Hayden Fox Environmental Assessment
#DOI-BLM-OR-L040-2013-04-EA

United States Department of the Interior
BUREAU OF LAND MANAGEMENT
Lakeview District - Klamath Falls Resource Area

ABSTRACT: The following Environmental Assessment addresses the environmental effects associated with a variety of proposed treatments in the Hayden Fox analysis area, located in the southwestern portion of the Bureau of Land Management (BLM) Klamath Falls Resource Area (KFRA). Proposed treatments include commercial timber harvesting, small diameter (understory and plantation) thinning, tree planting, fuels reduction treatments, juniper removal, brush mastication, road actions, and noxious weed treatment.

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The Bureau of Land Management is soliciting comments on this Environmental Assessment. Comments, including names and street addresses of respondents, will be available for public review at the above address during regular business hours. Before including your address, phone number, e-mail address, or other personal identifying information in your comment, please be aware that your entire comment – including your personal identifying information – may be made publicly available at any time. While you can ask us in your comment to withhold your personal identifying information from public review, we cannot guarantee that we will be able to do so. All submissions from organizations or businesses, and from individuals identifying themselves as representatives or officials of organizations or businesses, will be made available for public inspection in their entirety.

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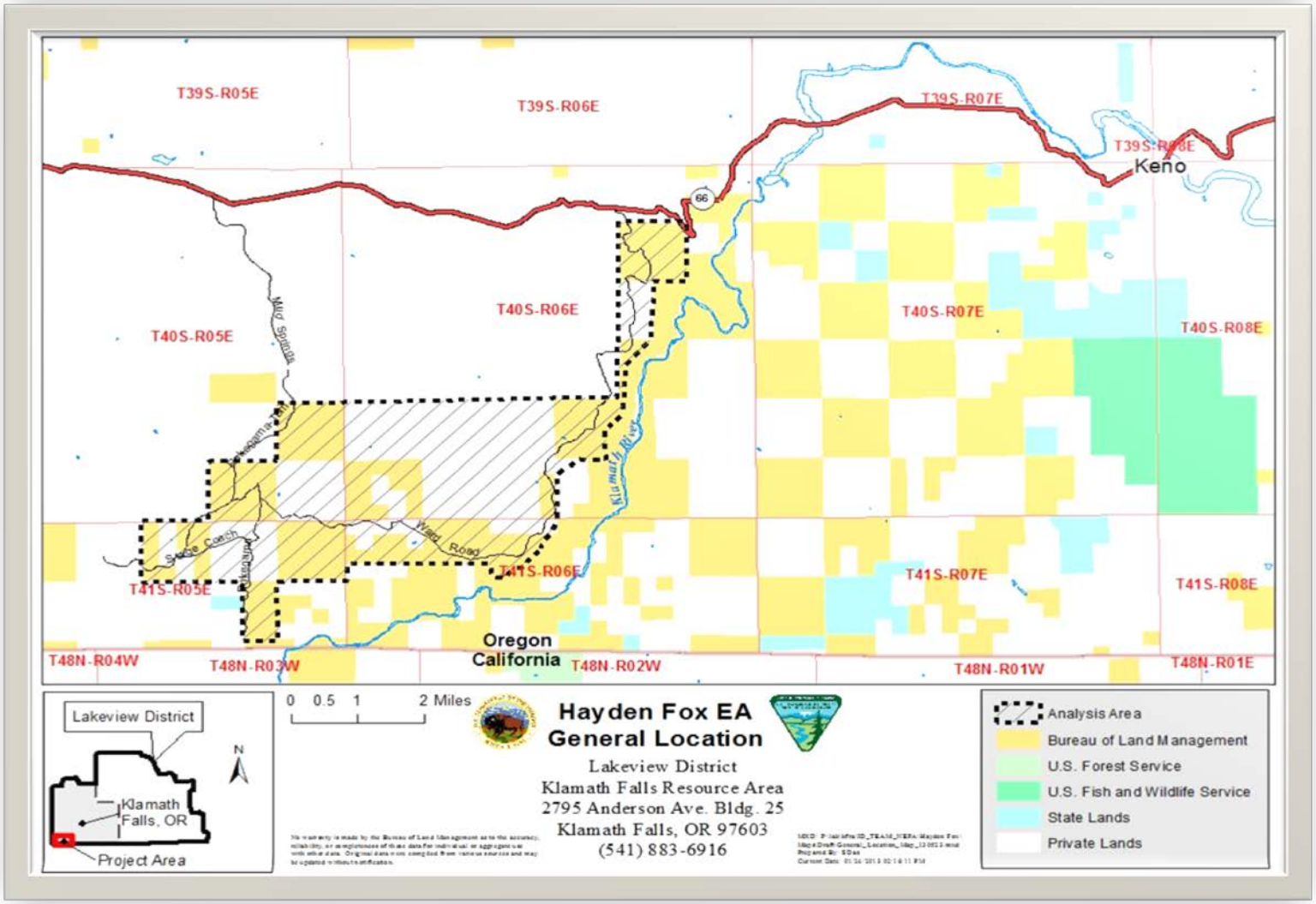
Figure 1. General Location Map of the Project Area



1 INTRODUCTION

The Klamath Falls Resource Area (KFRA) of the Lakeview District, Bureau of Land Management (BLM) is proposing to implement vegetation treatments on approximately 2,250 acres in the Hayden Fox project area. This environmental assessment (EA) analyzes the effects of the proposed actions and alternatives in the project area, located in the southwestern portion of the KFRA (see Figure 1, General Location Map). To meet the purpose of the project, the action alternatives consider varying amounts of thinning, brush mastication, and hazardous fuels treatments.

The Hayden Fox analysis area is approximately 11,830 acres in size, including 5,280 acres of BLM O&C Lands (designated under the Oregon and California (O&C) Lands Act of 1937, allocated for timber production), and 600 acres of BLM Public Domain (PD) Lands. The project area is located south of Highway 66, west of the Klamath River, east of the Klamath/Jackson County line, and north of the California state border.

1.1 Management Direction and Conformance with Existing Plans

Initial direction for this project comes from the land use allocations, management direction, and objectives of the 1995 Klamath Falls Resource Area Record of Decision and Resource Management Plan (RMP). Table 1 displays the acreage and summary of RMP objectives by land use allocation in the Hayden Fox project area. See map of land use allocations in Appendix A.

Table 1. Summary of RMP Objectives by Land Use Allocation in Hayden Fox Project Area

Land Use Allocation	**Approximate acres in project area (out of 2,250 acres proposed for treatment)**	**Definition/Objectives from 1995 RMP**	**Page numbers in RMP**
Matrix (General Forest Mgmt. Area)	2,026 acres	As stated in the RMP and Oregon and California (O&C) Lands Act of 1937, Matrix (General Forest Management Area) lands have objectives to produce a sustainable supply of timber and other forest commodities to provide jobs and contribute to community stability.	pp.22-23
District Designated Reserve (DDR)	213 acres	In District Designated Reserves (DDRs)/Late Successional Reserves (LSRs), treatments are designed to protect and enhance conditions of late-successional and old growth forest ecosystems, which serve as habitat for late-successional and old growth forest-related species including the northern spotted owl.	pp.18-22
Riparian Reserves (RR)	150 acres	Riparian Reserves (RR) are lands along streams and unstable and potentially unstable areas where special standards and guidelines direct land use. Goals are to meet Aquatic Conservation Strategy (ACS) objectives.	pp.12-18
Area of Critical Environmental Concern	26 acres	Objectives for Areas of Critical Environmental Concern (ACECs) are to maintain, protect, or restore the values for which the ACEC was designated.	pp. 41-42

Management direction and recommendations for project design and implementation are also contained in a number of supporting documents, including the following:

- Record of Decision and Standard and Guidelines for Amendments to the Survey and Manage, Protection Buffer, and other Mitigation Measures Standards and Guidelines (2001)
- Survey and Manage Settlement Agreement, July 6, 2011, Conservation Northwest et al. v. Sherman et al., Case No. 08-1067-JCC (W.D.Wash)
- Revised Recovery Plan for the Northern Spotted Owl (USDI FWS 2011)
- Final Rule for Designation of Critical Habitat for Northern Spotted Owl (USDI FWS 2012)
- Vegetation Treatments Using Herbicide on BLM Lands in Oregon FEIS (July 2010)
- Topsy/Pokegama Watershed Analysis (1996)

1.2 Purpose and Need for Action

The BLM has a statutory obligation under Federal Land Policy and Management Act (FLPMA), which directs that the "Secretary shall manage the public lands in accordance with the land use plans developed by him under section 202 of this Act when they are available . . ." The KFRA RMP of June 1995 is the current land use plan that guides and directs management on these lands. The purpose of the Hayden Fox project is to implement actions to meet the objectives of the RMP, which include the following:

- Produce timber and other forest commodities
- Improve the resiliency of forest stands from drought, insect, and disease
- Reduce hazardous fuels to lower the risk of high intensity, stand-replacing wildfires
- Improve big game winter range
- Prevent the spread of known noxious weed populations
- Remove juniper to increase available water for preferred vegetation and forage for wildlife species
- Improve the condition of the existing transportation system as needed to facilitate forest product removal.

The proposed actions are designed to meet the objectives of the 2011 Northern Spotted Owl (NSO) Recovery Plan and the Designated Critical Habitat rule (2012).

Need

There is a need to offer commercial timber products and other forest commodities to support local and regional timber-related businesses. The majority of acres in the project area are designated as Matrix (see Table 1 for objectives on Matrix lands).

There is a need to reduce tree stocking level densities to improve growing conditions (reduce competition for water, nutrients and light) and increase the vigor of the remaining trees. Field observations and timber stand data show that many of the existing stands in the proposed project area are presently overstocked and have reduced annual growth. Trees within densely stocked stands are generally more susceptible to stress and vulnerable to attack by insects and diseases.

There is a need to reduce the overall hazardous fuel loading in the area. Throughout the 20th century, fire suppression and livestock grazing has effectively eliminated fire from the landscape. Due to this suppression, conditions have become favorable for numerous small trees, shrubs, and other vegetation to become established (Hessburg et al. 1995; Lehmkuhl et al. 1994 in USDI BLM 2003, 100). This resulting increase in surface, ladder, and crown fuels contributes to the risk of a stand replacing fire (Huff as stated in USDI BLM 2003, 100).

There is a need to prevent the further spread of encroaching juniper, decadent brush, and undesirable noxious weeds in the planning area to lessen competition with native plant species that may be important for big game winter range and grazing uses.

There is a need to manage vegetation conditions to help attain Aquatic Conservation Strategy (ACS) objectives in the Riparian Reserves (RR). The proposed road improvements to facilitate forest product removal are needed to help attain ACS objectives while ensuring that the aquatic resources are not diminished as a result of poor road management (USDI BLM 2003, p.130). The location and condition of the road network to, and within, the project area can have negative land management effects on water quality and habitat quality (USDI BLM 2003, p.72).

There is also a need to consider the recommendations of the 2011 Revised Spotted Owl Recovery plan (RRP; USDI FWS 2011). This plan utilizes the habitat reserve network (Late Successional Reserves (LSRs), etc.) from the Northwest Forest Plan (NWFP) as the basis for a habitat conservation network for the spotted owl. There are two LSRs (identified as Un-Mapped LSRs in the 1995 RMP) in the project area (approximately 100 acres each), and the project falls within the East Cascades Province/Recovery Unit.

1.3 Public Input Summary and Issue Development

The scoping proposal was mailed to adjacent landowners, permittees, agencies, and other interested parties on January 25, 2013. Notice of the public scoping letter was published in the *Herald and News* on January 31, 2013. The project was listed in the KFRA Planning Update in the Summer 2013 edition. As a result of scoping, the BLM received five letters from interested parties. All scoping comment letters and emails received can be found in the Hayden Fox EA project file. A summary of scoping comments and responses can be found online on our web page: http://www.blm.gov/or/districts/lakeview/plans/collaborative/hayden/documents.php. The interdisciplinary team reviewed the scoping responses and used the relevant comments in developing alternatives.

Comments, questions, and issues were raised by the public, interested individuals, groups, and BLM's interdisciplinary team. Issues are points of discussion, dispute, or debate about the environmental effects of proposed actions. Issues and concerns raised were considered in the formulation of alternatives, project design features, or environmental effects. Some comments were not related to the decision to be made, were procedural concerns, or were already decided by law, regulation, policy, or direction (such as in KFRA's RMP).

The Council on Environmental Quality (CEQ) National Environmental Policy Act (NEPA) regulations require that agencies "…identify and eliminate from detailed study the issues which

are not relevant or which have been covered by prior environmental review…" (40 CFR 1501.7 (a) (3)). "Most important, NEPA documents must concentrate on issues that are truly significant to the action in question, rather than amassing needless detail" (40 CFR 1500.1).

Issues Presented in Detail

In the NEPA process, issues are further defined as cause and effect relationships based on the proposed action. The interdisciplinary team developed a list of key issues which were used to guide the analysis and develop alternatives for the Hayden Fox EA. The following key issues also represent those issues that the decision maker needs to consider in selecting an alternative:

1. What are the effects of proposed project actions on forest health and stand characteristics?

2. What are the effects of proposed project actions on the spread of noxious and invasive weeds?

3. What are the effects of proposed activities on fire risk and hazardous fuels in the project area?

4. What are the effects of timber harvest and associated activities on the northern spotted owl, suitable habitat, and Designated Critical Habitat?

5. What are the effects of proposed project actions on terrestrial wildlife species (other than the northern spotted owl)?

6. What are the effects of proposed activities on soil compaction and displacement?

7. What are the effects of proposed activities on water quality, peak flow, and hydrologic function?

8. What are the effects of the proposed activities on the attainment of ACS objectives?

9. What are the effects of timber harvest and associated activities on air quality?

10. What are the socioeconomic effects of the proposed activities?

Issues Considered But Not Presented in Detail

The project's interdisciplinary team and public scoping comments raised additional concerns related to resources that had the potential of being affected by proposed project actions. For some issues, such as effects on grazing management, recreation, and visual resources, the IDT conducted substantial analysis, including inventory and assessment, before concluding that the impacts would be negligible, or would have little to no bearing on the decision to be made. For reasons described below, the following issues were not carried forward to be presented in detail in this EA, but are documented further in the project record.

What are the effects of proposed project actions on Cultural Resources?

A file search was performed at the Klamath Falls Resource Area and the results of this review indicate that the project area has partial survey data and illustrates areas requiring new cultural survey. The project area will be surveyed for cultural resources prior to implementation, and all known cultural locations will be avoided by activities during project implementation. Details are filed in the project record.

What are the effects of proposed project actions on Special Status Plant Species, including vascular and non-vascular plants, bryophytes, lichens, and fungi?

Botanical surveys were completed in the field season of 2012 over 1,707 acres in the Hayden Fox EA treatment area, and in 2013 over 563 additional acres. Several populations of a single special status plants were recorded. The BLM Sensitive species, *Limnanthes floccosa* spp. *bellingeriana* (Bellinger's woolly meadowfoam), is currently in consideration for being listed as threatened or endangered in the state of Oregon. It is found in vernally wet areas with 25 historic sites within or adjacent to the proposed units, and 10 newly documented sites (see project record for survey results). A single site of *Arabis davidsonii*, a BLM Strategic species, was historically located in Unit 3-2, but was not recorded in 2012 surveys. There were no Threatened or Endangered plant species nor any Survey and Manage plant species found in the Hayden Fox project area. The BLM Sensitive species that were discovered are found in vernally wet areas, which are already buffered, so there would be no direct effects as a result of any alternative selected.

The BLM is not required to survey for Sensitive fungi or Survey and Manage (S&M) fungi in stands less than 180 years old. There were no stands greater than 180 years old within the proposed unit boundaries, therefore, fungi surveys were not completed in 2012 or 2013. Historic surveys completed in 1999 and 2000 recorded 315 sites of S&M fungi within the Hayden Fox project units. All historic Survey and Manage category A-E fungi sites (3 sites) within units containing stands of over 80 years of age would be protected with buffers, so there would be no discernable impacts to S&M fungi regardless of the alternative selected.

What are the effects of proposed project actions on aquatic species and habitat?

The analysis area has extremely limited perennial water and aquatic species habitat. The Upper Klamath River and Edge Creek are the only perennial waterways that contain habitat for fish and other aquatic species within or near the analysis area boundary. The Upper Klamath River and associated riparian reserve are entirely out of the analysis area. Edge Creek is fish-bearing in this reach and has an appropriate Riparian Reserve buffer. There are no ESA or BLM listed aquatic species in Edge Creek.

Intermittent aquatic habitat does exist in the form of streams and ponds. These include Hayden and Tom Creeks, and Fox, Griffith, Ward and Stockschlager reservoirs. None of these waterbodies contain any ESA or BLM listed aquatic species. Implementation of any of the alternatives with the application of the identified and appropriate BMPs and PDFs are expected to minimize short term impacts to aquatic resources and Riparian Reserves/Riparian Management Areas (See Appendix B for PDFs and BMPs). In the long term, restored and/or maintained riparian forest stand health would be anticipated to maintain, protect and restore aquatic resources and Riparian Reserves/Riparian Management Areas. For the proposed weed treatment, the herbicide imazapyr (a formulation of imazapic for use near aquatic species) would

be applied and aquatic species are not affected by this chemical (Fickenscher, 2013). Nonetheless, specific PDFs are still in place to negate any potential impacts. The proposed actions are consistent with the objectives for Riparian Reserves and the Aquatic Conservation Strategy (ACS) in the 1995 KFRA RMP and would not prevent or retard attainment of any of the ACS objectives in the long term (USDI BLM 1995, pgs. 7-8).

What are the effects of proposed project actions on Greenhouse Gases & Climate Change?

The primary factors leading to the expectation of global warming are substantial increases in atmospheric carbon dioxide, nitrous oxide, methane, chlorofluorocarbons, and other trace gasses. The BLM's proposed land management activities in the Hayden Fox analysis area would primarily only affect the amount of carbon dioxide being released into the atmosphere. The action alternatives would have direct impacts related to harvest of growing trees and release of greenhouse gases through burning of forest residue and fossil fuels, especially through vehicle and heavy equipment emissions. According to modeling data for the project area, emissions from the proposed action would roughly be greater than 36,000 tonnes of CO2. Greenhouse gas emissions from either action alternative, as compared to total U.S. emissions, constitute 0.00000546% of 2011 U.S. emissions, which were 6,700 million metric tonnes of CO2 (www.epa.gov, US Inventory Report). This issue will not be presented in detail in this EA because any alternative selected would have an indiscernible impact on Greenhouse Gases and Climate Change.

1.4 Decision to be Made

This EA will provide the decision maker, the KFRA Field Manager, with a summary of current information on key issues to aid in the decision-making process. It will also determine if an Environmental Impact Statement (EIS) needs to be prepared or if a Finding of No Significant Impact (FONSI) is appropriate.

2- PROPOSED ACTION & ALTERNATIVES

The Interdisciplinary Team identified a Proposed Action, Alternative 1, and a No Action Alternative for the Hayden Fox EA as outlined below.

2.1 No Action

Under the No Action alternative, management activities considered in this project would not occur. Activities proposed in and adjacent to the analysis area that have been analyzed and approved in other NEPA/Decision documents could still occur, such as fuel reduction treatments, road maintenance as needed, forest inventory and surveys, and fire suppression. Selection of the No Action Alternative would not change land allocations or the direction the BLM has to manage these lands. The No Action alternative serves as a baseline or reference point for evaluating the environmental effects of the action alternative.

2.2 Proposed Action

The following treatments have been identified as part of the Proposed Action and are shown on the map in Appendix A:

(1) Thinning-Timber Sale- These units would include thinning trees of all size classes using uneven-aged silvicultural prescriptions. Approximately 1,783 acres of this treatment is proposed. Mechanical harvesting methods would be used to cut and remove designated timber. Group selection (gaps) would be used to reduce tree densities within areas of less than five (5) acres to levels required for preferred species regeneration. This tool helps create variability within the stand while treating insects and disease, promoting early seral habitat and adjusting species composition. Patch cuts are proposed in up to 15% of the total acreage. Thermal clumps would be implemented on up to 15% of the total acreage. These areas may also be treated with understory thinning, oak thinning, hazardous fuels reduction, conifer planting, and juniper removal where applicable. Other elements of this treatment include mistletoe retention in clumps and retention of individual trees with desirable mistletoe structure for wildlife. Whole tree yarding would also be required.

One unit (26 acres) is within the Upper Klamath River Area of Critical Environmental Concern (ACEC). Treatments are proposed in the ACEC to increase stand health and vigor and include conifer thinning, oak thinning, and prescribed fire. These treatments would not degrade the historic, cultural, and scenic values and would maintain the fish, wildlife, and botany habitat values for which this ACEC was designated in 1996. Treatments to promote late successional forest structure are proposed within two District Designated Reserves (DDRs)/Late Successional Reserves (LSRs), Dixie and Hayden Creek, totaling 213 acres.

Riparian Reserve (RR) treatments are proposed to advance Aquatic Conservation Strategy objectives, and are analyzed for all Timber Sale units with RRs. The proposal is to mechanically treat the outer half of the riparian reserves in one timber sale unit. The acre figure above (1,783) includes RR treatment acres. No timber harvest treatment is proposed for the inner half of the riparian reserves under this alternative.

(2) Thinning- Plantation Thin- This treatment refers to thinning of plantation trees in previously planted stands. Approximately 177 acres of this treatment are proposed. These stands are typically younger (30 to 50 years old) than most natural stands, are less variable in diameter distribution and species composition (mostly ponderosa pine), and are more evenly spaced. Mechanical harvesting would be used in these stands to cut and remove designated trees. Riparian Reserve Treatments proposed in these units are the same as those for “thinning- timber sale” units.

(3) Brush Mastication- Mechanical mastication of brush is proposed on approximately 182 acres to improve forage conditions for deer and other wildlife species. This treatment would also include the mastication of western junipers not meeting the older juniper definition (found in Project Record) and mastication/thinning of clumps of small diameter oaks. All other conifers would be retained within mastication units that are within timber stands or where timber stands existed as indicated by presence of large stumps. Where brush mastication units abut timber sale /plantation thinning/understory thinning units, the brush mastication treatment may be extended into the adjacent treatment/sale unit up to 100 feet. Conifers other than junipers would not be masticated within this extended area.

Riparian Reserve (RR) treatments are proposed to advance Aquatic Conservation Strategy objectives, and are analyzed for all brush mastication units, but may not be implemented in all depending on unit by unit need. The proposal is to treat the full riparian reserve (inner and outer half) in these brush mastication units, following applicable PDFs (see Appendix B).

(4) Hazardous fuels treatments- Hazardous fuels treatments are proposed throughout the project area including prescribed fire and brush mastication. Fuels treatments in the form of prescribed fire would occur in the full Riparian Reserve within existing units.

(5) Weed treatment- The Proposed Action includes noxious weed treatment in the units listed in Table 2, totaling approximately 51 acres. The BLM would manage these populations of medusahead rye with a prescribed burn, followed by pre-emergent application of imazapic (trade name Plateau), then seed with native perennial grasses.

Table 2. Locations of medusahead rye treatment

Section	Unit(s)	Acres of Treatment (approximate)
1	1-1, 1-1C, 1-2	4
5	5-1C, 5-3P	13
6	6 -1C	10
4	4-1	1
11	11-2x	1
25	25-1C	1
27	27-1, 27-1P	15
31	31-1C, 31-2C, 31-3C, 31-4x, 31-5x	4
33	33-1	1
35	35-1C, 35-2, 35-2C	1

(6) Tree Planting- Following timber sale treatments, areas that are understocked (i.e. group selection areas)-or where natural seeding is expected to be inefficient, may be planted with pines, Douglas-fir or incense cedar seedling trees.

(7) Roads - No new road construction, obliteration, or new closures are proposed. One culvert located in Section 3 is proposed for replacement. Replacement of this culvert is expected to temporarily interrupt traffic on the 41-5E-4.0 road. However, through traffic can still travel on the 40-5E-34.0 road located to the north. Existing roads would be used to remove forest products, and associated road maintenance and/or renovation would be done to keep the roads from degrading during hauling of materials and to maintain safe driving surfaces. Further, select interconnected roads on private lands would also be used to access various pieces of the project area, and associated maintenance would be done on these roads in the event of the proposed removal of forest products.

