas (unstable-lands riparian reserves) are included in the analysis and evaluation. The conclusions of these evaluations for each alternative are summarized, by Aquatic Conservation Strategy objective, as follows:

The earliest disturbance of the watershed condition in the North Fork Salmon River was mining in the 1850s. Commercial logging and associated road construction followed in the 1950s. Historically, the North Fork Salmon had frequent fires with a fire return interval of ten-25 years (Watershed Assessment, pg. 4-4). The recent wildfires contributing to the current watershed condition in the North Fork Salmon River 5th field watershed are the Hog fire (1977), the Yellow and Neilson fires (1987), the Specimen fire (2008) and the Salmon Complex (2013). However, there have been no large fires in the Jess project area in the last 100 years.

Alternative 2

Maintain and restore the distribution, diversity, and complexity of watershed and landscape-scale features to ensure protection of the aquatic systems to which species, populations and communities are uniquely adapted.

Watershed complexity, in this analysis, takes into consideration effects to large wood recruitment, the distribution of large trees in riparian reserves, coarse woody debris on the hillslopes, and the drainage network.

Little quantitative data is available regarding the historic range of variability of large woody debris, coarse woody debris and large trees in the riparian reserves. Assumptions can be made considering the history of disturbance. The sources of large woody (in channel wood) and coarse woody (upslope downed wood) debris have been reduced from

historical conditions by commercial harvest. In the past frequent wildfires would have contributed to well-distributed large woody and coarse woody debris by creating snags that eventually fall. Historic mapping circa 1940s (Weislander) shows that the project area had ridges that were pine dominated. These areas would have had large trees widely spaced on the ridges. The remaining area was mostly mixed conifer. There are stumps in the project area that indicate that large trees were well distributed throughout the project area even in the riparian reserves. The drainage network has been modified by mining, but the basic skeleton of the drainages were not altered. Ditches were cut into the hillslope, but most of them are abandoned once the large scale mining ceased by the 1930s and do not currently divert water.

The treatments in both the commercial and non-commercial units will increase the quadratic mean diameter of the stands by 10 percent over the next 30 years. This is due to the reduction in mistletoe infection rates. The treatments will move the vegetative community in treated areas closer to that which occurred historically with greater structural diversity, less homogeneous species composition and large trees. (Section 3.1 of this final EIS and the Silvicultural resource report). In Alternative 2, these treatments will occur and benefits will be seen in the outer 70 feet of the riparian reserves in the units. These changes, in turn would result in an improved trend for large woody debris recruitment in the stream channels, coarse woody debris on the hill slopes and stream shading in the riparian reserve. There will be no treatment in the inner 100 feet of the riparian reserves which is the most important portion of the riparian reserve for large wood debris recruitment (Aquatic Resources Report). This exclusion of commercial and non- commercial treatment and project design features for prescribed burning will also prevent any removal of existing large woody debris in the stream channel (Aquatic Resources Report). There will be no substantial effect to peak flows or debris flow potential as a result of the project. So the potential transport of large woody debris to the North Fork Salmon River will be maintained. There is currently an average of 5.6 logs per acre of coarse woody debris in the project area with values ranging between 0.8 to 13.6 logs per acre (Soils Report). This is not expected to change due to the project design features for both commercial treatments and prescribed fire requiring existing coarse woody debris remain untouched where possible (Soils Report). The commercial, non-commercial and prescribed fire treatments will not impact the drainage network in the project area. The legacy site repairs include addressing the diversion potential at road crossings and cross- drain locations. This will further reduce any potential impacts to the drainage network from capture of the streams by roadbeds. One legacy site is a modification of a stream alignment. The project includes the realignment of the water back into its original drainage feature (Aquatic Resources Report and Hydrology Report). At the project scale, Alternative 2 will maintain and restore watershed complexity in the short and long-term. Alternative 2 will not prevent the attainment of this objective at the 5th field scale in the short-term. It will also contribute to the long-term improvement of

watershed complexity including coarse woody debris, large woody debris, large trees and drainage network at the 5th field watershed scale.

Maintain and restore spatial and temporal connectivity within and between watersheds Lateral longitudinal, and drainage network connections include floodplains, wetlands, upslope areas, headwater tributaries, and intact refugia. These network connections must provide chemically and physically unobstructed routes to areas critical for fulfilling life history requirements of aquatic- and riparian-dependent species.

Watershed Connectivity, for this analysis, takes into consideration the effects to aquatic species, fish, and riparian dependent terrestrial species passage in the project area and connectivity with the larger 5th field watershed.

Watershed connectivity would have ranged from high to impaired on any given section of the North Fork Salmon River and its tributaries. Landslide producing storms occurred about every ten years in the Klamath Mountains. So at any given time there would have been a percentage of stream channels recovering from debris flow and landslide impacts that would have scoured channels and stripped vegetation from the riparian. Small fires and blow-down would have left small openings in the canopy of riparian reserves as well. These impacts would have been smaller and better distributed in the watershed than they are today. Past road construction and clear cutting have increased the likelihood and consequence of some landslides and debris flows in portions of the watersheds. The recent wildfires in the North Fork Salmon River have been large and impacted entire 7th field watersheds (Watershed Assessment, pp. 4-8:9).

Alternative 2 will maintain and restore spatial and temporal connectivity within and between watersheds by maintaining a heterogeneous species composition as well as encouraging large tree development. In the short- and long-term, Alternative 2 will not result in any physical or chemical condition that would hinder or prevent the upstream or downstream movements of fish and other aquatic organisms or the migration routes for wildlife species. Potential direct and indirect impact to aquatic resources will primarily occur as a result of water drafting. Effects will be localized, small, and short-term. Other than water drafting, project components are either located in the uplands outside the riparian reserve, else adjacent to fishless streams far from fish-occupied waters. The use of resource protection measures/BMPs, along with distance, will mitigate the short- term impact to aquatic resources from non-drafting project elements to non-detectability from background processes, and therefore can be discounted. At the project scale, in the long-term Alternative 2 will improve migration routes for wildlife by opening up dense stands to restore the greater connectivity that was historically present in these watersheds. Alternative 2 will not prevent the attainment of this objective in the short-term and will contribute to the long-term improvement of watershed connectivity at the 5th field scale.

Maintain and restore the physical integrity of the aquatic system, including shorelines, banks, and bottom configurations.

Aquatic Systems Integrity, in this analysis, will consider effects to the channel geomorphology and include evaluations of road density, hydrology connectivity of road system and direct impact to bank and stream bottom.

Naturally the banks, shorelines and stream bottoms would have been varied and heterogeneous. At the site scale a downed tree or small landslide could have impacted banks, shores and bottom configurations and debris flows would have impacted these features along miles of stream channel at a time. However, there would have been a high percentage of streams with competent, overhanging banks, regularly inundated shorelines and stream bottoms with complex in-channel landforms and varied substrates.

The only direct disturbance to stream channels that could occur due to the project would be skidding logs at a designated location across one intermittent stream channel when it is dry in unit 118. This action will have only minor short-term effects on the physical integrity of stream channels because such skidding will be restricted to designated locations where little disturbance to the stream channel will result and where channel morphology can be easily restored, and before flows resume the following wet season.

This generally consists of removing excess soil, reshaping and waterbarring former approaches, and spreading slash on the former crossing. The road density in Alternative 2 will go from 2.71 miles/miles2 to 2.37 miles/miles2 in the Jessups Gulch 7th field watershed (Section 3.10 of this final EIS). There will be a reduction of hydrologic connectivity of the roads at stream crossings and cross-drain locations as a result of addressing diversion potential on the roads. In the short-term and long-term, Alternative 2 will meet this objective because any direct or indirect disturbances from project activities will not cause permanent measurable change in channel geomorphology at the project or 5th field watershed scale. Alternative 2, in the long-term, will contribute to the improvement of aquatic systems integrity at the 5th field watershed scale and not prevent the attainment of this objective in the short-term.

Maintain and restore water quality necessary to support healthy riparian, aquatic, and wetland ecosystems. Water quality must remain within the range that maintains the biological, physical, and chemical integrity of the system and benefits survival, growth, reproduction and migration of individuals composing aquatic and riparian communities.

As a tributary to the Klamath River, The North Fork Salmon River is listed in the 303 (d) Clean Water Act for stream temperature impairment (Hydrology resource report and Section 3.10 of this final EIS). The water quality analysis for this project will focus on stream shade as a proxy for temperature of the stream.

Several streams in the North Fork Salmon 5th field watershed were monitored for shade with results described in the Stream Shade Monitoring on the Klamath National Forest 2010 (USDA Forest Service 2011a). The monitoring estimated potential shade for each stream and compared it to the modeled existing shade on the stream. Five of the six streams monitored were under their potential shade. The streams with reduced shade were all within three percent of their potential shade. Crapo Creek was the only site monitored that was at or above potential shade along stream channels.

Alternative 2 has large buffers and canopy retention guidelines for treatments in the riparian reserves that will retain current shade on the perennial and late-flowing intermittent stream channels (Hydrology resource report and Section 3.10 of this final EIS). Since no shade providing trees will be removed, the alternative will not affect temperatures in the Jess project area. The increased defensibility against wildfires in the project area will mean that should a wildfire occur the disturbance will be limited and the stands treated in Alternative 2 will be more resilient to wildfire (Section 3.1 of this final EIS) which includes the outer 70 feet of the riparian reserve. There will be no measureable change in the short-term on temperature at the project or 5th field watershed scale. The benefits of larger trees, increase defensibility against wildfire and improved resilience of forest will be seen in the long-term at the confluence of the North Fork Salmon River and Jessups Gulch, Shiltos Creek, Eddy Creek and Jones Gulch. These tributaries provide cold water refugia to Chinook and Steelhead/rainbow trout in the North Fork Salmon River. Alternative 2 will contribute to the improvement of water quality at the 5th field watershed scale in the long-term.

Maintain and restore the sediment regime under which aquatic ecosystems evolved. Elements of the sediment regime include the timing, volume, rate, and character of sediment input, storage and transport.

The sediment regime analysis will consider the effects to sediment delivery to streams estimated by the Universal Soil Loss Equation and landslide models (Hydrology Report and Geology Report).

The Cumulative Watershed Effects modeling shows a background landside potential of 233,000 cubic yards per decade of sediment delivered to streams under pre-disturbance conditions for the North Fork Salmon 5th field watershed. The background soil erosion related sediment delivery to streams is estimated at 4,500 cubic yards per year. The current landslide potential is about 513,000 cubic yards per decade and soil erosion sediment delivery is estimated at 8,300 cubic yards per year. This leads to a risk ratio for landsliding of 0.60 and a soil erosion risk ratio of 0.21. Seventh field watershed estimates can be found for the project area in appendix A of the Hydrology Report. In general, the background landslide potential ranges from 7,350 to 18,650 cubic yards per decade for the project area. The current risk ratios for landsliding range from 0.51 to 1.73. The elevated risk ratio is in Olsen Creek which is a compound watershed that straddles the North Fork

Salmon River into the area affected by the 2013 Salmon Complex Fire. The background sediment delivery to streams from soil erosion ranges from 81 to 246 cubic yards per year. The current risk ratios range from 0.36 to 0.96.

In the short-term, there may be minor negative effects to sediment movement related to ground disturbing actions such as timber harvest, fuels reduction, and actions within stream channels such as road crossing upgrades, water drafting, and crossing dry channels with equipment at designated locations. These actions could affect sedimentation, and/or channel geomorphology at the site-scale but not more than 300 feet downstream (for water drafting which is the only action to occur in live stream. The estimated landslide potential would be increased by eight percent in Jessups Gulch over current conditions. The other 7th field watersheds have an estimated increase of landslide potential of less than 0.6 percent. The sediment delivery from soil erosion is estimated to increase by about 10 percent in Jessups Gulch and by less than one percent in the remaining 7th field watersheds. The estimates of soil erosion and landslide potential do not account for the project design features intended to meet Best Management Practices. Best Management Practices have been shown to have a 94 percent effectiveness rate in preventing sediment from being delivered to a stream (Hydrology Report). The closest fish bearing streams or fish habitat is more than 1.6 miles downstream of the nearest treatment proposed in Alternative 2. This distance along with the small amount of sediment increase expected means that there will be no measurable effect to fish or fish habitat (Aquatic Resources Report) at the project scale, and therefore at the 5th field watershed scale.

Adding the effects of the North Fork Salmon River Stormproofing project and the repairing of legacy sites, the effects of Alternative 2 will contribute to the improvement of the sediment regime in the North Fork Salmon River 5th field watershed in the long-term.

Maintain and restore in-stream flows sufficient to create and sustain riparian, aquatic, and wetland habitats, and to retain patterns of sediment, nutrient, and wood routing. The timing, magnitude, duration, and spatial distribution of peak, high, and low flows must be protected.

The water quantity analysis considers the effect to base flow using a qualitative assessment and peak flow using the Equivalent Roaded Acres model.

The historical range of variability for base and peak flow falls from 100 year flood events like the flood of 1964-1965 to drought years where the snow pack is less than 10 percent of normal in some areas. The spring-fed perennial streams have less variation in their base flows than snow-melt driven intermittent streams from year to year. Large fires can increase peak flows because of the reduction in precipitation interception and roughness that slow the water on the hillslope. There are no active diversions in the project area.

Jessups Gulch is the municipal watershed for the community of Sawyers Bar. So water is removed at the mouth of Jessups Gulch treated and distributed throughout the community.

There will be no watershed-scale changes to peak/base flows from Alternative 2 due to the upslope position, localized impacts, and functioning buffering capacity of intervening riparian reserve habitat. This is reflected in ERA model output, which remains below the threshold of concern. At the site scale, in-stream flows would only be affected by project related water drafting. At all project drafting sites, pumping rate will not exceed 350 gallons per minute or 10 percent of the flow of any anadromous stream and pumping is done in short periods. Water drafting will result in only slight temporary decreases in flow, which will be undetectable both a short distance downstream and further downstream in Coho Critical Habitat. Base and peak flows are not measurably affected at the project scale, and therefore there is no effect at the 5th field watershed scale.

Alternative 2 will not prevent the attainment of this objective on either the short or long-term.

Maintain and restore the timing, variability, and duration of floodplain inundation and water table elevation in meadows and wetlands.

The flow regime analysis will consider effects to the potential inundation of the North Fork Salmon River floodplain.

Floodplain inundation is a natural process that recharges groundwater and at high flows can naturally increase watershed complexity by modifying stream banks and gravel bars. Mining along the North Fork Salmon River has modified the floodplain by removing river terraces and leaving behind steep headcut banks and piles of tailings. Portions of the floodplain should be inundated every year or two with flood years filling the floodplain with slow moving water the entire width of the valley.

Peak flows in the tributaries to North Fork Salmon River that contribute to floodplain inundation will remain unchanged in the short- and long-term (see Water Quantity analysis above). Alternative 2 will have no effect on floodplain inundation and will not prevent the attainment of this objective.

Maintain and restore the species composition and structural diversity of plant communities in riparian areas and wetlands to provide adequate summer and winter thermal regulation, nutrient filtering, appropriate rates of surface erosion, bank erosion, and channel migration and to supply amounts and distributions of coarse woody debris sufficient to sustain physical complexity and stability.

This analysis will consider the expected response of conifer and hardwood trees in the riparian reserves including species diversity and structural components.

Historically, much of the area was pine dominated, both by ponderosa and sugar pine, with sugar pine being the dominant species. Some stands were also historically Douglas-fir dominated. White fir now occupies the majority position primarily due to past partial cutting practices and exclusion of natural wild fires. Mistletoe was overall at an endemic

infection rate. Dwarf mistletoe is a host specific parasitic seed plant. Evidence of mistletoe infection was found in the major conifer species that are present in the project area (Douglas-fir, white fir, incense cedar, ponderosa pine, sugar pine and red fir) indicating that several different dwarf mistletoe species are present in epidemic rates (see Table 1-2 in final EIS) (USDA Forest Service, 2013).

Treatments under Alternative 2 will move species composition and structural diversity of plant communities toward greater structural diversity and less homogeneous species composition at the site scale in the short-term and long-term. . Species composition will increase over the long-term due to the retention of historically dominate species and by planting rust-resistant sugar pine (Silviculture Report). The prescriptions are aimed at retaining hardwoods and restoring hardwood systems (Silviculture Report). The treatments would move communities within the treated stands toward a species mix that occurred prior to fire suppression and timber harvest, restoring the diversity and productivity of the riparian vegetation community. Forest Vegetation Simulator modeling predicts mistletoe infections across all infected stands will be reduced following treatments in the proposed action. Overall, an average of 54 percent reduction in Douglas-fir infections and 73 percent reduction in white fir infections are predicted at the end of the 30 year modeling period. This would increase forest health and resiliency to disturbances by moving the project area toward endemic infection levels. With a reduction in stand density, there is less competition for resources, resulting in increased growth and vigor of the trees that remain. Removal of severely mistletoe infected trees in the overstory will reduce the spread of infection to uninfected trees. Removal of trees from these stands also results in removal of ground fuels that would otherwise accumulate. These changes, in turn would result in an improved trend for large woody recruitment, stream shading and other key riparian system processes. Alternative 2 will contribute to the improvement of species and structural diversity at the 5th field watershed scale in the long-term and will not prevent the attainment of the objective in the short-term.

Maintain and restore well-distributed populations of native plant, invertebrate and vertebrate riparian-dependent species.

This analysis will consider the effect to the vegetation in the riparian reserves and the risk of the spread of noxious weeds.

The historical mining and logging activities have led to a modification of riparian reserve vegetation. Historically, it was likely a mix of willow and alder in streams that have recently experienced debris flows grading in to large conifers in the old-growth forest. Noxious weeds were not present before they were introduced by humans either intentionally or unintentionally.

Treatments will help accelerate the recovery of these stream courses riparian reserves at the site scale in the short-term and long-term by increasing plant species diversity and vegetative heterogeneity (see Species and Structural Diversity Objective above).

Treatments within riparian reserves would move the riparian community toward a more historic composition, providing the opportunity for riparian-dependent flora and fauna to be well-distributed within the project area and watershed. In both plantations and natural stands, treatments will result an increase in available water, nutrients, and sunlight available for improving the growth, resilience, and vigor of trees in the riparian reserves. Alternative 2 has a low risk of weed introduction or spread (Section 3.6 of this final EIS). Alternative 2 will not prevent the attainment of the objective in the short-term at the project or 5th field scale. The alternative will contribute to the improvement of distribution of native species in the riparian reserves at the 5th field scale in the long-term.