2.3 Alternative 1

Alternative 1 was developed to maintain all northern spotted owl (NSO) nesting, roosting, foraging habitat, as well as in response to comments received during the scoping process (see

Table 3 for comparison of alternatives). The footprint of Alternative 1 is smaller than the Proposed Action because some units or portions of units are not proposed for treatment under this alternative (see Alternative 1 Map in Appendix A). Treatments in Alternative 1 are identical to the Proposed Action with the exception of the differences described below:

(1) Thinning-Timber Sale

- Approximately 1,160 acres are proposed for treatment.
- All trees greater than 21" in diameter would be retained.
- All stands greater than 120 years old would be retained.
- There would be no downgrade of current northern spotted owl nesting, roosting, foraging (NRF) habitat.
- Approximately 10% of tops of harvested trees would be left in the stand, as opposed to whole tree yarding all severed trees.
- Riparian Reserves would not be mechanically treated under this alternative in timber sale units.

(2) Thinning- Plantation Thin- Riparian Reserves would not be mechanically treated under this alternative in plantation thin units.

(3) Thinning- Small Diameter- Thinning trees 3" DBH up to a maximum of 10" or 12" DBH (depending on the unit) is proposed on approximately 317 acres, in units identified in the Alternative 1 map (Appendix A).

(4) Weed treatment- Under Alternative 1, there would be no imazapic herbicide use to treat weeds.

(5) Roads - A reduction in road density is proposed in Alternative 1. Roads that are not needed to complete the Hayden Fox project actions or those needed in the forseeable future would be closed. Focus would be on closing (blocking) four small road spurs or unsurfaced "shortcut" connector roads in the project area on BLM. The road closures would total 1.04 miles. Roads would not be closed in areas that would prevent private landowners from accessing their property that is interspersed with BLM lands within the project area boundary. The condition of the road system would be improved, including renovation and slight re-alignment as needed for forest product removal.

2.4 Actions Considered, But Not Analyzed in Detail

Tractor piling fuels vs. underburning

A scoping comment was received that suggested tractor piling as an alternative to underburning for slash disposal. The commenter stated that tractor piling can drastically reduce costs and can

be very effective in treating high fuel loads, and that it should be analyzed in an alternative. Tractor piling was not analyzed in detail because due to the whole tree harvesting that is proposed, there would be very little slash to treat.

Use of "gap" treatments in Riparian Reserves

A scoping comment was received related to cutting all trees in gap utilization for use in riparian reserves. After field review of the Riparian Reserves in the project area, it was determined by the interdisciplinary team that gap creation is not needed or appropriate in those areas due to the natural breaks in vegetation. Therefore, this action was not analyzed in detail.

2.5 Comparison of Alternatives

Table 2 (below) is an overview of the treatments proposed for each action alternative. In summary, Alternative 1 includes approximately 10% less acreage for mechanical treatment than the Proposed Action (1,913 vs. 2,198 acres). This difference is due to a number of stands that are not proposed for treatment in Alternative 1 because of their land designation (i.e. DDR), or because they are over 120 years old.

Table 3. Overview of Treatments Proposed by Alternative

Area or Treatment		Proposed Action	Alternative 1	Common to Proposed Action and Alternative 1
Timber Sale Units		1,783 acres	1,166 acres	Density Management
	Riparian Reserves (RR)	Commercial mechanical treatment in outer half of RR using “gaps” and thinning	No mechanical treatment in RR (utilize prescribed fire only if needed)	
	Mistletoe	Mistletoe retention in clumps and individuals w/ good mistletoe structure	Retain all large diameter (>21”) trees affected with mistletoe	
	ACEC			Commercially thin conifers, thin oaks, prescribed fire
	Stand age	Thin throughout all age classes	Retain all stands > 120 years old	
	Diameter Limit	No Diameter Limit for Thinning Treatments	Utilize 21” Diameter Limit for Thinning Treatments	
	Understory Thinning			Mechanically thin understory
	Planting			Plant conifers
	Tree Tops	Whole tree yard with tops attached	Cut and leave 10% of tops of whole harvested trees in stand	
Plantation Thinning		177 acres	177 acres	Mechanically thin plantations
	(RR)	Mechanical treatment in outer half of RR using “gaps” and thinning	No mechanical treatment in RR (utilize prescribed fire only if needed)	
NSO Nesting, Roosting, Foraging (NRF)		NRF stands would be downgraded	No downgrade of current NRF habitat	
Juniper Treatment				Mechanically treat juniper in TS and plantation
Fuels Treatment				Treat fuels with prescribed fire, and brush mastication
	(RR)			Prescribed fire in RRs if needed
Brush Mastication		149 acres	149 acres	Mechanical mastication of brush, small diameter western juniper, some small conifers, and oaks
	(RR)	32 acres	32 acres	Mechanical mastication of riparian reserves adjacent to vernal wetlands
Weed Treatment		Treat known weeds with prescribed burn, followed by imazapic herbicide, and native seeding (51 acres)	No weed treatment	
Roads		No road closures	Reduce road density by closing 4 road spurs (1.04 miles total)	Renovate some roads, minor re-alignment on tight corners
Planting				Areas that are understocked following treatment (i.e. group selection areas) may be planted with pines, Douglas-fir or incense cedar.

3- AFFECTED ENVIRONMENT AND ENVIRONMENTAL CONSEQUENCES

The affected environment reflects the existing condition that has developed from all past natural events and management actions within the project area (or 5th field watershed). It is a combination of natural and human-caused fires, fire suppression, road building, timber harvesting, grazing, fuel reduction treatments, and the effects of recreational use. The current condition assessed for each affected resource is a result of all past natural events and management actions. It is therefore unnecessary to individually catalog all past actions in this EA. Such detail would be irrelevant to making a rational decision among alternatives. The important value of this EA is to assess and display for the deciding official the impacts of the alternatives on those resources as they exist today, to allow a determination if the resulting project effects and/or cumulative effects are either significant or are greater than those analyzed in the RMP EIS.

3.1 What are the effects of proposed project actions on forest health and stand characteristics?

Affected Environment

The project area has a mixed conifer vegetation type with grasses, forbs, and shrubs (primarily manzanita and *Ceanothus* spp.) in the understory. Shrub density varies according to the amount of overstory cover and dense shrubfields generally dominate early seral habitat. The forest ranges from dense cover with down woody debris to a more open canopy with mainly grasses and shrubs in the understory. Forested lands in the proposed treatment area contain mixed species (primarily ponderosa pine and Douglas-fir, with smaller components of incense cedar, white fir, sugar pine, western juniper, Oregon white oak and California black oak). These stands are multi-aged and multi-layered. Tree ages vary from one year old seedlings to dominant overstory trees over 200 years old. From the 1950's through the present, most of these stands were entered at least once for selective thinning and overstory removals. Many of the conifer-dominated stands have been selectively cut leaving an array of trees sizes and ages. There are some areas within the project area where most of the larger and older overstory trees have been harvested and the residual stands are a dense, multistoried mix of remnant trees and second growth. Throughout the project area there are scattered ponderosa and lodgepole pine plantations.

Plant associations are all moist Douglas-fir associations. Overstory trees for these plant associations generally consist of Douglas-fir, ponderosa pine, incense cedar, and white fir, as is the case in these stands. Although they may be referred to as moist in the plant association description, moist Douglas-fir plant associations are considered to be at the drier end of the plant association spectrum and are considered dry plant associations by Johnson and Franklin (2009).

The units in the majority of the project area vary from 3,500 to 4,500 feet in elevation. These units are dominated by Douglas-fir and ponderosa pine and have a much lower proportion of white fir than the units at higher elevation. The species composition of the lower elevation units is very similar to historical species composition (Leiberg 1900); however there have been some

shifts. Incense cedar has increased dramatically when compared to historical levels. Douglas-fir has increased in the more northern units and pine has decreased. White fir, which has increased dramatically in other areas of the resource area, shows only a slight increase. Sugar pine has all but disappeared from the area when compared to historic levels. Further discussion of forested stands in the proposed treatment area can be found in the Topsy/Pokegama Landscape Analysis, 1996 (Forest Composition section, pp. 17-24, and Ecosystem Structure and Function section, pp. 27-34), which is incorporated by reference.

Stand metrics vary widely both between and within units. The forest stands are made up of a mosaic of clumps and gaps. Average TPA (Trees per Acre) for the timber sale units is 178. Average quadratic mean diameter (QMD) is 14 inches. Basal area varies from 28 to more than 300 sq. ft./ac. The average basal area for all of the timber sale units is 121 sq. ft./ac. Average canopy closure for all timber sale units is 52%. The average total snags per acre for all of the timber sale units was 4.3 (3.2 snags <16”dbh and 1.1 snags > 16”dbh). The average coarse woody debris is 450.5 ft/ac less than 19 ft. long and 127.5 ft. /ac greater than 20 ft. long. All data taken from stand exams of the proposed units (see details in project record). Ages vary widely throughout the project area. Refer to Table 4 for a distribution of age classes throughout the project area. Many stands are uneven aged and have a wide variety of ages of trees in a single stand. Figure 2 shows the species distribution of the timber sale units. The current process for determining stand age for the KFRA, and individual stand metrics for each unit, can be found in the project record.

Figure 2. Species and size class distribution in the timber sale units

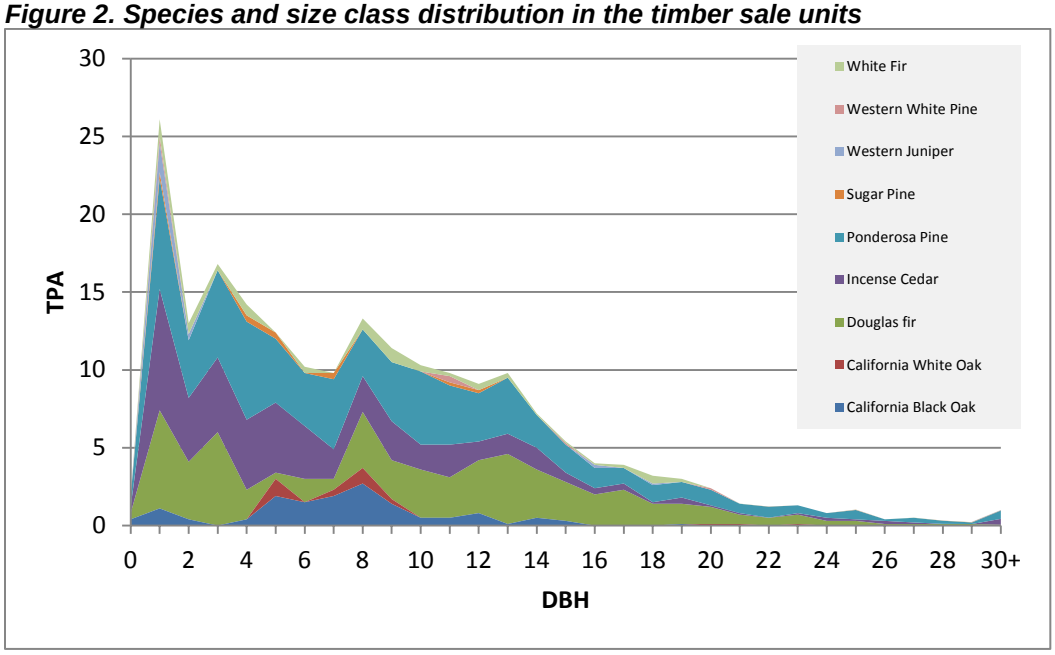


Table 4. Land ownership and Age Class Structure in the Hayden Fox project area

Owner	Age Class	Total Acres	% of BLM Land	% of Project Area	Acres Proposed for Treatment	% of Treatment area in BLM land
BLM Non-forested Land		310	5%		13	0.6%
BLM Forested Land	0-20	301	5%		130	6%
BLM Forested Land	30-80	924	17%		509	25%
BLM Forested Land	90-150	3477	63%		1325	64%
BLM Forested Land	160+	521	9%		100	5%
Total BLM Land		5534		69%		
Private Land		2529		31%		
Total Project Area		8063				

There are a number of insects that can cause damage to individual and groups of trees within these stands, including western pine beetle, mountain pine beetle, and fir engraver beetle, (*Scolytus ventralis)*. Density control is the most common recommendation for reducing mortality from these insects. Douglas-fir tussock moth can cause damage to Douglas-fir and true firs on low elevation late seral stands that were traditionally ponderosa pine (Simpson 2007) or on warm, dry sites. This would be typical of most of the project area. The best prevention of outbreaks would be species conversion to a species more appropriate for the site. Both species may also target pines. Additional stress from defoliator damage can often lead to damage by bark beetles or root disease.

Tree pathogens are also present within the project area. Dwarf mistletoe (*Arceuthobium* spp.) is caused by a parasitic plant that attacks conifers and occurs throughout the project area. Mistletoe brooms create microhabitat preferred by nesting northern spotted owls; at the same time, however, the disease is highly infectious in stands, deforms trees inducing bole and branch cankers that result in timber volume loss, and can kill trees. Dwarf mistletoe can be heavy in Douglas-fir and ponderosa pine and can cause both growth loss and mortality (Hopkins 1979). Young stands that are heavily infested will not develop into a large, tree dominated forest (Simpson 2007).

Root diseases such as Annosus, *Armillaria*, and laminated root rot are the most common in this area and occurred on 36% of plots examined (Simpson 2007). Annosus and *Armillaria* are the most common and tend to have the greatest mortality effect in stands of late successional true fir and where previous management has occurred.

Forest Vegetation- Environmental Consequences

Methodology

Forest Vegetation Simulator (FVS) was used to model a 100 year period with specific treatments repeating every 30 years. As the majority of these lands are matrix lands, meant to be managed for sustainable yield, it is expected that future harvests will occur on these lands. The No Action Alternative does not model any treatments within the 100 year period. Units were categorized to represent the types of stands present in the project area. The 3 model input units are described as

dense; denser fir dominated stands in the area, *average*; an average density management stand with a wide variety of species and tree sizes and *dry*; representative of some of the less dense, drier pine sites. Model results will refer to these stands as dense, average and dry, respectively. This model is used to compare different treatments as applied to the same stands. It is not intended to provide accurate quantitative estimates of forest metrics, either post treatment or in the future.

No Action

Under this alternative, there would be no immediate timber harvest in the project area. Modeling for treatment units in the action alternatives shows that, without any treatments, an increase in volume and stand density would occur in all units. In the dense and average units, stand density increases for about 20 to 40 years and then levels off and begins to decrease. This indicates that these stand's carrying capacity would be reached in 20 to 40 years before the stands begin to self-thin. In the average units, overall growth would be reduced after 20 years as competition for common resources (water, light and nutrients) increases. In the dense units, growth begins to decline immediately. In the dry units, growth increases for about 50 years. Average stand diameter increases in the dry stands. In the average stands, stand diameter increases approximately one inch over the 100 year period. In the dense stands, average stand diameter decreases over this time period. This is likely because the stands become so dense, that tree growth stagnates.

Modeling also indicates that over time, stands will become more and more fir dominated. This is especially true of stands that contain white fir, as shade tolerance allows it to thrive under a thick canopy. As fir increases in the stands, ponderosa pine decreases. This would move many of these stands further away from their historic species composition and stand structure.

Forest stands would grow denser, making them more susceptible to insect and disease attacks and increasing density-dependent mortality. This is especially true in the Hayden Fox project area as it is drier than much of the resource area and therefore, more susceptible to damage agents (Eglitis et al. 2012). Mortality from insects is expected to continue under this alternative, resulting in increased fuel loadings of dead material, both standing and ground level. This would potentially increase the severity of any wildfire that would take place.

Dwarf mistletoe infected trees will be retained in all stands. This will allow the spread of mistletoe to non-infected trees and impact the development of seedlings and saplings located near infested trees. Mistletoe is likely to continue to spread throughout stands where it is present.

Stands proposed in the action alternatives for understory or plantation thinning would be especially prone to fire risk if the no action alternative is implemented. Without treatment, ladder fuels will continue to accumulate which would lead to higher mortality in the event of a fire.

This alternative would also fail to improve resiliency to drought, insects and disease, reduce fuel loading and the likelihood of high intensity wildfires, and utilize materials from treatments to produce forest commodities.

No Action- Cumulative Effects

Considering the 5th field watershed scale, the greatest vegetation change would be, and has been, on private lands. Industrial forestry (private land) objectives involve shorter rotations resulting in a higher percentage of early seral stands. Even-aged management on private lands usually results in young stands of seedlings, saplings and pole-sized material, typically ponderosa pine. Over time, these stands generally develop into a mosaic of even-aged ponderosa pine stands distributed over the landscape with scattered natural second growth.

Although some of the BLM units have been previously thinned, BLM forest lands in the area would continue as relatively dense stands, with increased mortality from bark beetle attack, resulting in an increased amount of forest fuels. The risk of stand replacing fires on these lands would also continue to increase.

Proposed Action

The treatments are designed to promote shade intolerant species, maintain or promote a multistoried stand, and to improve forest resiliency to fire, insects and disease by reducing stand density. Prescriptions are site specific and based on stocking guidelines taken from Cochran et al. 1994 and Cochran 1998. These stocking guidelines were recommended by the local forest pathologist. These guidelines would maintain the stand at a low enough density to reduce the risk of density-dependent mortality due to insects and disease, especially in the instance of a drought.

Under this alternative, conifer trees will be removed from all diameter classes. This will leave a residual stand with less density and a variety of diameter classes. Species preference will focus on removing white fir where it is present at higher density than historical records indicate. This will restore species composition to historic levels, leaving a residual, uneven-aged stand with trees of a variety of species and sizes.

In areas where the gaps are implemented, post-harvest stocking would be evaluated and the gaps wouldwould be planted with conifers or left to regenerate naturally, depending on surrounding seed sources. The openings created by the gaps would allow for the establishment of a new cohort of trees. The combination of density management and group selection would create a more heterogeneous stand structure. Likewise, leaving skips (unthinned areas) would ensure a more heterogeneous residual stand.

According to the Forest Vegetation Simulator (FVS) model, stand density and volume would fluctuate with each harvest (every 30 years) over a 100-year period. These regular harvests keep the stands below recommended stocking and stand density levels. These levels are recommended in order to keep the stand from exceeding its carrying capacity and to reduce the danger of large scale mortality loss as a result of insects that favored stressed trees. Residual volume increases over time in the dense stands, remains constant in the average stands and is reduced slightly in the dry stands. Stand density stays fairly constant over time for the dry stands and the average stands, but decreases over time in the dense stands. This decrease in stand density (with an increase in volume in the dense stands) indicates that larger trees are taking the place of many smaller trees.

Growth would decrease in the dense stands, stay constant in the average stands, and increase in the dry stands. This indicates that over time, additional larger trees would develop in the denser stands and additional younger trees would increase growth in the dry stands. The most growth would occur in the dry stands and the least growth would occur in the denser stands. In comparison with Alternative 1, more growth would occur in the proposed action.

In the Proposed Action, stand diameter would increase slightly (1" DBH) in the average stands, decrease slightly in the dense stands (2" DBH), and fluctuate within 1" DBH in the dry stands over the 100 year period. In comparison to Alternative 1, the average remaining stand diameter would be lower in the proposed action because more of the smaller trees would remain in the stand.

Mortality in the stands would be reduced with every harvest and then would increase over time until the next harvest. The highest levels of mortality occur in the average stands under this alternative. In all stands mortality levels are 20 to 30% of the mortality for the No Action Alternative. Regular harvests reduce the risk of mortality within the stand and allow that mortality to be captured and used as forest products. In comparison with Alternative 1, there would be slightly higher mortality in the proposed action towards the end of the 100 year period.

The highest volume per acre over time would come from the average stand. The highest initial volume per acre would come from the dense stand. Volumes remain similar over the 100 year time period when the three stand types are compared. In comparison with Alternative 1, more volume would be harvested in the proposed action. More residual volume would be retained in Alternative 1.

Some mistletoe infected trees would be retained in all stands. Mistletoe would be retained in clumps or in large single trees in which the mistletoe brooms create desired wildlife structure. Scattered mistletoe infected trees would be removed. In areas where mistletoe is retained, this would allow the spread of mistletoe to non-infected trees and impact the development of seedlings and saplings located near infested trees. In areas where mistletoe is eliminated, it is likely that spread to other trees would be reduced. Mistletoe is likely to continue to spread throughout stands where it is present, however these areas would be reduced by the removal of scattered mistletoe infected trees.

Gaps (group selection < 5 acres) would be implemented in areas with insect or disease issues in order to reduce the spread of pathogens or insect mortality. The RMP directs that forests be managed in such a way that tree disease does not increase within the stand, but that wherever possible infected trees would be used to meet structural objectives (RMP p. E11). Regular harvests and treatment of pathogens are necessary to maintain forested stands that can be harvested to maintain a sustainable supply of timber.

Plantation and understory thinning would be performed under this alternative, which would lead to a reduction in ladder fuels and stand density. This would lower the mortality levels, as compared to the no action alternative, in the event of a fire.

If large (>16” dbh) snags were created in the timber sale units, it would reduce the number of large, live overstory trees. These are generally young stands that are deficit in both large trees and snags (see Figure 2, Distribution of Size Classes). The RMP snag guidelines were generated with older stands in mind and these stands need to age more before they can produce RMP levels of both large live trees and snags. Snags that are created would be at or above the average stand diameter in order to be representative of the stands. All existing snags would be maintained (with the exception of snags that pose an immediate safety risk) and if necessary, snags of an appropriate size relative to the stand itself, would be created.

In summary, this alternative would improve resiliency to drought, insects and disease, reduce fuel loading, restore fire-dependent processes, restore historic stand structure and composition and utilize materials from treatments to produce forest commodities.

Proposed Action - Cumulative Effects

The Topsy/Pokegama Watershed Analysis (TPWA 1996) describes the events that contributed to the current condition such as early hunting/gathering by aboriginal inhabitants, mining, road building, agriculture and water diversions, wildfire, and timber harvest. Forested vegetation zone descriptions can be found on pages 17-34 in the TPWA. Approximately 37% of the acreage proposed for treatment in the Proposed Action was harvested in the past 10 years with a thinning prescription.

Potential future harvesting and fuels treatments on BLM lands within the watershed would have similar impacts on the timbered stand density and canopy closure as described in the Proposed Action. These types of actions were analyzed for the Matrix and Riparian Reserve land use allocations in the KFRA RMP Final Environmental Impact Statement (FEIS) (Biological Diversity 4-24 to 4-32, Ecosystem Health 4-32 to 4-33, Vegetation Management 4-35-4-4). Thinning of timber stands would affect the relative abundance of tree species in a stand, but would not affect the overall diversity of species across the landscape. Lower levels of stand density and the use of prescribed fire would result in higher vigor of individual plants and an increase in community and ecosystem stability. Density management called for by the RMP would contribute to the improvement of forest resiliency. The potential future actions mentioned would be within the range of effects described in that FEIS analysis. Potential future recreation and road actions would have little to no effect on upland forest vegetation.

The effect of the proposed action on BLM lands, combined with future actions on private lands would result in no change in age or seral classification of stands on BLM lands within the watershed. Generally, the seral classification of BLM lands would remain mid to late seral as the structural and functional composition of the stands would be maintained after treatment. As stated above, the greatest change in vegetation would likely occur on private lands with an increased percentage of early seral habitat.

Alternative 1

This alternative maintains northern spotted owl (NSO) nesting, roosting, foraging (NRF) habitat, limits harvesting to less than 21” DBH, would not target large diameter (>21”) mistletoe trees for removal, and would not include tree harvest in riparian reserves or late successional habitat (stands >120 years old).

In Alternative 1, trees up to 21” DBH would be thinned. This would leave a residual stand with less density and a variety of diameter classes. Species preference would focus on removing white fir where it is judged to be overly abundant when compared to historic levels. This would move species composition toward historic levels. The residual stand would be an uneven-aged stand with trees of a variety of species and sizes.

Initially, the diameter limit would not make much difference in stand structure when compared with the Proposed Action. Because most of these stands are very young, the majority of the trees (97%) are less than 21” DBH (See Figure 2, Species and Size Class Distribution). As the stands age, and modeled harvests continue, however, focusing harvest on the smaller trees over multiple entries would create a single layer of large trees as opposed to a variety of sizes as results from modeling the implementation of the Proposed Action.

Under this alternative, some stands are reserved from harvest. As a result, the environmental consequences to these stands would be similar to what is described in the No Action Alternative. This is problematic, especially in the denser stands (such as units 3-2, 3-3 and 3-4) which are severely overstocked. These stands would remain extremely vulnerable to insects, disease, and fire.

The FVS model shows that stand density and volume would fluctuate with each harvest (every 30 years) over a 100 year period. These regular harvests keep the stands below recommended stocking and stand density levels. These levels are recommended in order to keep the stand from exceeding its carrying capacity and to reduce the danger of large scale mortality loss as a result of insects that favored stressed trees. Residual volume and stand density stay fairly constant over the 100 year period. Residual volume increases slightly in the dry stands over time. Growth decreases in all of the stands, likely because the younger trees that would have higher growth rates are removed in each harvest. Additionally overall growth is lower in Alternative 1than in the Proposed Action.

Average stand diameter would increase slightly for all of the stands, but the dry stands would show the greatest variation (about 2” DBH) over the 100-year period. This increase is due to the smaller trees being eliminated (over 100 years) from the stand leaving only the larger trees.

Mortality in the stands would be reduced with every harvest and then would increase over time until the next harvest. The highest levels of mortality occur in the average stands under this alternative. In all stands mortality levels are 20 to 30% of the mortality for the No Action Alternative. Regular harvests reduce the risk of mortality within the stand and allow that mortality to be captured and used as forest products. Alternative 1 has slightly lower mortality levels over time than the proposed action.

Alternative 1 would produce less total volume per acre for all stand types when compared to the proposed action. In addition, 39% of the acres proposed for timber sales in the proposed action are not proposed for timber sales in this alternative. This would reduce the total volume harvested from this alternative.

Mistletoe infected trees would be retained in all stands. This would allow the spread of mistletoe to non-infected trees and impact the development of seedlings and saplings located near infested trees. Mistletoe is likely to continue to spread throughout stands where it is present. Alternative 1 includes plantation and understory thinning, which would lead to a reduction in ladder fuels and stand density. This would lower the mortality levels, as compared to the No Action Alternative, in the event of a fire.

Creating snags in the timber sale units would have similar effects to those described in the proposed action. This alternative would improve resiliency to drought, reduce fuel loading, restore fire dependent processes, and utilize materials from treatments to produce forest commodities on all the units treated. This alternative does not provide treatment for disease within the stand and allows it to spread.

In the long term, this alternative would fail to restore historic stand structure as the diameter limits would create stands that are primarily a single story of large trees rather than a multi storied, uneven aged structure as would be maintained in the proposed action. The 39% of acres not treated under this alternative would fail to meet all of these purposes.

Alternative 1- Cumulative Effects

Overall, the cumulative effects of the treated acres in Alternative 1 would be similar to the proposed action. The cumulative effects on the untreated acres reserved from harvesting and prescribed fire would more closely resemble the cumulative effects of the No Action Alternative. Potential future harvesting and fuels treatments on BLM lands within the watershed would have similar impacts on the timbered stand density and canopy closure as described in the proposed action and would be within the range of effects described in the FEIS (referenced above). Potential future recreation and road actions would have little to no effect on upland forest vegetation.

3.2 What are the effects of proposed activities on the spread of noxious weeds?

Affected Environment

Several populations of noxious weed species are located on BLM lands within the project area. Weed populations are mostly located in roadside habitats or past harvest units, and are primarily associated with physical disturbance. The following noxious weeds were found in the project area during botanical surveys:

- Medusahead rye (*Taeniatherum caput-medusae*), 38 sites, approximately 17 acres
- St. Johnswort (*Hypericum perforatum*), three sites, approximately 2 acres

The Oregon Department of Agriculture Noxious Weed Control Policy and Classification System for 2013 classify these two species as “B” designated weeds (a weed of economic importance that is regionally abundant, but may have limited distribution in some counties).

In addition, the invasive annual grass, North Africa Grass (Ventenata dubia) was found in several locations on two sites, totaling 50 acres, within the project boundary. This grass is not labeled as

‘noxious’ yet, but is in consideration for becoming labeled in the state of Oregon at this time, so these populations are considered in this analysis.

Noxious weeds- Environmental Consequences

No Action

Under the No Action Alternative, the BLM would not implement new management actions that could result in ground disturbance, changes in canopy cover, or importation of noxious weed seeds or plant parts into the Hayden Fox EA project area. Therefore, implementing the No Action Alternative would result in minimal impacts to noxious weeds and allow noxious weeds to continue on their gradual rate of spread. By not treating the medusahead rye, the 51-acres of 38 populations would continue to spread out from this small population into more public and private land, creating larger populations. Medusahead rye exhibits characteristics that allow it to suppress native perennial species. It germinates in late winter and begins growth before the perennial species, thus using available moisture in the upper soil layers. Medusahead rye litter is also high in silica and has a slow decomposition rate that allows it to build up over time and suppress native plants (Bovey et al. 1961). The result is often a dense monoculture of medusahead rye (George 1992). This buildup of litter also increases the potential fire frequency to the detriment of native perennials (Torell et al. 1961, Young 1992, Milton 2004). It also decreases biodiversity, reduces livestock forage production, and degrades ecological function of native plant communities (Davies and Svejcar 2008). A similar effect would be expected to occur for the invasive annual grass, *Ventenata dubia*, which covers approximately 50 acres in two sites.

The No Action Alternative would allow the three St. Johnswort populations, covering approximately two acres, to proliferate and progress at a slower rate due to lack of disturbance from mechanical treatments. These populations would continue to spread through natural mechanisms such as wind, water, wildlife, and natural wildfire events, as well as through non-natural mechanisms such as through recreation (hunting, hiking, ATV/UTVs), and through grazing activities that may take place in the project area.

No Action- Cumulative Effects

Past activities in the Hayden Fox project area that have likely contributed to the introduction and spread of noxious weeds on both private and public lands include road building and vehicular traffic, timber harvest, livestock grazing, wildfire, agriculture, rural land development, mining, and recreational activities. In addition, weeds spread through natural processes such as transportation by wind, water, birds, or animals.

These human-caused activities and natural processes would continue to present risks of introducing new and spreading existing noxious weed populations in the project area. While there is a potential for continuous influx of noxious weeds due to those activities, the BLM has an ongoing program of inventory and treatment of noxious weeds within the Hayden Fox project area. Treatments in the past few years have focused on quarries and road systems. Treatments in those areas, and new areas discovered during surveys in 2012 and 2013, are funded for 2014.

Effects Common to All Action Alternatives

Timber harvest would remove some overstory trees and leave a lower percent canopy. These stands would be vulnerable in the short term to invasion by noxious weeds that are shade intolerant. Management activities which disturb the soil and remove existing vegetation leaves areas open for possible invasion by noxious weeds. Noxious weed seeds or plant parts could be transported from infested areas outside the project area to non-infested areas within the project area on equipment or vehicles used for timber harvest. Vehicles or equipment could spread seeds or plant parts while traveling in and out of the project area along haul routes or between units during timber harvest operations Noxious weed populations have been documented along roads going through the units.

Implementing PDFs (see Appendix B) would reduce the risk of introducing noxious weeds into the project area. These measures are the recommended weed prevention strategies in the action plan developed by the western states BLM weed coordinators, with review and input by 30 individuals from agricultural research services, state agencies, universities, weed societies, and weed advisory councils with backgrounds in weed prevention and control (Bureau of Land Management 1996, 35-40).

Mechanical mastication of brush

Brush mastication in areas of thick *Ceonothus spp.* would create openings in the understory which may be conducive to noxious weed invasion. Some units are in seasonally wet areas where invasive annual grasses such as medusahead rye and *Ventenata dubia* may already be present at low levels. Mowing of brush in these areas may create disturbance where these species can dominate and form monocultures. Noxious weed seed can be carried on equipment and on the clothing of personnel completing the mowing activities and be spread into and amongst the units. Mowing may also create soil compaction which may exclude native vegetation from recovery and allow noxious weeds to proliferate. Implementing PDFs (see Appendix B) would reduce the risk of introducing noxious and invasive weeds into the mowing project area.

Fuels treatments

Fuels treatments such as prescribed fire could potentially increase the spread of noxious weeds. Prescribed fire can be beneficial in the treatment of invasive annual grasses when combined with an herbicide treatment or a treatment of seeding with native perennial grasses. However, when prescribed fire is located near or within a population of invasive annual grasses, it is likely that annual grasses would invade the area post-burn and create a monoculture without the additional treatments. Construction of fireline around treatment units could also spread weeds through moving of seed sources and creating exposed mineral soil during fireline construction. Implementing PDFs (Appendix B) would reduce the risk of introducing noxious and invasive weeds into the proposed prescribed fire units.

Planting conifers

Planting conifers causes minor soil disturbance, which can leave areas vulnerable to noxious weed establishment. Most species of noxious weeds prefer disturbance and are shade-intolerant, however, so in the in the long-term, planting conifers would aid prevention of future populations of noxious weeds to be established.

Proposed Action

Noxious Weed Treatment

Prescribed burning, when used in combination with herbicide application, is an effective management tool for the control of noxious weeds. Medusahead rye has been shown to be reduced after prescribed burning as a stand-alone treatment (Kyser et al. 2008). However, using prescribed burning prior to imazapic application shows a significant decrease in medusahead rye (Sheley et al. 2007, Davies 2010), due to the removal of thatch left over from prior growing years (Kyser et al. 2007). Prescribed burning the areas infested with medusahead rye would remove the thatch layer and allow for the herbicide to penetrate the pre-emergent seed. Prescribed burning prior to imazapic application should not negatively impact the existing native plant community, as it has been used to revitalize perennial grasses by encouraging more above-ground growth (Rau et al. 2008, Blank et al. 1994). Burning in semi-arid environments can result in increased available nutrients and reduce competition for resources from woody species (Sturgis 1993) and increase abundance of perennial herbs (Cook et al. 1994).

The proposed Imazapic application of 6oz/acre would be effective at controlling populations of medusahead rye and *Ventenata dubia*, as long as the Standard Operating Procedures (SOPs) and the label are followed. Pre-emergent applications would take place in the late fall to be effective on medusahead and *V. dubia*, as seeds germinate in the winter. Small, spot treatments in following years may be needed to ensure the seed bed is depleted.

Within the proposed herbicide application area (see Table 2), the proposed action to seed native perennial grasses provides the highest likelihood that perennial vegetation would establish and persist to carry out ecological processes. If establishment is successful, there would be green plants through much of the growing season. This breaks up the uniform fuel conditions created by invasive annual grasses that typically become dry and flammable by the end of June. Thus, even in poor production years, there would be plants present to protect the soil. While medusahead rye produces a dense ground cover in good years, following several years of poor production, the soil can be nearly bare. Sheet erosion occurs under the medusahead rye thatch layer. The seeded species create more structure than a medusahead rye-dominated community. Successful seeding of the selected species would interrupt the transition to an invasive annual grass-dominated community, introduce a longer green period through the growing season, provide more habitat values than an invasive annual grass community, and allow plant succession to occur.

Treatment in Riparian Reserves

Commercial mechanical treatment in the outer half of riparian reserves and thinning may introduce or spread noxious weeds within the project area. Management activities which disturb the soil and remove existing vegetation leave areas open for possible invasion by noxious weeds. Riparian areas can act as conduits for noxious weeds, as seeds may float downstream and start new noxious weed populations outside of the project boundary. PDFs would be followed to reduce these effects.

Road Treatments
In the Proposed Action, there would be no reduction in road density. Some roads would be renovated, including some minor realignment on tight corners. This minimal amount of road work would likely have no significant impact on noxious weeds in the project area.

Alternative 1

Alternative 1 does not include medusahead rye treatment in any units. There would not be a prescribed burn, imazapic application, or native perennial grass seeding on the 51 acres of medusahead rye populations. Medusahead rye may then spread out from these small populations into more public and private land, creating larger populations and monocultures. Medusahead rye occurs in the same areas as the special status species, *Limnanthes floccosa* spp. *bellingeriana*. Without treatment, medusahead rye may compete with *L. floccose* spp. *bellingeriana* for resources and choke out populations of the special status plant, which may cause the species to trend towards listing.

Potential direct and indirect effects of timber harvest and treatment of post-harvest slash on noxious weeds would be similar in Alternative 1 as those described in the Proposed Action. One difference would be that riparian reserves would not be treated, amounting to a lower risk of noxious weed invasion in those units. All stands older than 120 years of age would be retained, which would also amount to a lower risk of noxious weed invasion in those areas, due to lack of disturbance. Thus, the environmental consequences to these stands would be similar to what is described in the No Action Alternative. Also, a 21" diameter limit on harvest would be in place under Alternative 1, possibly leaving more of a canopy in stands, which would leave more shaded forest land than in the Proposed Action. This may pose less of a risk for invasion by noxious weeds due to the canopy and shade retention of these units, as most noxious weeds found in southern Oregon require ample sunlight and disturbance. The same PDFs found in the Proposed Action would also be applied for Alternative 1 to reduce the risk of introducing or spreading noxious weeds.

In Alternative 1, by reducing road density, noxious weeds may populate the closed road within the project areas in the short term. As long as PDFs are followed, this would not be a large issue in the long term, as closed roads would reduce the amount of vehicular traffic in forested stands and eliminate one conduit for noxious weed dispersal.

Cumulative Effects for All Action Alternatives
Noxious weeds have also impacted plant communities in the Hayden Fox project area, especially more open ones, like meadows. Non-native plants and noxious weeds compete with native species, resulting in reduced species diversity. Road construction, logging activities, and other disturbances occurring in the future would likely continue to introduce and spread noxious weeds in the project area. Noxious weeds are treated on BLM-administered land when they are reported.It is expected that timber harvest, grazing, road building, and other activities would continue in the future on both private and BLM-administered land in the watershed. It is also assumed that Special Status plants that occur in the area would only be protected on BLM-administered land.

Added to past, current, and future activities, the proposed timber harvest, planting conifers, brush mowing, fuels treatments, and related road work may add cumulative effects to noxious weeds in the project area, but the use of PDFs would reduce the risk of these effects. The risk of introducing or spreading noxious weeds as a result of activities proposed in the Proposed Action or Alternative 1 is low to moderate if weed treatments continue to be funded. The risk of increasing weeds as a result of implementing Alternative 1 would be lower compared to that in the Proposed Action because the total acres impacted and mechanical harvest acres are fewer in Alternative 1. However, the lack of herbicide treatment on medusahead rye in Alternative 1 would allow the spread from several small populations into more public and private land. The application of PDFs would reduce the risks that activities in any of the action alternatives would add cumulative effects to noxious weeds in the Hayden Fox treatment unit area.

3.3 What are the effects of project activities on fire and hazardous fuels?

Affected Environment

Within the project boundary, there was an average of two fires per year based on fire start data between 1968 and 2008. The primary cause of these fires was lightning and the majority of fires are extinguished by initial attack firefighters while they are less than ¼ acre in size. Currently, fuels in the project area can generally be described with two fuel types including very high load dry climate timber-shrub (TU5) (~85%) and high load, dry climate shrub (SH5) (~15%).

Under 90th percentile weather conditions, these fuel models could have surface flames lengths from over 14 (TU5) to over 28 feet (SH5), based on outputs from BehavePlus (5.0.5) modeling. 90th percentile weather conditions for the project area are based on historical records obtained from the nearby Parker Mountain remote area weather station (RAWS) observations from June 1st to October 1st (typical fire season) between 1995 and 2012.

Based on Landfire Data (2008), the majority of fuels within the project area are categorized as Fire Regime I, Condition Class II. Fire Regime I can be described as conditions where historically, fires occurred every 0 to 35 years, and were generally of low to mixed severity. Condition Class II indicates that fire regimes have been moderately altered from their historical range. The risk of losing key ecosystem components is moderate. Fire frequencies have departed from historical frequencies by one or more return intervals. This departure could result in moderate changes to one or more of the following: fire size, intensity and severity, and landscape patterns. Vegetation attributes have been moderately altered from historical range.

Fire and Hazardous Fuels - Environmental Consequences

No Action

Under the No Action alternative, both surface fuels and ladder fuels would increase over time, which would increase fire intensity, flame length, and rate of spread in the event of a wildfire. The shrub and ladder fuel components of the TU5 fuel model would increase and the potential flame lengths during a wildfire under 90th percentile weather conditions would increase to over

28 feet. The SH5 fuel model would continue to have flame lengths over 28 feet under the same conditions.

Proposed Action

Underburning is proposed on approximately 1,893 acres following thinning treatments. Implementation of underburning would be done over the course of several years when conditions are favorable. Thinning would occur in all size classes and would reduce ladder fuels and decrease the continuity of the overstory trees. Underburning would consume existing and activity-generated surface fuels. Underburning would occur in those stands that are pine-dominated, rather than those stands that are fir-dominated. Prior to underburning, control lines would be created with hand tools or with a small plow pushed by a small two tracked light weight tractor and the line in both cases would be approximately 18" wide down to mineral soil. Roads and natural barriers would be used as control lines whenever possible. After thinning, there may be some slash left at the landing and that would be burned when conditions are favorable.

The combination of these treatments would result in lower flame lengths, fire intensity, and rate of spread during a wildfire. Brush mastication is proposed on approximately 372 acres. For the units where brush mastication is proposed, approximately 182 of those acres consist of pine plantations that would be thinned first. Approximately 190 acres of brush mastication includes thinning of oak and juniper. Brush mastication is proposed (rather than underburning) due to the high brush component and smaller diameter of the trees in these areas. Smaller diameter trees tend to be less fire resilient and brush mastication would not expose these trees to underburning while still reducing surface fuel height. Smaller diameter conifer trees would not be targeted during brush mastication on timber production base acres, however some small trees in the brush may be taken.

After treatments are complete, fuels currently described as TU5 would most likely resemble a fuel model TU1 (low load dry climate timber-grass-shrub) and potential flame lengths during a wildfire would be reduced to under four feet. The SH5 fuel model would be changed to a fuel model SH1 (low load dry climate shrub) where potential flame lengths during a wildfire would be reduced to under seven feet.

Alternative 1

Alternative 1 differs from the proposed action in that there would be approximately 357 acres that would be thinned without underburning. In these stands, activity generated and existing surface fuels would remain. After treatments are complete in these area, fuels currently described as TU5 would most resemble a fuel model SH2 (moderate load dry climate shrub) and potential flame lengths during a wildfire would be over nine feet. Also, there would be approximately 234 acres that would receive no treatment at all and the effects would be the same as described in the No Action Alternative.

Cumulative Effects

Past fuels treatments and currently proposed fuels treatments on Federal and private lands adjacent to the project area, in addition to this project, contribute favorably to reducing hazardous fuels in much of the Hayden Fox project area by reducing potential fire behavior.

3.4 What are the effects of project activities on the northern spotted owl, Suitable Habitat, and Designated Critical Habitat?

Affected Environment

The northern spotted owl (*Strix occidentalis caurina*), hereinafter "spotted owl," is the only Federally-listed species that may be affected by the proposed project. Surveys to protocol were completed for the Hayden Fox analysis area and there are no spotted owl sites that may be affected by the proposed project (see Table 5).

Table 5: Threatened & Endangered Species in the project area potentially affected by proposed actions

Common Name	Scientific Name	Status	Key Habitat Association within the KFRA	Comments
Northern Spotted Owl	*Strix occidentalis caurina*	Federally Threatened	Foraging- Mature/Late Successional Mixed Conifer Nesting – Mature/Late Successional Mixed Conifer	No nest territories in analysis area. Surveys to protocol complete. Proposed units 23-1, 27-1 and 27-1P (330 ac. total) are within 2012 designated Spotted Owl Critical Habitat Unit ECS-2

Historically there were three sites (Hayden, Edge, and Dixie) that would have been potentially affected by this project. However, based on long term monitoring data and documented habitat reductions within their home ranges these three sites have been declared abandoned by the USFWS (see project record for further details). Barred owls are not believed to be a factor in the abandonment of these sites because barred owls have never been detected on KFRA lands south of Highway 66 as of the 2013 survey season.

Because there are no sites involved or affected, effects to specific spotted owl nesting territories or sites will not be addressed in this EA. Only effects to spotted owl suitable habitat in general, Spotted Owl Recovery Plan, and effects to Northern Spotted Owl (NSO) Designated Critical Habitat for spotted owls are discussed. Further details of the analysis can be found in the project record.

Spotted Owl Suitable Habitat

Suitable habitat on BLM lands was classified in 1994 during the development of the 1995 Klamath Falls RMP. Table 6 below displays the habitat classification descriptions.

Table 6: Spotted Owl Habitat Descriptions in use on KFRA as of January 2012.

*__Category One-Nesting/Roosting Habitat (NR portion of NRF)__: Habitats that provide nesting and roosting opportunities for spotted owls. Comprised of coniferous forest stands that provide at least roosting opportunities but or may not provide nesting structures. Nesting and roosting habitat is indistinguishable except that nesting habitat has sufficient nesting structures (mistletoe trees, broken top trees, cavities, etc) present to support nesting , These stands have a multi-layered canopy of several species of conifer trees with large trees in the overstory and an understory of conifers and/or hardwoods. Canopy closure generally, but not always exceeds 70%. There is a significant measure of decadence in the stand resulting in the occurrence of snags and broken topped live trees along with dwarf mistletoe infections. The forest floor has substantial accumulations of large down woody material in the form of fallen trees. These stands also serve as foraging and dispersal habitat.
*__Category Two- Foraging Habitat (F portion of NRF)__: Lands that provide foraging opportunities for foraging for spotted owls, but without the structures and/or characteristics to support roosting and nesting (for example the

absence of large trees in the overstory, a reduced amount of down woody material on the forest floor, a reduced canopy closure). Habitat 2 generally has less diversity in the vertical structure and has either limited or poorly defined multi-layer canopy structure. The understory may be somewhat open, allowing for owl movement and foraging. Canopy closure exceeds 60%. This 60% figure has historically been used by the USFWS and KFRA for consultation purposes, and is generally accepted as the minimum canopy closure for foraging quality habitat. It is also supported in the 2011 recovery plan and in research (Courtney et al. 2004). These stands also serve as dispersal habitat.
Dispersal Habitat (D): Owls use Category 1 and 2 for dispersal but this category includes those other forested stands that facilitate spotted owl movement across the landscape, but do not have the characteristics of category 1 and 2 stands such as large trees, multiple canopy layers, etc. , but do have sufficient canopy closure, generally 40% or greater (USDI BLM 1994).

* equate to suitable habitat for the spotted owl.

Suitable Habitat within Hayden Fox Action Analysis Area

In order to assess effects of the proposed Hayden Fox project on NSO habitat, an Action Analysis Area (AAA) was established by buffering the proposed units by 1.2 miles (provincial home range radius) and creating a polygon in GIS as recommended by the USFWS, Klamath Falls office. This polygon contains a total of 32,336 acres, 12,328 of which are managed by (KFRA). Table 7 below displays the land ownership pattern within the AAA. Spotted owl habitat available on KFRA lands within the AAA (including proposed Hayden Fox units) is displayed in Table 8 below.

Table 7. Land ownership with in the Hayden Fox Action Analysis Area

Ownership	Oregon acres	California Acres	Ownership totals
BLM	12,328*	238***	12,566
USFS	0	42	42
State	107	0	107
Private	18,453	974	19,427
Other	194**	0	194
State Totals	31,082	1,254	32,336

*= 38 % of total AAA acreage; **Mostly Klamath River Channel (under water); ***Managed by the Redding Field Office.

Table 8: Spotted Owl Habitat Suitability on the KFRA Portion of Action Analysis Area (AAA)

Type	Acres	Suitability Label
Nesting/Roosting	394	Suitable (NRF) 1,779 acres
Foraging	1,385	
Dispersal	2,811	Non-suitable 10,725 acres
Non-habitat -with potential	1,036	
Non-habitat- w/o potential	6,878	

Of the 12,328 acres of KFRA managed land within the AAA, 4,688 are designated Critical Habitat for the spotted owl. Critical habitat is addressed below in its own section.