Alternative 3

All of the objectives are similar to those of Alternative 2 except Complexity of Watershed, Sediment Regime and Species Composition and Structural Diversity. The differences are described below.

Maintain and restore the distribution, diversity, and complexity of watershed and landscape-scale features to ensure protection of the aquatic systems to which species, populations and communities are uniquely adapted.

The difference from Alternative 2 is that the commercial and non-commercial units will increase the quadratic mean diameter by only 2.8 percent compared to 10 percent in Alternative 2 over the next 30 years. This means fewer large trees than in Alternative 2 because of the reduction in acres treated in Alternative 3. Since there are no commercial treatments in the riparian reserves, none of the benefit of the treatments will be gained in the riparian reserves.

Maintain and restore the sediment regime under which aquatic ecosystems evolved. Elements of the sediment regime include the timing, volume, rate, and character of sediment input, storage and transport.

The difference from Alternative 2 is a reduction in the sediment estimated to be delivered to the stream channel from soil erosion and landsliding. The increase in sediment delivered to the stream from landsliding is estimated to be less than two percent compared to eight percent in Alternative 2. The increase in sediment delivery from soil erosion is about seven percent compared to 10 percent in Alternative 2. The project has a reduced sediment delivery rate because it treats fewer acres than Alternative 2.

Maintain and restore the species composition and structural diversity of plant communities in riparian areas and wetlands to provide adequate summer and winter thermal regulation, nutrient filtering, appropriate rates of surface erosion, bank

erosion, and channel migration and to supply amounts and distributions of coarse woody debris sufficient to sustain physical complexity and stability.

The difference between alternatives 2 and 3 is that Alternative 3 will have a 103 percent and 764 percent increase in mistletoe infection rates (in Douglas-fir and white fir, respectively) in Alternative 3 compared to a reduction in mistletoe infection in Alternative 2. There is no commercial treatment in riparian reserves which means that the benefit to species diversity gained by commercial treatment will not occur in the riparian reserves.

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Appendix G: Response to Comments on the Jess Project Draft Environmental Impact Statement

This appendix is a summary of public comments received on the *Jess Project Draft Environmental Impact Statement*. The Klamath National Forest published the Notice of Availability of the draft EIS in the *Federal Register* for review and public comment on October 4, 2014. Comments were requested within 45 days of publication of the legal notice. All comments received during the 45-day period, ending November 17, 2014 have been reviewed and responses are included herein. A full copy of comments received from EPA is included at the end of this appendix.

A total of 6 comment letters and emails were received from 9 interested and affected individuals and groups, tribes, and other agencies (two additional comment letters were received after the end of the legal comment period). The letter numbers, names of respondents, and information on attachments to comments letters are displayed in Table G-1.

Comment documents were tracked upon receipt to assure all comments were captured. Individual comments from within each document were categorized based on the comment topic. The exact wording of comments was used, rather than summaries. The Comment Analysis and Response Application was used to organize and code comments for comment analysis. Only literature cited that is associated with a project specific comment and that was provided to the Forest by the commenters is addressed in this response to comments.

Supporting documents referenced responses below are found within the project record. To review resource reports visit: http://www.fs.usda.gov/project/?project=38943.

Table G-1: Letter number, date received.

Letter Number	Date	Name of Respondent and Organization Affiliation if Given
1	9/29/2014	Richard Svilich, American Forest Resource Council
2	10/1/2014	Toby Mills, Scott Timber Company
4	11/5/2014	George Sexton, Klamath-Siskiyou Wildlands Center
5	11/18/2014	Kimberly Baker, Klamath Forest Alliance
6	10/16/2014	George Sexton, Klamath Siskiyou Wildlands Center
7	11/17/2014	Kathleen Martin Goforth, Environmental Protection Agency Region IX
8	11/17/2014	Patricia Sanderson Port, Office of Environmental Policy and Compliance
9	11/18/2014	Kimberly Baker, Environmental Protection Information Center

The response table is organized by subject area, using the categories listed below.

A. General
B. NEPA, Management Direction, and Decision Framework
C. Collaboration
D. Fire and Fuels
E. Silviculture/Forest Health
F. Wildlife
G. Water Resources, Hydrology, Geology, and Soils
H. Fisheries

The following five responses were used to respond to comments as per guidance provided by the Council on Environmental Quality (CEQ) regulations:

1. Modify alternatives, including the Proposed Action
2. Develop and evaluate alternatives not previously given consideration
3. Supplement, improve, or modify the analysis
4. Make factual corrections
5. Explain why the comments do not warrant further agency response

In the following response table, issues from comments have been assigned to one of the five categories above, which is listed prior to each response.

Table G-2. Comments and Responses

Comment	Letter Number	Response Type and Response
General		
Please ensure that we are sent hard copies of the forthcoming decision documents for this project	#4-1	Hard copies of the final EIS will be sent as requested and a digital version will be available online at: http://www.fs.usda.gov/project/?project=38943
We appreciate the opportunity to review this draft EIS. When the final EIS is released for public review, please send one hard copy and three CD ROMs to the address above (mail code: ENF 4-2). If you have any questions, please call me at (415) 972-3521 or you can contact Carter Jessop, the lead reviewer for this project, at (415) 972-3815 or jessop.carter@epa.gov.	#7-8	Hard copies and CD ROMs of the final EIS will be sent as requested and a digital version will be available online at: http://www.fs.usda.gov/project/?project=38943
We are also concerned with impacts to special status or endangered species and water quality.	# 7-3	Chapter 3 of the final EIS summarizes the effects to wildlife (section 3.3), fish (section 3.4), botanical resources (section 3.5), and water quality (section 3.10) from the project alternatives. The project meets all law, policy, and regulations regarding these resources.
NEPA, Management Direction and Decision Framework		
Based on our review there is only one feasible alternative that fully meets the purpose and need statements for the proposed project. Alternatives 1 and 3 do not fully meet the intended purpose of the project. Alternative 2 is the only one that does. The only alternative AFRC can support for the proposed Jess project is Alternative 2.	#1-1	Your comments are appreciated. The way in which alternatives meet the Purpose and Need was analyzed and the results are included in Table 2-3 of the final EIS. If an alternative did not meet the Purpose and Need it was eliminated from detailed study (Section 2.3 of the final EIS). The Record of Decision will identify the alternative selected and the reasons for the selection.
The only alternative Scott Timber Company will support for the proposed Jess project is Alternative 2. Based on our review there is only one feasible alternative that fully meets the purpose and need statements for the proposed project. Alternatives 1 and 3 do not fully meet the intended purpose of the project and will not provide adequate timber stand improvement on the ground for long term effectiveness.	#2-1	See response to #1-1
EPA acknowledges the importance of these goals. The ongoing problems of unnatural stand density, buildup of fuels, and susceptibility to disease and infection by dwarf mistletoe require prompt and appropriate management actions. While carefully designed timber harvest and prescribed underburning can be effective tools to reduce the risk of fire and restore natural	# 7-1	Direct, indirect, and cumulative effects of no action and two action alternatives were described in detail in the final EIS and in supporting documentation. Specifically, each specialist's report included an "environmental consequences" section describing the effects of all three alternatives on the relevant resource of concern; these are summarized and referenced in chapter 3 of the final EIS. The analyses completed in

Comment	Letter Number	Response Type and Response
ecological processes, unsustainable harvest practices can have negative consequences. Therefore, it is vital that decision making be based upon the most current available science and data available regarding stand health and harvest practices.		the specialist reports take into consideration, and make conclusions based on, research, science, reports, models, monitoring and site-specific information as it was available, in conjunction with scientific recommendations regarding the management of, and effects of, the project activities on the relevant resource. The science used to develop the Jess project is listed in the literature cited section of the final EIS (section 4.3.3) and the respective resource reports.
Please note that page 49 of the draft EIS anticipates a greater brush response from implementation of alternative 2 than would occur under alternative 3. Hence alternative 3 would better achieve the purpose and need for the project.	#4-119	See response to #1-1 and #7-1 The quotation from page 49 of the draft EIS, in relation to the effects of alternative 3 on fire and fuels, is: “The reduction in commercial treatments means there are fewer acres with increased brush by 2022. However, by 2032 the area has a higher percent of the treatment area with high fire behavior and 12% of the treatment area is trending toward increased brush. In brush-related fuels, fires carry throughout the shrub layer where foliage is more flammable but this requires moderate winds, greater than eight miles per hour at mid-flame height. Fire will drop to the ground at low wind speeds or at openings in stands. A broad range of shrub conditions is covered in brush-related fuels. Fuel situations that will be considered include intermediate stands of oak brush and snow brush.” This does not indicate how alternative 3 would better achieve the purpose and need of the project than alternative 2; it only discloses that the short-term effect of alternative 3 would be fewer acres of brush than alternative 2 but the long-term effect on brush would be more acres than alternative 2.
For the aforementioned reasons, we recommend the agency select Alternative 3 or not downgrade or remove spotted owl NRF habitat.	#4-54	See response to #7-1 The Record of Decision will identify the selected alternative and reasons for its selection.
Our organizations remain committed to science-based restoration and fuels treatments and continue to oppose volume-driven large tree logging, tractor yarding in riparian reserves and the downgrading and removal of forest conditions necessary for the survival and recovery of North spotted owl populations.	#4-124	Response - The science used to develop the Jess project is listed in the literature cited section of the final EIS (section 4.3.3). The final EIS discloses the effects of the project regarding the removal of habitat and the recovery of the Northern Spotted Owl (Section 3.3.4).
The Forest Service contention (draft EIS page 189) that proposed fuels treatments along the Sawyer's Bar Road are "outside the scope of the project" misses the point. HFRA directs the agency to include the public and the WCPP in defining the scope of the project.	#4-12	The Jess project includes components of the Community Wildfire Protection Plan such as roadside and ridgetop fuels treatments. The suggestion to add roadside fuels reduction along Sawyers Bar Road was eliminated from detailed study because it was outside of the project boundary (Section 2.3 final EIS). The collaborative effort that was made

Comment	Letter Number	Response Type and Response
Similarly, the 9th Circuit has admonished the Forest Service for defining the scope of its projects so as to preclude reasonable action alternatives. Here, retention of large trees and canopy cover, as well as treatments along the Sawyer's Bar Road would have directly contributed to the stated project purpose and need but were rejected from development due to an agency preference for a project that focused on commodity removal rather than community safety. Similarly, the contention on page 195 of the draft EIS that the agency is free to ignore the large tree retention provisions of HFRA is misguided. The authors of HFRA, and the Forest Service itself, have been quite clear that HFRA was not intended to facilitate and expedite large tree removal, yet that is exactly the outcome the Forest Service hopes to achieve in this project area.		during the project planning process is outlined in Appendix E of the final EIS, this includes descriptions of how components of the Community Wildfire Protection Plan were incorporated into project planning. HFRA Section 102(a)(4) is the primary authority being used in this project. It authorizes vegetation management projects where an insect or disease epidemic on Federal or immediately adjacent lands is present and there is an imminent risk of the epidemic spreading. The evidence of a dwarf mistletoe epidemic in the project area is presented in Section 1.2 and Table 1-2 of the final EIS. Also, please see the response to comment #6-6 below.
Collaboration		
Our organizations had hoped to work with the Forest Service in a productive collaborative manner to develop a project that would reverse the negative impacts of fire suppression on forest health and resiliency and to allow for a forward looking and sustainable relationship with fire in this fire-evolved and fire-dependent forest.	#4-2	Response -The collaborators for the Jess project were self-selecting and represented a wide range of interests and points of view. The Forest is restricted by the Federal Advisory Committee Act (FACA) from defining the makeup of the collaborative group and from requiring consensus. Within the constraints of FACA, the Forest moved forward with a collaborative process intended to promote the sharing of ideas, exchange of information and to allow for concerns to be heard. The collaborative process did sculpt the Jess project. Through the collaborative process the purpose and need was expanded, treatments were removed and added based on input from the group, and concerns were discussed and included in analysis of the effects (see final EIS appendix E and section 1.7).
Instead, collaborators have invested significant time into attending meetings, field tours and developing detailed comments only to have the Forest Service insist on logging large diameter trees (that are in severe deficit in this planning area), tractor log riparian reserves and downgrade spotted owl foraging habitat that has been designated as "critical" to the survival and recovery of the species by the U.S. Fish and Wildlife Service.	# 4-3	See response to # 6-1
We thought that the potential existed to bring stakeholders together to identify treatment areas and develop prescriptions that accomplish these restoration objectives. But the opportunity to	#4-5	See response to #4-2

Comment	Letter Number	Response Type and Response
achieve collaborative support for such actions appears doomed by Forest Service insistence that project outcomes must include large-tree removal, tractor yarding in riparian reserves and extreme canopy reduction in native forest stands.		
More generally, we had hoped to establish basis for productive and meaningful collaborative planning with the Klamath National Forest for decades to come. We continue to believe that true collaboration, as envisioned by the Healthy Forests Restoration Act, should include substantive community and stakeholder participation early in the planning process and on through project implementation and monitoring. Indeed, HFRA specifically states: "In order to encourage meaningful public participation during preparation of authorized hazardous fuel reduction projects, the Secretary shall facilitate collaboration among State and local governments and Indian tribes, and participation of interested persons, during the preparation of each authorized fuel reduction project in a manner consistent with the Implementation Plan." 16 USC§6514(f).	#4-6	See response to #4-2
Congress identified reducing wildfire risk via collaboration as one of the primary purposes of HFRA. 16 USC §6501(1) (stating the purpose is "to reduce wildfire fire to communities, municipal water supplies, and other at-risk Federal land through a collaborative process of planning, prioritizing, and implementing hazardous fuel reduction projects"). Page 90 of the draft EIS acknowledges that "the project area is not likely to experience high-severity wildfire in the short term.	#4-7	See response to #4-2. HFRA Section 102(a) (4) is the primary authority being used in this project. It authorizes vegetation management projects for federal land on which the existence of an epidemic of disease or insects, or the presence of such an epidemic of disease or insects on immediately adjacent land and the imminent risk that it will spread, poses a substantial threat to an ecosystem component. The evidence of a dwarf mistletoe epidemic in the project area is presented in Section 1.2 and Table 1-2 of the final EIS. The project is designed to re-establish the ecosystem's ecologic integrity by using silvicultural methods to reduce the rate of dwarf mistletoe infection and improve stand health so forest stands can better respond to dwarf mistletoe presence. The collaborative process also led to the expanded purpose and need to reduce the risk of wildland fire by improving the defensibility of the project area by treating ridgetops, improving the safety of ingress/egress, and providing maintenance to existing control features already on the landscape (HFRA, Sec. (102 (a)(2) and Sec. (102 (a)(3))). The full quotation from the draft EIS, page 90, states: "Although the project area is not likely to experience a high-severity wildfire in the short term, in the long term increased mortality in the project area will affect the safety of local residents, firefighters, forest workers and visitors." This long-term emphasis is consistent with HFRA.

Comment	Letter Number	Response Type and Response
		The project is also consistent with the Forest Plan and HFRA (Sec. 102(b)) in that the project is not located (a) within a component of the National Wilderness Preserve System, (b) on Federal land on which the removal of vegetation is prohibited or restricted by Act of Congress or Presidential proclamation.
Our attempts to work collaboratively to achieve an outcome that achieves the stated purposed of HFRA though implementation of the Wildfire Community Protection Plan have been rejected by the Forest Service.	#4-9	See responses to #4-2 and #4-7
Our organizations were identified as early collaborative partners with the Forest Service in planning the Jess Project in the Salmon River Watershed of the Klamath National Forest. We had hoped to work with the Forest Service to reverse the negative impacts of fire suppression on forest health and resiliency and to allow for a forward looking and sustainable relationship with fire in this fire-evolved and fire-dependent forest. Instead, the issues we identified as being important to our organizations early on in the planning process were not incorporated by the agency. We requested 1) meaningful, substantive collaboration if our organization's names and reputations were going to be associated with the project, 2) retention of large-diameter trees in compliance with HFRA, and 3) that the agency utilize the community wildfire protection plan in designing the HFRA project. Instead of honoring our requests and engaging in the collaborate process, the agency's preferred alternative involves extensive logging of large fire-resilient trees with late-successional character, commercial logging in riparian reserves, downgrading forest habitat in NSO Critical Habitat Units (CHU), and fails to fully implement the community wildfire protection plan in regards to large tree retention and reintroduction of fire into this fire- starved landscape.	#6-1	See response to #4-2 A collaborative effort compliant with HFRA requirements (see response to #4-7) was undertaken. The results of the collaboration are summarized in Appendix E of the final EIS. An alternative (alternative B) that did not remove large trees was considered but eliminated from detailed study for reasons stated in Section 2.3 of the final EIS. Portions of the Community Wildfire Protection Plan were incorporated into the project through the collaborative process (see Appendix E for summary) which included roadside and ridgetop fuels treatments. The effects of commercial logging in the riparian reserves and the Critical Habitat Unit are discussed in Chapter 3 of the final EIS (sections 3.3 and 3.10).
In our February 18, 2014 letter, we expressed concern that the Jess Project was moving away from the necessary focus on restoration and collaboration. We believe that productive collaboration must allow for stakeholders and communities to have an early and substantive role in defining project objectives, priority areas for treatment, and treatment prescriptions as well as post-project monitoring.	#6-2	See response to #4-2