Spotted Owl Recovery Plan

This EA addresses two of the recovery actions found in the 2011 Revised Spotted Owl Recovery Plan, Recovery Action 10 and Recovery Action 32.

Recovery Action 10

Recovery Action 10 (RA 10) recommends that agencies identify and maintain some undisclosed amount of "High Value" habitat across the range of the spotted owl. Land ownership pattern around sites is a factor on KFRA lands due to the checkerboard BLM ownership pattern. This ownership pattern is especially prevalent in the area south of State Highway 66 where the proposed Hayden Fox project lies. Most of the private lands intermixed with BLM lands have essentially no suitable habitat on them. At many KFRA historic spotted owl sites, there is sufficient private land within the Provincial Home Range (PHR) that even if the BLM lands within the PHR were 100% in NRF conditions, the site would still be considered deficient. The KFRA has completed the prioritization process and has determined that 10 of its 18 sites meet the criteria for high priority sites. The Klamath Falls USFWS office has agreed with this determination, and the process used to make it. (Meeting notes, Level 1 meeting with USFWS on Oct. 11, 2011). **No spotted owl sites, high priority or otherwise, are within the Hayden Fox analysis area or potentially affected by the proposed project.**

Recovery Action 32

Recovery Action 32 (RA 32) states: "Because spotted owl recovery requires well-distributed, older, and more structurally complex multi-layered conifer forests on Federal and non-federal lands across its range, land managers should work with the Service as described below to maintain and restore such habitat while allowing for other threats, such as fire and insects, to be addressed by restoration management actions. These high-quality spotted owl habitat stands are characterized as having large diameter trees, high amounts of canopy cover, and decadence components such as broken-topped live trees, mistletoe, cavities, large snags, and fallen trees"(USDI FWS 2011 pp. 67). Based on the stand exam data and field review of the units, there is no habitat proposed for treatment that currently meets the high-quality standard for RA 32. **Therefore, all proposed actions would be consistent with Recovery Action 32.**

Northern Spotted Owl Designated Critical Habitat

Portions of the Hayden Fox project area (Units 11-1, 23-1, 27-1, 27-1P, totaling 483 acres) are designated as NSO Critical Habitat (CH) by the USFWS as of 2012. Therefore, BLM must make a determination as to the effects of the proposed Hayden Fox project on CH, describe those effects, and potentially formally consult with the USFWS on the effects of the Hayden Fox project on CH. The Endangered Species Act requires the BLM to consult with the USFWS when a project may adversely affect CH for a listed species.

All of the KFRA CH lands are in the East Cascades South Critical Habitat Unit (CHU-8). The KFRA CH lands south of State Highway 66 are in East Cascades South subunit 2 (ECS-2), including some of the Hayden Fox proposed project units. The KFRA manages approximately 5,557 acres (8.4%) of the total 66,086 acres of the ECS-2 subunit, and the KFRA lands are the northernmost in ECS-2.

Critical Habitat Objectives

The recovery objectives for the ECS-2 subunit, in priority order, are to:

1. Provide connectivity between adjacent CH units and subunits.
2. Provide demographic support (maintain existing sites and produce young for recruitment into the breeding population) (USFWS 2012).

Landscape evaluation of the KFRA portion of ECS-2 showed that NRF and dispersal habitat is limited and not well-distributed. There are approximately 5,557 total acres within the KFRA portion of the subunit (8.4% of the total subunit) and 3,273 of that acreage is considered non-habitat; the majority (2,670 acres) of that non-habitat acreage is not habitat-capable. There are approximately 947 acres of NRF habitat and 1,037 acres of dispersal habitat on KFRA lands within the subunit. Most of this is on the edges and northern portion of the Klamath River Canyon, making the functionality for north-south connectivity of ECS-2 questionable. There are no active NSO nests territories on the KFRA portion of ECS-2. This calls into question the KFRA portion of the subunit's current functionality for demographic support. The high percentage of non-habitat that is also not habitat-capable within this subunit makes the potential for improvement of functionality in meeting the objectives of connectivity and demographic support very low, regardless of management actions taken on BLM lands. The NSO habitat suitability of the KFRA portion of ECS-2 is displayed in Table 9 below.

Table 9: Spotted Owl Habitat Suitability on the KFRA Portion of ECS-2

Type	Acres	Suitability Label
Nesting/Roosting	312	Suitable (NRF) 947 acres
Foraging	635*	
Dispersal	1,037*	Non-suitable 4,610 acres
Non-habitat -with potential	903	
Non-habitat- w/o potential	2,670	

*Figures account for 9 acres of foraging habitat in ECS-2 downgraded to dispersal as part of Keno EA.

Active Management within Critical Habitat

The 2012 CH rule includes an acknowledgement that in dry forest types (including lands in ECS-2 and the Hayden Fox project) maintaining functioning, high quality NSO habitat will require careful planning and a balance between the need to actively manage the forest for fuels reduction, disease and insect resiliency versus NSO habitat values (USFWS 2012). The USFWS acknowledges that maintaining dry forest ecosystem processes and stand structure as well as high quality NSO habitat on the same acre at the same time is not a successful strategy in the long run because reproductive NSOs need forest structure that is largely incompatible with fire and disease resilience in dry forest types. The general strategy for CH in dry forests is to retain sufficient amounts of suitable NSO habitat in large enough patches to function for NSO reproduction, within a landscape of surrounding stands managed for dry forest stand structure that supports dry forest ecosystem processes and is fire resilient and/or resistant.

In order to facilitate this balancing of objectives within the CH landscape, the CH rule strongly suggests that action agencies administering lands within the EC region perform a large scale analysis on their CH lands (USFWS 2012). This analysis is to include an assessment of existing habitat conditions, potential risk to current habitat, and potential for development of future habitat in portions of the landscape where it is likely to persist long term in the presence of natural disturbances associated with dry forest types - especially wildfire. The anticipated output of this analysis is a better understanding of places on the landscape where treatments for dry forest structure restoration and fuels reduction make sense, and places where such treatments should not occur in the short to mid-term in order to maintain sufficient high quality NSO habitat for NSO population support (USFWS 2012.)

The KFRA has interpreted this guidance to mean that areas that are of high NSO habitat quality and value, and at comparatively low risk of loss to fire, insects, disease and drought would be temporarily deferred from harvest in the short term until the BLM completes its on-going RMP planning process or re-evaluates the deferred acres. , Pursuant to this interpretation, 6,447 acres of KFRA high value spotted owl habitat in CH (ECS-1 sub unit) in the Surveyor Mountain area, approximately 10 miles north of the Hayden Fox planning area, were deferred from timber harvest under the decision record for the Lost EA in 2012. The landscape in which the Hayden Fox project lays contains no high quality or high value habitat and is generally inhospitable to spotted owls due to the combination of natural forest patchiness and past and on-going timber harvest on BLM and private lands. This situation is made evident by the abandonment of all three historic spotted owl sites within close proximity of the project.

Most of the proposed Hayden Fox project units are outside CH. None of the proposed Hayden Fox treatment units are split by CH boundaries. That is, each proposed Hayden Fox project unit is either entirely in or entirely out of CH. The following proposed Hayden Fox units are in CH: 11-1, 23-1, 27-1, 27-1P.

ECS-2 contains approximately 66,086 acres of which approximately 4,688 acres are within the Hayden Fox AAA. There are approximately 489 acres of ECS-2 within proposed Hayden Fox treatment units. None of the 489 acres is NRF habitat. Approximately 383 acres of those 489 acres are within proposed timber harvest units. Of those 383 acres, there is no (0 ac.) Nesting, Roosting or Foraging (NRF) habitat, and 314 acres of dispersal (D) habitat. The remaining 177 acres are non- habitat. Of those 177 non-habitat acres in the proposed timber harvest units, 169 acres have the potential to become dispersal habitat or better in the future. A stand's potential to develop into NSO habitat is based on a variety of factors, and assumes no future management aimed at producing NSO habitat, and is not time-limited. The biggest factor is the current mix of species present on the site. Table 10 below displays the NSO habitat quality and proposed treatment type of proposed units within CH.

Table 10: Proposed Hayden Fox units within NSO Critical Habitat (ECS-2).

Unit #	Acres NRF	Acres Dispersal	Acres non habitat		Proposed treatment type
			Potential	No potential	
11-1	0	0	63	0	Timber sale
23-1	0	19	0	8	Timber sale
27-1	0	295	0	0	Timbersale
27-1P	0	0	106	0	Plantation thinning
Totals ->	0	314	169	8	

Spotted Owl Habitat - Environmental Consequences

Methodology

For the spotted owl habitat analysis, several assumptions were made to determine the effects of the proposed actions on northern spotted owl (NSO) suitable and dispersal habitat. These assumptions are as follows:

- Timber harvest prescriptions on similar forest stands from previous sales would result in similar habitat qualities after harvest within the proposed project. Post-harvest stand exams (USDI BLM, 1999-2011) have supported this assumption with respect to canopy closure, tree density, snag density, and stand structure.
- Timber harvests that maintain snags, coarse woody debris, multi- age stands, greater than 120 basal area (BA) with the majority of the BA in the overstory would maintain canopy closure greater than 60% and would maintain spotted owl foraging habitat.
- If multiple treatments (i.e., commercial timber harvest, submerchantable thinning, and prescribed fire) were conducted within NRF habitat on the same acres, the loss of the structural components resulting from the additional treatments may reduce the quality of habitat and downgrade the habitat to dispersal habitat.
- Pre-commercial, hand thinning, and prescribed burning would maintain nesting, roosting, foraging (NRF) and dispersal habitat based on the structural components and canopy closure left after treatment. This is based on past treatments that have been conducted in similar habitat that resulted in the maintenance of NRF and dispersal habitat.
- NRF and dispersal habitat that is harvested to a stand basal area (BA) of “60-80” will no longer function as habitat for dispersal, and will be classified as “habitat removed” for effects analysis in Hayden Fox EA.
- A BA of 80 or above would maintain dispersal habitat.
- Treatments in the riparian reserves would maintain the spotted owl habitat function of the stand. That is, treatment prescriptions that meet the ACS objectives would be consistent with maintaining spotted owl habitat functions of the treated riparian areas. However, in riparian areas where the surrounding stand’s habitat function is downgraded, the riparian reserve would also be downgraded due to its narrow shape (high edge to volume ratio) and small size.

No Action

Spotted Owl Suitable Habitat

Under the No Action Alternative, the NRF and dispersal habitat within the project would be maintained in its current state for the short-term (less than 40 years). Growth of trees within

stands would remain slow due to stem density and the forest stands currently classified as NRF would maintain that functional status for the next 20 to 40 years in the absence of a major disturbance (wildfire or insect or disease outbreak). Over time, without treatment or other disturbance, the forest stands within the project area would trend towards more fir-dominant as succession and ingrowth of firs continues. This would be beneficial to spotted owls, especially in those stands moving towards a Douglas-fir dominated stand. Long-term (more than 40 years) forest stands would see a decline in stem density and an increase in tree diameter through natural mortality thinning due to density-related issues from insect and disease or drought (see vegetation section). Depending on the severity and rate of tree mortality the process may result in the reduction of spotted owl habitat quality and/or quantity in the long-term. Under the No Action Alternative, the project area overall is expected to continue to provide dispersal and foraging habitat on a limited basis for spotted owls that may move through the project area.

In the vegetation section of this EA, the No Action Alternative was modeled as if the units were not harvested now, and were allowed to grow unharvested for 100 years into the future. Under this scenario, spotted owl habitat components would continue to develop in the units. Given enough time, some of the non-habitat, most the current dispersal, habitat, and all of the roosting/foraging quality stands would eventually develop into spotted owl nesting quality habitat, unless it burned up in a wildfire. The time to reach nesting quality habitat conditions would depend on each stand's current stand make up and structure and its growing site potential. Most of these stands would likely achieve nesting quality within 100 years (some stands much sooner), assuming no significant stand altering event such as catastrophic beetle kill or high intensity fire.

Plantations proposed for thinning treatment under the Proposed Action and alternative 1 would not be treated under the No Action Alternative. These developing stands would have reduced tree growth rates and would take longer to reach NSO dispersal habitat conditions than if they were thinned.

Forgoing the understory thinning, underburning, and brush mastication treatments contained in the Proposed Action and Alternative 1 would allow continued surface fuel accumulation and ladder fuel development and thereby increase the likelihood of habitat loss through stand replacement wildfire.

No Action - Spotted Owl Recovery Plan

This alternative would be consistent with the 2011 Spotted Owl Revised Recovery Plan because no direct or indirect impacts to spotted owls would occur. The recovery plan's general call to actively manage landscapes for a variety of purposes would be satisfied by the on-going, and planned future forest management elsewhere in the Klamath River watershed on both BLM and private lands.

No Action - Northern Spotted Owl Designated Critical Habitat

Under the No Action Alternative, there would be no direct effect to designated spotted owl critical habitat. The habitat currently classified as foraging and dispersal habitat would continue to serve those functions. The primary constituent elements (PCEs) as described in the final rule that comprise critical habitat (stand type, nesting-roosting habitat, foraging habitat, and dispersal

habitat) would not be affected by the No Action Alternative. The anticipated benefits of plantation thinning as in the Proposed Action and Alternative 1 would be forgone. Without thinning, this stand would take longer to develop into dispersal habitat, and thus delay the ability of those stands to contribute to the ECS-2 objective of providing dispersal habitat. Forgoing the understory thinning, underburning, and brush mastication treatments contained in the proposed action and Alternative 1 would allow continued surface fuel accumulation and ladder fuel development and thereby increase the likelihood of habitat loss through stand replacement wildfire.

Cumulative Effects of No Action

Selecting the No Action Alternative for the Hayden Fox units would likely result in another sale already in the planning process being moved up in the KFRA timber sale schedule in order to either meet KFRA's timber volume production commitment for FY 2014 if possible, or to make up for the 2014 volume shortfall in FY 2015. Given that KFRA has a volume commitment, that volume will come from somewhere either here and now, or somewhere else later. Getting the required volume here, in Hayden Fox, has comparatively little impact on spotted owls and their habitat compared to most other areas on KFRA where the volume might be obtained. For example, there are no NSO sites impacted by the Hayden Fox project, and there is either minimal or no impact to designated Critical Habitat depending on the alternative chosen or crafted for the decision record.

The Hayden Fox units could be looked at again for harvest at some point in the future. The 1995 RMP modeled a harvest entry schedule of approximately every 20 years. The vegetation section of this EA modeled entries every 30 years under the Proposed Action and Alternative 1.Selecting the No Action Alternative at this time would not be a permanent withdrawal of the Hayden Fox units from the timber harvest base, but rather a temporary deferral of harvest for an undetermined period of time until a new planning process is completed. Under the No Action Alternative, BLM Matrix lands, including most of the proposed Hayden Fox units would continue to be managed on a sustained yield basis using an uneven aged management strategy. The designation of some of these lands as critical habitat for spotted owls, will likely reduce the intensity of harvest on some of the acres.

Effects Common to All Alternatives

For all alternatives, including No Action, there will be no direct effects to territorial/resident spotted owls from proposed activities. The historic spotted owl sites in the project area have all been declared abandoned by the USFWS (see project record for details of analysis). None of the proposed actions will have any effect on the current spotted owl population due to the lack of resident/territorial spotted owls within the project area. The spotted owl habitat remaining within the Hayden Fox EA landscape is fragmented and no longer provides large contiguous blocks of NRF habitat that would support spotted owl occupancy and/or reproduction.

Effects Common to Proposed Action and Alternative 1

The proposed brush mastication treatments would have no effect on NSO habitat immediately or in the future other than that treated areas would potentially serve as places where a wildfire could be controlled more easily, thus potentially reducing the threat of wildfire spreading to NRF or dispersal quality NSO habitat within the project area. Reducing surface fuels and lower ladder

fuels through underburning would reduce the likelihood of habitat loss from stand replacement wildfire within treated stands and neighboring untreated stands.

Prescribed underburning in forested stands would maintain the pre-burn levels of NRF and dispersal habitat throughout the Hayden Fox project area. Burning may reduce the quality of spotted owl foraging habitat within the project in the short-term (less than 10 years) due to the reduction of understory shrubs and potential loss of downed wood. But treatments would maintain the multi-story structure within the NRF habitat and maintain canopy closure when implemented in conjunction with the project design features (PDFs –Appendix B. Burns would be designed and conducted to leave a mosaic of burned and unburned within the proposed units, thereby retaining stand structural diversity and providing a continued prey base for spotted owls that may be dispersing through the area. Further discussion of the potential effects of underburning on NSO habitat are addressed under each alternative below.

In 2012, a dispersal habitat analysis was conducted for the Keno project area which is adjacent to (east of) the Hayden Fox project area. This analysis used the 50-11-40 rule, and was based on quarter townships where 50% of the quarter township has trees 11" DBH or larger and a 40% canopy closure on average. The BLM habitat input was based on the KFRA spotted owl habitat layer. The private, state, and other federal lands were estimated by NAIP imagery. Only two of the eight quarter townships within the Keno landscape met the 50-11-40 standards and both were only slightly above 50%. This is an indicator that current habitat conditions in the Keno project area and surrounding area are not favorable for spotted owls due to the lack of habitat connectivity within the Keno analysis area. Dispersal habitat is currently very limited within the Keno project area. All of the factors contributing to low levels of dispersal habitat in the Keno project analysis are present and even more pronounced in the Hayden Fox project area landscape. No dispersal habitat analysis was performed on the Hayden Fox project area landscape. A detailed analysis is not necessary to conclude that the Hayden fox project area and surrounding lands are not favorable for spotted owl dispersal and are not likely to become favorable regardless of which actions are taken as a result of the Hayden Fox planning effort. The landscape ownership pattern, historical harvest levels and patterns, and the naturally more open and fragmented forest conditions in the Hayden Fox project area all combine to make favorable dispersal habitat levels even less likely to be achievable than in the Keno project area landscape. Both the Proposed Action and Alternative 1 would reduce the amount of dispersal habitat to varying degrees. However, the landscape is already non-functional for spotted owl dispersal based on the 50-11-40 standard, and will likely continue to be so largely due to factors beyond BLM's control.

Proposed Action and Alternative 1 activities would have the potential to disturb dispersing spotted owls that may move through the area. Timber harvesting, timber hauling, fuels treatments, and road maintenance may all require heavy equipment, chainsaws, and large vehicles that produce high levels of noise. Spotted owls are susceptible to disturbance from human-caused activity (Delaney et al 1999), especially during critical periods in the nesting season. The project area does not have resident spotted owls due to current habitat conditions. Dispersing owls are not behaviorally tied to a specific stand or geographic area as nesting owls are, so it is reasonable to assume that those spotted owls that may move through the project area

would be able to avoid areas where disturbing activities are occurring and would not be adversely affected by those activities.

Spotted Owl Recovery Plan There are currently no (0) spotted owl sites within the Hayden Fox planning area. Neither the Proposed Action, or Alternative 1 would affect any spotted owl site (high priority or otherwise), so the project complies with RA 32 and interim guidance for RA 10.

Proposed Action

Under the Proposed Action the NRF and dispersal habitat within the project would be reduced. Although there are no longer any spotted owl sites within the project area (or within 1.2 miles of the project area), there are approximately 465 acres of NRF habitat (47ac. Nesting/Roosting + 418 ac. Foraging) and 868 acres of dispersal habitat that would be entered with vegetation treatments (prescribed burn, timber harvest, understory thinning, brush mowing). These types of treatments have the potential to remove or downgrade spotted owl habitat.

The removal of some trees infected with mistletoe in this alternative would reduce future nesting structure for the spotted owl and reduce habitat structure used by its prey. The bushy tailed woodrat and northern flying squirrel (key prey species) both are highly associated with mistletoe brooms (Lemkuhl et al 2006; Lemkuhl et al 2006 (a)). Mistletoe brooms also are important nest structure for spotted owls especially in younger stands where large live trees and snags are not available. The retention of some patches of mistletoe infected trees and some large single infected trees called for in the Proposed Action would partially mitigate the effects of treatment on both future nesting substrate and prey habitat (Lemkuhl et al 2006; Lemkuhl et al 2006 (a)). Alternative 1 would also continue to promote future spotted owl nesting and prey habitat by retaining the source for future trees to be infected.

The short term effects of proposed underburning on NSO habitat under this alternative are expected to be discountable because all of the stands proposed for underburning post –harvest will have already been rendered non-habitat for the NSO by the harvest. The proposed underburning may or may not retard these stands' recovery to the 40% canopy closure threshold for dispersal habitat. Accurate estimation of the potential degree of delay in canopy closure development over several decades is not practical. Burning may create habitat structures such as cavities, dead tops, snags, and logs that are components of NRF habitat, and thus hasten the development of NRF stand characteristics in the short and long term.

Proposed Action - Northern Spotted Owl Designated Critical Habitat

Approximately 483acres within CH would be treated with timber harvest, plantation thinning, brush mowing, prescribed fire, and weed control in various combinations. See Table 11below for the treatments proposed for units in CH. Of these 483 acres, zero (0) acres are classified as NRF habitat, 314 acres are classified as dispersal habitat, and the remaining acres are classified as non-habitat for the spotted owl. Under this alternative, 314 acres of dispersal habitat within designated critical habitat would be removed, and would no longer support spotted owls until stand in-growth provided dispersal habitat conditions (at least 40% canopy closure) again.

The acres of CH entered equate to approximately 9% of the total acres within the KFRA portion of ECS subunit 2, but less than 1 % of the total acres within ECS-2. The 314 acres of dispersal

habitat removed from ECS-2 would represent 6% of the KFRA acreage in ECS-2 and less than 1% of the total acreage of ECS-2. The KFRA portion of ECS-2 contains approximately 1,984 acres of NSO habitat capable of supporting dispersal (947 NRF + 1,037 D). The 314 acres of dispersal habitat proposed for removal within CH under this alternative represents a 16 % reduction in the KFRA managed habitat capable of supporting NSO dispersal. Supporting spotted owl dispersal is the primary purpose/objective of ECS-2. Therefor the removal of 314 acres of dispersal habitat would be a likely to adversely affect (LAA) action for ESA Section 7 consultation purposes.

Table 11. Effects of the Proposed Action units on spotted owl designated critical habitat

Unit #	Total Acres in CH	Proposed Treatment	Total Acres NRF in CH	Maintain NRF (Y/N)	Total acres Dispersal Habitat in CH	Maintain Dispersal (Y/N)	Effect of Proposed Unit on Habitat Quality and/or Quantity
11-1	63	Timber sale	0	N/A	0	N/A	No effect
23-1	19	Timber sale	0	N/A	19	No	19 acres of dispersal habitat removed
27-1	295	Timber sale, Followed by underburn	0	N/A	295	No	295 acres of dispersal habitat removed
27-1P	106	Plantation Thinning and Brush Mowing	0	N/A	0	N/A	No effect
Total Acres		483			314		314 acres of dispersal habitat removed
ESA Determination to CHU ECS-2							Likely to Adversely Affect (LAA)

Alternative 1

Alternative 1 is designed to maintain spotted owl NRF habitat where it currently exists, and avoid removal of dispersal habitat within designated critical habitat. Under Alternative 1 the NRF habitat within the project area would be maintained and dispersal habitat within the project area would be reduced. Although there are no longer any spotted owl sites within the project area (or within 1.2 miles of the project area), there are approximately 196 acres of NRF habitat (0 ac. Nesting/Roosting + 196ac. Foraging) and 784 acres of dispersal habitat that would be entered with vegetation treatments (prescribed burn, timber harvest, understory thinning, brush mowing). These types of treatments have the potential to remove or downgrade spotted owl habitat. Under this alternative, The NRF habitat that is proposed to be treated would have the understory lightly thinned, removing understory trees 12 inches or less in diameter, maintaining a minimum basal area of approximately 120 and a canopy closure of 60% at a minimum, followed by a cool underburn. These stands would still function as foraging habitat post treatment. All NRF habitat would be maintained under this alternative but dispersal habitat would be reduced by 383 acres. None of the 383 acres of habitat removed would be from within designated critical habitat. Table 12 below displays the changes in the availability of spotted owl suitable habitat (NRF) and dispersal habitat that would result from Alternative 1 implementation.