Comment	Letter Number	Response Type and Response
Meaningful Collaboration Is Essential HFRA specifically states: "In order to encourage meaningful public participation during preparation of authorized hazardous fuel reduction projects, the Secretary shall facilitate collaboration among State and local governments and Indian tribes, and participation of interested persons, during the preparation of each authorized fuel reduction project in a manner consistent with the Implementation Plan." 16 U.S.C. § 6514(f). However, the Jess timber sale collaboration process has been neither productive nor meaningful. The Klamath National Forest has largely cast aside our proposals for creating a fire-resilient forest and instead appears committed to a timber sale focused on logging trees with late successional character across nearly 2000 acres, logging critically important spotted owl and wildlife habitat, and logging	#6-3	See response to #6-1
Congress identified reducing wildfire risk via collaboration as one of the primary purposes of HFRA. 16 U.S.C. § 6501(1) (stating the purpose is "to reduce wildfire risk to communities, municipal water supplies, and other at-risk Federal land through a collaborative process of planning, prioritizing, and implementing hazardous fuel reduction projects") We would very much like to work towards and support a project that emphasizes the establishment of shaded fuel breaks along strategic ridges and roads to allow for the return of fire, that maximizes the use of prescribed fire, and that treats existing fiber plantations and those trees that have encroached on natural stands due to the impacts of fire exclusion on the landscape in order to generate sustainable commercial timber harvest and build long-term forest health and resiliency. The potential exists to bring stakeholders together to identify treatment areas and develop prescriptions that accomplish these restoration objectives. The opportunity to achieve collaborative support for such actions will be lost if the Forest Service insists that outcomes must include large-tree removal and extensive canopy reduction in native forest stands.	#6-4	See response to #6-1
"We understand that the Forest Service retains decision-making authority, but HFRA contemplates and requires more than an entirely procedural collaboration process. See 16 U.S.C.§ 6514(f)."	#6-10	See response to #6-1

Comment	Letter Number	Response Type and Response
More generally, we hope to engage in collaborative planning with the Klamath National Forest for decades to come in a productive and meaningful way. We believe that true collaboration, as envisioned by the Healthy Forest Restoration Act, should include meaningful community and stakeholder participation early in the planning process and on through project implementation and monitoring. See 16 U.S.C. § 6514(f). We have helpful information and perspectives to offer regarding priority areas for treatment, effective prescriptions, and long-term fire and fuels management.	#6-5	See response to #6-1
We believe that substantive collaboration with diverse stakeholders will improve project development and reduce controversy.	#6-11	See response to #4-2
We are concerned that future collaborative efforts may be fruitless if conducted in the same manner as the Jess planning process.	#6-14	See response to #4-2
Please take this opportunity to ensure that collaborative restoration on the Klamath National Forest is truly collaborative within the meaning of the statute and truly restorative by substantively (rather than procedurally) engaging with us to reverse the impacts of fire exclusion on the landscape.	#6-17	See response to #4-2
HFRA requires that the agency "shall consider recommendations under subsection (a) that are made by at-risk communities that have developed community wildfire protection plans." 16 U.S.C. § 6513(b).	#6-8	The Jess project, through the collaborative process, includes components of the Sawyers Bar Community Wildfire Protection Plan such as roadside and ridgetop fuels reduction treatments. See Appendix E of the final EIS.
Fire and Fuels		
We had hoped to support a project that emphasized the establishment of shaded fuel breaks along strategic ridges and roads to allow for the return of fire, that maximized the use of prescribed fire, and that treated existing fiber plantations and those trees that have encroached on natural stands due to the impacts of fire exclusion on the landscape.	#4-4	The action alternatives that were analyzed in detail for the Jess project include ridgetop fuels treatments, underburning, and roadside fuels treatments. The Jess project has strategically located the fuels treatments based on fire history, fire modelling (flame lengths/ rates of spread), and professional experience. The entire project area has been analyzed for prescribed fire and this work is anticipated to take place periodically over the next decade as units are re-evaluated. Chapter 3 of the final EIS summarizes the effects to fire and fuels from the establishment of fuel breaks and prescribed fire as planned in the action alternatives (section

Comment	Letter Number	Response Type and Response
		3.2) Table A-1 and Table A-2 in Appendix A of the final EIS list units proposed for prescribed burning in alternatives 2 and 3 respectively.
Page 14 of the draft EIS indicates that the Forest Service is only proposing to implement 250 acres of prescribed fire treatments. Additional use of prescribed fire is a reasonable action alternative that would contribute to attainment of the project purpose and need.	#4-118	Prescribed fire treatments in the project area were strategically located with the intent of improving defensibility of the Jessups Gulch watershed from wildfire, and to slow and modify fire behavior and provide safe ingress and egress to the public and firefighters during a wildfire event. The 250 acre underburn that is proposed is an initial entry into the Jess project area. Harvest units with a follow up fuels treatment of hand-piling are also slated for underburning after the handpiles have been burned and the units have been re-evaluated for further hazardous fuels treatment. Table A-1 and Table A-2 in Appendix A of the final EIS list units proposed for prescribed burning in alternatives 2 and 3 respectively..
The Klamath National Forest has not considered the community wildfire protection plan, and instead proposed to log large-diameter, old fire-resilient trees in the project area, potentially increasing the risk of severe wildfire that could harm nearby communities.	#6-9	The Sawyers Bar Community Wildfire Protection Plan was used for analyzing the ingress/egress routes in relation to roadside fuels treatments and strategically located fuel breaks, complementing the CWPP's strategy in the event of a wildfire.
Large tree logging and aggressive canopy removal in native forests on north facing slopes are not collaborative restorative actions that will result in greater fire resiliency and community safety.	#6-15	The strategically placed fuel breaks and roadside treatments contribute to greater fire resiliency and community safety as described in the Fire and Fuels section of the final EIS (Chapter 3, section 3.2)
The draft EIS includes only very limited information regarding recent wildfire activity and firefighting efforts near the project area. The Whites Fire of 2014 is not discussed in the draft EIS, while the Salmon River Complex Fire of 2013 is discussed briefly. EPA understands that control of these bums had direct and indirect impacts upon the project area due to heavy use of forest roads for access to the fires, construction of fire breaks, burning of Northern spotted owl habitat near the project area, and introduction of increased sediment to streams and aquatic habitat. It is unclear how these prior recent impacts, and the resulting current conditions, might alter the anticipated environmental outcomes described in the draft EIS. The final EIS should discuss the recent wildfire history in the project vicinity, any change in conditions from those described in the draft EIS, and any updates to anticipated effects based on the current conditions.	#7-4 and #7-5	The introduction of Chapter 3 of the final EIS provides information on the effects of the Whites fire on the project that were unknown at the time of publication of the draft EIS. The Whites fire did not burn into the project area. It did, however, overlap with some of the resource defined analysis areas. There were contingency fire lines built in the project area. The affected environment for each resource area affected by the fire and fire-associated contingency lines has been modified in light of the potential change in conditions and each appropriate resource analysis is updated in the final EIS. The effects of the Salmon Complex did not occur in the project area but were included in some resource analysis areas and incorporated into the affected environment sections of these resource reports and summarized and referenced in chapter 3 of the final EIS.

Comment	Letter Number	Response Type and Response
While EPA supports the purpose of the proposed project, we have concerns regarding the characterization of the project area and possible project impacts in relation to recent wildfire activity near the project area.	# 7-2	See response to #7-4 and #7-5
It appears that the Forest Service is committed to ignoring the cumulative, synergist and related impacts of recent forest fires and fire suppression activities on the Jess project area. Our understanding is that at least 350 acres in the project area was burned by the 2014 wildfires. How did this impact wildlife habitat, fuel loading and forest resiliency? It is also our understanding that fire suppression activities, such as fireline construction, that involved significant impacts to soil resources and vegetative removal occurred in the Jess project area. Where did these activities occur? What was the impact on wildlife habitat, hydrology and soil resources?	# 4-35	See response to #7-4 and #7-5
Silviculture/Forest Health		
It appears that the purpose of this HFRA planning effort is primarily to produce commercial timber products.	#4-8	The purpose and need for the Jess project as stated in Section 1.4 of the final EIS is to: 1) Improve defensibility against wildfire to the municipal watershed and nearby communities; 2) Improve compositional, structural, and functional attributes of biologically diverse forest ecosystems by restoring ecological processes that build resiliency to high-intensity wildfire and insect and disease infestation; and 3) Provide a broad range of ecosystem services including wood products, rural economic health, biodiversity and beneficial uses of water.
The Forest Service has selectively identified portions of the Sawyer's Bar Wildfire Community Protection Plan that support its volume-driven logging agenda while ignoring the portions of the WCPP that recommend increased canopy retention, retention of large trees and fuels treatments along the Sawyer's Bar Road from the Forest boundary to Sawyer's Bar.	#4-10	Alternative A was developed to respond to the scoping comment related to extending fuels treatments along the Sawyers Bar road outside the project boundary. Alternatives B and C were developed in response to issues related to retention of canopies and large trees that were raised during scoping. Reasons for not studying these alternatives in detail are provided in section 2.3 of the final EIS. Appendix E of the final EIS also discusses the development of these alternatives and why they did not meet the purpose and need of the project.
HFRA requires that the Forest Service "shall consider recommendation under subsection	#4-11	The Jess project has considered and incorporated multiple recommendations from the Sawyers Bar Community Wildfire Protection Plan as described in Section 1.3 of the final EIS, including fuels

Comment	Letter Number	Response Type and Response
That are made by at-risk communities that have developed community wildfire protection plans." 16 USC §6513(b). Here the agency's consideration of the Sawyer's Bar WCPP has been arbitrary and capricious. The draft EIS (pages 46 and 88) references the WCPP selectively to support conclusions and preferences of the Forest Service while rejecting those portions of the WCPP that call for large tree retention, canopy retention and treatment along the entire Sawyer's Bar Road to enhance community safety. HFRA collaboration and the required consideration of Community Wildfire Project Plans were not designed to simply bolster Forest Service logging proposals; rather, they were intended to establish a basis for substantive and meaningful community input into project layout and design.		treatments along emergency access roads, ridgetop treatments to act as shaded fuel breaks for wildfire defense, and silvicultural prescriptions to maintain defensibility against wildfire within the municipal watershed.
Page 4 of the draft EIS indicates that the "desired condition" for the project area would result in stands "just below the ridge will have a mix of large diameter Douglas-fir, ponderosa pines and rust resistant sugar pines [while] [s]tands on the middle third of the slope will be trending toward having multi-layered canopies and old-growth characteristics." Unfortunately, the silvicultural prescriptions for the project call for removing, rather than retaining, large trees, multi layered canopies and old-growth characteristics. Hence the proposed action will not contribute to attainment of the "desired condition" identified by the Forest Service.	#4-13	Appendix B in the Silviculture Report provides a detailed description of how stands will be marked to achieve the desired condition. Some examples include unit 138, where the prescription states "in general, leave all PILA [sugar pine], PSME [Douglas-fir] and CADE [incense cedar] with good crowns or greater than 24" [inches] dbh [diameter at breast height] that have crowns with less than a 3 BVR [broom volume ratio] dwarf mistletoe infestation" (page 43). Appendix B of the Silviculture Report provides further examples of retaining large diameter trees to achieve multi-layered canopies with clumps and openings and to achieve stands with diversity and resilience. Vegetation modeling also indicates that the resulting stands will have reduced prevalence of mistletoe and larger mean diameters which indicate a probably trajectory for stands to achieve old-growth characteristics (Silviculture Report).
Yet the Forest Service intends to remove exactly these structural elements where they currently exist. Page 33 of the draft EIS indicates that the agency hopes to log 6 trees per acre that are greater than 26" inches DBH. Page 41 of the draft EIS indicates that this logging will occur in stands in which the quadradic mean diameter of trees located in these units is 11.7" inches. In other words, the Forest Service intends to remove the largest overstory trees from stands which are largely defined by smaller diameter trees. Page 45 of the draft EIS acknowledges that the Forest Service intends to remove 1/3rd of the trees greater than 26" inches that exist in proposed logging units.	#4-15	See response to #4-13 regarding detailed silvicultural prescriptions. The final EIS also indicates that following treatments, quadratic mean diameters will increase by 10% over the baseline condition. An increase in quadratic mean diameters indicates that small diameter material was reduced within the stand, thereby increasing the diameters of trees in the residual stand. The final EIS discloses the direct and indirect effects of no treatment in Section 3.1.4 and states "Habitat conditions would remain as described in the existing condition with a trend toward less healthy stand conditions through 2042 (see Vegetation section of this chapter). Overall, effects to wildlife and wildlife habitats of [alternative 1] no action will result in reduced availability and distribution of stands that could develop into suitable habitat for late successional habitat related species (northern spotted owl and all Survey and Manage species). There will be reduced

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This targeting of large diameter trees is occurring in a landscape in which such trees are in severe deficit. Page 15 of the draft EIS acknowledges the extensive impacts of prior large tree removal on the seral and species composition of proposed logging units. Page 51 of the draft EIS indicates that there is currently twice as much early seral forest habitat in the planning area than older forests. Yet the agency is proposing to downgrade 254 acres of existing NSO foraging habitat and remove 281 acres of such habitat. This will exacerbate the existing trend of abnormally high levels of early seral habitat and deficit levels of older forests and larger trees and directly inhibit project objectives regarding forest resiliency and ecosystem services.		availability and development of hardwood-related wildlife habitat in the understory as hardwoods are outcompeted by the continuing encroaching conifers." The direct and indirect effects of action alternatives are further discussed in section 3.1.4 regarding effects to habitat.
The agency's analysis of the proposed large tree removal is consistently biased, arbitrary and capricious. The contention on page 101-102 of the draft EIS that removing 1/3rd of the existing large diameter trees (in a planning area in which such tress are in severe deficit) will "increase opportunities to observe larger trees" is incorrect. While page 165 of the draft EIS acknowledges the "benefits of larger trees" for maintaining water quality, the ACS analysis on that page does not acknowledge or analyze the impacts of the proposed significant large tree removal across the project area. Table 10 on page 45 of the draft EIS indicates that the number of TPA greater than 26 inches present 30 years after project implementation would be 17.9 under the no action alternative, 11.9 under the proposed action and 15.8 if Alternative 3 were implemented. In other words there will clearly be more large trees on the landscape if the Forest Service avoids logging the existing large trees. Yet the ACS analysis contained on page 169 concludes that implementation of Alternative 3 would result in fewer large trees than implementation of Alternative 2. This analysis is incorrect, arbitrary and capricious. Similarly, the contention non page 164 that logging large diameter trees via Alternative 2 will "maintain special and temporal connectivity" by "encouraging large tee development is directly undermined by the findings illustrated on Table 10 that project implementation will reduce, rather than increase, the number of large trees in both the short and long term.	#4-16	The final EIS, regarding commercial and non-commercial treatments, states that "These treatments will create long-term positive effects where forest visitors can look into more open stands, observe larger trees (where present after treatments reduce insect and disease-related tree mortality), and see greater species diversity and spatial variety." Silvicultural prescriptions for treatments within riparian reserves state "Within the outer 70 feet of riparian reserves, to meet ACS [aquatic conservation strategy] objectives of enhancing large tree component, retain existing large diameter trees and this from below to reduce stand density." This management practice has been shown to result in diameter growth in residual stands following reduction in competition.

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The Northwest Forest Plan requires the Forest Service is establish that commercial logging is "needed" in order to attain the objectives of the Aquatic Conservation Strategy (ACS) prior to authorizing such logging. Here the agency has not pointed to one ACS objective that cannot be met by simply allowing riparian stands to mature without the negative impacts associated with logging and yarding in this land use allocation.	#4-17	Appendix F in the final EIS describes how the project is consistent with the Aquatic Conservation Strategy (ACS) including its objectives. The first objective states: *Maintain and restore the distribution, diversity, and complexity of watershed and landscape-scale features to ensure protection of the aquatic systems to which species, populations and communities are uniquely adapted.* The treatments will move the vegetative community in treated areas closer to that which occurred historically with greater structural diversity, less homogeneous species composition, and large trees. Aquatic systems integrity will be improved by reducing road densities and reducing hydrologic connectivity. Other specifics on how the project is consistent with the ACS and its objectives are provided in Appendix F. The ACS analysis (final EIS appendix F) demonstrates that there is a benefit to commercial harvest in the outer 70 feet of the riparian reserves. Alternative 2 will result in a 7.2% increase in the average diameter of trees in the riparian reserves over alternative 3. Under alternative 3, the mistletoe infection rates will be about 661% higher than for alternative 2; commercial harvesting in riparian reserves will lead to larger trees and less mistletoe in the riparian reserves. These differences are due to the removal of commercial thinning in the outer portion of the riparian reserves in alternative 3.
Please note that WA-9 at page 22 of the draft EIS indicates that the agency intends to allow skid trails across intermittent streams. Not only is this practice not needed to attain ACS objectives, it will in fact directly inhibit attainment of aquatic management objectives.	#4-18	Project design feature WA-10 (final EIS Table 2-1) is in place to mitigate impacts following any skid trail use that involves an intermittent stream crossing in order to be consistent with the ACS.
WA-13 on page 22 of the draft EIS states that the Forest Service plans on conducting ground-based endlining of logs out of the equipment exclusion zone associated with designated Riparian Reserves. Again, this practice inhibits, rather than contributes to, attainment of ACS objectives. BMP 1.17 found on page 148 of the draft EIS anticipates "gouging" of soils (and channelization of water) from this yarding practice in Riparian Reserves.	#4-19	Best Management Practices (BMPs) were developed to comply with Section 208 of the Clean Water Act and have been certified by the State Water Quality Resources Control Board and approved by the Environmental Protection Agency (EPA) as the most effective way of protecting water quality from impacts stemming from non-point sources of pollution. These practices have been applied to forest activities and have been found to be effective in protecting water quality within the Forest. Specifically, effective application of the Region 5 USFS BMPs has been found to maintain water quality that is in conformance with the Water Quality Objectives in the Basin Plan prepared by the North Coast Region Water Quality Control Board (Water Board) (http://www.waterboards.ca.gov/northcoast/water_issues/programs/basin_plan/) as noted in Appendix D of the final EIS. Region 5 Forest Service

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		BMPs have been monitored and modified since their original implementation in 1979 to make them more effective. Numerous on-site evaluations by the Water Board have found the practices to be effective in maintaining water quality and protecting beneficial uses. BMP1.17 (Erosion Control) relates to preventative measures to minimize or eliminated negative effects. In relation to the Jess project, the project-specific design feature for this BMP (identified in the final EIS as Watershed-13) states: "Where ground-based yarding/endlining is used to retrieve logs from riparian reserve equipment exclusion zones, and if gouging occurs that creates a trough for overland flow to enter the channel, waterbars will be installed or slash applied to the area." This project design features supplements other project design features to minimize or eliminate negative effects to riparian reserves such as those that require placement of cable corridors to minimize disturbance to inner gorges (Watershed-2) and require one end suspension for skyline yarding, preferably full suspension over stream channels (Watershed-16). Information on consistency with the ACS is provided in Appendix F of the final EIS.
WA-16 on page 23 of the draft EIS indicates that the agency intends to conduct skyline yarding over and through stream channels and will not necessarily require even one end log suspension. This activity will inhibit, rather than achieve, ACS objectives.	#4-20	The project design feature (Watershed-16) in Table 2-1 in section 2.2.4 of the final EIS states: "All skyline yarding stands will use one end suspension. Full suspension over stream channels is desired where possible." This project design feature applies to all commercial skyline harvest units. Information on consistency with the ACS is provided in Appendix F of the final EIS.
In order to better portray environmental baseline conditions and to understand the likely effects of thinning proposals, the USFS and BLM should develop stand data separately for riparian and upland forests. NMFS 2010, 10.	#4-29	Stand data was collected to capture the variability of stand conditions within the project area. Conditions within the outer 70 feet of the riparian reserves where treatments are proposed are very similar to the conditions of the adjacent stands where plot data was collected. For the purpose of the Jess project, the data was suitable for analysis in a single database.
Lastly, please note that as reflected by public comment 3-1 referenced on page 182 of the draft EIS the timber industry trade group AFRC indicates that "all the proposed commercial units are in the Matrix land use allocation." We would like to join AFRC in their contention that commercial treatments be limited to the Matrix land use allocation.	#4-30	All the proposed commercial units are within the following management areas: Partial Retention Visual Quality Objective (MA-15), General Forest (MA-17), and Riparian Reserve (MA-10). All except for riparian reserves are identified as "matrix" lands on the Forest Plan Land Allocations map. The reasons for proposing commercial treatments in the outer 70 feet of riparian reserves are presented in section 2.2.2 and in Appendix F of the final EIS.

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As stated in the "logging large trees" section of these comments, the repeated contention contained in agency's ACS Analysis at Appendix F that the project will result in more large trees over time is in error. As documented on page 33, 41, and 45 of the draft EIS the project actually targets up to 1/3rd of the existing large trees for removal such that fewer large trees will remain in both the short and long term. See draft EIS Table 10. Hence the conclusions of the ACS analysis are in error.	#4-34	In regards to the suggested error in Appendix F, Appendix F states "riparian reserves will benefit from the improved stand health due to the treatments that decrease mistletoe infection, reduce tree mortality, and encourage the growth of more large trees per acres." The modelling statistics do show a reduced number of trees per acre larger than 26 inches dbh for the action alternatives; however; these numbers that were generated for the tables are not specific to the prescriptions designed for the riparian reserves (60 acres of riparian reserve are proposed for commercial thinning and 120 acres for roadside fuels reduction treatment). Commercial thinning in the outer 70 feet of riparian reserves will consist of a thin from below to reduce stand densities and stand competition to facilitate diameter growth in the residual stand while maintaining the largest diameter trees (Silviculture Report, Appendix B). Fuels reduction activities will focus on thinning trees less than 10" diameter at breast height final EIS Section 1.5 along roadsides, thereby providing more growing space for larger residual trees.
The Jess draft EIS largely ignores the essential role that mistletoe serves in promoting late-successional forest character and wildlife habitat. Our organizations have submitted peer-reviewed literature to the agency that establishes the ecosystem services provided by mistletoe and that calls into question the efficacy of logging the remaining older trees in the landscape to facilitate mistletoe removal.	#4-68	Mistletoes present in the project area are primarily dwarf mistletoes in the genus *Arceuthobium* (Viscaceae); a small infestation of "true" mistletoe, *Phorandendron* (Viscaceae) (found in incense-cedar) is also present. Literature provided with this comment discusses both *Arceuthobium* (Viscaceae) and *Amyema* (Laranthaceae) species. Although both are considered keystone species (Watson 2012;Shaw et al. 2004), there are a number of differences that influence the management proposed in this project. The effects of *Arceuthobium* on their hosts are dramatic and deleterious whereas *Amyema* (Laranthaceae) rarely has any negative effects on host growth form or survival (Shaw et al. 2004). Mathiasen (personal communication 2005) indicated that there is much more mistletoe present on the landscape now than endemic levels. These two factors have influenced the decision to reduce dwarf mistletoe in selected stands that have high levels of infestation in order to promote the growth and vigor of uninfected species both in the overstory and secondary canopy levels. Dwarf mistletoes are native plants that play an important role in the ecology of forest ecosystems and complete removal from forest ecosystems could have a disproportional impact on forest ecology (Shaw et al. 2004). The mistletoes (Viscaceae) within the project area will continue to have a presence and positive effect on vertebrate diversity. Silvicultural prescriptions were written to reduce but not eliminate the elevated levels of infestation while restoring species diversity and promoting fire resilience within stands.

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The draft EIS states: The project area has epidemic levels of mistletoe infection which especially impacts Douglas fir ad white fir and pose a significant threat to ecosystem function. Lindenmayer et al. (2012) was used to support a project specific comment and was provided to the Forest for review. The paper focuses on the loss of large trees throughout the world and their ecological importance. The Jess project is retaining large trees when it does not limit the accomplishment of other objectives of the project, specifically the reduction of disease infection rates. There is no consensus as to the definition of a large tree for the Jess project. During the June 27, 2013 meeting there was a suggestion that some of the collaborators considered a tree larger than 20" dbh a large tree. Trees larger than 20" dbh are marked for commercial harvest when they are diseased (mistletoe, blister rust) and there is risk of understory infection, they are dying quickly (heavy blister rust infection, rotten boles), or, sometimes a healthy tree will be taken if they are near a preferred species in order to reduce competition.	#4-69	One of the objectives of the project is to restore stands to a fire resilient condition. As the "Global Decline in Large Old Trees" article provided states, "maintenance of appropriate population age structures can help to ensure the perpetual supply of large old trees. This requires policies and management practices that intentionally grow such trees and reduce their mortality rates" (Lindenmayer et al, 2012). The purpose and need for the project is identified in Section 1.4 of the final EIS.
draft EIS 195. Logging disease units and targeting mistletoe and late-successional character is neither biologically sound, nor is it an effective strategy to combat any perceived mistletoe problems with forest stands. How did the USFS determine that the project area has epidemic levels of mistletoe, and poses a significant threat to ecosystem function? What literature does the USFS rely upon to support such a contention that mistletoe poses a significant threat to ecosystem function? This contention is unsupported by well-documented scientific literature. NEPA requires consideration of the best available science, which the USFS has not done. Mistletoe is in fact is an important indicator of a properly functioning ecosystem. "To take the required 'hard look' at a proposed project's effects, an agency may not rely on incorrect assumptions or data in an EIS. 40 C.F.R § 1500.1(b) ("Accurate scientific analysis, expert agency comments, and public scrutiny are essential to implementing NEPA."). Native Ecosystems Council v. U.S. Forest Service, 418 F.3d 953, 964 (9th Cir. 2005).	#4-70	The Forest asked the Northern California Shared Service Area Plant Pathologist to evaluate the conditions in the Jess project area. The following paragraph is from his report after several field visits to the area. "The Douglas-fir and white fir in these Units are under added stress due to the impacts of the widespread and severe levels of their respective dwarf mistletoes, which is causing mortality in all sizes of these trees. While dwarf mistletoe is a natural component of many forest stands, and provides important nesting habitat for a wide variety of bird species (including the northern spotted owl), this level of the pathogen, which has been able to increase due to the effects of many years of fire suppression, is not. In addition, dwarf mistletoe seed is continually raining down onto the understory, perpetuating and accentuating the problem. Also, fire risk is high due to the mortality and brooms, creating fuels in all levels of the Units. Continued mortality may be expected in the most highly infected Douglas-fir. Mallams (2007) evaluated a series of permanent monitoring plots that were set up to monitor spread and impact of Douglas-fir dwarf mistletoe in similar mixed conifer stands in southwest Oregon and found that 45% of class 6 DMR/BVR-rated DF died in the 10-year monitoring period, and 11% of class 5 DF died. In addition to the direct effects of drought and dwarf mistletoe, the enhanced fuel levels could lead to the

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		loss of the area by wildfire. This situation is not sustainable. Without active management, the Units will not be able to maintain old growth characteristics or wildlife habitat (including nesting habitat in the brooms of Douglas-fir), while the continued infection of younger understory Douglas-fir will limit the ability for them to grow into large old trees that will survive for many decades, (USDA Forest Service 2013a)."
One of the purposes of this project is the perceived need to treat a mistletoe problem, "[s]ilvicultural prescriptions were written to reduce the elevated levels of infestation while restoring species diversity and promoting fire resilience within stands." draft EIS 194. In actuality, mistletoe does not inhibit forest health, even at "epidemic levels" as the USFS describes. Mistletoe does reduce the growth rate of the host trees, but that is only a forest health problem if one believes that fiber production is the only measure of forest health. Mistletoe creates complex habitat structures such as brooms and snags and is a natural and vital part of the ecosystem. Indeed, mistletoe decadence is a key component of late-successional forest character. Please do not target the boles of large diameter trees affected with mistletoe for removal. We urge the USFS to manage for a complex forest and a wide range of forest values. Science tells us that mistletoe is a persistent part of infected stands and very difficult to eliminate and control.	#4-74	See response to #4-68 and 4-70
Ironically, logging practices often contribute to the spread of dwarf mistletoe. When soils are disturbed and ground cover is removed during logging operations, stand densities increase because pine seedlings readily germinate and grow on bare mineral soil. Such disturbances are particularly prevalent when heavy machinery is used to remove trees. Logging may increase mistletoe in the remnant stand, rather than decrease it. Many mistletoe seeds that infect host trees do not readily produce aerial shoots; these are known as "latent infections" (Knutson and Tinnin 1980). After thinning, 90 percent of all latent infections will appear within five years (Shea 1964). To suppress mistletoe, further logging would likely be necessary after this entry, which is a foreseeable cumulative impact that was not disclosed in the NEPA analysis. Mistletoe seed production will increase after the proposed entry with improved nutrition of the infected leave trees that do not now display symptoms of infection. More open stands will promote regeneration, and the new trees can become infected by the	#4-75	The restoration prescriptions incorporate the recommended management activities as described for favoring trees which include removing overstory from dense understory and thinning the understory, maintaining mixed-species stands, favoring tree species that are immune to the species-specific mistletoes, and favoring trees without infections in the upper half of the crown (Knutson and Tinnin 1980). Wider spacing than the optimal dwarf-mistletoe spreading distance of 12-feet is also proposed. Because the complexity of managing dwarf mistletoe is widely recognized, prescriptions were carefully developed according to scientific research recommendations. Modeling outputs support the prescription objectives to reduce mistletoe (Section 3.1 of the final EIS).

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mistletoe seeds dropped from infected leave trees. Moreover, increased mortality can occur in the remaining overstory trees; some heavily infected trees are not able to adjust to release from competition (Knutson and Tinnin 1980).		
We Request the Agency Please Read And Respond To The Following Mistletoe Science: Conklin, David A., Dwarf Mistletoe Management and Forest Health in the Southwest USDA Forest Service, Southwest Region. http://www.forestpests.org/diseases/pdfs/dwarfmistletoe.pdf Pennings, Steven C., and Ragan M. Callaway. 2002. Parasitic plants: parallels and contrasts with herbivores. Oecologia. http://biology.umt.edu/Callaway/Lab/Full/text/papers/and/abstracts/oecologia2002/paras itic/plants.htm Geils, Brian W.; Cibrián Tovar, Jose; Moody, Benjamin, tech. coords. 2002. Mistletoes of North American Conifers. Gen. Tech. Rep. RMRSˆGTRˆ98. Ogden, UT: U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station. 123 p. http://extension.usu.edu/forestry/Reading/Assets/PDFDocs/RMRS_GTR_098.pdf Bennetts, Robert E., Gary C. White, Frank G. Hawksworth, and Scott E. Severs. 1996. Dwarf Mistletoes: Biology, Pathology, and Systematics The Influence of Dwarf Mistletoe on Bird Communities in Colorado Ponderosa Pine Forests. Agriculture Handbook 709. USDA Forest Service, Washington, DC. Mar 1996. Maloney, P.E.; Rizzo, D.M. 2002. Dwarf mistletoe-host interactions in mixed-conifer forest in the Sierra Nevada. Phytopathology. 92(6):597-602. Hawksworth, F. G. 1985. Insect-Dwarf Mistletoe Associations. P. 49-50, In, Proceedings Of The 36th Annual Western Forest Insect Work Conference, Boulder, Colorado. March 4-7, 1985. Northern Forestry Centre, Canadian For. Service, Edmonton, 54p	#4-76	See responses to comments #4-77 through #4-109; responses to this literature are incorporated into these responses.
Forest insects and pathogens are increasingly being recognized as important agents in shaping the structure and composition of forests. Mistletoes affect the forest canopy, landscape pattern, and tree species mix.	#4-78	The Forest agrees with this statement. The desired condition of the project includes endemic levels of insects and pathogens including dwarf mistletoe as described in Section 1.2 of the final EIS.

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These plants are integral part of forested ecosystems, and have existed as part of the coniferous forests of North America since the Miocene.	# 4-79	Chapter 2, Table 1-2 of the final EIS illustrates that the mistletoe infection rate is at epidemic levels. The Forest Plan calls for vegetation practices to avoid conditions that promote the introduction and spread of disease, increased risk of insect attack, or promote unacceptable fire risk (page 4-51 Standard and Guideline 21-58). It also provides direction to the decision maker, during vegetative manipulation projects, to consider the removal of overstory trees that have been infected by dwarf mistletoe (page 4-51, Standard and Guideline 21-63). One of the goals of the Jess project is to put the dwarf mistletoe infection rate on a trajectory toward an endemic rate.
Land use activities (grazing, logging, and fire suppression) have encouraged the spread of dwarf mistletoes. Many of the silvicultural challenges created by these parasites are exacerbated by ecologically insensitive land management policies such as fire suppression, livestock grazing, and inappropriate silvicultural techniques.	# 4-82	A description of the actions that have contributed to the epidemic dwarf mistletoe infection rate is provided in Section 3.1.3 of the final EIS. Components of past management activities may have contributed to the elevated rate of infection. The Jess project is designed to reduce the presence of dwarf mistletoe in the forest and set the area on a trajectory toward a more endemic rate (Section 3.1 of the final EIS).
In general, dwarf mistletoe only becomes a problem when land managers attempt to create highly productive forests or tree farms to grow timber far in excess of historical production rates.	# 4-83	See response to # 4-82
Probably the most significant forest health problem in the Northwest is that there are too many fiber plantations, primarily small and medium-sized trees, over vast areas. Thus, efforts to improve forest conditions should focus on areas that can benefit the most from thinning.	# 4-84	The purpose of the Jess project is to (1) improve defensibility against wildfire to the municipal watershed and nearby communities; (2) improve compositional, structural, and functional attributes of biologically diverse forest ecosystems by restoring ecological processes that build resiliency to high-intensity wildfire and insect and disease infestation; and (3) provide a broad range of ecosystem services including wood products, rural economic health, biodiversity and beneficial uses of water. The alternatives proposed for the Jess project that are considered in detail are designed to meet these purposes.
The damaging effects of mistletoe can best be minimized, and their ecological benefits maximized, by recreating forest stands with age, size and density distributions similar to the original, presettlement forests.	#4-85	The desired condition to meet the purpose and need of the Jess project is summarized in section 1.3 of the final EIS. Silvicultural treatments described in section 2.2 of the final EIS considered historic conditions in conjunction with past management actions, current environmental conditions and the possibility of future conditions that involve climate change and wildland fire suppression activities.

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There is an urgent need for the USFS to reevaluate its current strategy for managing dwarf mistletoe, and to adopt an integrated ecosystem perspective that manages for forest ecosystem integrity, rather than waging a war against dwarf mistletoe.	# 4-86	Knutson and Tinnin's research (1980, page 9) describes latent infections as undeveloped sites that do not readily produce aerial shoots. The cause of latent infections is unknown although it has been shown that the more open the stand is, the less likely it is that latent infections will appear. The restoration prescriptions incorporate the recommended management activities as described for favoring trees which include removing overstory from dense understory and thinning the understory, maintaining mixed-species stands, favoring tree species that are immune to the species-specific mistletoes, and favoring trees without infection in the upper half of the crown (Knutson and Tinnin 1980). Wider spacing than the optimal dwarf mistletoe spreading distance of 12 feet is also proposed. Because the complexity of managing dwarf mistletoe is widely recognized, prescriptions were carefully developed according to scientific research recommendations. Modeling outputs support the prescription objectives to reduce mistletoe (Section 3.1 of the final EIS).
An integrated management strategy that restores some of the fundamental components and processes that historically existed in these systems would largely eliminate the mistletoe problem. All components need to be incorporated into an overall management plan for any one of them to work correctly. Such an integrated strategy would include the following fundamental components: 1. No cutting of large diameter trees and snags. 2. Thin understory trees to create stand structure and densities that approximate pre-settlement conditions. 3. Reestablish regular ground fires in order to minimize seedling survival and to prevent the accumulation of fuel. 4. Reduce livestock densities to a level that will allow a relatively continuous ground cover of herbs and grasses to develop where light, soil and moisture conditions would normally support such vegetation. Once forests are thinned and opened up, they will simply return to their pre- thinning densities if livestock remain to prevent the reestablishment of ground cover.	# 4-87	Alternative C of the Alternatives Considered but Eliminated from Detailed Study incorporated most of these components (section 2.3 of the final EIS) except the removal of livestock densities. The range management unit (RMU) that overlaps with the project area is not currently permitted so there is no livestock grazing in the project area.
In none of the aggressively treated research plots was dwarf mistletoe eliminated. After treatments had reduced the parasite to undetectable levels, populations inevitably began to rise in these experimental areas.	#4-88	Silvicultural prescriptions were written to reduce elevated levels of infestation, not to eliminate draw mistletoe. Modelled results of the effects of treatments over a 30-year period show a reduction in mistletoe infections using the unit specific guidelines. See response to #4-74
When stands are opened up by selective harvest or thinning, dwarf mistletoes are stimulated. Latent infections are more apt to develop shoots; existing shoots grow more rapidly and produce	#4-89	See response to #4-86