Alternative 1 - Northern Spotted Owl Designated Critical Habitat

Approximately 464 acres within CH would be treated with timber harvest, plantation thinning, brush mowing, prescribed fire, and weed control in various combinations. See Table 12 below for the treatments proposed for units in CH. Of these 464 acres, zero (0) acres are classified as NRF habitat, 295 acres are classified as dispersal habitat, and the remaining acres are classified as non-habitat for the spotted owl. Under this alternative, zero acres of dispersal habitat within designated critical habitat would be removed.

The acres of CH entered equate to approximately 8% of the total acres within the KFRA portion of ECS subunit 2, but less than 1 % of the total acres within ECS-2. The KFRA portion of ECS-2 contains approximately 1,984 acres of NSO habitat capable of supporting dispersal (947 NRF + 1,037 D). Implementation of this alternative would not change these acreage figures. Supporting spotted owl dispersal is the primary purpose/objective of ECS-2. Implementation of this alternative would have little to no effect on the ability of ECS-2 to support NSO dispersal. Therefore, this would be a may affect, not likely to adversely affect, (NLAA) action for ESA Section 7 consultation purposes.

Table 12. Effects of Alternative 1 units on spotted owl designated critical habitat

Unit #	Total Acres in CH	Proposed Treatment	Total Acres of NRF in CH	Maintain NRF (Y/N)	Total acres Dispersal Habitat in CH	Maintain Dispersal (Y/N)	Effect of Proposed Unit on CH
11-1	63	Timber sale	0	N/A	0	N/A	No effect
27-1	295	Timber sale	0	N/A	295	Y	My affect, not likely to adversely effect
27-1P	106	Plantation Thinning and Brush Mowing	0	N/A	0	N/A	Positive effect long term
Total Acres	464	-	0	-	295	-	0
ESA Determination to CHU –ECS Subunit 2							My affect, not likely to adversely effect (NLAA)

The short term effects of proposed underburning on NSO habitat under this alternative are expected to be discountable because:

1. All of the "Thin to 60-80 BA" stands proposed for underburning post –harvest will have already been rendered non-habitat for the NSO by the harvest.
2. In the 6 stands proposed for thinning of the 3-12 inch trees, followed by underburning, PDFs (Appendix B) are designed to minimize the likelihood of loss of overstory and mid story trees, and thus preserve the canopy closure in all underburned stands, and preserve the multilayered canopy structure in stands that have multiple layers. The possible loss of a few scattered individual trees is unlikely to change the nature and character of the stands such that their habitat function would be altered.

The proposed underburning may or may not retard the stand's recovery to the 40% canopy closure threshold for dispersal habitat. Accurate estimation of the potential degree of delay in canopy closure development over several decades is not practical. Burning may create habitat structures such as cavities, dead tops, snags, and logs that are components of NRF habitat, and thus hasten the development of NRF stand characteristics in the short and long term.

Cumulative Effects on Spotted owls and their habitat Both Action Alternatives
Cumulative actions were analyzed in the 1995 BLM RMP FEIS and the potential future actions on federal lands would be within the range of effects described in that analysis. The project area is on the eastern edge of the spotted owl range. Past management (primarily timber harvest) on public and private lands in this private lands dominated landscape has resulted in a very limited amount of suitable (NRF) and dispersal habitat within the AAA. The KFRA manages 12,328 acres (38%) of the AAA. Only 14% (1,779 acres) of the KFRA lands within the AAA are classified as NRF and the other public and private lands within the AAA have less than an estimated 10% that would qualify as NRF and dispersal habitat. Only 37% (4,590 acres) of the BLM lands in the AAA currently functions as dispersal habitat or better. The acres classified as NRF are widely scattered and severely limit the opportunity for owls to nest within the entire AAA. The surrounding private industrial forest lands are predominately in early seral condition, occupied by ponderosa pine seedlings and saplings, and poles. Based on past management, these lands are not expected to provide spotted owl habitat (even of dispersal quality) in the future.

With the exception of the small percentage of the AAA that is in riparian reserves and unmapped late successional reserves, BLM forest lands within the Hayden Fox project area are classified as Matrix lands and are intended to provide a sustainable supply of timber (see Section 1.1, Table 1 for the RMP objectives by land use allocation). The private industrial forest lands will continue to be harvested for timber production. The objectives on both private and public timberlands and the "checkerboard" ownership of lands within the project area will continue to make it essentially impossible to provide enough contiguous habitat of sufficient quantity and quality to support nesting spotted owls. The cumulative effects from past actions (timber harvest) have left the current landscape unsuitable for spotted owls. This is demonstrated by the Service's determination that all of the historic spotted owl sites in the project area have been abandoned. The proposed action (as well as the action alternative) and foreseeable projects would not change the current trend on both public and private lands and would continue to limit the ability for spotted owls to occupy the landscape or move through the project area.

3.5 What are the effects to terrestrial wildlife species (other than the northern spotted owl)?

Affected Environment
This section focuses on those species considered special status species (other than the northern spotted owl, which was discussed in the previous section, 3.5), that may be affected by management activities. These include species listed under the BLM special status species policy as Bureau Sensitive, species classified as Survey and Manage under the 2001 S&M ROD, and land birds classified as Species of Concern by the U.S. Fish and Wildlife Service (USDI FWS 2008a).

Table 13 is a list of terrestrial wildlife species that may be affected by the proposed actions. Details of each species analyzed for this project can be found in the project record.

Table 13: Special status species in the project area potentially affected by proposed actions

Common Name	Scientific Name	Status	Key Habitat Association within the KFRA	Comments
White-headed Woodpecker	*Picoides albolarvatus*	BLM Sensitive FWS BCC	Forging - Large Ponderosa Pine Nesting – Large Snags	Documented within the Project Area
Great Gray Owl	*Strix Nebulosa*	S&M	Foraging – Natural Openings or Meadows Nesting – Mature Forests	Some surveys conducted w/in the commercial timber harvest area. Great gray owls detected, no nests found. See GGO section for discussion of surveys.
Northern Goshawk	*Accipiter gentilis*	No Special Status	Foraging -Mature Mixed Conifer Nesting – Mature Mixed Conifer	Historic sites in the project area (Sec. 25), but not in proposed units. Not addressed further.
Flammulated Owl	*Otus flammeolus*	FWS BCC	Foraging -Open Mixed Conifer Nesting - Snags	No systematic surveys have been conducted. May occur in the project area
Pacific Fisher	*Martes pennanti*	BLM Sensitive Federal Candidate	Mature complex mixed conifer forest	May have historically occurred within the project area. Surveys conducted in more likely occupied areas near Hayden Fox project area. No Pacific fisher detected on KFRA until summer2013. Fisher(s) documented in the Surveyor Mountain area approximately 14 miles North of Hayden Fox in summer 2013. See project record for details.
Pallid Bat	*Antrozous pallidus*	BLM Sensitive	Roosting – Primarily caves, rocks but may use large snags	No surveys, assumed present
Fringed Myotis	*Myotis thysanodes*	BLM Sensitive	Roosting – Primarily caves, rocks but may use large snags	No surveys, assumed present
Evening Fieldslug	*Deroceras hesperium*	BLM Sensitive S&M	Moist forest in low vegetation, litter, debris, rocks. Priority habitat is considered forested habitat within 30 m (98 ft.) of perennial water (USDA/USDI 2003).	May be present. Some surveys conducted. Identification to species level of individuals collected during surveys was inconclusive. Delineate-and-avoid strategy employed in areas of suitable habitat that were not surveyed. See project record for details.
Crater Lake Tightcoil	*Pristiloma arcticum crateris*	BLM Sensitive S&M	Moist to wet sites such as riparian areas, near springs, wetlands and mountain meadows. Priority habitat is considered forested habitat within 10 m of perennial water (USDA/USDI 2003).	May be present. Some surveys conducted. No individuals suspected to be this species collected during surveys. Delineate-and-avoid strategy employed in areas of suitable habitat that were not surveyed. See project record for details.
Chase Sideband	*Monadenia chaceana*	BLM Sensitive S&M	Talus and rock slides in and adjacent to conifer and oak woodlands. It may be found within 30 m (98ft.) of rocky areas, talus deposits and in associated riparian areas in the Klamath physiographic province (USDA/USDI 2003).	May be present. Some surveys conducted. No individuals of this species found or collected during surveys. Delineate-and-avoid strategy employed in areas of suitable habitat that were not surveyed. See project record for details
Oregon Shoulderband	*Helminthoglypta hertlieni*	S&M	Within rocky habitat, the species is associated with herbaceous vegetation and deciduous leaf litter, generally within 30m. (98 ft.) of stable talus deposits or other rocky areas in shrub lands or rocky inclusions.	May be present. Some surveys conducted. No individuals of this species found or collected during surveys. Delineate-and-avoid strategy employed in areas of suitable habitat that were not surveyed. See project record for details.

FWS BCC – U.S. Fish and Wildlife Service Birds of Conservation Concern 2008; S&M – Survey and Manage Species included in the Standards and Guidelines in the 2001 S&M ROD; BLM Sensitive – Those Species considered By the Bureau of Land Management as a sensitive species; Federally Threatened – Those Species listed under the Endangered Species Act as Threatened

Survey and Manage Species

Great Gray Owl

Portions of the project requiring pre-disturbance surveys for great gray owls (GGOs) have been surveyed with a two season survey effort, as per the interagency GGO survey protocol of 2004 (units 27-1, 33-1 and 33-2) . Other portions have been surveyed with one season of effort which is deemed to be adequate under the 2011 Survey and Manage settlement agreement (Consent Decree). Two units (1-4X and 11-2X) have received no survey effort. In these 2 units, the harvest prescription was modified in order to provide protection for potential nesting GGOs without performing surveys. A thorough discussion of the GGO survey requirements, survey history, and modified harvest prescriptions is located in Appendix C.

Individual Great gray owls were infrequently detected during the surveys, no nests were located, and no sites were established as per the 2004 interagency survey protocol. Accordingly, the only modifications to the proposed action for this species were the modifications outlined in Appendix B that were developed so as to protect potential nesting GGOs without completing otherwise required surveys on two proposed units. The PDF would apply to both the proposed action and Alternative 1.

Other Terrestrial Wildlife Species of Interest

Deer in this area include black-tailed deer on the eastern edge of their range, mule deer on the western edge of their range and mule/black-tail hybrids. Deer are more generalists than elk in their habitat and dietary selections, and flourish in highly disturbed landscapes with abundant shrubs and hiding cover such as the Hayden Fox project area. Elk generally select areas with sharp contrast between forested hiding cover and grassy foraging areas. The early seral stages provided by private lands adjacent to more heavily forested BLM lands provides this mix of habitat types in the project area. Deer are browsers most of the year and their preferred forage species occur throughout the project area. Deer and elk inhabit the project area year round. Both of these species prefer habitats away from open roads and frequently used ATV trails. The entire project area is within the Pokegama cooperative seasonal vehicle closure area. This closure is intended to protect wintering wildlife including deer and elk, and to prevent damage to native surface roads during the wet season. The closure period is from Nov. 20 through April 1 annually. Due to extensive current and past timber management on BLM and adjacent private holdings thermal cover for wintering elk, and especially deer, has been raised as a concern on BLM projects in this area in the past. To address this concern, areas were set aside from harvest as “thermal clumps” in previous harvest entries on BLM lands in this area.

Black bears appear to be comparatively abundant in the Klamath River canyon and surrounding country including the Hayden Fox project area. They eat a variety of foods throughout the year, and hibernate during the winter. Historic and current timber harvest on private and BLM lands is likely limiting the number of large, hollow, trees preferred for dens by bears in this area, but also results in an abundance of early and mid seral plants which provide forage in the form of leaves and berries.

Terrestrial Wildlife - Environmental Consequences

Table 14. Summary of Effects of Action Alternatives on Special Status Species in the Project Area

Common Name	Proposed Action	Alternative 1	Comments
White-headed Woodpecker	Snag and green tree retention measures would maintain population.	Snag and green tree retention measures would maintain population.	Both action alternatives would be beneficial to promote long-term habitat needs. More acres treated under Preferred alternative would result in more beneficial effect.
Lewis's Woodpecker	Snag and green tree retention measures would maintain population. Prescribed burning would provide more foraging opportunities	Snag and green tree retention measures would maintain population. Prescribed burning would provide more foraging opportunities	Both action alternatives would be beneficial to promote long-term habitat needs. More acres treated under Proposed Action would result in more beneficial effect
Great Gray Owl	Seasonal restriction and modified prescription in nesting habitat would minimize negative effects to discountable level. Brushfield mowing would benefit this species in the short term (up to 5 years).	Seasonal restriction and modified prescription in nesting habitat would minimize negative effects to discountable level. Brushfield mowing would benefit this species in the short term (up to 5 years).	Neither action alternative is expected to have any negative effect on GGOs. There are no known GGO sites within the project area, and both action alternatives implement specific PDFs designed to protect GGO nesting habitat structure and substrate, and avoid disturbance within potentially occupied GGO nesting habitat in 2 units where surveys were not performed. Both action alternatives include brush mastication and underburning which would increase the abundance of open, grassy areas between and within stands. This should improve habitat conditions for GGO in the project area.
Flammulated Owl	Snag and green tree retention measures should maintain population	Snag and green tree retention measures would maintain population	Alternative 1 would be most beneficial because it retains some dense stands for roosting.
Pacific Fisher	No effect	No effect	Area believed to be unoccupied - Habitat believed to be unsuitable for Pacific Fisher.
Pallid Bat	Snag and tree retention measures would maintain population	Snag and tree retention measures would maintain population	All action alternatives meet the habitat needs in the short and long term.
Fringed Myotis	Snag retention measures should maintain population	Snag retention measures should maintain population	All action alternatives meet the habitat needs in the short and long term.
Evening Fieldslug	No Effect	No Effect	
Crater Lake Tightcoil	No Effect	No Effect	
Chase Sideband	No Effect	No Effect	
Oreon Shoulderband	No effect	No effect	

None of the proposed alternatives would have a measurable effect, positive or negative, on overall population numbers for the special status species considered in this assessment. All of these species are well distributed across their range and the amount of habitat being affected by proposed project activities would not result in a measurable change to their overall populations. See project record for details of effects for each species.

The imazapic chemical application would have no adverse effects to the special status species considered in this EA. Imazapic has been shown to **not** be highly toxic to most terrestrial wildlife species (BLM FEIS 2010). "Mammals are more susceptible during pregnancy and larger mammals are more susceptible than small mammals. Imazapic has low toxicity to honeybees. No adverse short-term exposure risks to birds were noted for imazapic, but some chronic growth reduction was noted. None of the risk categories for susceptible or non-susceptible shows any ratings that exceed the level of concern" (BLM FEIS 2010).

Effects on cavity-dependent special status species

The PDFs for snag retention which is applicable to both action alternatives would provide sufficient habitat for these species. (DOI, BLM 1995 RMP).

Effects on big game winter range

Brush mastication is intended to remove the top portion of old wedgeleaf ceanothus (Ceanothus cuneatus) plants. Removing the top portion of the plant encourages the remaining portions of the plant to sprout new growth. This succulent new growth is highly nutritious and highly palatable to browsing species such as deer and elk. Recent mastication projects in this same area have resulted in a flush of herbaceous species and grasses in the first growing season post-treatment as well as vigorous re-sprouting of the treated ceanothus plants. In subsequent years, the herbaceous component continues to develop and the ceanothus plants continue to increase in size and continue to produce new growth. Establishment of new ceanothus seedlings has also been observed, likely facilitated by exposing seeds in the soil seed bank to additional sun, moisture, and growing space.

The mastication treatment also includes thinning dense clumps of small oaks, and removing scattered young and mid-aged junipers and some other species of conifers within the treatment units. Based on recently completed mastication projects in the area, thinning the oaks would result in vigorous stump sprouts that are palatable to deer and elk. The sprouts would soon grow to a height tall enough that browsers cannot reach the terminal buds. Once the sprouts escape browsing, they would develop into a second generation of trees growing underneath the boles retained in the thinning operation. The retained boles would be dominant and would increase their diameter and height faster than if the thinning had not occurred. Acorn production would increase because acorn production is positively correlated with bole diameter.

Removing junipers that are encroaching into the shrub/oak stands would reverse the encroachment process that would normally be held in check by frequent fires in this landscape. Left unchecked, encroachment by junipers would eventually reduce the quality and quantity of forage for deer and elk by competing directly with forage species for nutrients and growing space. The size, shape and location of the proposed treatment units is intended to retain sufficient

untreated areas between and within treated units to provide hiding cover for a variety of species, as well as nesting habitat for shrub-nesting bird species.

While deer use of new growth in recently treated units has not been formally monitored, informal observation of browsing intensity, deer sign, and deer presence in the recently treated units indicates that deer are making extensive use of the new growth stimulated by the recent treatments. This same response can be expected in the units proposed for brush mastication in the Hayden Fox project area.

3.6 What are the effects of proposed activities on soil compaction and displacement?

Affected Environment

Soils in the project area formed primarily in residuum derived from andesite deposits of the High Cascade Province. Elevations range from approximately 3,500 feet along the Klamath River Canyon rim to over 4,500 feet on the higher mountain sideslopes. With few exceptions, the landscape is characterized by nearly level to moderately steep slopes. The region experiences warm dry summers and cold wet winters, with freezing temperatures possible any time of the year. The geologically young parent material coupled with the cold climate has produced soils in early or intermediate stages of development (Natural Resources Conservation Service, 1993). The NRCS soil survey of the area identifies 16 soil map units (or types) in the project boundary (NRCS, 1993). Within the proposed treatment units, there are 11 soil types greater than 20 total acres. Soil map units of the forested sites consist primarily of the Campfour, Paragon, Pinehurst, Greystoke, Pokegema, and Woodcock soils.

The Campfour and Paragon soils are found on the low-elevation warmer environments of the southern end of the project. These soils exhibit dark loamy surface layers, with clay loam in the subsoil. The stacked layers, otherwise known as horizons, form a distinct soil profile. Campfour and Paragon soils are differentiated by total soil depth and the amount of rock fragments in the profile. Campfour is the deeper of the two, and Paragon contains more rock fragments in the subsoil.

The deep, well drained Pinehurst, Greystoke, Pokegema, and Woodcock soils also exhibit thick dark surface horizons. The Pinehurst and Greystoke soils are found at colder locations in the southern project area, whereas the Pokegema and Woodcock soils are associated with high elevation or coldest sites. Here again, these soils are further distinguished by the amount of rock fragments within the subsurface horizons.

Potential forestland productivity varies among the soil types. When evaluated for site index and potential volume of wood fiber, productivity tends to be lowest on the Campfour-Paragon units and on the south-facing Pinehurst-Greystoke units for both Douglas-fir and Ponderosa pine. The flat and north-facing Pinehurst and Greystoke soil types rate higher for forestland productivity. The highest site index and wood fiber volumes for Douglas-fir and Ponderosa pine typically occur on the Pokegema and Woodcock soils (NRCS, 1993). Fragile slope gradient and groundwater soils (defined in the 1995 KFRA ROD/RMP, page D-12) are present in the project

area. Fragile soils have been identified within riparian corridors, meadows, vernal pools, and segments of the canyon escarpment that are within the project boundary.

Six map units are rated as “highly susceptible” for soil degradation to occur during disturbance. The rating is based on the site’s resistance to degradation, often referred to as an area's buffering capacity. Degradation susceptibility represents the relative risk of water and wind erosion, organic matter and nutrient depletion and/or redistribution, and loss of adequate rooting depth to maintain desired plant communities (NRCS, 1993). Exclusive of map unit 152B and areas of small dispersed vernal pools, soil types highly susceptible to degradation occur on the steeper units.

All soils within the project area have a high restoration potential, again with the exception of map unit 152B. Also defined as soil resilience, this is a soil’s inherent ability to recover from degradation. Restoration potential describes the ability of a site to restore soil functional and structural integrity after a disturbance. The shallow, extremely stony Randcore-Shoat soils of unit 152B pond in the winter and are droughty in the summer and fall. As such, these soils exhibit a low resistance to and recovery from site degradation. They are found in flat open areas at the southern end of the project, predominantly in the inner riparian areas of treatment units 1-3x, 11-2x, 31-4x, 35-1C, 35-2, and 35-2C. Most of the vernal pools described in the Hydrology section correspond to soil map unit 152B. Overall, unit 152B comprises approximately 30 total acres.

When moist, all soils in the project area exhibit a low resistance to compaction. Likewise, the hazard of forming deep ruts is severe in most of the soils. In their natural state, most of the soil types allow water to move freely into and through the profile, creating a slow to medium potential for runoff when thoroughly wet. The hazard of erosion, from both roads and off-road areas following disturbance activities trends from slight to moderate. The only soil types that display a high erosion hazard and rapid runoff potential are the Woodcock stony loams found on the steeper slopes of treatment units 27-1 and 27-1P.

Table 15 displays the soil map units and characteristics relevant to project analysis. Units comprising less than 20 acres were included with similar soils for the purpose of this analysis. A soil map is available in the project record.

Table 15: Soil Map Units and Interpretations for Management-Timber and Fuels Treatments

Map Unit	Soils	Erosion Hazard (water)	Compaction Resistance	Runoff Potential	Site Degradation Susceptibility	Acres (approx.)
Less than 12% slopes						
24C	Campfour-Paragon complex	Slight	Low to Moderate	Slow	Slightly	765
145C	Pinehurst-Greystoke complex	Slight	Low	Slow	Slightly	515
147C	Pokegema-Woodcock complex	Slight	Low	Slow	Slightly	345
152B	Randcore-Shoat complex	Slight	Low	Ponded to Slow	Highly	30
173D	Skookum-Rock Outcrop-McMullin complex, 1-20%	Slight to Moderate	Low	Slow to Rapid	Slightly	40

Map Unit	Soils	Erosion Hazard (water)	Compaction Resistance	Runoff Potential	Site Degradation Susceptibility	Acres (approx.)
	slopes					
12 to 35% slopes						
24E	Campfour-Paragon complex	Moderate	Low to Moderate	Medium	Highly	35
79E	Greystoke-Pinehurst complex, north slopes	Moderate	Low	Medium	Highly	45
80E	Greystoke-Pinehurst complex, south slopes	Moderate	Low	Medium	Highly	220
171E	Skookum-Bogus complex, north slopes	Moderate	Low	Medium	Moderately	25
205E	Woodcock-Pokegema complex, south slopes	Moderate	Low	Medium	Highly	195
Greater than 35% slopes						
203F	Woodcock stony loam, south slopes	High	Low	Rapid	Highly	45

Source: Soil Survey of Jackson County Area, Oregon. 1993

Assorted land management activities have occurred throughout the project area over the past 50 years, and most, if not all, have impacted soil conditions and functions to some extent. The harvesting of timber has been well documented, with some forest stands entered more than once. Historically, vegetation treatments were accomplished with ground-based mechanized equipment, which would likely continue in future operations. Site prep methods commonly included tractor piling, scarification, ripping, and broadcast burns. Fuel management activities have included prescribed fire, pile burning, and brush mastication to reduce ladder fuels. The Topsy-Pokegama Landscape Analysis (1996) describes an area where natural and human activities have created a mosaic of disturbance patterns across the landscape. Soils in the open areas typically exhibit more physical alteration due to logging and grazing activities, whereby soils in forest clumps experience less physical disturbance. Residual impacts from past harvest activities remain in the project area, where isolated areas devoid of ground cover, litter, and topsoil persist.

A transportation system was constructed throughout the project area to provide access for timber harvest and other land management activities. A network of cutting lanes, skid trails, roads, and railroad grades were created to transport timber to local mills. Many of the legacy roads exist to this day, and evidence of the historical transportation network is still intact and identifiable across the landscape. The construction of roads typically creates a permanent disturbance footprint of about three acres per mile for a bladed 14-foot road width (McCarty, personal communication, 2011). GIS analysis indicates 88 miles of roads are present in the project area, including private holdings and BLM-administered lands. These figures equate to approximately 264 acres (2 percent) of ground disturbance from the existing road system. Additionally, undocumented user-created roads afford access for dispersed recreation.