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more seed. This is probably a result of both improved tree vigor, which provides more water and nutrients to the parasite, and increased light. Unlike many forest insects and pathogens that are often associated with weak or slow-growing trees, dwarf mistletoes actually do better on vigorous trees.		
Dwarf mistletoes are well-adapted for survival and are remarkably persistent. They infect all ages and sizes of trees; moreover, a very significant proportion of infected trees have no visible shoots. Although these parasites spread slowly, trees grow slowly. Dwarf mistletoe populations can double several times the length of a rotation.	#4-90	See response to #4-68 and 4-70. Alternatives B, C and D, alternatives considered but eliminated from detailed study, all include components to leave large trees regardless of mistletoe infestation; section 2.3 of the final EIS describes how these alternatives would not meet the purpose and need of the project.
Dwarf mistletoes tend to do better on vigorous trees. Since a primary goal of silviculture is to promote vigorous trees, it can indirectly promote the parasite.	#4-91	See response to #4-75
Because of the typical patchy, concentrated distribution of the parasite, the removal of all visibly infected trees usually results in stands having understocked areas that contain mostly small trees. Except in very lightly infected stands, this type of treatment can greatly alter stand structure and have significant visual impact. Moreover, even when attempts are made to remove all infected trees, considerable infection remains in most treated areas, due to latent infection. Follow-up treatments (before the next scheduled entry) are often difficult to justify economically, except in very young stands. While cutting all visibly infected trees can provide better disease control than a less vigorous approach, the practice can fall short when other factors, especially aesthetic and ecological ones, are considered.	#4-92	Presuming the parasite of discussion is dwarf mistletoe, this comment is outside the scope of the project. Distribution of dwarf mistletoe within the project area is not typical or concentrated. Epidemic levels of mistletoe (USDA Forest Service 2013a; Mathiason, personal communication 2005) are present throughout the project area and are proposed to be treated using recommended management strategies as described by scientific literature. See response to #4-91.
The most vigorous dominant and codominant trees should be retained. Selection of “leave trees” should be based on overall tree qualities rather than just mistletoe. A lightly infected dominant or codominant tree is usually a better choice for retention than an intermediate or suppressed tree without visible infection.	#4-93	Silvicultural prescriptions are site specific and include guidelines with specific levels of mistletoe infection to address when marking trees for retention or removal as summarized in section 2.2 of the final EIS; Appendix B of the Silviculture Report provides details regarding the standards used to determine trees to retain or remove.
Entering a stand to remove only the more heavily infected trees is usually not an effective way to manage dwarf mistletoe or to improve forest conditions. In most cases, stand infection levels would rebound to even higher levels before the next entry and become progressively more severe over time. Infection should	#4-94	See response to #4-93

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generally be reduced as much as possible without sacrificing the best trees in the stand.		
Group selection has also been perceived and used recently as a tool for treating dwarf mistletoe. However, its efficacy for control of mistletoe is largely untested, and opinions and perspectives vary.	#4-95	Most historical dwarf mistletoe control has involved removing infected trees from stands, modifying stand structure to minimize spread, and managing other tree species which are not susceptible to damage. In many cases such treatments have been quite effective (Schmitt 1997). Group selection in conjunction with species preference, stand spacing, and removal of the most infected overstory are activities that favor trees, and are deleterious to dwarf mistletoe (Knutson and Tinnin 1980).
The creation of small openings can be very favorable to dwarf mistletoes over the long run, leading to heavy losses. In many cases, the regeneration that develops within the openings will be exposed to infected trees on the edges, and, in some cases, from infected trees within the openings. The parasites can penetrate small (1- to 4-acre) openings relatively quickly.	#4-96	See Response to #4-95
Underburning may well be a good ecological approach for managing dwarf mistletoes on many ponderosa pine and mixed conifer sites. Often a combination of mechanical thinning and burning can be used to reduce infection levels and improve overall stand conditions. Fire can be used to help maintain infection at or below a desired level, perhaps allowing longer intervals between mechanical treatments. Significant amounts of crown scorch are probably needed to provide a controlling effect.	#4-97	Research has shown that prescribed burning can control mistletoe by eliminating infected residual trees in logged-over areas and by destroying stands that are so heavily infested that the site is unproductive (Alexander and Hawksworth 1975). Effective mistletoe control requires optimum fire prescription for the stands in question. Little research is available for western forests with regard to this type of management. Stocking control and removal of the most severely infected trees has been shown to reduce damage in several coniferous species which is consistent with the sanitizing effects of historical low and moderate-intensity fires (Hessburg et al. 1994). The prescription for underburning within the Jess project is intended to keep mortality below 10% and less than 5% canopy loss, the fire behavior needed to reduce current infection levels exceeds acceptable mortality post-harvest (Section 2.2 final EIS).
Prescribed fire will be more effective in reducing infection levels when crews can “shape the fire (increase intensity) within infected areas. Fires covering relatively small areas (certainly no more than a few hundred acres at a time) should provide better results than larger fires, since crews generally have more control over coverage and intensity. 24. Mistletoe presence, incidence, and severity may not be good indicators themselves of wildlife habitat value. Wildlife species are probably responding in a complex way to special features such as	#4-98	See response to #4-97

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brooms and snags, to vertical crown structure, to canopy gap pattern and other factors affected by mistletoes.		
Mistletoes are also valuable as mistletoes themselves and as members of a biotic community. 26. Mistletoes possess aesthetic, scientific, and intrinsic values.	# 4-99	See response to # 4-79
Forests are not only managed for the resources they produce but also to sustain and protect forest health and ecosystem values. Dwarf mistletoes are important disturbance agents with distinct ecological functions. They contribute to natural diversity structurally and biologically.	# 4-100	See response to # 4-79
An important consideration in the design of a silvicultural entry is whether dwarf mistletoe treatment is necessary. In many cases the presence of dwarf mistletoe poses no threat to stand objectives.	# 4-101	See response to # 4-79
Because the spread and intensification of dwarf mistletoe in uneven-aged, multistory strands can be quite rapid, management of these stands is a serious challenge.	# 4-102	See response to # 4-86
Larger trees often tolerate more dwarf mistletoe infection without deleterious effects.	# 4-103	Section 3.1.4 of the final EIS discloses the effects to mistletoe on large trees as well as the effects of leaving large trees infected with mistletoe in the forest stands. It states “Removal of severely mistletoe-infected trees in the overstory will reduce the spread of infection to uninfected trees. Removal of trees from these stands also results in a 30% reduction in future dead vegetation.”
One of the major challenges for management of infested uneven-aged stands is the dispersal of dwarf mistletoe seed from infected overstory trees to the understory. Although the predominant opinion has been that dwarf mistletoe intensifies rapidly after a partial cutting or disturbance such as windthrow.	#4-104	See Response to #4-95
In view of the uncertainties and potential adverse effects from selection and partial cutting in infected stands, use of the appropriate criteria for selecting and retaining trees is especially important.	#4-105	See Response to #4-95

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From certain perspectives and in some situations, dwarf mistletoe infestations have beneficial impacts for associated species and communities. In old-growth forests, dwarf mistletoes may exert a different set of effects on infected trees and display different dynamics. Special management strategies and silvicultural treatments for infested stands are required where the objectives are to maintain and enhance wildlife habitat, old-growth character, and other ecosystem values.	#4-107 and #4-108	Silvicultural prescriptions have been reviewed by an interdisciplinary team and the effects of the proposed project analyzed for multiple resources (in Chapter 3 of the final EIS and relevant resource reports). The project is consistent with all applicable law, regulation, policy, and direction (Chapter 3 of the final EIS, section 3.1.4).
Please note that page 6 of the draft EIS indicates that the Forest Service intends to create 1 – 2.5 acre clearcuts in the proposed logging units. The location, number and impacts of such logging is not disclosed or analyzed by the agency.	#4-115	The final EIS states that some small openings will be increased to resemble more historic gap sizes of one to 2.5 acres. Silvicultural prescriptions, identified by unit number, describe which units and under what conditions these gaps will occur (summarized in Appendix A of the final EIS and provided in more detail in the Silviculture resource report).
Page 7 of the draft EIS indicates that the Forest Service may construct up to 30 new log landings. The location and site-specific impacts of this action are not disclosed or analyzed by the agency.	#4-116	The final EIS discusses the analysis of these landings in Section 2.2.2 under connected actions: “There will be approximately one landing for each commercial harvest unit that will be about one acre in size.” Impacts are disclosed as applicable in chapter 3 of the final EIS. Project design features minimize negative impacts of landings (section 2.2.4 of the final EIS, especially Watershed-14 and Watershed-15).
Page 15 of the draft EIS acknowledges that "[p]artial harvesting of large diameter trees dates back to the 1960s; this harvest created openings within many of the stands." Hence the agency's contention that additional large tree logging and additional openings are needed to meet the project purpose and need is in error.	# 4-117	See response to # 4-86
Page 51 of the draft EIS indicates that there are currently twice as many acres in the planning area in early seral condition than there are “older forests.” Page 54 of the draft EIS indicates that the proposed logging will exacerbate this trend by downgrading or removing an additional 535 acres of forests currently service as NSO foraging habitat which will move the project area further away from its historic range of variability and diminish its ability to provide ecosystem services.	#4-120	See response to #4-15
"Large Tree Removal Is Not Restoration HFRA clearly states large trees are to be retained, not logged. Agencies are to develop and carry out projects that ""focus[]	#6-6	The Jess project is authorized under the Healthy Forests Restoration Act (HFRA) section 102(a)(4) Threats to Ecosystem Components or Forest and Rangeland Resources. This section of HFRA is exempt from the old-

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largely on small diameter trees, thinning, strategic fuel breaks, and prescribed fire to modify fire behavior, as measured by the projected reduction of uncharacteristically severe wildfire effects for the forest type (such as adverse soil impacts, tree mortality or other impacts).'" 16 U.S.C. § 6512(f)(1). Agencies are required to '"maximize[] the retention of large trees, as appropriate for the forest type, to the extent that the trees promote fire- resilient stands. Id. HFRA is very clear on this subject, and we have specifically requested the agency not log large-diameter trees in compliance with HFRA, but to no avail. 16 U.S.C. § 6514(c) (action alternatives proposed during collaborative processes that meet the purpose and need are to be analyzed by the agency in the NEPA document). The Forest Service refused to develop an action alternative that would not log large-diameter trees as requested during the collaborative process and appears poised to authorize logging of approximately 6 trees per acre greater than 26 inches DBH across the project area. Please note large fire-resilient trees of this size are in severe deficit in the Salmon River Watershed."		growth and large tree retention provisions required under Section 102(e) and 102(f). The project area has epidemic levels of mistletoe infection which especially impact Douglas-fir and white fir and pose a substantial threat to ecosystem function. The Jess project is retaining large trees when it does not limit the accomplishment of other objectives of the project, specifically the reduction of disease infection rates. There is no consensus among participants to collaboration meetings as to the definition of a large tree for the Jess project. During the June 27, 2013, meeting there was a suggestion that some of the collaborators considered a tree larger than 20 inches in diameter to be a large tree. Trees larger than 20 inches in diameter are marked for commercial harvest when they are diseased (mistletoe, blister rust) and there is risk of understory infection, they are dying quickly (heavy blister rust infection, rotten boles), or, sometimes a healthy tree will be taken if they are near a preferred species in order to reduce competition. Some trees larger than 20 inches in diameter are marked where the intent is to favor hardwood species. Trees larger than 20 inches in diameter that meet hazard tree criteria for affecting roads and other infrastructure are also slated for removal during commercial harvest.
We recognize that the Forest Service is using mistletoe infestation as a justification for large tree removal; however, we are not in agreement on the validity of this argument. The proposed alternative does not address the root cause of the forest health issues within the project area. The project area has not seen fire in over 100 years, and is suffering from a multitude of effects of prolonged fire suppression, combined with past forest management actions. Removing a portion of the trees with mistletoe, and primarily targeting the largest of these trees, without the use of extensive prescribed fire does not address the core forest health issues, and will not lead to long term forest resiliency. The draft EIS does not adequately address the need for the reintroduction of fire into the landscape to deal with the very issues it hopes to mitigate, as proposed on multiple occasions by stakeholders during the planning process.	#6-7	Although prescribed fire is a valuable tool, the use of it exclusively would not achieve the stated purpose and need for the project as discussed in section 2.3 of the final EIS in relation to alternative E. The project proposes prescribed burning both as a block of underburn below a strategic ridgetop for fire control and as a follow-up treatment within commercial, non-commercial units, and ridgetop treatments. Both underburning and burning of piled material were considered and incorporated into the project. See response to #4-97 regarding research on using prescribed fire to control mistletoe. Table A-1 and Table A-2 in Appendix A of the final EIS list units proposed for prescribed burning.
Since the inception of the Jess Project we have expressed concerns regarding tractor yarding, canopy removal in natural stands on north facing slopes, and the proposed logging of large-	# 6-12	The effects of these practices have been mitigated by the project design features incorporated into action alternatives. The effects of such activities have been analyzed in the resource reports as summarized and referenced in Chapter 3 of the final EIS.

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diameter trees. We do not believe such practices are restorative in nature		
From the extensive large-diameter and canopy removal proposed in the Jess draft EIS, and the lack of prescribed fire as a treatment it is apparent our concerns regarding these elements of the project have been largely dismissed by the Forest Service Planners.	#6-13	Alternative C was developed in response to the issues of canopy removal and retention of large diameter trees raised during scoping; this alternative was eliminated from detailed study for the reasons discussed in Section 2.3 of the final EIS. Prescribed fire has been considered and is included in the project as described in Section 2.2 of the final EIS. In addition to the proposed 250-acre block of prescribed fire, project units were evaluated for pile burning following hand treatments and underburning following commercial harvest. The need for implementation of these underburns will be determined following evaluation of conditions in the units after the initial treatments are completed.
Wildlife		
Please note that page 33 of the draft EIS indicates that the Forest Service intends to downgrade or remove 535 acres of Northern spotted owl (NSO) foraging habitat. These 535 acres currently contain the large trees and multi-layered canopies that comprise the "desired condition" for the project area.	#4-14	The effects of the Jess project alternatives on northern spotted owl habitat are summarized in Table 2-5 of Section 2.5 and disclosed in Section 3.3.4 of the final EIS. The treatments proposed in alternative 2 downgrade or remove 535 acres of foraging habitat for northern spotted owl on the upper 1/3 of slopes where northern spotted owl use is uncommon. “Negative effects are likely to be greatest during the short term while the younger and healthier trees grow and fill in the canopy. In the long term …. the treatment will benefit the northern spotted owl habitat by creating an environment by creating an environment with less disease and allow for healthier stands that are more resilient to disturbance” (section 3.3.4 of the final EIS). This will help meet the desired condition of the project area which is described in Section 1.2 of the final EIS.
The combined and synergistic impacts of the Jess timber sale, recent wildfire and fire suppression activities, past logging, and adjacent logging projects threaten jeopardy to the Northern spotted owls and their habitat. We are concerned that the four remaining NSO home ranges that overlap the project area, already in deficit, will be threatened further by the agency's proposal to remove late-successional trees and high quality habitat as defined by the Recovery Plan. Simply leaving home ranges in habitat deficit untouched by logging is not enough, the NSO needs surrounding habitat retained to expand home ranges. This fact is especially important considering the recent wildfires that have shifted the character of NSO habitat, as well as	#4-36	The effects to northern spotted owl are disclosed in Section 3.3 of the final EIS. The determination of these effects will be a "likely to adversely affect the northern spotted owl and its critical habitat.” Application of project design features is expected to minimize effects to habitat and the likelihood that northern spotted owls will be harassed, killed or injured during project implementation. The retention of snags, hardwoods, and "skip" areas will retain areas with mature trees (Section 3.3 of the final EIS).As noted in the response to #4-14, the treatment will benefit northern spotted owl habitat by creating an environment with less disease and allow for healthier stands that are more resilient to disturbance. These treated stands of trees will increase in stand diversity and complexity and

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continued barred owl encroachment throughout the Klamath Province.		eventually development of multi-aged stands (Section 3.3.4 of the final EIS).
The Jess timber sale proposes to downgrade or remove 535 acres of existing spotted owl foraging habitat including 44 acres of foraging habitat that serves as designated critical habitat. The impacts of this proposed logging on spotted owl habitat, reproductive success and dispersal are not fully analyzed or disclosed in the draft EIS. The cumulative impacts of the timber sale in conjunction with wildfire, wildfire suppression, and nearby logging projects is not fully analyzed and disclosed. The draft EIS even splits NRF habitat into components in an attempt to characterize the impacts to foraging habitat as not impacting NRF habitat. "Alternative 2 will maintain and not degrade, downgrade, or remove suitable nesting/roosting northern spotted owl habitat," draft EIS 54, yet extensive amounts of foraging habitat is being downgraded or removed, potentially causing long- term impacts to the recovery of the NSO. The logging of large DBH, late-successional mistletoe trees will preclude establishment of nesting or roosting habitat for a significant number of years, impeding the attainment of late-successional character, development of NSO habitat, and recovery of the NSO in the KDSA. Regarding the character of the NSO Critical Habitat Unit to be logged, the draft EIS states: Part (12,727 acres) of Subunit KW-8 (Klamath West Modeling Region) of the northern spotted owl Critical Habitat Unit 9 is located in the Jess analysis area (USDI Fish and Wildlife Service 2011). The analysis area for northern spotted owl contains approximately 2,366 acres of older forest (nesting/roosting habitat), 9,953 acres of midseral forest (foraging habitat), 3,010 acres of open mid-seral forest (dispersal habitat), and 5,937 acres of early seral forest (non-habitat).	#4-37	Nesting/roosting habitat has a higher standard of stand characteristics than foraging habitat (Section 3.3 of the final EIS). Because of the difference between nesting/roosting and foraging habitat, the effects are more clearly displayed by keeping them separate in the analysis. Separating the habitat components in this way more clearly demonstrates that the effects will be to the lesser standard of habitat (foraging) than to nesting/roosting habitat which is more important to reproduction. Effects to critical habitat are disclosed in section 3.3.4 of the final EIS. See also the response to #4-14.
draft EIS 51. For a purpose and need that characterizes the area as having a mistletoe epidemic that is significantly impacting ecosystem function, there is a great deal of early seral and midseral forest habitat that is not functional NSO nesting habitat or likely to be in the near future in the project area and CHU. Our organizations fail to see how the purpose and need fits in with this CHU already devoid of larger overstory trees and late-	#4-38	The logic for determining the epidemic levels of dwarf mistletoe in the project area is summarized in Table 1-2 in section 1.3 of the final EIS. The long term improvement of stand health will benefit northern spotted owls; see response #4-14 and 4-36.

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successional character, or where the Klamath NF came up with its conclusion regarding a mistletoe epidemic threatening the ecosystem. Simply aggregating the acreage shows that there are only 2,366 acres of high quality habitat, and 18,900 acres of foraging or non- habitat. That is a mere 13 percent of the CHU analysis area that is 60 percent canopy cover or greater, and 87 percent which is 40 percent canopy cover or less which does not support NSO nesting. Again, we are perplexed why the Klamath NF would propose further downgrade and removal of soon-to-be high quality and late-successional habitat and nest trees in violation of the NWFP, KFP, and NSO Recovery Plan, when the spotted owl is already rapidly declining in the Klamath Province.		
Recently on the Klamath Demographic Study Area (KDSA), while the meta-analysis indicated spotted owl populations were stable through 2006, recently Davis et al. 2013 documented many sites on the KDSA becoming vacant and most likely due to barred owls. In fact, the demography data paints an even more grim picture: In recent years there has been a steady decline in the number of non-juveniles detected (Appendix B) and an even larger decrease in the number of pairs detected (Appendix A). The number of non-juveniles detected in 2012 (134) was the lowest ever documented on the study area (Appendix B). The number of individual spotted owls during 2012 was 39.6% fewer than the high of 222 during 2002. The decline in the number of pairs was even more sizeable, with 48.4% fewer detected in 2012 than the high of 97 during 2005. The 50 pairs detected during 2012 was the lowest number documented during the study period. Although the number of sites surveyed during this period has remained relatively constant, the number of pairs detected at sites has declined and the number of unoccupied sites has increased (Appendix A). While the recent meta-analysis (Forsman et al, 2011a) indicated that survival on the KSA was stable through 2006, the most recent data regarding occupancy has shown a rapid decline, which suggests the stability of the survival rate may no longer be valid.	#4-39	The effects of the project on the interactions between northern spotted owls and barred owls were analyzed and are summarized in section 3.3.4 of the final EIS. There is limited data to explain how land management will affect these interactions but management recommendations focus on maintaining and increasing large patches of contiguous nesting/roosting habitat. The Jess project will not degrade, downgrade, or remove nesting/roosting habitat. There is no strong evidence that changes to northern spotted owl habitat will result in increasing barred owl and northern spotted owl interactions.
Davis et al. 2013, 7 (collecting and reporting on 2012 demography data). Davis et al. 2013 go on to explain that	#4-40	See response #4-39 and #4-44

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The fecundity rate for 2012 was 0.191, which was lower than the average for the years 1990-2012 (0.320) (Appendix C). While the fecundity rate for spotted owls is known to fluctuate, we documented only 2 years during the most recent 10 years where the fecundity rate was above the overall average, indicating a downward trend (Figure 6). Forsman et al. (2011a) noted that the fecundity rate on the KSA was declining and the most recent data agrees with this conclusion. The number of juveniles detected within the KSA during 2012 (12) was much lower than the overall median (44) and followed 2011 (7), the lowest number of juveniles ever detected on the study area (Appendix B). The 2011 and 2012 combination of the low fecundity rates, the lowest number of pairs ever documented, and the lowest number of non-juveniles ever documented may indicate potentially serious problems with maintaining a stable population. This is even more alarming since these results are following a long term downward trend.		
Id. at 8 (emphasis added). This "alarming" "downward trend" continued through 2013, as Davis et al. 2014 explain: The number of non-juveniles detected in 2013 (133) was the lowest ever documented on the study area (Appendix B). The number of individual spotted owls during 2013 was 40.0% fewer than the high of 222 during 2002...The decline in the number of pairs was even more sizeable than the decline of individuals, with 50.5% fewer detected in 2013 than the high of 97 during 2005. The 48 pairs detected during 2013 was the lowest number documented during the study period. Although the number of sites surveyed during this period has remained relatively constant, the number of pairs detected at sites has declined and the number of unoccupied sites has increased (Appendix A). While the recent meta-analysis (Forsman et al, 2011a) indicated that survival on the KSA was stable through 2006, the most recent data regarding occupancy has shown a steady and rapid decline, which suggests the stability of the survival rate may no longer be valid.	#4-41	See response to #4-39 and #4-44
Davis et al. 2014, 7-8. With respect to fecundity in 2013, Davis et al. 2014 explain that The fecundity rate for 2013 was 0.160, which was lower than the average for the years 1990-2013 (0.312) (Appendix C)...The number of juveniles detected within the KSA during 2013 (15) was much lower than the overall median (44)	#4-42	See response to #4-39 and #4-44

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and the most recent 3 years were the lowest number of juveniles detected on the study area (Appendix B).		
Id. at 8-9. Based on the long-term demographic survey data, Davis et al. 2014 concluded that "The 2011-2013 combination of the low fecundity rates, the lowest number of pairs ever documented, and the lowest number of non-juveniles ever documented may indicate potentially serious problems with maintaining a stable population." Id.	#4-43	See response to #4-39 and #4-44
We are concerned by 1) the downward trend of the NSO in CHU 9, 2) the failure of the KNF to consider cumulative impacts of logging and removal of owl habitat in the CHU, combined with the impacts of the Jess project, and 3) the agency's disregard for the early to mid-seral character of the CHU, and when the agency should be retaining late- successional character supporting additional NSO population, the agency instead proposes to log mistletoe habitat for spurious reasons. Maintaining all 21 in. DBH trees, with or without mistletoe character, is sound owl science that ensures mature old-growth is protected. The Klamath NF is remiss to characterize late-successional mistletoe logging as beneficial to the Northern spotted owl: All action alternatives will degrade or remove foraging habitat used by northern spotted owl by a small amount in the short term, but this is offset by reducing the density of vegetation and improving stand health and ecological processes in the long term as described in section 3.3. Long-term beneficial effects will occur as desired tree species and currently mid-sized trees grow.	#4-44	The cumulative effects of logging and removal of owl habitat are summarized in Section 3.3.4 of the final EIS and disclosed in detail in the Terrestrial Wildlife Resource Report. A critical component of the project is to restore species composition to its historic range of variability (Section 3.1.1 of the final EIS). The effects of the project on species composition and structural diversity are summarized in Table 2-3 and in Section 3.1.4 of the final EIS; structural diversity includes all seral stages within the project area. The dwarf mistletoe epidemic in the project area is outlined in Table 1-2 of section 1.3 of the final EIS; treatments in the project area are designed to move stands toward endemic dwarf mistletoe rates. In response to the recommendation to maintain all 21 inch diameter trees, with or without mistletoe, silvicultural prescriptions were written to reduce the elevated levels of infestation while restoring species diversity and promoting fire resilience within stands. (See disposition of comments (19) Other Issue: Logging can increase the rate of mistletoe infected forests, p. 193-194 draft EIS). Alternatives B, C and D, alternatives considered but eliminated from detailed study, all include components to leave large trees regardless of mistletoe infestation; section 2.3 of the final EIS describes how this would not meet the purpose and need of the project. See also the response to #4-14 and 4-36. The Jess project will improve forested habitats by reducing dwarf mistletoe occurrence toward endemic levels and will provide a landscape that is more defensible against wildfire. Davis (2014) concluded that there is mounting evidence that barred owls could be negatively influencing spotted owl populations in his Klamath Study area (located north of the Klamath National Forest in Southwestern Oregon). In this study, Davis recognized an increasing trend of barred owls and an inverse decreasing trend in detections and occupancy of northern spotted owls. There has been a continual downward trend of northern spotted owl detections on the Forest since the 1990s. Influence

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		of large wildfires and continued presence of barred owls could play a role in these trends. The effects of the Jess project and of past activities have been considered in the Jess Project biological assessment. Many studies have found negative correlations between northern spotted owls and barred owls where they co-occur, but the effect of forest management on barred and spotted owl interactions is not well documented. Even without fully understanding the effects of forest management, recent research has expressed the importance of maintaining high quality nesting/roosting habitat and decreasing habitat fragmentation to minimize northern spotted owl interactions with barred owls (Dugger et al. 2005, Dugger et al. 2011, and Wiens et al. 2014). Nesting/roosting habitat in the analysis area has been influenced by past land management activities, mistletoe, disease, and wildfire. The Jess Project treatment areas are almost entirely in the center portion of the analysis area away from the high valued nesting/roosting habitat. However, about 2 acres of hazard tree reduction treatment will occur in nesting/roosting habitat along existing roads. This project will not downgrade or remove nesting and roosting habitat. Northern spotted owl foraging habitat is well distributed throughout the analysis area. Non-commercial treatments and underburn activities will not downgrade or remove foraging habitat thus it is unlikely that these actions will have a significant effect on influencing barred owl and northern spotted owl interactions. Commercial treatments will mostly occur on the upper 1/3 of the slope; this part of the landscape is not commonly used by northern spotted owls unless pressure from barred owl interactions is occurring. There are fewer treatments planned in the mid slope position where northern spotted owls are more likely to occur in the foraging habitat. The long-term trend of barred owl and spotted owl interactions in the analysis area is not known. According to survey data barred owls most likely occur on this landscape in low numbers and have only recently been detected. We can assume northern spotted owls and barred owls are currently interacting at some level, but the effects of these interactions are not clear. Implementation of the proposed actions will reduce the amount of foraging habitat on the upper two-thirds of the slope position. However, foraging habitat is not limited in the analysis area and the degraded foraging habitat will remain functional as foraging habitat. Even though the effects of forest management on northern spotted owl and barred owl interactions are not completely understood, the treatment will not affect the current level of nesting/roosting habitat and there is no evidence that interactions between northern spotted owl and barred owl

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		will increase as a result of the proposed actions. (Wildlife Biological Assessment page 45).
draft EIS 108. The agency appears to be disputing well-established scientific literature which states conclusively and clearly that spotted owls nest in large-diameter mistletoe trees and snags. How does the agency support the view that logging prime, productive, essential, critical NSO habitat right now, makes for long-term beneficial effects as non-habitat trees grow? A more scientifically sound statement would be that as mistletoe and late-successional characteristics develop further, snags and high quality habitat will serve as nest trees and aide foraging potentially creating a beneficial impact and development toward recovering the threatened and declining NSO. The NSO and wildlife that depends on NSO habitat as a proxy are not assisted or benefited in the long term by USFS proposals to further reduce both canopy cover and the average diameter of trees in the project area	#4-45	One of the objectives of the project is to restore stands to a more ecologically resilient condition. Dwarf mistletoes are native plants that play an important role in the ecology of forest ecosystems and complete removal from forest ecosystems could have a disproportional impact on forest ecology. The mistletoe within the project area will continue to have a presence and positive effect on vertebrate diversity. Silvicultural prescriptions were written to reduce the elevated levels of infestation while restoring species diversity and promoting ecological resilience within stands. The restoration prescriptions incorporate the recommended management activities as described for favoring trees which include removing overstory from dense understory and thinning the understory, maintaining mixed-species stands, favoring tree species that are immune to the species-specific mistletoes, and favoring trees without infections in the upper half of the crown. Wider spacing than the optimal dwarf-mistletoe spreading distance of 12-feet is also proposed. Because the complexity of managing dwarf mistletoe is widely recognized, prescriptions were carefully developed according to scientific research recommendations. Modeling outputs support the prescription objectives to reduce mistletoe (Section 3.1 of the final EIS). It is acknowledged that northern spotted owl utilize large diameter mistletoe trees for nesting (Wildlife Biological Assessment, page 24). The project will not downgrade or remove any nesting roosting habitat. There will be some effects on foraging habitats. The project will focus on reducing the elevated levels of mistletoe infestations but mistletoe will not be eliminated from the project area. An objective of the project is to restore species diversity and promote ecological resilience. This will result in some loss of mistletoe, moving it towards endemic levels. Changes in habitat conditions are described in the Wildlife Biological Assessment.
Regarding barred owls, the draft EIS solely states: Many studies have found negative correlations between NSOs and barred owls where they co-occur. However, there is limited data to explain how land management will affect these interactions, but management recommendations focus on maintaining and increasing large patches of contiguous nesting/roosting habitat. The Jess project will not degrade, downgrade, or remove nesting/roosting habitat. Therefore, the	#4-46	See response to #4-55

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proposed activities will not reduce the current number of nesting/roosting habitat acres and there is no strong evidence that indicated changes to NSO habitat will result in increasing barred owl and spotted interactions.		
draft EIS 55. This is an incorrect characterization of barred owl impacts to NSO; they generally do not co-occur. While barred owls are native to North America, they only recently arrived in the West, and are larger and more aggressive than spotted owls competing for the same habitat. The barred owl has recently expanded as far south as Marin County, California (Gutiérrez et al. 2004, pp. 7-12 to 7-13; Steger et al. 2006, p.226), and the barred owl's range now completely overlaps that of the northern spotted owl.	#4-47	See response to #4-55
Barred owls may be competing with spotted owls for prey (Hamer et al. 2001, p.226) or habitat (Hamer et al. 1989, p.55; Dunbar et al. 1991, p. 467; Herter and Hicks 2000, p. 285; Pearson and Livezey 2003, p. 274). In addition, barred owls physically attack spotted owls (Pearson and Livezey 2003, p. 274), and circumstantial evidence strongly indicated that a barred owl killed a spotted owl (Leskiw and Gutiérrez 1998, p. 226).	#4-48	See response to #4-55
Recent research has shown that the two species of owls share similar habitats and are likely competing for food resources (Hamer et al. 2001, p. 226). There is a great deal of data regarding management impacting interactions and competition, especially as habitat levels are decreased intensifying competition, which the KNF needs to include and respond to in the final EIS.	#4-49	See response to #4-55
Forsman et al. (2011, pp. 69-70) found that the presence of barred owls led to a decrease in fecundity, apparent survival, and caused a decline in populations in most of the demography study areas included in their large scale modeling effort. Olson et al. (2004, p. 1048) found that the presence of barred owls had a significant negative effect on the reproduction of spotted owls in the central Coast Range of Oregon. The conclusion that barred owls had no significant effect on the reproduction of spotted owls in one study (Iverson 2004, p. 89) was unfounded because of small sample sizes (Livezey 2005, p. 102). It is likely that Forsman et al. 2011,	#4-50	See response to #4-55

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Olson et al. 2004, underestimated the effects of barred owls on the reproduction of spotted owls because spotted owls often cannot be relocated after they are displaced by barred owls (E. Forsman, pers. comm., cited in USDI FWS 2011, p. B-11). Olson et al. (2005, p. 924) found that the presence of barred owls had a significant negative effect on the detectability of spotted owls. Dugger et al. (2011, pp. 2463-2467) confirmed the synergistic effects of barred owls and territory habitat characteristics on extinction and colonization rates of territories by northern spotted owls. Extinction rates of northern spotted owl territories nearly tripled when barred owls were detected (Dugger et al. 2011, p. 2464) (emphasis added).		
In the KDSA, "Barred owls were detected on the highest percentage of sites during 2013, and the percentage of sites where spotted owls were detected was the lowest of any year." Davis et al. 2014, 10. Although analysis within the KSA indicated a stable spotted owl population during the study period (1992-2006) (Forsman et al. 2011a), the recent data may indicate a change towards a declining population. The numbers of barred owls continued to increase, while spotted owl occupancy and fecundity continued to decrease.	#4-51	See response to #4-55
The number of individual barred owl detections was increasing during recent years and 2013 was the highest number ever detected. In addition, many of these detections appear to comprise more than one pair of barred owls within a single spotted owl site...There were at least 97 non-juvenile barred owls detected on the KSA during 2013 compared to 83 during 2012. The numbers may be underestimated since detections were incidental while using spotted owl calls....	#4-52	See response to #4-55
Davis et al. 2014, 10. Barred owls in the Klamath Province are so widespread and problematic that FWS has instituted an experimental lethal control program to remove barred owls from the landscape. Furthermore, the agency's conclusion that "the proposed activities will not reduce the current number of nesting/roosting habitat acres and there is no strong evidence that indicated changes to NSO habitat will result in increasing barred owl and spotted interactions," draft EIS 55, fails to take into account the impacts of canopy reduction and large tree logging	#4-53	See response to #4-55

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which could increase competition between barred owls and spotted owls for remaining habitat that exists in this CHU. Again, when there is only 13 % habitat sufficient for nesting in the project area, downgrading and removing foraging habitat and trees with late-successional character removes habitat thereby increasing competition between barred and spotted owls. The agency is in error to find that barred owls simply co-occur when literature indicates there is competition between the species for the same habitat and prey.		
As the project now stands, the agency's conclusion that the removal of large-trees in NRF habitat-that can develop into snags and high quality habitat in the short term-will benefit the spotted owl in the long term after logging via allowing mid-seral trees to grow, is as arbitrary and capricious decision making in violation of Ninth Circuit law. Lands Council v. McNair, 629 F.3d 1070, 1074 (9th Cir. 2010).	#4-55	Many studies have found negative correlations between northern spotted owls and barred owls where they co-occur but the effect of forest management on barred and spotted owl interactions is not well documented. Even without fully understanding the effects of forest management, recent research has expressed the importance of maintaining high quality nesting/roosting habitat and decreasing habitat fragmentation to minimize interactions between northern spotted owls and barred owls (Dugger et al. 2005; Dugger et al. 2011; and Wiens et al. 2014). Nesting/roosting habitat in the project area has been strongly influenced by past land management, disease, and wildfire, resulting in almost the entire nesting and roosting habitat distributed in the northern and far western section of the analysis area. Scattered patches of nesting/roosting habitat exist in the eastern and southern portion of the analysis area. The Jess project treatment areas are almost entirely in the center portion of the analysis area away from the high-value nesting/roosting habitat. However, about two acres of hazard tree reduction treatment will occur in nesting/roosting habitat along existing roads; this will not downgrade or remove habitat. The northern spotted owl foraging habitat is well distributed throughout the analysis area. Non-commercial treatment units and the underburn unit will not downgrade or remove foraging habitat; thus it is unlikely that these actions will have a substantial effect on the likelihood or outcome of barred owl and northern spotted owl interactions. The commercial treatments which mostly occur on the upper 1/3 of the slope (about 60% of the treatment type) are not commonly used by northern spotted owls in the absence of barred owls. The remaining portion (about 40%) of foraging habitat within commercial treatment is located in the mid-slope position and is likely be used by northern spotted owls, if they are present. However, when barred owls are present within the same area as northern spotted owls, barred owls may push the northern spotted owls into other areas, even up slope. The long-

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		term trend of barred owl and northern spotted owl interactions in the analysis area is not known; it is known that barred owls occur in the landscape, likely at low numbers. Northern spotted owl surveys have been implemented in the project area for many years and barred owls have only been recently detected. These detections occurred in an area where northern spotted owls have been previously located. It can be assumed northern spotted owls and barred owls are currently interacting at some level but the effects of these interactions are not clear. Implementation of alternative 2 of the final EIS will reduce the amount of foraging habitat on the upper two-thirds of the slope position. However, foraging habitat is not limited in the analysis area and the degraded foraging habitat will remain functional as foraging habitat. Even though the effects of forest management on northern spotted owl and barred owl interactions are not completely understood, the treatment will not affect the current level of nesting/roosting habitat and there is no evidence that interactions between northern spotted owl and barred owl will increase as a result of the proposed actions. (Wildlife Biological Assessment page 45)
Pacific fisher is proposed for listing as "endangered" under the Endangered Species Act by the USFWS due to substantial declines and continued uncertainty about viability of the West Coast distinct population segment ("DPS"). See 69 Fed. Reg. 18770 (April 8, 2004) (finding that Pacific fisher warrants protection as an endangered species). Indeed, the FWS is taking comments on the proposed listing concerning how to structure the DPS in the final rule. We find the agency's decision to log extensive mistletoe structure, essential habitat for the endangered fisher whose population is on the decline, considerably flawed considering the proposed fisher DPS.	#4-56	Under ESA, the pacific fisher is proposed for listing but a proposed species is not protected in the same manner as a listed species. The USDI Fish and Wildlife Service can provide guidance to minimize effects to the fisher through the conferencing process but conferencing is only required when a proposed project is likely to jeopardize the continued existence of a proposed species or adversely modify critical habitat. This project is not expected to appreciably reduce the recovery of the pacific fisher and the fisher has no proposed critical habitat so conferencing is not required.
Use of northern spotted owl habitat to assess effects to fisher assumes a direct correlation of key habitat features used by both species. Zielinski and others (2006) revealed a low correlation of spotted owl and fisher habitat at multiple scales in northern California, and cautioned: Although owl and fisher habitat are moderately correlated on federal lands, we cannot assume that federal lands can play the same relative role (i.e., contribution to overall population viability) for the fisher as they have been expected to do for the owl (USDA Forest Service and USDI Bureau of Land Management, 1994).	#4-57	Analysis of effects of the project on the pacific fisher has been updated to include habitat typing specific to the literature descriptions of fisher habitat (section 3.3 of the final EIS and an amendment to the Wildlife resource report).