To evaluate the residual effects of previous management activities, field evaluations were conducted in 2013 by KFRA staff. An assessment of the existing conditions, together with known soil characteristics and responses, formed the basis for predicting impacts of the proposed

action on the soil resources. Soil disturbance monitoring was accomplished utilizing the Forest Soil Disturbance Monitoring Protocol (FSDMP, Napper et al, 2009) to quantify physical soil attributes that could influence site sustainability and hydrologic function. The protocol interprets soil conditions based on ocular observations made along random soil monitoring transects in the project area. At each sampling point, site information collected included depth of forest floor, condition of topsoil, the presence and depth of ruts, compacted horizons, soil structural changes, and surface features. All monitoring transects were located on upland sites; riparian zones were not monitored using the FSDMP.

Data collected verified that most of the stands were impacted by former management activities and showed evidence of previous entries. The data indicate most of the detrimental soil conditions were attributed to past timber harvest activities that resulted in topsoil displacement and mixing. Soil displacement is the loss of surface horizons (forest floor and mineral topsoil) by a combination of harvesting disturbance and mechanical site preparation, and is an indicator of soil organic matter and nutrient loss (Dumroese, et al, 2009). When topsoil is displaced or moved offsite, soil productivity is diminished, and the displaced topsoil is more susceptible to erosion by water or wind. Topsoil mixing and displacement were observed in 47 and 53 percent of the samples, respectively.

Surface compaction and rutting features were documented in 35 percent of the sample points. However, only 3 percent of the samples recorded detrimental compaction and rutting depths. Compaction and rutting can adversely affect site productivity by increasing the density of a soil. Detrimental soil compaction and rutting are characterized by increased runoff, which generally increases erosion rates and affects organisms living within the soil. Monitoring results indicate detrimentally compacted soils were primarily found in plantations greater than 20 years old. The former practices of scraping, piling, and/or windrowing topsoil prior to planting resulted in isolated areas of deep persistent compaction.

Erosional features including soil pedestals, rills, or sediment deposition comprised a minor component of the landscape. Erosion is an active, natural geologic process, and typically occurs at naturally low rates when soils are protected by vegetation and organic litter layers. Accelerated erosion above the natural background erosion rate is the primary concern, and is usually associated with disturbances or events that reduce vegetative cover, displace organic surface layers, or reduce soil porosity through compaction (NRCS, 1993). Monitoring studies support this assertion, attributing the low incidence of erosion across the landscape to the gentle to moderate slopes, low presence of compacted soils, and small percentage of exposed surface soil.

Overall, the pre-activity soil monitoring revealed detrimental conditions ranged from 7 to 13 percent of the sample points. It is important to note that some of the monitoring was conducted in units where timber harvest and various fuels treatments occurred within the last 13 years. Accordingly, the areal extent of detrimental soil disturbance was expected to be greater than the actual findings. The field results most likely reflect the inherent resilience of these soils, as well as appropriate PDFs and effectively implemented management practices. Existing soil conditions will establish a post-harvest baseline for future activities within the project area. Complete monitoring results are available on file at the Klamath Falls Resource Area.

Soils- Environmental Consequences

Forest management activities have the potential to alter or reduce the soil surface by causing compaction, displacement, increased runoff, and accelerated erosion. Soil disturbances such as these can result in nutrient loss and reduced site productivity. Former management treatments, human activities, and naturally occurring events can influence site productivity. Activities that reduce soil stability, alter site hydrology, or diminish nutrient cycling processes can result in decreased productivity. Soils within the project area were analyzed for potential impacts of various management actions on soil productivity.

The 1995 ROD/RMP specifies objectives and practices to maintain or improve soil productivity. To meet those objectives, best management practices have been established limiting soil detrimental conditions to no more than 20 percent of the total acreage within an activity area. "Detrimental soil conditions" are defined in terms of detrimental compaction, displacement, and creation of adverse cover conditions. With the exception of displacement, quantitative specifics and thresholds of detrimental soil condition variables are outlined in the ROD, page D-11. For this analysis the Region 6 US Forest Service threshold for displacement is referenced, defined as the loss of 50 percent of the A horizon (surface layer) from an area of 500 ft2 (FSM 2520, R-6 Supplement No. 2500-98-1).

The baseline used for the potential effects analysis was the existing conditions described previously. For each alternative, an analysis was conducted to assess the effects of proposed management actions on the soil resources. Information used in the analysis about soils and the effects on soils from various management actions was compiled from field investigations, soil survey inventories, GIS data, literature review, and consultation with various resource professionals. The analysis represents best estimates of impacts based on expertise and professional judgment.

To identify the level of effects and compare the consequences between alternatives, prospective acres of disturbance and soil productivity were used as indicators for the soils impact analysis. "Acres of disturbance" are the acres of surface-disturbing activities and treatments that could potentially affect soil productivity. Ground disturbing activity that could lead to loss of ground cover or vegetation, reduction of topsoil, or in any way decrease site productivity would be an indicator of adverse effects to soils.

The magnitude of impacts or effects ranges from negligible to moderate. Negligible effects on soil productivity would be at or below the level of detection, whereby moderate effects would be readily apparent, result in changes of soil character, and would likely require mitigating measures to minimize adverse effects.

No Action

Under this alternative no soil-disturbing treatments would be implemented. Detrimental soil conditions from timber harvest and fuels treatment activities would not increase above existing levels. The No Action Alternative would have the least adverse effects of all alternatives on soil productivity. Additional soil impacts such as compaction, rutting, or displacement would not occur. Upward trends in soil and site productivity could be expected throughout the project area.

Conversely, under the No Action Alternative, hazardous fuel reduction and juniper treatment activities would not occur. Fuels would continue to accumulate and the spread of noxious weeds would persist through natural processes. The lack of adequate periodic fuel treatments would likely result in more intense and wide-spread wildfires. Indirect effects would be a greater potential for soil nutrient loss due to volatization and the formation of a hydrophobic (water-repellant) surface following a wildfire event. Fire results in the loss of cover and, on steeper slopes, renders the soil more susceptible to surface erosion. A stand-replacing wildfire could have long-term adverse effects on the soil resource, negating any improvement in productivity realized by implementing the No Action Alternative.

Actions and Effects Common to the Proposed Action and Alternative 1

- Thinning- timber sale
- Mechanical thinning and mastication in plantations
- Mechanical thinning of juniper and oaks; brush mastication
- Planting conifers

Implementing the activities described in both the Proposed Action and Alternative 1 would result in some detrimental soil impacts. Use of ground-based mechanized equipment for timber sales, thinning activities, and brush mastication operations has the potential to cause isolated areas of compaction and topsoil displacement, creation of adverse surface conditions, and diminish site productivity. Soil compaction would most likely occur on skid trails and landings, whereby tractors and skidders make multiple passes over a designated area. The use of mechanical harvesters normally results in a greater area of ground disturbance, particularly soil displacement, since they are not confined to skid roads.

In an attempt to quantify soil disturbance caused by mechanical harvester operations, KFRA timber staff evaluated GIS and GPS data from the Grenada East and Muddy Tom timber sales. Results of the analysis suggest the extent of soil disturbance from conventional ground-based logging methods typically ranges from 5 to 12 percent (KFRA staff, 2004). Other studies assert the total degree of residual detrimental soil disturbance remaining after all ground-based timber harvest activities varies from 15 to 21 percent (Megahan, 1986; Landsberg, 2003; Deschutes National Forest, 1995-1999). Discrepancies in data are presumably due to the fact that the KFRA analysis did not consider soil disturbance apart from skid trails, landings, and temporary road construction, whereby outside studies accounted for all disturbances from timber harvest activities.

The precise extent and magnitude of potential detrimental soil conditions resulting from vegetation treatments remains unknown. However, extensive areas of detrimental soil conditions are not likely to occur under implementation of the Proposed Action or Alternative 1. Short-term minimal effects would be alleviated by application of Best Management Practices, such as utilization of existing roads, skid trails, and landings; operating restrictions during periods of high soil moisture; and retention of dead and down woody material (see Appendix B for a complete list of BMPs). With effectively implemented BMPs, site restoration potential is likely to remain high and detrimental soil conditions are expected to remain below threshold limits established by the 1995 RMP.

To improve wildlife habitat and eliminate ladder fuels, brush mastication treatments are proposed in units identified for plantation thinning, oak thinning, juniper cutting, and brush removal. Mastication activities can create varying amounts of soil disturbance depending upon machine operator techniques and how fuels are distributed within a treatment unit. The forest floor and topsoil can easily be displaced, particularly where equipment makes small-radius turns (Napper et al, 2009). Soil types highly susceptible to degradation risk nutrient depletion and/or loss of adequate rooting depth as a result of management activities. That said, it is essential that BMPs are closely adhered to on sites highly susceptible to degradation and of low soil resilience. These areas correspond to soil map unit 152B (inner riparian areas of treatment units 1-3x, 11-2x, 31-4x, 35-1C, 35-2, and 35-2C) and are otherwise identified as vernally wet areas. Appendix B outlines specific BMPs when enacting management activities on these soil types.

Additional fuels reduction treatments include prescribed fire underburning. Since burning would occur when the soil surface is very moist, it is anticipated that underburning would have minimal adverse impacts on soil properties. Typically, cool broadcast burns have a slight short-term positive effect of increasing available nutrients, with a slight negative effect three to five years post burning due to decreases in nitrogen. Soil productivity is expected to improve due to the positive flush of post-treatment nutrients. The planting of conifer species is proposed in several units. Localized adverse soil impacts from planting activities are expected to be short-term and negligible due to the gentle slopes, deep loamy soils, and minimal ground disturbance from foot traffic and hand planting equipment. In the long-term, beneficial effects of replanting these units can be anticipated as a result of increased nutrient cycling and improved soil surface stability.

Proposed Action

It is expected that effects of the Proposed Action on soil resources would be more, in both extent and magnitude, than the impacts of Alternative 1. This is due to the greater number of acres treated and the variation in treatment prescriptions. Under the Proposed Action, an additional 340 acres would be thinned and underburned that are not planned for treatments in Alternative 1. Furthermore, with implementation of the Proposed Action, approximately 39 percent more wood volume would be removed (Vegetation section). Trees would be harvested with tops intact. More acres treated, greater volume extracted, and whole tree yarding equates to more ground disturbance and soil impacts than that of Alternative 1. If implemented, the Proposed Action could increase the extent of existing detrimental soil conditions.

The Proposed Action includes the application of imazapic herbicide following prescribed fire to treat weeds. Application of imazapic is proposed in treatment units 1-1, 1-2, 3-5, 27-1, 31-1, 31-2, 33-1, and 1-3X. Prescribed burning of medusahead sites is likely to have minimal direct effects on soils. Burning would result in light to moderate mosaic burns that remove medusahead litter and kill some of the shrubs. Studies of herbicide effects on soils indicate there is no evidence of loss of soil productivity. Generally, either no effects or short-term effects have been found at concentrations likely to occur from typical application rates. Similar to other treatment methods, direct effects to soils could include small amounts of compaction and disturbance during implementation of herbicide treatments, and indirect effects could result from changes in plant composition and vegetative cover. In the long term, treatments could improve soil conditions by removing invasive plants and restoring native vegetation on the site (USDA Forest Service, 2011).

Limited thinning activities in the outer half of some riparian reserves (less than 10 acres total) utilizing mechanical methods are planned under the Proposed Action. Harvest activities would operate under the same soil moisture constraints as other units in the project area. Hence, impacts on soil resources would be similar to those of commercial thinning operations.

Under the Proposed Action minor road improvements would be implemented as needed. Studies have shown that forest roads are a source of sediment production, with the road surface being the main source of erosion and sediment generation (Croke and Hairsine, 2001). Road improvement activities can cause minor sedimentation and erosion. Road maintenance activities are expected to result in minimal short-term adverse soil impacts in localized areas. A complete discussion of sediment production and deposition can be found in the Hydrology section.

Alternative 1

Implementation of Alternative 1 would result in less adverse impacts than the Proposed Action because fewer acres of ground-disturbing activities would occur. Additionally, Alternative 1 proposes retention of large diameter trees, retention of old trees, leaving some tree tops in the stand, and no treatments in riparian reserves. Fewer mechanical treatments and lower overall volume removed would result in less soil disturbance than would occur under the Proposed Action. Short-term minimal adverse effects such as soil displacement and compaction are expected within treatment units. Residual detrimental soil conditions could be expected at the lower limits of typical detrimental site disturbance range under implementation of Alternative 1.

This alternative does not include the application of imazapic herbicide following prescribed fire to treat weeds. Although soil impacts from herbicide application are negligible, the indirect effects of improved soil conditions due to invasive plant eradication would be lost.
Alternative 1 proposes closure of four road segments totaling 1.04 miles and conducting minor road improvements as needed. The effects of road renovation activities would be the same as those of the Proposed Action. Reduced road densities planned under Alternative 1 would provide additional, though minimal, long-term beneficial effects to soil resources. Although all roads within the project area will continue to yield some amounts of sediment, Croke found that sediment concentrations in road runoff were much lower on abandoned roads than on well-used ones, and abandoned roads were minor sources of sediment (Croke, 1999). A complete discussion of sediment production and deposition can be found in the Hydrology section.

Cumulative Effects

It is recognized that former management treatments, human activities, and naturally occurring events have resulted in various degrees of soil disturbance within the project area boundaries. A majority of the project units have been previously entered for management activities. Since the year 2000, two BLM timber sales operated within currently proposed project boundaries. An array of fuels treatments, including underburning, brush mastication, and pile burning have been performed in most units. Roads, both aggregate and native-surfaced, cross many of the units. Cumulative effects of management actions on soil resources are evident throughout the project area. As a consequence, soil productivity has been impacted to various degrees.
2013 pre-activity soil monitoring of data indicate 7 to 13 percent detrimental soil conditions exist in proposed treatment units. The cumulative effects of implementing either the Proposed Action or Alternative 1 would result in detrimental soil conditions increasing post-treatment. The extent

of residual site disturbance and effects on soil productivity are directly related to existing soil conditions, soil buffering capacity and resiliency, acres treated, and treatment methods.

For all management units, treatments would continue to be implemented during the summer months (June-October) when soils are least susceptible to damage. Winter logging over snow or with frozen ground conditions would be a recommended option whenever feasible. Ongoing monitoring to measure soil and forest floor conditions would assure that effects on soils are within the RMP standards and are minimized by appropriate measures when needed.
Future activities anticipated within the project area include, but are not limited to: timber sales, vegetation and fuels treatments, grazing, dispersed recreation, road construction and maintenance, and watershed improvement projects. Wildfires have occurred and continue to occur throughout the watershed. Most of these actions were analyzed in previous EAs. Continued implementation of project design features, BMPs, and monitoring would ensure compliance with soil resource management objectives in the RMP.

3.7 What are the effects of proposed activities on water quality, peak flow, and hydrologic function?

Affected Environment

The Topsy Pokegama Landscape Analysis (TPLA 1996) provides general water resources background information for the project area. The project area is completely within that landscape analysis area on the west side of the Upper Klamath River. The Hayden Fox analysis area is located in the Upper Klamath River sub-basin upstream of Irongate Dam. There are portions of four subwatersheds and two watersheds in the Hayden Fox Project Area. Table 16 summarizes acres of analysis area within each 5th (Watershed) and 6th (Subwatershed) field Hydrologic Unit Code (HUC).

Table 16. Acres of analysis area by Subwatershed and Watershed

Subwatershed (Huc 12)	Watershed (Huc 10)	Analysis Area Acres		
		BLM	Other	Total
Big Bend - Klamath River	John C Boyle Reservoir - Klamath River	735	322	1057
Deer Creek - Klamath River	Copco Reservoir - Klamath River	457	356	813
Hayden Creek	John C Boyle Reservoir - Klamath River	2829	3281	6110
Rock Creek - Klamath River	John C Boyle Reservoir - Klamath River	1833	1737	3570

The climate is characterized by mild wet winters and hot dry summers with relatively low average precipitation compared to other areas of western Oregon. Average annual precipitation ranges from approximately 21 inches to 25 inches. Winter precipitation in the higher elevations usually occurs as snow, which ordinarily melts during the spring runoff season from April through June. Rain predominates in the lower elevations with a mixture of rain and snow occurring between approximately 3,500 feet and 5,000 feet in what is referred to as the transient snow zone (TSZ). Rain-on-snow runoff events originate in this zone and can trigger floods and road damage. Summer rainstorms occur occasionally and are usually of short duration and high

intensity. These types of events are usually limited in coverage but can result in increased erosion and sediment deposition. The geology of the project area is volcanic in origin. The drainages are dominated by lava flows of basaltic andesite, basalt, and andesite (TPLA 1996).

Surface Water

Surface water in the Hayden Fox analysis area includes streams, ditches, springs, wet meadows, vernal wet areas, and reservoirs. Streams in the project area are classified as perennial, intermittent with seasonal flow (long duration intermittent), intermittent with ephemeral flow (short duration intermittent), and dry draws with ephemeral flow. Streams categorized as perennial or intermittent, wet meadows, and vernal wet areas on federal lands are required to have Riparian Reserves (RR) as defined in the Northwest Forest Plan (USDA and USDI 1994). Dry draws do not require RR designation because they lack the combination of a defined channel and annual scour and deposition (USDI 1995). Streams and meadows on private forest lands are managed according to the Oregon Forest Practices Act. Stream and meadow types on BLM-managed lands were identified through site specific stream inventories in 2013. For this analysis, the site potential tree lengths used for establishing RR are120 feet.

Watershed Conditions

The connectivity of the transportation network was analyzed in Hayden Creek watershed to determine whether the road network could be impacting watershed processes (TPLA 1996). Road systems impact the natural hydrologic routing pattern by intercepting subsurface flow paths and increasing the drainage efficiency. Increasing the drainage efficiency can exacerbate the frequency and magnitude of peak flows and cause increases in sediment delivery to streams (Jones and Grant 1996). For the Hayden Creek watershed, TPLA reports a 73% increase in drainage efficiency due to the amount of road miles (21.4) within 100 feet of stream channels and the number of stream crossings (2.4) per mile of road. For the Hayden Fox analysis area, there is currently an average of approximately 3.85 miles of road per square mile. GIS analysis shows that approximately 82% are native surface roads. There are 5.21 stream crossings (intermittent and perennial streams) per square mile in the analysis area.

Widespread logging on private lands has occurred during the last 20 years, particularly upstream of the project area. The dominant logging method for the area on private and public lands is ground based machine cutting and ground skidding using a network of skid trails and landings. Increases in compaction and soil bulk density can reduce soil infiltration rates, accelerating run-off rates and increasing overland flow. On private lands, these skid trails and landings are often ripped and replanted. The legacy effects of compaction are unknown at the watershed scale across ownerships.

Research supported by local and regional field evaluations have consistently found roads, native surfaced roads in particular, to be the primary source of accelerated erosion in managed forest watersheds (Reid and Dunne, 1984: Luce and Black, 1999). Roads impact aquatic systems through both chronic and episodic erosion. Chronic erosion is where material is detached and transported to streams via the road surface and drainage structures such as cross drains and inboard ditches. This occurs in response to precipitation events throughout the year. Episodic erosion usually occurs as a result of intense rainfall and rain-on-snow events within the transitional snow zone. Large failures often occur as a result of culvert plugging, stream

diversion and fillslope landslides. In addition, where road densities are high, concentration and routing of stormwater may result in increased peak flows. Both road density and the number of stream crossings are gross indicators of the level of road impacts in watersheds. Although road density is a useful indicator, it should be noted that not all roads impart similar effects. For instance, the magnitude of impacts from roads on steep slopes is different than those from roads located on flat terrain. Roads located near streams and road stream crossings are responsible for the majority of sediment delivered to channels. Within the analysis area, some roads are located within RR.

Although some road work has been accomplished, some crossings are susceptible to failure through culvert plugging and stream interception. Other road segments are unsurfaced, steep, lack adequate drainage, or are located within close proximity to streams. Lack of road maintenance or improper road maintenance by all jurisdictions within the analysis area has likely increased sediment production or the potential for sediment production.

Canopy Cover and Transient Snow Zone

The effect of large contiguous areas of open canopy on peak flows has not been specifically studied in this watershed (TPLA 1996). It has been documented that western Cascade watersheds that are 30 to 40% vegetatively unrecovered can realize substantial increases in two to five year return peak flows as well as increases in flow volumes (Grant et al 2008). These effects are likely to be additive with other watershed disturbances, such as road interception, rather than compounding or magnified (Jones 2000). Substantial changes in the two to five year return peak flows can alter the channel shape and induce channel bank erosion and down-cutting (Ziemer et al 1991). If peak flows have been enhanced in this watershed, it is likely that stream channels have already adjusted (enlarged). Historically, geomorphic processes that shape landscape and channel geometry are triggered by large, infrequent storm events. In recent times, these events can be characterized by warm, moist storms that result in high intensity, long duration rainfall. The results can be intensified when rainfall occurs on an established snowpack. The percent of a watershed in the transient snow zone (TSZ), for Hayden Fox area (roughly an elevation band between 3,500 and 5,000 feet), can indicate elevated risk of adverse impacts. Approximately 99% of the Hayden Fox area is in the TSZ. These impacts can be accelerated by modifications to forest canopy cover, roads, and other disturbance features. Drainages where TSZ compromises greater than 25% of the drainage area are of hydrologic concern, particularly where large openings such as clearcuts exist. All drainage areas in the analysis area have greater than 25% in the TSZ (Table 17). Large areas of vegetation removal in the TSZ are of particular concern due to alterations of the streamflow regime and the potential for resultant increased peak flow magnitudes (Christner and Harr 1982).

Table 17. Acres in Subwatershed in TSZ, total Subwatershed acres, and percent in the TSZ

Subwatershed (6th fieldHuc)	Watershed (5th field Huc)	Acres in TSZ	Total Acres	% in TSZ
Big Bend - Klamath River	John C Boyle Reservoir - Klamath River	14195	17785	79.81
Deer Creek - Klamath River	Copco Reservoir - Klamath River	12411	27740	44.74
Hayden Creek	John C Boyle Reservoir - Klamath River	17172	17981	95.50
Rock Creek - Klamath River	John C Boyle Reservoir - Klamath River	26418	34043	77.60

Modifications of canopy cover in a watershed, particularly in the TSZ, that result in less than historical conditions, either through fire or timber harvest, may affect the timing and volume of stream flow. An assessment of percent canopy cover is also useful in determining potential cumulative effects of the proposed activities. In the analysis area, the Ecoregion Description (TPLA) lists historic canopy closure as 30%. An analysis of percent canopy cover of forested land at the 6th field HUC was conducted. This scale is where detectable changes in peakflows would likely occur.

Different levels of harvest in watersheds have demonstrated variable effects on peak flows (Wemple et al. 1996; Harr and Rothacher 1979). When less than 25% of a watershed is harvested, no detectible change in peak flows has been observed (Stednick 1996). It should be noted that the majority of literature available regarding the relationship between harvest and flow has focused on clear cut harvesting, many in areas that removed close to 100% of the overstory canopy. For this analysis, any area where 30% or greater of the forested acres is less than 30% canopy cover, it is assumed to be hydrologically unrecovered, and responds similarly to a clearcut. This is particularly true if a large percentage of the drainage is located within the TSZ. None of the TSZ canopy cover values within the Hayden Fox Project drainages reflects a value that may elevate the potential to alter timing and increase the potential for peakflows.

A LiDAR percent canopy cover analysis of the Hayden Creek subwatershed was performed to assess whether there exists an elevated risk of peak flow effects from additional disturbances. This subwatershed has the greatest potential for change under the action alternatives because it comprises the most acres of the Analysis Area and has the most acres in the TSZ. This analysis procedure included creating a vegetation height layer from 1 meter LiDAR data for all the land within the Hayden Creek Subwatershed except a 300 acre area located in the Klamath River Canyon. A threshold height of 2 meters was selected to distinguish canopy cover from non-canopy cover, resulting in any cell with a height greater than 2 meters being considered canopy cover. This threshold was selected based on knowledge of brush height and similar thresholds used in other work (Alistair et al. 2009; Gatziolis 2010). The results of the analysis were that approximately 34% of the area is in Equivalent Clearcut Area (ECA) condition (i.e. approximately 66% of the watershed has more than 30% canopy cover). All naturally non-forested areas, such as meadows, were not included in the analysis. Additionally, analysis units were interpreted at a scale of 1/16th of a township and range section which equates to approximately 40 acres but may have been smaller depending on how the watershed intersects the section boundary. The analysis units were assessed as to whether they were greater or less than 30% ECA.