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Thus, we should not assume that fisher viability in northern California is insured by protections for the spotted owl included in Northwest Forest Plan.1		
The Forest Service overlooked this scientific information the Jess timber sale draft EIS. Research funded by the U.S. Fish and Wildlife Service on denning ecology of female Pacific fishers in northwest California noted that coniferous trees no smaller than 105 cm (41.3 inches) diameter were selected as dens.2 Other research in California reported rest habitat selection by both sexes in the very largest available forest structure: the average size of live conifers selected for resting was 117.3 cm (46.2 inches) diameter, and the average snag was 119.8 cm (47.2 inches) diameter.3 High-quality late-successional forest habitat as is known to be selected by fisher is present at very few locations in the Jess project area, and the approved timber sale will remove structural elements of preferred denning and resting habitat.	#4-58	See response to #4-57.
Matthews and others (2011) reported a "devastating" fisher population decline in a northern California study area from 1995-2008, possibly due to a combination of disease outbreak and habitat replacement by fire, although the exact cause is unknown.4	#4-59	See response to #4-57
The draft EIS acknowledges that cumulative effects are likely to occur in Pacific fisher habitat, but the rate of habitat loss or specific locations are not known to the agency. Where the Forest Service can quantify cumulative impacts to fisher habitat on adjacent Federal lands it fails do so.	#4-60	The final EIS summarizes the cumulative effects to wildlife species including the pacific fisher in section 3.3.4; cumulative effects are described in greater detail in the Wildlife Biological Evaluation. The updated analysis for effects to pacific fisher, including the cumulative effects can, be found in Section 3.3 of the final EIS and the amendment to the Wildlife resource report.
As explained above, there is no evidence in the draft EIS that spotted owl habitat is a reliable proxy for Pacific fisher. Therefore, the Jess draft EIS fails to take a hard look at cumulative impacts to the candidate species, in violation of NEPA.	#4-61	See Response to #4-57
would cause the fisher to avoid such areas that is downgraded habitat, and the draft EIS fails to quantify or analyze how the project will impact the fisher. Fishers hunt in mistletoe trees and snags, what is the impact of disease prescriptions for these late-	#4-62	An updated effects analysis for pacific fisher can be found is Section 3.3 of the final EIS and the amendment of the Wildlife resource report.

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successional trees on the fisher's ability to forage in the project area?		
In the draft EIS we request the agency include similar analysis akin to relevant discussions below from other districts proposing similar logging projects: "Large mistletoe clusters that form solid platforms and one of the preferred rest sites for this species." -Rustler EA page III-60. "Moderate to high canopy closures (defined as greater than 60%) has been shown to be important for all aspects of fisher biology and ecology." -Rustler EA page III-63. 80% canopy is required to provide habitat for Fisher denning and resting, "80% or greater overall canopy closure at a fine scale provides opportunities for fishers to locate suitable den and rest site. . . . "Moderate to high canopy closure (defined as greater than 60%) has been shown to be important for all aspects of fisher biology and ecology." Bybee EA page 205. "Generally, Fishers use the highest-quality habitats available for den and rest sites." Bybee EA page 209. "Based on the available information, it appears that the core [Pacific Fisher] population is centered on the High Cascades Ranger District of the Rogue River- Siskiyou National Forest near Prospect, Oregon.- Bybee EA page 196. "Removing of understory and mid-story canopies around large structures may also reduce the effectiveness of the structure as a secure rest site because they contribute to the microclimate of the site."- Bybee EA page 197.	#4-63	An updated effects analysis for the pacific fisher can be found is Section 3.3 of the final EIS and the amendment of the Wildlife resource report. The analysis incorporates relevant literature into models for habitat connectivity and home range potential.
We are concerned about the agency's plan to target mistletoe and fisher habitat for logging. The draft EIS fails to discuss anything regarding population dynamics, or if the project contributes to the need to list the species under the ESA.	#4-64	Reasons for harvesting in mistletoe-infested stands are addressed in sections 1.3 and 2.2 of the final EIS and in responses to #4-14 and 4-36. One of the objectives of the project is to restore stands to a more ecologically resilient condition. Dwarf mistletoes are native plants that play an important role in the ecology of forest ecosystems and complete removal from forest ecosystems could have a disproportional impact on forest ecology. The mistletoe within the project area will continue to have a presence and positive effect on vertebrate diversity. Silvicultural prescriptions were written to reduce the elevated levels of infestation while restoring species diversity and promoting ecological resilience within stands. The effects of alternatives on pacific fisher habitat are disclosed in

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		Section 3.3.4 of the final EIS and the amendment to the Wildlife resource report. Changes to habitat for pacific fisher from logging will not affect habitat connectivity or home range potential. The analysis incorporates relevant literature into models for these analysis indicators as summarized in section 3.3.4 of the final EIS and provided in more detail in the referenced amendment to the Wildlife resource report..
Sensitive species "are those species whose viability is of concern because they have significant current or predicted downward trends in numbers or density, or because there is a significant downward trend in their current or predicted habitat that would reduce their distribution." Friends of the Wild Swan v. U.S. Forest Service, 966 F. Supp. 1002, 1009 (D. Or. 1997); Foundation for North Am. Wild Sheep v. U.S. Dept. of Ag., 681 F.2d 1172, 1175 (9th Cir. 1982) ("Under federal law, the Bighorn is classified as a 'sensitive' species entitled to special management protection."). Pacific fisher uses the area where the road construction and timber harvest are proposed. The USFS cannot take actions that would lead to a trend toward listing a species under the ESA. In the case of the fisher, logging large-diameter trees to the point of reducing canopy closure below 40% would continue to harm this species.	#4-65	The Terrestrial Wildlife Biological Evaluation determined that the Jess project may affect individuals but is not likely to lead to a trend towards Federal listing. See also the response to #4-64 for a discussion of effects to the pacific fisher.
No consideration is given to required avoidance or mitigation to minimize impacts to local populations. The USFS neglects to identify maintenance of Fisher populations as a project-planning objective. It generates no information to indicate that proposed logging and road building would avoid a trend toward ESA listing. Instead, the draft EIS calls for harming fisher habitat by downgrading and removing dispersal and foraging habitat in the planning area. Such impacts may displace resident populations, or impact reproductive success, which must be analyzed and discussed in the EIS.	#4-66	The need for change in the Jess project area is described in Section 1.2 of the final EIS; the need for change led to the development of the Purpose and Need for the project which is described in Section 1.3. There was no need for change regarding Fisher habitat discovered during this planning process. The Terrestrial Wildlife Biological Evaluation analyzes the effects of the project on pacific fisher and its habitat in detail, and this information is summarized in section 3.3.4 of the final EIS. The analysis found that the project as currently designed (without additional project design features specifically for pacific fisher) has little effect to fisher habitat connectivity or habitat in the home ranges, and that there is long term benefits to the project (section 3.3.4 of the final EIS).
We are concerned the draft EIS fails to provide an alternative that offers ecological benefit to the fisher. How will the project impact the fisher? Will it jeopardize the species? We are concerned about the disease management portions of the project that will remove large mistletoe and legacy trees. How many acres of foraging habitat has been downgraded or removed across this population	#4-67	Alternatives were developed based on relevant issues that were raised during the scoping process; there was not a relevant issue directly related to pacific fisher or its habitat. As noted in response to #4-64, 4-65 and 4-66, the analysis of effects to the pacific fisher were updated between draft EIS and final EIS; the final EIS discloses no substantial effects of alternatives on the pacific fisher and its habitat. Alternative 3 was

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area already? How many individual fisher have been lost in the action area?		designed based on relevant issues #1 and #2 (Section 2.2.3 of the final EIS); this alternative avoids more northern spotted owl habitat than alternative 2 and northern spotted owl habitat was used as a proxy for fisher habitat in the wildlife analysis for the draft EIS. Also, alternative C (considered but eliminated from detailed study) had large tree retention and high percent canopy retention; this alternative was eliminated from detailed study because it did not meet the purpose and need. See the response to #4-64 and #4-65
The USFS has improperly downplayed the importance of dwarf mistletoe for the NSO. Marshall et al. (2003) noted that approximately 90% of known Spotted Owl nests on the Applegate Ranger District of the Rogue River National Forest were in dwarf mistletoe brooms in Douglas-fir trees. Instead, The Klamath NF is focused on downgrading and removal of NSO habitat simply because of the presence of mistletoe. Where there is a scientific debate, NEPA requires presenting both sides of the issue so the public can make an informed decision, which the Klamath NF has not done.	#4-71	See response to #4-45
The EIS has failed to provide information about how there is an actual scientific controversy regarding what the treatment is, or how effective the treatment has been in the past, rather than analyze the impacts from mistletoe removal. The EIS fails to mention the detriments of such removal to old-growth dependant species, and the ecological functions and habitat mistletoe provides.	#4-72	See Response to #4-45
For further information on this point, please see Ecology Center v. Austin, No. 03-35995, 35 ELR 20248 (9th Cir. 2005) (holding that the USFS decision to permit logging in critical old-growth forest and post-fire habitats in the Lolo National Forest was arbitrary and capricious. The agency's decision to permit commercial logging in old-growth forest stands as a form of rehabilitative "treatment" violated NEPA. "The EIS discusses in detail only the Service's own reasons for proposing treatment, and it treats the prediction that treatment will benefit old-growth dependent species as a fact instead of an untested and debated hypothesis.") USFS has failed to inform the public of the importance of mistletoe to nesting NSOs and NSO recovery under the ESA, as well as the habitat benefits mistletoe provides to other old-growth dependant species.	#4-73	

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While dwarf mistletoe has traditionally been viewed as a forest pest because of reducing in timber volume, these sources suggest that in areas where management goals are not strictly focused on timber production, control of dwarf mistletoe may not be justified, practical, or even desirable. The data suggests that dwarf mistletoes may have positive influences on wildlife habitat. Consequently, they suggest that eradication efforts be reconsidered given that dwarf mistletoes have been a part of these forest ecosystems for thousands of years.	#4-77	See response to #4-45
Dwarf mistletoe is important to the ecology of these systems. The fruit, foliage and pollen of dwarf mistletoe are a food source for numerous bird, mammalian and insect species. Dwarf mistletoe alters the growth patterns of infected trees, creating structural complexity within forests in the form of witches brooms and snags, both which are used by numerous wildlife species for nesting, roosting and cover.	#4-80	See response to #4-45
The witches, brooms and higher snag densities in infected areas enhance habitat values for birds and other wildlife. In considering the beneficial aspects of dwarf mistletoe infection, it seems reasonable to assume that it is the large infected trees, particularly those with large witches' brooms, which have the greatest ecological value.	#4-81	See response to #4-45
Where wildlife habitat is an important consideration, it may be desirable to maintain or encourage features resulting from mistletoe infections, such as snags and witches, brooms. The same factors that can be manipulated to reduce mistletoe spread, intensification, and effects can also be used to enhance these processes and produce a continuing supply of dead and diseased trees.	#4-106	See response to #4-45
Greater bird diversity is associated with increased mistletoe infestation (24 of 28 species positively associated); the key limiting resource for the birds in this situation may be snags. Parker (2001) reports a similar study in a northern Arizona ponderosa pine forest. He finds, however, a more complex situation with four species positively associated with mistletoe (cavity-nesting birds), five species with a negative association (avoiding infested areas), and seven with no relation (indifferent). Fairweather (1995) and	#4-109	See response to #4-45, and #4-90

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Parks and others (1999b) describe mistletoe control treatments in which infected trees were killed but left standing for woodpeckers and other cavity-nesting animals. Although these snags are used, they remained standing for only a few years. Studies of broom use by wildlife include work by Parks and others (1999a), Hedwall (2000), and Garnett (2002). These studies identify which birds and mammals use witches, brooms, how they use it (for nesting and roosting), and what kinds of brooms are preferred. This information is useful to determine if retaining certain brooms is a potential benefit for a favored species. Information still lacking is knowledge of how the number and distribution of snags and brooms relates to levels of mistletoe infestation and to wildlife populations and the dynamics (rates of generation and loss) of these features. Dwarf mistletoe is extremely important for NSO nesting, and logging spreads mistletoe. What large dominant trees are being retained? The Jess draft EIS entirely fails to discuss this aspect of the problem-logging spreading forest pathogens-a particularly important adverse impact considering that the agency is proposing disease prescriptions throughout the project area. Additionally, the USFS characterizes the mistletoe and late successional character of the project area as having the potential for significant ecological impacts. These are beneficial ecological impacts, namely the recovery of habitat for the NSO, which the DIES fails to disclose to the public or the decision maker. Consequently, the agency's proposal is arbitrary and capricious as it fails to consider an important aspect of the problem-logging disease units may only serve to exacerbate the spread of forest pathogens, and that logging disease units causes significant harm to late successional character, reduces forest resiliency to fire, and harms wildlife species such as the Pacific fisher and NSO which are dependent upon late successional-character for survival and recovery. Lands Council v. McNair, 629 F.3d 1070, 1074 (9th Cir. 2010).		
The Jess sale area is home to numerous species designated as Management Indicator Species (MIS) by the Klamath National Forest Land and Resource Management Plan (LRMP). Many of these species would be adversely affected by increased fragmentation caused by timber sale activities such as logging and	#4-110	Based on the Forest Plan, Management Indicator Species are addressed through habitat associations and not as individual population numbers. Forest wildlife Management Indicator Species that are applicable to the Jess Project are the snag habitat associated species which include Vaux's swift, pileated woodpecker, downy woodpecker, hairy woodpecker,

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yarding activities. At a minimum the draft EIS must address MIS "individual species" such as the NSO, pileated woodpecker, black bear, American Marten, Fisher and Black-tailed deer as well as the Tanoak Madrone Assemblage, the Snag Assemblage, the Down Woody Material Assemblage and the Black Oak/White Oak Assemblage. This has not occurred.		red-breasted sapsucker, white-headed woodpecker, and black-backed woodpecker. The effects on these species associations are addressed in section 3.3.4 of the final EIS and in the Management Indicator Species Report, Parts I and II. This analysis concluded that with implementation of snag-related Forest Plan Standards and Guidelines, at a minimum, the proposed project prescriptions maintain moderate capability snag habitat in the majority of timber harvest units and high capability habitat in untreated parts of the project area (“capability” as determined in Appendix I of the Forest Plan final EIS, Wildlife Habitat Capability Model for Cavity Nesting and Decadence Wildlife Assemblage). In addition to Standards and Guidelines, which provide protection for snags as a habitat component, riparian reserves were established that help to protect and enhance conditions of late-successional forests. Riparian reserves are habitat “reserves” where populations of snag-associated species will be largely unaffected by land management activities.
The agency largely failed to provide site-specific information describing population numbers, locations, and trends for key wildlife species, or monitoring data to determine that the proposed action would maintain numbers and distribution of these species sufficient to ensure long-term viability.	#4-111	See response to #4-110
The EIS relies on PDFs rather than analyzing the impacts to the relevant species under NEPA, and relies on the erred conclusion that "Project activities will provide short- and long-term beneficial effects to bird species (and their key habitats)." draft EIS 202.	#4-112	Analysis of effects on migratory birds is summarized in section 3.3.4 of the final EIS and details are provided in the referenced Compliance Review for the Migratory Bird Treaty Act MOU. This review concludes that the Jess project will have long-term benefits to these bird species (and their key habitats) and will maintain key migratory bird habitat components by the reduction of fuel loading, re-establishment of mosaic forest habitats, and improvement of stand condition, thereby reducing the risk of further, stand-replacing wildfire. This project will provide short- and long-term beneficial effects to bird species (and their key habitats); it is determined that the project will not adversely affect migratory birds.
The regional decline of migratory birds is a significant issue for this project. Numerous studies have reported local and regional trends in breeding and migratory bird populations throughout North America (e.g., DeGraaf and Rappole 1995, Sauer et al. 2004). These studies suggest geographically widespread population declines that have provoked conservation concern for birds, particularly neotropical migrants (Askins 1993, Terborgh 1989.) The 2005 report from the Klamath Bird Observatory entitled	#4-113	See response to #4-112. Additionally, the literature provided show that declines in migratory bird populations throughout North America could partly be due to loss of habitat in the northern portions of the study sites. This is attributed largely to loss of habitat as a result of suburban development and forest fragmentation. The analysis of the effect to migratory birds from the Jess project shows that key migratory bird habitat components will be maintained and improved over time by the reduction of fuel loading, re-establishment of mosaic forest habitats, and

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Local and Regional Trends in Breeding and Migratory Bird Populations in the Klamath and Rogue River Valleys: Monitoring Results for 1993-2003 indicates that several species on songbirds are suffering declining population trends at the regional level.		improvement of stand condition. Habitat for migratory birds in the project area would not be altered to the extent that habitat would be considered fragmented as a result of project implementation.
The Migratory Bird Treaty Act (MBTA) makes it unlawful to pursue, hunt, take, capture, kill, attempt to take, capture, or kill, possess, offer for sale, sell, offer to barter, barter, offer to purchase, purchase, deliver for shipment, ship, export, import, cause to be shipped, exported, or imported, deliver for transportation, transport or cause to be transported, carry or cause to be carried, or receive for shipment, transportation, carriage, or export, any migratory bird, any part, nest, or egg of any such bird, or any product, whether or not manufactured, which consists, or is composed in whole or part, of any such bird or any part, nest, or egg thereof. 16 U.S.C. § 703. Please respond to the following literature that discusses impacts of fire and logging on migratory birds, and disclose this information in the final EIS:	#4-114	See response to #4-112
Page 51 of the draft EIS indicates that there are currently twice as many acres in the planning area in early seral condition than there are "older forests." Page 54 of the draft EIS indicates that the proposed logging will exacerbate this trend by downgrading or removing an additional 535 acres of forests currently service as NSO foraging habitat which will move the project area further away from its historic range of variability and diminish its ability to provide ecosystem services.	#4-120	See response to #4-44
Water Resources, Hydrology, Geology, and Soils		
Page 86 of the draft EIS acknowledges negative direct impacts to channel conditions from project activities but utilizes obfuscation (rather than qualitative language) to describe the impacts as "short-term effects to channel geomorphology from skidding logs across ephemeral and intermittent streams will directly affect channel conditions in the short- term at the site-scale only."	#4-32	Project design features Watershed-9 and Watershed-10 in Table 2-1 of the final EIS are designed to limit any direct effects to channel conditions so that they will be short-term and site specific. In the Jess project area, there will be two ephemeral stream crossings in Units 118 and 122. The Timber Sale Administrator will designate an appropriate crossing. Any erosion caused by the crossings should be captured by the annual Forest stream sediment monitoring which is available at http://www.fs.usda.gov/detail/klamath/landmanagement/planning/?cid=fsm8_049843. In addition, in annual Best Management Practices Evaluation Program monitoring, sites selected randomly will capture any inadequacies and needed improvements.

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Although the draft EIS indicates that the project would not significantly degrade water quality due to design measures intended to protect hydrology (such as wide riparian buffers), EPA is concerned with potential water quality impacts of the project. Road use, in particular, has the potential to introduce increased sediment into the North Fork Salmon River. Although the draft EIS states that the increase in sediment to the waterway would be 10% or less, and other impacts to water quality will be negligible, recent wildfire related activity in the project area likely involved heavy forest road use that may have resulted in increased sediment into waterways. EPA encourages KNF to continue to work with the North Coast Regional Water Quality Control Board to ensure that all feasible precautions are taken to minimize water quality impacts. Although the draft EIS indicates that the water quality Best Management Practices implemented for this project will be monitored as part of the Forest BMP Evaluation Program, the scope of this monitoring effort is unclear. Further, the draft EIS does not clearly state how data on mitigation effectiveness would be integrated into BMP design improvements, or how additional mitigation may be applied should monitoring show that the proposed measures are insufficient to protect water quality. The final EIS should elaborate on this program and its relationship to the proposed project, clearly describing methodologies and triggers for additional mitigation.	#7-7	Treatment of legacy sites is part of action alternatives for this project. As stated in section 2.2 of the final EIS, most of the roads in the project area have legacy sediment sources that were addressed by the North Fork Roads Storm-proofing project which will treat 20 legacy sites found within the Jess project area. An additional five legacy sites that are outside the North Fork Roads decision will be treated as part of the Jess project as part of meeting requirements of the North Coast Region Water Quality Control Board (Water Board) Category B waiver. This waiver ensures compliance of the project with the Clean Water Act. Treating legacy sites will decrease the potential for sediment moving into streams and improve water quality. Information was collected to allow analysis of the compliance of the project alternatives with the Water Board and to minimize negative effects of the project to water quality as disclosed in Section 3.10 of the final EIS. As discussed in section 3.10.3 of the final EIS, the only watershed that was affected by the Whites wildfire is Jessups Gulch-North Fork Salmon River. About 20 acres of low intensity fire burned on the southwest side of the watershed which is outside of the Jess project boundary; however, contingency lines were installed within the Jess project. All contingency lines were hydrologically stabilized after completion. Monitoring through the Best Management Practices Evaluation Program will occur on a sample of the BMPs appropriate for this project; site-specific project BMPs are listed in appendix D of the final EIS along with the project design features that address these BMPs. Since many project activities do not occur within the same year, they will be included in Best Management Practices Evaluation Program monitoring pools for up to a decade as needed. The Forest Sediment Monitoring Plan (USDA Forest Service 2013c) and Shade Monitoring Plan (USDA Forest Service 2011) which will be implemented for Total Maximum Daily Load compliance as displayed in section 2.4 of final EIS provide more information on monitoring protocols. Monitoring to assess the implementation and effectiveness of project design features to meet soil Standard and Guidelines in the Forest Plan may occur in the Jess project. Field investigations of soil cover, soil compaction, and impacts to soil organic matter will occur on a minimum of 5% of activity areas forest wide, as described in Chapter 5 of the Forest Plan. Units will be selected randomly from all activity areas across the Forest where soil disturbing activities take place; the Jess project will be

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		included in the sampling pool for soil monitoring. Results will be documented in the Forest annual monitoring reports. The monitoring and reporting program section of the Waiver states that "Follow-up monitoring will be conducted for sites that were rated as not fully effective the previous year, corrective actions will be implemented and documented, and results will be presented in annual BMPEP report" http://www.fs.usda.gov/detail/klamath/landmanagement/resourcemanagement/?cid=stelprdb5312713. Waiver monitoring will be implemented as required.
Pages 73 and 74 of the draft EIS conclude that alternative 2 will increase landslide volume in Jessups Gulch by four times more than would alternative 3 (8% and 2% respectively). Hence alternative 2 will adversely impact the resiliency and ecosystem objectives of the project. Page 81 indicates that alternative 3 will negatively impact soils on fewer acres while page 80 anticipates that a "combination of increased compaction, reduced soil cover, and soil displacement will lead to a loss of nutrients on skid trails and landings where ground- based tractor yarding takes place." BMP 1.1 at page 145 of the draft EIS anticipates the use of tractors off of designated skid trails but fails to disclose or quantify the impacts of this action.	#4-123	Alternative 3 has a smaller footprint and treats fewer acres than alternative 2 so it has fewer effects to soil resources and landslide risk than alternative 2. The effects on landslides and soils, with analysis updated to include the effects of the 2014 Whites fire and suppression activities, are disclosed in sections 3.7 and 3.9, respectively, of Chapter 3 of the final EIS and the respective resource reports. There is an estimated landslide volume of 1427 cubic yards/decade for alternative 2 versus 354 cubic yards/decade for alternative 3. The difference is directly correlated with the footprint of the activities proposed for each alternative. In other words, for alternative 2 in order to treat more acres there is more acres of disturbance therefore more estimated landslide volume from the CWE GEO model. The risk ratio for both alternatives is below the threshold of concern with alternative 2 being at 0.68 and alternative 3 being at 0.57. Neither action alternative increased the landslide risk compared to the no action alternative. There are forty-five watershed related project design features, which are not included in the model, that are intended to mitigate these effects. So the actual landslide volume, should a 10-year storm event occur, will be less than what is estimated by the model. Tractors are not required to stay on the skid trails and the analysis does not make the assumption that tractors will only be used on the skid trails. The impacts of tractors leaving skid trails is disclosed on page 13 of the Soil Report, which states "on skid trails where machinery makes one or two passes, compaction increases only slightly; rooting environment and infiltration are not negatively affected". To protect soil productivity from the impacts of tractor skidding, BMPs restrict tractors to slopes less than 35% except for short areas between benches and require that ground-based equipment operate according to Wet Weather Operation Standards (BMP 1.1, Appendix D of the final EIS).

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Project. Given the extent of acreage of critical habitat that was degraded by recent wildfire activity, EPA recommends that the KNF work with the USFWS to ensure that the Biological Opinion for this project is based upon the current post-fire forest condition. In addition, the cumulative effects analysis of the BO and final EIS should consider how these recent fires might contribute to a loss of habitat connectivity for wildlife, and special status and endangered species in particular. We recommend that the final EIS include a detailed summary of the findings of the USFWS' Biological Opinion.	#7-6	Planning for the Jess project included a high degree of coordination with the USDI Fish and Wildlife Service through the Level 1 Streamlined Consultation process. The analysis considered post-wildfire effects as current condition on species and habitats as noted in section 3.3.3 of the final EIS. The Biological Opinion has not been finalized but will be included in the project record prior to decision.
Fisheries		
Conclusions contained in a National Marine Fisheries Service Memorandum dated July 23, 2010 indicates that the proposed Riparian Reserve thinning would not achieve aquatic conservation objectives, Importantly, all stream channels must receive a minimum 150 foot no cut buffer.	#4-21	See response to #4-22 regarding buffer width and see response to #4-25 regarding Forest Plan Aquatic Conservation Strategy direction and compliance.
We request the agency to consider and respond to a National Marine Fisheries Service memo (NMFS 2010) to support our position that commercial thinning in the Riparian Reserve is not appropriate and is likely harmful, adversely impacting achievement of aquatic conservation objectives. NMFS states that: “In examining forest thinning proposals designed to accelerate the development of late-successional forest conditions and restore instream fish habitat, NMFS is finding that, in many cases, they are likely to do neither. NMFS 2010, 8. NMFS foes on, “our results suggest that the thinning regimes proposed by the Siuslaw National Forest will delay the development of key structural elements of forest and stream habitat by more than century. The delay in stream habitat recovery can be minimized by creating a no cut buffer of 150 feet or more in width between streams and any forest thinning operations.” Id. at 31 (emphasis added). The NMFS memo continues, “[t]he tradeoff of getting a few more large standing live sooner at the expense of a continuous supply of both large and small trees over a long term period always needs to be considered.” Id. at 4.	#4-22	The buffer distances modeled by the National Marine Fisheries Service (USDC NOAA 2010, Appendix 1 document are not directly applicable to the Jess project because the Jess project is set in an inland forest with a lower precipitation regime and potential site trees which are less than those considered in the NMFS 2010 document (e.g., 170 foot [Appendix D] versus 250 foot [NMFS 2010, page 39]). However, the concept of using a buffer which is representative of approximately 90% of wood input to a stream so as to minimize negative impacts to riparian thinning, as per the NMFS 2010 position paper, is valid. Benda and Bigelow (2011) as referenced in the Aquatic resource report examined various aspects of wood recruitment in northern California with a focus on differences between discrete geomorphic provinces – coast ranges, Klamath Mountains, Cascade Mountains, and Sierra Nevada Mountains. Inland provinces, including the Klamath Mountains, had 90% of wood volume originating from less than 35m (115 feet) from the stream, and often much closer. In comparison, 90% of large wood originated from substantially greater distances from streams for old-growth coastal forests. Where possible, buffer distances should be sized so as to meet need of an individual project while taking into account resource considerations, such as fisheries, and the background setting/environment within which a project is set. For Jess, all project units which included a riparian reserve component were visited to determine an appropriate buffer width with

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		consideration of geology, soils, hydrology, and aquatic habitat. In most cases, a 100-foot no-cut buffer was found to be appropriate, which is very close to the Benda and Bigelow (2011) observation distance of 35 m being where 90% of large woody debris originate for inland northern California provinces. Hydrologic status, presence of roads, and other factors were used to provide rationale for treatment buffer distance from streams. Documentation on buffer distances is found in Table A-3 in appendix A of the Jess final EIS.
With regard to "large wood," NMFS states that "[a]lthough NMFS included this [24 inch diameter] value in NMFS (1996), and did not advocate changing the value during negotiations on the AP document, we recognize now that (1) it does not provide a target that is based on reference conditions for Westside forests, (2) this target is not sensitive to site-specific conditions (e.g., stream size and power), and (3) use of this target exclusively results in analyses that do not adequately address other sizes of wood that provide important ecological functions in streams." Id. at9. Thus the size standards used for the desired condition are not appropriate because all sizes of wood entering small streams would improve channel function.	#4-23	As summarized in the NMFS 2010 document (page 6), it is recognized that all wood sizes affect channel function, especially pool formation. Appendix C of the Aquatics resource report, as referenced and summarized in section 3.4 of the final EIS, provides the background for various habitat indicators used to determine baseline for project streams. Indicators, including large wood, are recognized to be flexible with indicator values as suggested guidelines subject to change to meet local needs. In addition to using the indicator value of "large wood" to equate a bole 50 feet long by 24 inches in diameter, baseline wood for the project applied the Forest Plan guideline of "20 pieces of large wood (40 cubic feet or larger) per 1,000 lineal feet within 3rd to 5th order channels, or as identified in the ecosystem management process at the watershed level" (MA-56). For surveys of Jess project streams where wood debris data is available, 40 cubic meters equates an approximate wood class size of 13 feet long by 24 inches diameter (4 m by 0.61 m) or 26 feet long by 18 inches diameter (8 m by 0.46 m), which are smaller than the indicator value of large wood in the Forest Plan. As stated in the Aquatics resource report, Appendix D, it was the professional judgment of the fish biologist that baseline large wood was deficient in project streams, regardless of the metric used. The Jess project will not affect recruitment of smaller wood classes (e.g., branches, large brush, and smaller diameter trees) to stream systems. As affected by the project, wood recruitment and transportation is discussed in the Aquatic resource report. General recruitment rate in regards to large wood is discussed in response to #4-22.
In this vein the agency finds that "[a] II wood and other organic material, whether large or small, is important to the proper functioning of streams; none of it is unimportant." Id. at 6. NMFS further states that "[o]f particular note is that large wood that cannot singly form pools will form pools in combination with other	#4-24	See response to #4-23

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pieces of wood and other obstructions by forming “wood jams.” The NMFS states “[w]hile thinning increases tree diameters, it does not increase tree heights; thus, it will not increase the length of tree boles entering streams.” Id. at 4.		
For the reasons NMFS discusses in this 2010 memo, our organizations hold that Riparian Reserve logging proposed in the Jess timber sale is not needed to attain the objectives of the Aquatic Conservation Strategy (ACS) of the NWFP. S&G C-32 of the NWFP is clear that logging in Riparian Reserve is prohibited unless “needed” to attain the ACS objectives. Such logging is not “needed” in this project area and will involve felling of wildlife snags, the reduction of forest canopy, and the felling of non-target conifers to facilitate yarding.	#4-25	The need to treat within the outer 70’ of some riparian reserves in the project area is discussed in section 2.2 and in more detail in Appendix F and in Table A-3 in Appendix A of the final EIS.
The USFS and BLM should include all sizes of wood in describing environmental baseline conditions and in analyzing the effects of its proposed actions, not just pieces of wood that are greater than 24 inches in diameter and greater than 50 ft. in length..	#4-26	See response to #4-23
The USFS and BLM should adjust their tree diameter targets based on stream size. Database curves are available for both functional-sized and key pieces of wood (e.g. Fox and Bolton 2007)	#4-27	See response to #4-23. Fox and Bolton (2007) does not seem to be directly applicable to the Jess project area because the reference systems presented by the paper included data from Olympic Range (coastal) and Cascade Range ecotones in Washington state. As per the response to #4-22, caution must be applied in the use of reference conditions and/or recommendations from different ecotones due to differences in climate, tree composition, and other considerations.
Page 64 of the draft EIS states that the project "may adversely affect" Essential Fish Habitat for Coho and Chinook salmon, yet the draft EIS does not analyze or disclose or quantify the actions that may result in the acknowledged adverse affect. Similarly, page 64 of the draft EIS indicates that the project "may affect" lamprey yet fails to quantify or analyze impacts to this species.	#4-121	Essential Fish Habitat (EFH) is different from Critical Habitat. Although the concept of EFH is similar to “Critical Habitat” under the Endangered Species Act, measures recommended by National Marine Fisheries Service or a Council to protect EFH are advisory, not prescriptive. There are only two determinations possible for EFH: “No Effect” or “Adversely Affect.” As part of ESA consultation, the National Marine Fisheries Service determines if adverse effects to EFH would occur and if conservation recommendations are necessary. While the determination language of EFH is similar to Critical Habitat, “adverse effect” <u>has a different meaning</u>. EFH regulations define an adverse effect as “any impact which reduces quality and/or quantity of EFH...[and] may include direct (e.g. contamination or physical disruption), indirect (e.g. loss of prey, reduction in species’ fecundity), site-specific or habitat-wide impacts, including

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		individual, cumulative, or synergistic consequences of actions." As such, what causes an "adverse impact" under EFH is more strict than Critical Habitat; and "adverse impact" is applied regardless if there will be a measurable effect to habitat or not. In contrast, Critical Habitat requires a measurable impact to habitat that will degrade its ability to support the associated species in order to entail an "adverse impact." Concerning Lamprey – As per the Aquatics resource report, "…indirect effects to anadromous fish will serve as a proxy for lamprey." Therefore, project effects to salmonids (i.e., Coho, Chinook, and steelhead) are expected to be broadly similar to effects to lamprey. Language in section 3.4 of the final EIS has been modified to better reflect that lamprey analysis is similar to salmonids.