Recent research indicates that effects from peak flows, although of concern, should be confined to a relatively distinct portion of the network where channel gradients are less than approximately 2.0% slope and streambeds are composed of gravel and finer material. Furthermore, data supports the interpretation that if peak flow increases do occur, they can only be detected in flows of moderate frequency and magnitude. Beyond that, they are likely not detectable (Grant et al. 2008). This suggests that if increases in peak flows occur, they are unlikely to result in adverse effects to the higher gradient channels located within the analysis area. Also, that peak flows are only detectable in smaller storm events with return periods of 6 years or less, where channel forming processes are minor in effect. Most of the stream channels

in the analysis are greater than 2% slope suggesting that peak flow effects, if they occur would be limited in extent.

Water Quality

Limited information is available on existing water quality conditions in the analysis area. Intermittent streams in the analysis area have the potential to deliver sediment and associated nutrients to receiving waterbodies including 303(d) listed waterbodies, such as the Klamath River. (The Clean Water Act requires each state to compile a 303(d) list of threatened or impaired waters that do not meet water quality standards). The roads network has the potential to route sediment if it is not designed and maintained to minimize hydrologic connectivity to streams.

Hydrology- Environmental Consequences

No Action

There would be no direct effects which would result from selection of the No Action Alternative. The current conditions in the Hayden Fox Analysis Area, which are the result of past actions not related to the proposed Hayden Fox project, would persist. All current conditions and trends would continue as specified in the Affected Environment discussion. Namely, roads with poor drainage and lack of maintenance, or improper maintenance, would continue to deliver water and sediment to streams. Likewise, in certain stream reaches, roads located along and crossing stream channels would continue to contribute sediment to stream channels. Some routine maintenance and repair of roads would likely occur.

On BLM-administered lands, over time, vegetation recovery within RR would mediate stream temperatures (to the limited extent that this would occur in only intermittent streams) and provide for increased wood recruitment to stream channels. There would be no changes in percent of area in non-recovered (less than 30 percent canopy cover) openings, areas of compacted soil, road densities, percent of area in roads, or number of stream crossings. There would therefore be no changes to the magnitude and frequency of peak flows beyond those which may already be occurring.

In the long-term, climate change projections indicate that the West and Pacific Northwest are likely to experience continued warming and increased precipitation, along with more extreme wet and dry years (Furniss et al. 2010). As a result, hydrologic changes, particularly the changes in snowpacks and runoff patterns, are among the most prominent and important consequences. Declines in snow water equivalent occurring in low and mid-elevation sites may result in earlier spring flows and lower late-season flows. Average annual streamflows are also expected to decrease. Flood severity is expected to increase because increased inter-annual precipitation variability would cause increased runoff in wet years and increased rain-on-snow probability in low-elevation snowpacks.

Under the No Action Alternative, given the right conditions, the lack of vegetation and fuels treatments may increase the likelihood of a high-intensity wildfire over part or all of the area. If so, it could alter the surface water and groundwater regime. Immediately after a severe fire, the loss of vegetation would make more groundwater available for streamflow, and summer flows

would likely increase. However, the absence of vegetation may also result in an increased risk of higher peak flows, increased erosion, and water quality impacts. Burned areas would also become more susceptible to weed infestations which would negatively impact hydrologic function.

Noxious Weeds
Not treating the identified noxious weed populations would have the effect of continued reduced hydrologic function. These weed infestations reduce infiltration and reduce protection from erosion provided by native perennial plant cover. This effect would be magnified if the populations were to spread and increase in aerial coverage or spread to new areas.

Effects Common to Proposed Action and Alternative 1

Prescribed burning may cause some small increases in sediment and nutrient delivery to stream channels, although RR should limit this impact. Such increases are usually short-lived, with water quality soon returning to pre-fire levels (Debano et al. 1996).

The mechanical treatment in the RR of brush mastication units would reduce the high brush component and remove some small diameter trees. Access to the units may require crossing the adjacent vernally wet areas that make up approximately 27 acres of the RR (PDFs - Appendix B). No-entry machine buffers within inner portions of stream RR would ensure that there would be no direct impacts to stream hydrology or water quality from mastication activities. Machine entry into RR adjacent to vernal wetlands will have no hydrologic affect.

Proposed Action

The proposed action proposes various treatments of density management, road maintenance and improvements, prescribed burning, and thinning. All road maintenance, improvement, and log hauling would be restricted to the dry season/conditions, or when winter logging condition exist (see PDFs in Appendix B). All vegetation treatments would maintain an overstory and mosaic of understory vegetation. Small openings from low density areas within units are not expected to add additional hydrologic effects. Canopy closure reduction through thinning to this level is unlikely to result in changes in the timing and magnitude of run-off events. This conclusion is supported by other studies in the western cascade ecoregion (Grant et al 2008), where thinning entire watersheds to 50% canopy retained hydrologic functions sufficiently to not cause significant increases in peak flows. As provided in the table below, proposed activities comprise a low percentage of the watershed area at the watershed and subwatershed scales.

Table 18. Treament acres by Subwatershed and percentage of Subwatershed affected by treatment.

Subwatershed (Huc 12)	Watershed (Huc 10)	Treatment	Acres	Total Subwatershed (HUC 12) %
Big Bend - Klamath River	John C Boyle Reservoir - Klamath River	Timber Sale	77	0.4
Deer Creek - Klamath River	Copco Reservoir - Klamath River	Timber Sale	343	1.2
		Timber Sale RR	4	
Hayden Creek	John C Boyle Reservoir - Klamath River	Timber Sale	686	4.0
		Timber Sale RR	35	

Rock Creek - Klamath River	John C Boyle Reservoir - Klamath River	Timber Sale	676	2.6
		Timber Sale RR	10	
		Plantation Thinning	180	
		Plantation Thinning RR	3	

There would be no increase of forested area with canopy cover less than 30% within the Hayden Fox Analysis Area, including the TSZ.

Treatment would occur only in the outer half of the RR occurring within timber sale or plantation thinning units. Where patch cuts would occur in the outer half of the RR, they would be designed and placed to ensure there would be no reduction in stream shading from the secondary shade zone. Design of these projects would be consistent with meeting ACS objectives.
In order to maintain long term site productivity, silvicultural treatments would likely occur over a period of several years, distributing activity over time. These activities would not appreciably decrease canopy cover, as only small diameter vegetation would be cut and piled. Sediment levels due to roads, past harvest, and other disturbances is the primary focus of concern. The proposed action includes road improvement, log hauling and associated minimal road maintenance. This could include minor ditch cleaning (if necessary), road blading, and maintenance of drainage features. Log truck traffic, especially on unsurfaced roads, loosens the road surface and makes that material available for transport to stream channels. In 2011, the BLM conducted a review and update of BMPs to provide direction regarding road maintenance practices and road-related actions. The intention was to minimize or prevent sediment delivery to waters of the United States in compliance with the Clean Water Act and its revisions. All applicable road construction and road improvement BMPs as described in Appendix D of the 1995 RMP (as modified by IM-OR-2010-074) will be utilized in this project. Examples include sidecasting material, undercutting cutslopes, improper disposal of material, and unnecessary disturbance within RR. For a link to this list of BMPs, see Appendix B of this EA. Specific PDFs for road maintenance and upgrades on proposed haul routes are proposed. These PDFs are designed to reduce sediment production and run-off and minimize delivery of sediment to streams.

With implementation of the Proposed Action, hauling and road maintenance activities are expected to result in short term increases in sediment and turbidity. Luce and Black (1999) found no significant increase in erosion when only the road surface was treated; however, statistically significant erosion occurred when road ditches were bladed. Luce and Black (2001) observed an 87% decrease in erosion and sediment transport from roads in years one and two following road maintenance activities. With implementation of BMPs and properly conducted maintenance activities, these increases are expected to be minor. Transport of sediment at low flows is unlikely. If transport occurs during high flows, which is likely, the introduced sediment would become an immeasurable fraction of the total sediment load, and would not be detectable at downstream locations.

Skid trails and landings would contribute to the overall increase of hydrologically unrecovered area, but would be treated following applicable BMPs (for example properly spaced water bars

on slopes) to minimize erosion potential. Stream crossings and landings would be placed to avoid impacts to stream and riparian areas to the extent practical.

Noxious Weed Treatment

Fall prescribed burning and herbicide (imazapic) application PDFs would minimize impacts to existing vegetation and water quality. Impacts would be minimized because the treatment sites are not near or adjacent to perennial or intermittent streams, ponds, or reservoirs. Impacts could occur, however, in ephemeral streams or where there is surface runoff immediately following application. Herbicides are usually picked up in stream flow by the first storm large enough to create flow in the channels. The 2007 National Vegetation FEIS pp. 4-28, Table 4-9 quantifies the off-site movement potential for imazapic. Groundwater leaching potential ranges from low to high while surface water runoff is low. Even if an herbicide has runoff or leaching potential, the likelihood of it reaching a water body also depends on site characteristics. For the proposed treatment site, groundwater levels are likely greater than 100 feet below the ground surface (based on nearby local domestic well log information) and precipitation is low. Therefore, the overall potential for that herbicide to reach groundwater before degrading would be very low (2001 National Veg. FEIS, pp. 4-26). These site characteristics of the proposed project area, coupled with current buffer protections, would help to minimize accidental direct application or drift at concentrations high enough to impair water quality.

Risk to non-target riparian vegetation associated with herbicide use would be low or non-existent due to the location of the proposed treatment. The proposed method of hand treatment decreases the risk for accidental direct spray or drift onto non-target species. As long as standard operating procedures for stream buffering and chemical application are followed, there would be no measurable risk to water resources and wetlands/riparian areas.

Benefits to riparian and aquatic environments would occur from the upland treatments designed to establish native perennial grasses, shrubs, and forbs. Once adequate perennial native vegetation is established, the potential for erosion would be reduced. In general, underburning would improve the effectiveness of the herbicide application and as such, would be more effective in improving hydrologic function of the watershed as the site becomes re-vegetated with desirable species.

Water Quality

Erosion and runoff from road systems, skid trails, and landings are the primary source for water borne nutrient transport to listed water bodies including the Klamath River in the Hayden Fox Analysis Area watersheds. Because the proposed actions would minimize road and harvest activity in RR, there will be a low likelihood of sedimentation or runoff entering stream channels.

The width of RR and no-machine-entry buffers within the inner half of RR would be sufficient to protect stream channels from direct adverse changes to water temperature regimes (i.e., warming in streams, warming and freezing in wetlands) caused by canopy openings or skid trail use.

Mastication in RR would not affect water quality in vernally wet areas because of the flat topography. Implementing PDFs that only allow access in the dry season and designating crossings will limit soil disturbance.

Alternative 1

Alternative 1 proposes fewer timber sale unit acres and would overall have slightly less ground-disturbing activities than the proposed action, and therefore, slightly less hydrologic impact from ground disturbance and road use. Short-term adverse effects such as road use and compaction would be slightly lower under this alternative than the proposed action.

In Alternative 1, baseflows would likely remain unaffected as the magnitude of vegetation removal would not significantly reduce transpiration. Since there is no harvest proposed within RR in Alternative 1, stream temperatures would not be affected because there is no change to the vegetation currently providing shade. The project would allow attainment of the Aquatic Conservation Strategy (ACS).

Reduction of road density within the Hayden Fox Analysis Area is proposed in Alternative 1. Closed roads that have potential for negative hydrologic effects would be hydrologically disconnected (stormproofed) from the surface water stream network. This would result in low potential to capture and route storm runoff.

Noxious Weed Treatment

As stated in the No Action Alternative, not treating the identified noxious weed populations would have the effect of continued reduced hydrologic function. These weed infestations reduce infiltration and reduce protection from erosion provided by native perennial plant cover. This effect would be magnified if the populations were to spread and increase in aerial coverage or spread to new areas.

Cumulative Effects

As described in the affected environment, impacts from roads, clearcut logging, and water diversions have altered watershed processes. It is expected that reasonably foreseeable future actions, including rotational harvest on commercial timberlands that maintain forest conditions in an early to mid-seral condition (USDI 1995), and land disturbance attributed to development of private lands, will continue at the past rates. Activities on BLM lands will likely continue to focus on commercial thinning for forest health and fuels reduction projects. Some recovery is expected to occur as previously harvested areas within RR improve shade and large wood recruitment. Overall, none of the action alternatives would reduce canopy cover below critical thresholds (less than 30 percent canopy cover) or result in appreciable increases in ground disturbance. These would be the primary catalysts that may trigger synergistic responses. The proposed project does not appreciably decrease canopy cover within the TSZ that may result in peak flow increases. The elevated risks to peak flows from this potential reduction in canopy cover exist regardless of the treatments proposed in the action alternatives. Recent research supports the interpretation that if peak flows increase, they can only be detected in flows of moderate frequency and magnitude and not in extreme storm events. Beyond that, they are likely not detectable (Grant et al. 2008). This suggests that if increases in peak flows occur, they are unlikely to result in adverse effects to the higher gradient channels located within the analysis

area. Also, that peak flows are only detectable in smaller storm events with return periods of 6 years or less, where channel forming processes are minor in effect.

3.8 What are the effects of the proposed activities on the attainment of ACS objectives?

Aquatic Conservation Strategy (ACS) objectives established with the Northwest Forest Plan include nine specific objectives that establish criteria for management within Riparian Reserves. These nine objectives direct the maintenance and restoration of aquatic habitat characteristics through management actions. Initial evaluation of this potential issue determined that some ACS objectives would be maintained (no change expected) under all alternatives, whereas effects on other ACS objectives had potential for effects differences between alternatives. An analysis of the nine ACS objectives and how the alternatives impact them was conducted for this analysis and is captured in a report titled "Evaluation for Consistency with Aquatic Conservation Strategy, " which is filed in the Hayden Fox Project Record.

Presented in this EA are not the nine ACS objectives, but rather information that interrelates to the ACS objectives as presented though issues for this project. Elements of ACS objectives presented in detail in this document include watershed health, peak flow analysis, sediment delivery, and species diversity. The specific issues identified related to those resources are presented in Section 3.0, Affected Environment and Environmental Consequences. Effects to resources associated with other ACS objectives are not analyzed in detail because those resources would not be meaningfully affected or are not present in the project area.

3.9 What are the effects of timber harvest on air quality?

Affected Environment

Air quality is a sensitive issue in the Upper Klamath Basin primarily because of the designation of part of Klamath County as nonattainment for PM2.5 (particulate matter 2.5 microns). This area of non-attainment is located approximately 7 miles northeast of the analysis area. Potential air quality consequences are important for the preservation of high quality visual values for the region. National Ambient Air Quality Standards (NAAQS) were established by the 1970 Clean Air Act and subsequent amendments to protect the public health and welfare from adverse effects associated with the presence of pollutants in the ambient air.

In 2006, EPA revised the 24-hour NAAQS for PM2.5 downward from 65 to 35 μg/m3. If the particulate matter for NAAQS is exceeded, the EPA is required to designate the area as a "nonattainment" area. Air pollutants are emitted from a variety of sources in the Basin including woodstoves, open burning, industrial plants, and internal combustion engines. Woodstoves contribute greatly to particulate matter during the winter. Agricultural and forestry burning operations are substantial sources in the spring and fall. With the emphasis on reducing risk of wildfire, fuels reduction projects using prescribed fire are also a common source of pollutants that can contribute to reduced air quality. This is a Class II airshed, with the closest Class I airshed, Mountain Lakes Wilderness, located approximately thirteen miles to the north. To

comply with air quality standards and minimize impacts to either the non-attainment area of Klamath Falls or the nearby Class I airshed, the Klamath Falls Resource Area (KFRA) reports to the Oregon Department of Forestry (ODF) an estimate of the tonnage it expects to consume for each proposed burning project. Burn days are selected in coordination with the ODF Smoke Management to minimize the probability of smoke impacting these sensitive areas.

Air Quality – Environmental Consequences

The following assumptions are made for smoke emissions, based on FOFEM and CONSUME modeling:

- Underburning: 364 lbs PM2.5 / acre
- Wildfire: 522 lbs PM2.5 / acre

No Action

This alternative would not directly produce any PM2.5. However, the potential for subsequent wildfires that would produce large quantities of PM2.5 would continue to increase as surface and ladder fuels accumulate. A single 1,000 acre wildfire would result in approximately 261 tons of PM2.5, which would occur under unknown dispersal conditions, in a short period of time, and quite likely affect one or more smoke sensitive receptors.

Proposed Action

For the proposed action alternative, the proposed underburning will take place on 1,893 acres which is expected to produce a total of approximately 345 tons of PM 2.5. Underburning will occur under favorable weather conditions to maximize smoke dispersion. These treatments are most likely to be implemented over the course of two to five years after the thinning treatments are completed.

Alternative 1

For alternative 1, underburning would take place on 1,302 acres which is expected to produce a total of approximately 237 tons of PM 2.5. Underburning will occur under favorable weather conditions to maximize smoke dispersion. These treatments are most likely to be implemented over the course of two to five years after the thinning treatments are completed.

Cumulative Effects

It is anticipated that regional emissions would remain at the current level, and that these actions would have a short-term additive effect, lasting for several days at a time. It is likely that other prescribed burning in the region would take place concurrently which is mitigated through the smoke management process described in the Affected Environment section above.

3.10 What are the socioeconomic effects of the proposed activities?

Affected Environment

The project area is host to a variety of human uses on both the public and private lands interspersed throughout the area. Revenue generating activities in the area includes hunting,

camping, mushroom harvesting, and grazing, along with other activities such as dispersed OHV use and wildlife watching. With the presence of merchantable forested land in the project area, there is potential for the forest products industry to contribute to the local economy using material from the project area.

The RMP states that the allowable sale quantity (ASQ) for the KFRA from matrix lands is approximately six million board feet (6 MMBF). The ASQ of 6 MMBF is an annual level of harvest that forest inventories and stand growth models have determined is sustainable.

Processing facilities locally and in neighboring communities are dependent upon a stable, sustainable, and reliable supply of timber. There are at least three local (Klamath County) wood products processing facilities and local forest products periodically go to facilities in the Medford, Bend and Yreka areas.

In Klamath County specifically, the forest sector makes up about 25% of the county's economic base. Federal forestlands make up 60% of Oregon's forest land base and only 12% of Oregon's harvested volume. Recently, federal eastside Oregon forestlands produced about 0.5 billion board feet (BBF) annually (Oregon Forest Resources Institute, 2012 Forest Report).

Socioeconomics- Environmental Consequences

No Action

The No Action alternative would result in the KFRA not offering one or two timber sales in this project area and not meeting part of the ASQ for 2014.

The No Action alternative would affect local businesses primarily dependent upon the production of forest products, as no timber harvesting or fuels treatments of smaller material would be completed. Based upon the assumption that every million board feet (MMBF) of timber harvested creates or retains eleven forest sector jobs (Oregon Forest Resources Institute, 2012 Forest Report), approximately 52 jobs could be impacted if this alternative is chosen.

However, the No Action alternative should not result in any detectable socioeconomic change in regards to recreation uses. Hunting and other recreational uses are expected to continue at present levels regardless of the alternative chosen.

Proposed Action

Under the Proposed Action, approximately 4.7 million board feet (MMBF) of timber is expected to be commercially harvested from approximately 1,895 acres. The proposed sale would accomplish about 78% of KFRA's yearly ASQ. This corresponds to an average of approximately 2,500 board feet per acre. This estimate is based on FVS modeling, sale reconnaissance and past experience in similar landscapes on KFRA lands where 2,000 to 3,000 board feet of timber were removed per acre. In the recent past, similar ground based sales have been economically viable as demonstrated by the sales being purchased and successfully harvested.

This volume figure has the potential to create or retain approximately 52 direct forest sector jobs. As stated above, the local area processes a considerable amount of timber, and the expected harvest volume from the Proposed Action contributes to the stable supply of timber for processing facilities.

Further, other proposed treatments such as pre-commercial forest thinning, planting, brush mastication and weed treatments are also expected to contribute to the local economy as the work would be contracted out.

The proposed action could also result in an increase of morel mushroom picking opportunities in the area resulting in some socioeconomic benefits. Morel mushrooms seem to favor areas with a certain amount of disturbance, especially burning disturbance (WMMA, 2011) as would be provided if the proposed action is implemented. This additional area for mushroom harvesting could in turn help provide economic benefit to local mushroom commercial harvesters and sellers.

Alternative 1

According to FVS modeling, area reconnaissance and past experience in similar KFRA landscapes this alternative would harvest approximately 2.7 MMBF or roughly 57% of the total volume expected to be generated by the Proposed Action. Volume harvested under this alternative could support approximately 30 forest products based jobs as compared to 52 jobs for the Proposed Action. This alternative would harvest an average of approximately 1,500 to 2,300 board feet per acre. The lower total volume harvested, reduced harvest acres, reduced volume per acre and particularly smaller log diameters harvested under Alternative 1 would have a negative effect on the economic viability of the proposed sale. Past timber sales on similar ground in KFRA with less than 2,000 board feet per acre have not been economically viable as demonstrated by no bid sales. Reduced harvest volume and reduced log sizes generated by Alternative 1 would result in the sale being marginally viable or uneconomical to log.

The impacts of actions proposed under Alternative 1 would have a lesser positive impact on local economic opportunities due to the decreased amount and scope of proposed treatments. Tighter constraints on the amount and size of timber proposed for commercial timber harvest under this alternative could result in levels that might make the sale uneconomical to harvest.

Further, there is no proposal to treat weed populations under this alternative which would have a small economic impact of less opportunity for local contract work.

Cumulative Effects

As mentioned above, forest product processing facilities depend on a sustainable supply of wood material for economic strength. Continual delays such as litigation of timber sales on federal lands have decreased the stability of a sustainable supply. The cumulative effects of this instability are partial to permanent closures of processing facilities and the corresponding loss of jobs. Although private timberlands supply much of the present demand for timber, some of the present forest industrial infrastructure is dependent upon a sustainable supply of timber from federal lands. While each timber sale harvested may offer a short duration of the above mentioned employment, cumulatively a steady supply of timber sales are expected to result in

longer, more reliable employment. OFRI reports show that for areas east of the Cascades, there is a need for a dependable long-term timber supply to sustain remaining few mills. Additional employment opportunities could result from any follow-up biomass operations that would utilize residual landing debris.

4- CONSULTATION AND COORDINATION

4.1 Endangered Species Act (ESA) Consultation

Consultation with the U.S. Fish and Wildlife Service on the effects of the Hayden Fox Project on northern spotted owls and Designated Critical Habitat for the northern spotted owl has been initiated and is on-going. The level and degree of consultation will ultimately depend on the Decision Record for the EA. The two action alternatives analyzed in the EA have differing impacts to spotted owl habitat and spotted owl Designated Critical Habitat. The U.S. Fish & Wildlife Service (FWS) has been briefed on the two action alternatives and their expected impacts to spotted owls and critical habitat. The Decision Record will probably be a hybrid between the two action alternatives and the No Action Alternative. The FWS is aware of this. The BLM and the FWS agree that the hybrid action will be the basis of the consultation process. The FWS had an opportunity to review the EA during the public comment period.

Consultation will be completed prior to implementation of the treatments proposed in the EA. The BLM has made a determination of "No Effect" on the Hayden Fox Project with regard to ESA listed, proposed, or Candidate species other than the northern spotted owl.

4.2 Tribal Consultation

Consultation with the Klamath Tribes has been on-going since March 2012 for this analysis and no concerns have arisen.

4.3 List of Preparers

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Matt Broyles	Wildlife Biologist
Madeline Campbell	Silviculturist
Johanna Blanchard	Botanist; Noxious Weeds, Special Status Plants
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Deb Boudreau	Lands/Realty/Minerals
Brian McCarty	Transportation Specialist
Terry Austin	Resource Area Planner

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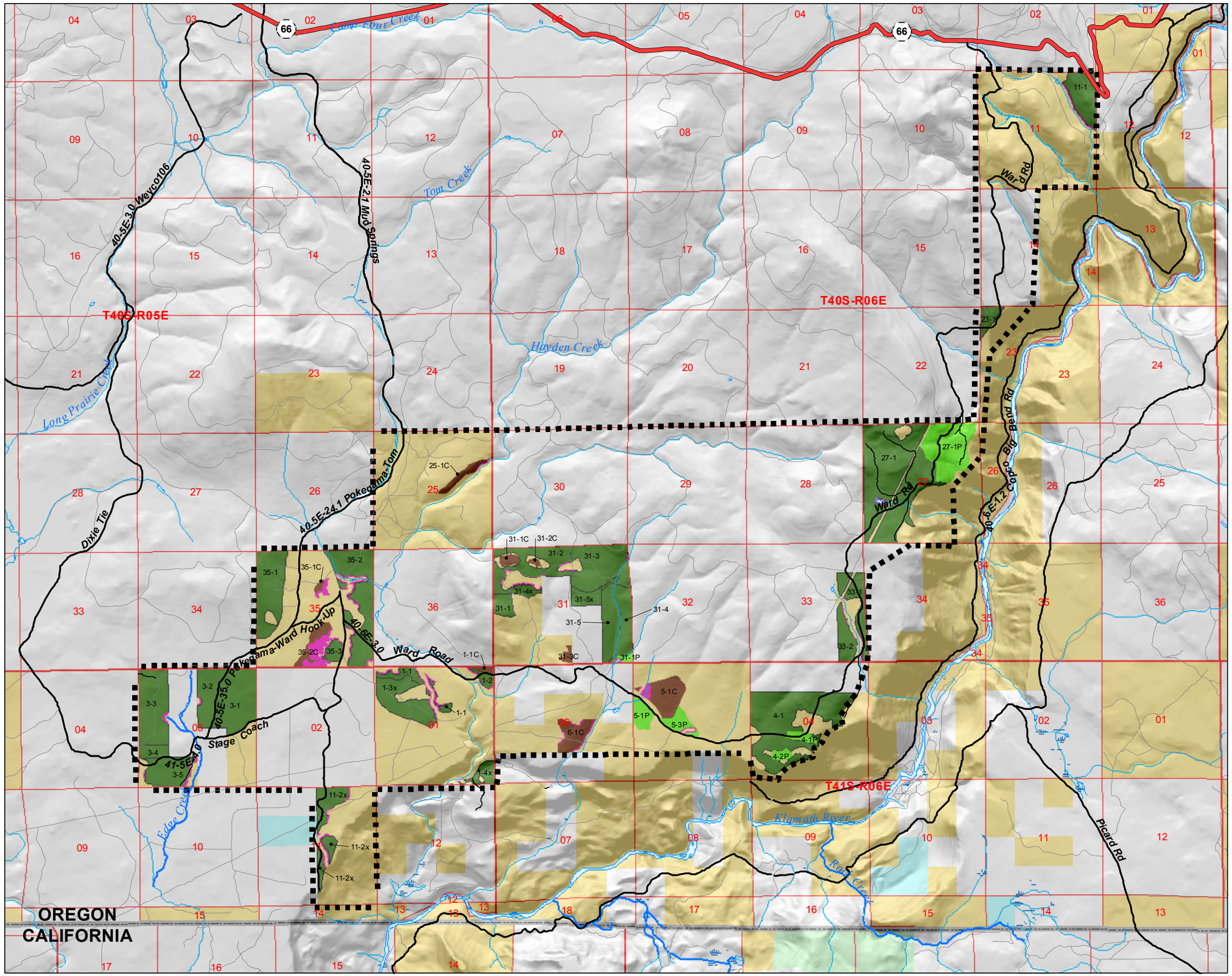
APPENDIX A: MAPS

Proposed Action – Hayden Fox EA

Alternative 1 – Hayden Fox EA

Land Designations – Hayden Fox EA

Proposed Action
Hayden Fox
Environmental Assessment



Proposed Action

- Brush Mastication (149 ac.)
- Riparian Treatment (89 ac.)
- Thinning - Plantation Thin (177 ac.)
- Thinning - Timber Sale (1783 ac.)
- Hayden Fox Analysis Area

Streams

- Perennial Stream
- Intermittent / Seasonal Stream

Jurisdiction

- Bureau of Land Management
- State Lands
- Private Lands
- U.S. Forest Service

Klamath Falls Field Office
Lakeview District
Bureau of Land Management
2795 Anderson Ave. #25
Klamath Falls, Oregon 97603-7891
(541) 883-6916

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Miles

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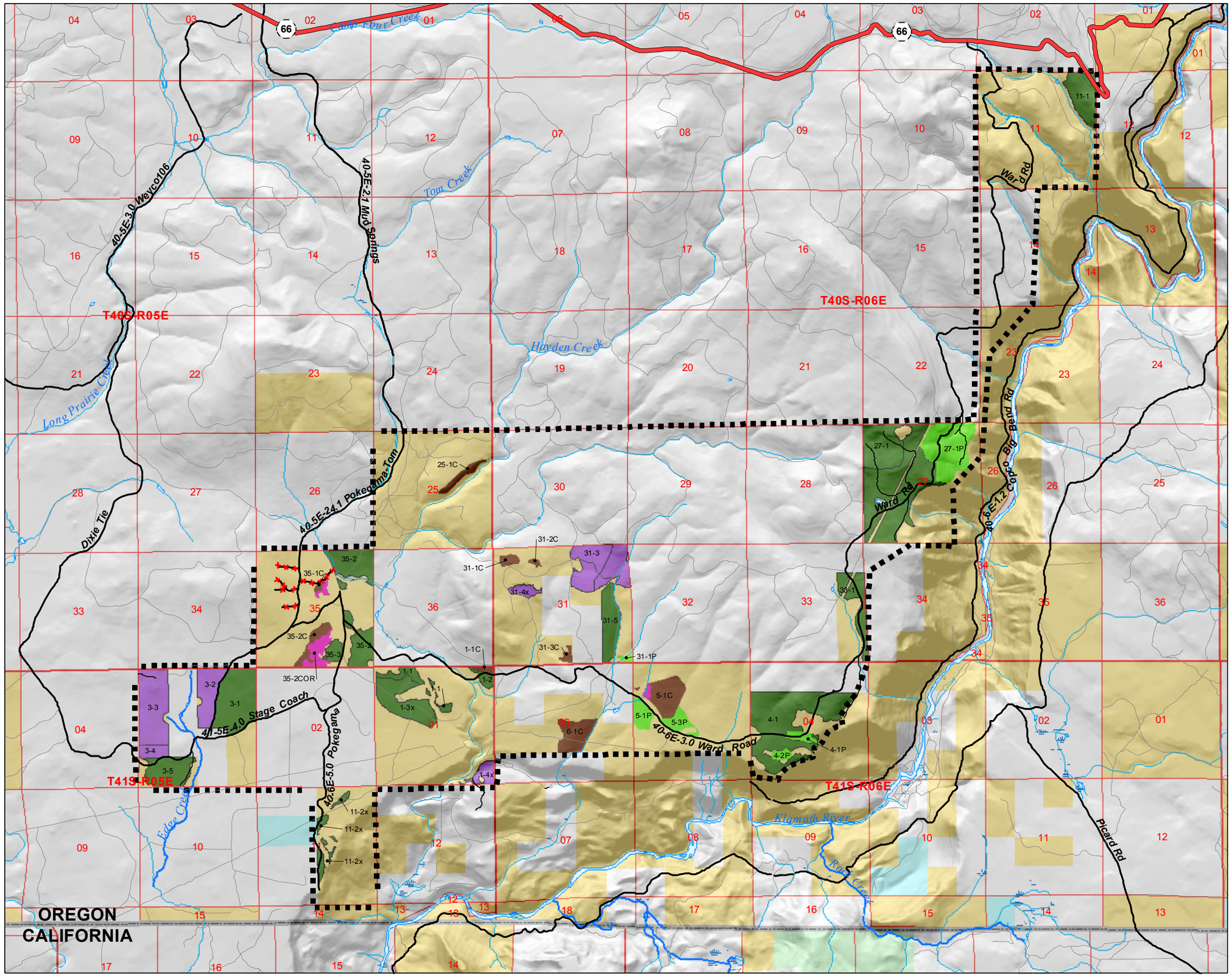
Alternative 1
Hayden Fox
Environmental Assessment



Alternative 1

- Brush Mastication (149 ac.)
- Riparian Brush Mastication (32 ac.)
- Thinning - Small Diameter (317 ac.)
- Thinning - Plantation Thin (177 ac.)
- Thinning - Timber Sale (1166 ac.)
- Proposed Road Closure (1.04 mi)
- Hayden Fox Analysis Area

Streams

- Perennial Stream
- Intermittent / Seasonal Stream

Jurisdiction

- Bureau of Land Management
- State Lands
- Private Lands
- U.S. Forest Service

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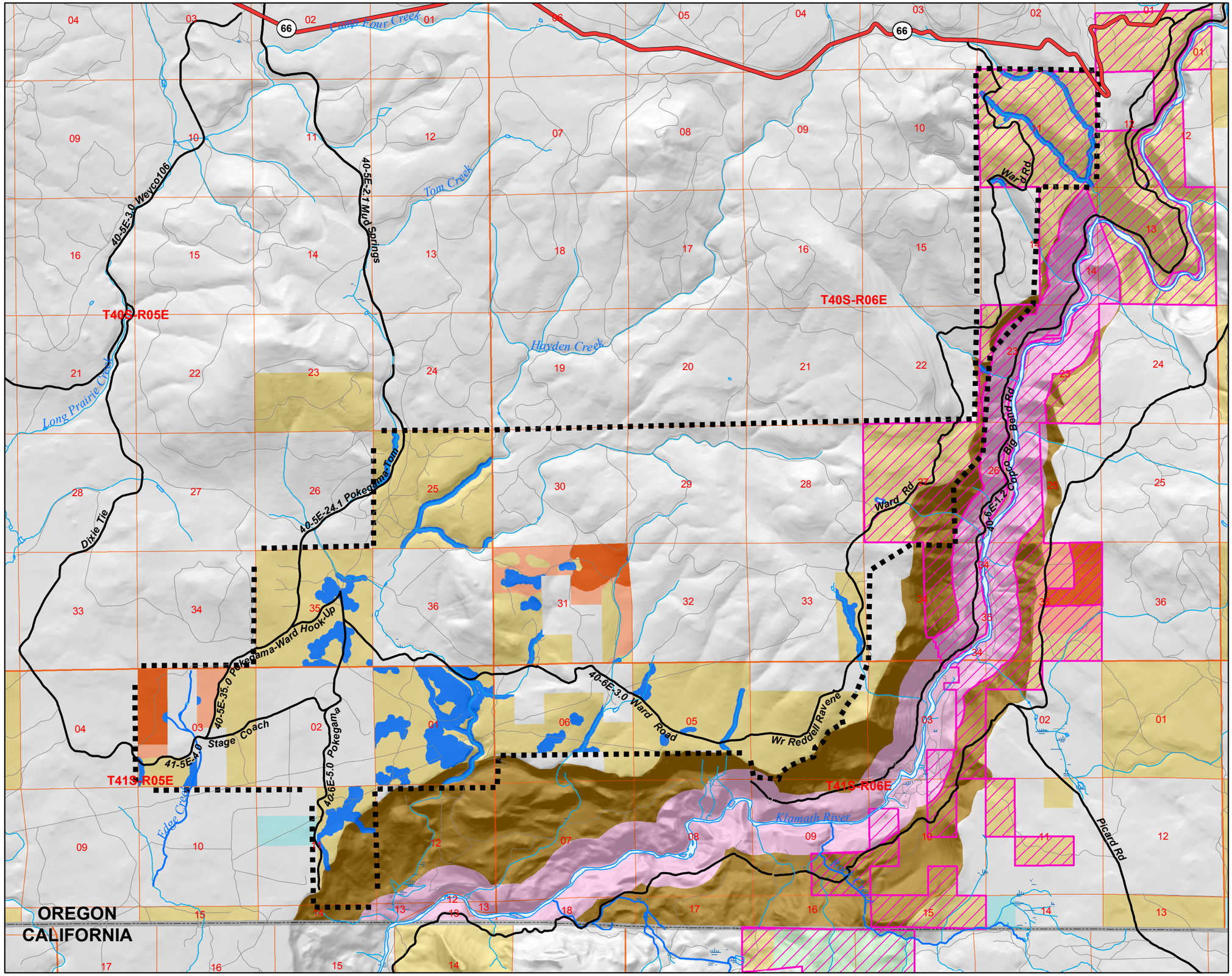
Land Designations
Hayden Fox
Environmental Assessment



Designations

- Northern Spotted Owl Critical Habitat 2012
- Hayden Fox Riparian Reserves
- Wild & Scenic River
- Area of Critical Environmental Concern
- District Designated Reserve
- District Designated Reserve Buffer
- Hayden Fox Analysis Area

Streams

- Perennial Stream
- Intermittent / Seasonal Stream

Jurisdiction

- Bureau of Land Management
- State Lands
- Private Lands
- U.S. Forest Service

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APPENDIX B: Summary of Best Management Practices and Project Design Features

Appendix D of the RMP (pages D1-D46) describes the Best Management Practices (BMPs) that are "designed to achieve the objectives of maintaining or improving water quality and soil productivity and the protection of riparian-wetland areas." BMPs are defined as methods, measures, or practices selected on the basis of site-specific conditions to ensure that water quality will be maintained at its highest practicable level (D-1, Appendix D, RMP). In addition to BMPs that focus on water quality and soil production, the interdisciplinary team also developed project design features (PDFs) with the objective of meeting other resource goals. For instance, the PDFs listed below under Wildlife and Vegetation are designed to meet resource objectives associated with these resources, and not necessarily water quality.

Roads

The KFRA RMP (1995) was updated in 2011 to improve BMPs in order to reduce sediment delivery from BLM roads in Oregon, as per Instruction Memorandum No. OR-2011-074. The BMPs in this list, R 001 through R 101, would be applied during the Hayden Fox project implementation. The complete list can be viewed on the BLM website at: http://www.blm.gov/or/districts/lakeview/plans/files/BMPPlanMaintMemo1995_120109.pdf

Soil Resources

• Limit detrimental soil conditions to less than 20 percent of the total acreage within the activity area. Use current soil quality indicators to monitor soil impacts.
• Limit mechanical cutting and yarding operations to periods when the soil moisture is below 20 percent at a six inch depth.
• Low-disturbance yarding equipment is recommended.
• Avoid placement of skid trails in areas with potential to collect and divert surface runoff, such as the bottom of draws and ephemeral drainages.
• Where operations utilize forwarder harvester or shovel/loader, create an adequate layer of green slash (limbs, tops and small boles) by the harvesting or felling process to limit bare soil exposure. A desired depth of such material would be 12 to 18 inches of loose slash.
• Residual slash will be placed upon skid trails upon completion of yarding.
• Retain minimum effective ground cover amounts to prevent erosion from ground-disturbing activities. Vegetative retention and establishment is 45-60% in the first year and 60-75% in the second year on disturbed sites of high erosion hazard (KFRA ROD/RMP, page D-11).
• Retain sufficient small woody (dead and down) material to sustain soil nutrients. See KFRA ROD/RMP, page D-11 for specifications. In ponderosa pine forest stands, nine tons per acre of duff and litter are desired (approximately ½ inch deep).
• Winter logging activities will be allowed when sufficient snow or frozen ground are present. This is normally when snow depths average twenty (20) inches or greater, or when the ground is frozen to a depth of six (6) inches.

• To protect soil resources and water quality, hauling on unsurfaced roads will be restricted during periods of high soil moisture unless waived by authorized personnel.

• Conduct underburns during conditions when a light to moderate intensity burn can be achieved (KFRA ROD/RMP, page D-30).

- Light burns are characterized by partly burned duff, crumbled wood, or other woody debris, and logs not deeply charred. Soil surface structure is intact and water-repellency is similar to pre-burn conditions. Less than 2 percent of the area is severely burned, whereby the top layer of mineral soil is significantly changed in color, usually to a reddish color, and the next 0 5 inch is blackened by heat conducted through the top layer.
- Moderate burns are characterized by duff, rotten wood, or other woody debris partially to mostly consumed, but mineral soil under the ash is not appreciably changed in color. Less than10 percent of the area is severely burned.

• Construct fireline by hand on slopes greater than 35 percent.

Additional Soils BMPs for inner riparian areas of treatment units 1-3x, 11-2x, 31-4x, 35-1C, 35-2, and 35-2C and Vernally Wet Areas:

- Limit the use of tractors and brush mastication operations to periods when (1) the soil moisture is below 15 percent at a six inch depth, or (2) soils are frozen to a depth of six inches.
- Cease operation if RMP disturbance threshold is exceeded (if ruts from equipment wheels or tracks exceed 6 inches in depth and are present on 15 percent or more of the treatment unit).
- Commence rehabilitation promptly, by seeding or planting of native species or species that will quickly establish desired ground cover conditions.

Hydrology & Riparian Reserve Treatments

PDF for Logging operations in Unit 40-6-11

The primary access and haul route for this unit is a road located adjacent to an intermittent stream channel. Harvest operations would therefore require entering and moving logs across the RR. The road could be used to haul and as a landing platform however the road needs to be brought up to current road standards to meet current BMP and water quality standards. Because of its proximity to the stream channel, this road should be surfaced with crushed rock to prevent direct run-off of sediment from the road to the stream channel. In addition, the road should be re-graded to an outsloped condition over the length of the RR and the downslope berm removed. No landings would be constructed in the RR although logs could be skidded to the road at designated points through the RR.

PDF for Logging operations in Unit 41-5-11-2x:

A segment of the primary access and haul route for this unit passes through the RR. The road segment within the RR could be used to haul however the road needs to be graded and renovated to provide drainage. No landings would be constructed in the RR.

PDF for crossing vernally wet areas:
Access to brush mastication units may require entering vernally wet areas. Entering vernally wet areas with machinery for brush mastication will be limited to the dry season.

Timber Harvest

- Delineate Riparian Reserve widths as described in the RMP (pg F-8, ROD pgs C-30 to 31). Refer to Table B-1 below.
- For timber sale and thinning treatments within Riparian Reserves, limit the use of mechanical equipment to the outer one-half of the Riparian Reserve (except for designated skid trail crossings, roads, or yarding corridors).
- No new landings will be constructed in Riparian Reserves.
- Existing landings and roads within Riparian Reserves will be used only when replacing them with landings and roads outside the Riparian Reserves would result in greater overall disturbance to the Riparian Reserve or water quality.
- Avoid placement of skid trails and landings in areas with potential to collect and divert surface runoff such as the bottom of draws and ephemeral drainages.
- Harvest/treatment methods that would disturb the least amount of soil and vegetation (yarding over snow or frozen ground, limiting activities to the dry season, pulling line to each tree, and minimizing skid trails) will be used in the Riparian Reserves. The 20-foot radial arm on the mechanical harvester will be used to reach toward the boundary line of Riparian Reserves wherever possible.
- Thin to a higher basal area (100-160 square feet per acre), favoring larger trees for shading and remove competing conifers around dominant pines.
- No new permanent roads will be constructed within Riparian Reserves (except where construction or re-alignment of short road segments allows obliteration of longer road segments).
- Yarding/skidding corridors that pass through Riparian Reserves will be designated prior to project implementation, will have a minimum spacing of 300 feet and be oriented perpendicular to streams, will have minimal relative slope, and will be revegetated following project implementation (as needed).
- Stream crossings will be selected at stable, naturally armored locations or will be armored with slash before being used as a corridor.
- Use of existing roads and landings within Riparian Reserves will be reviewed by the appropriate members of the Klamath Falls Resource Area interdisciplinary team and recommendations made to the authorized officer.
- No ripping, piling, or mechanical site preparation (except for designated skid trail crossings, roads, or yarding corridors) in timber sale Riparian Reserves.

Table B-1: Riparian reserve types and widths from the KFRA RMP

Riparian Reserve Type	Reserve Width (for each side of streams/wetlands)
Fish-bearing streams	At a minimum, the reserve width will include: ▪ Slope distance equal to the height of two site potential trees (240 feet); or, ▪ The stream channel and the area extending to the top of the inner gorge; or, ▪ The area extending to the outer edges of riparian vegetation; or, ▪ The 100-year floodplain; or, ▪ The extent of unstable or potentially unstable areas, whichever is greatest.

Riparian Reserve Type	Reserve Width (for each side of streams/wetlands)
Perennial non-fish-bearing streams and Intermittent (seasonal) non-fish-bearing streams; Constructed ponds and reservoirs; and Wetlands greater than one acre	At a minimum, the reserve width will include: ▪ Slope distance equal to the height of one site potential tree (120 feet); or, ▪ The stream channel (or waterbody/wetland) and the area extending to the top of the inner gorge; or, ▪ The area extending to the outer edges of riparian vegetation; or, ▪ The 100-year floodplain (for streams) or the extent of seasonally saturated soil (for waterbodies and wetlands); or, ▪ The extent of unstable or potentially unstable areas, whichever is greatest.
Wetlands less than one acre and Unstable or potentially unstable areas	At a minimum, the reserve width will include: ▪ The wetland and the extent of seasonally saturated soil; or, ▪ The area extending to the outer edges of riparian vegetation; or, ▪ The extent of stable or potentially unstable areas, whichever is greatest.
Lakes and natural ponds	At a minimum, the reserve width will include: ▪ Slope distance equal to the height of two site potential trees (240 feet); and, ▪ The body of water or wetland and the area to the edges of riparian vegetation; ▪ The extent of seasonally saturated soil; ▪ The extent of unstable or potentially unstable areas; whichever is greatest.
Springs	Reserve widths vary according to the size of the associated wetland (see above).
*A site-potential tree is defined as the average maximum height of the tallest dominant trees (200 years old or more) for a given site class. In the Hayden Fox project area, the site potential tree height was determined to be 120 feet.	

Ignitions within Riparian Reserves:

- Ignition of broadcast fires will not occur within a minimum of 50 feet from the stream channel within the Riparian Reserves. The specific distance for lighting fires within the RR will depend on topography, habitat, ignition methods, and fuel moisture.
- Ignition line location nearest the stream will be based on topography and ignition methods and will be sufficient to protect water quality, CWD, and stream overhead cover. There will be no ignition of CWD directly touching the high water mark of the stream, or of CWD that may be affected by high flows. Where there is thick vegetative cover that extends out from the stream, ignition lines will be located in the forest stand, away from the stream.
- Ignition lines near large open meadows, associated with the stream channels will be located at the toe slope above the meadow elevation as much as possible to protect meadow vegetation.
- Increased ignition spacing from the stream will occur when igniting fuels on the lower end of the window of moisture content to protect CWD and overhead cover components.

Streamside pumping sites:

- Pumping on small streams will not reduce the downstream flow of the stream by more than half the flow.
- Avoid the construction of temporary pump chances; when necessary, use temporary plastic dams to create chances and remove these dams when not actively pumping.
- All pumping located on fish-bearing streams must have a screen over the intake to avoid entrainment of small fish.

- Pump intake must be suspended near the thalweg (deepest/highest quantity of flow) of the stream. Avoid placing pump intakes on the substrate or edges of the stream channel.

Post Riparian Reserve treatments for access roads and temporary fire trails:

- Install drainage dips, or water bars, in accordance with RMP BMPs to reduce surface run-off.
- A layer of duff (average of ½ inch after final burn) will be retained to protect soil from erosion during the wet season (typically October 15 to May 1).
- Seeding or other methods of soil stabilization will be applied prior to the wet season to reduce surface erosion.
- Design blockages (close or decommission) upon completion of treatments to minimize non-authorized use of roads and trails within treatment areas.
- Place residual slash on trails upon completion of mechanical treatments.

Noxious Weeds

- Pressure wash vehicles and equipment that will travel off system roads prior to entry onto BLM-managed lands. This will remove loose seeds, grease, plant parts, and dirt that may contain viable noxious weed seeds, thereby reducing potential introduction of new noxious weeds into the project area and into newly disturbed sites. If the job site includes a noxious weed infestation, require cleaning of all logging and construction equipment and vehicles prior to leaving the job site.

- Monitor the project area 1-3 years after harvest is complete and treat noxious weeds as detected in areas that were disturbed by project implementation.

- Road graders used for road construction or maintenance will grade towards any known noxious weed infestations. If no good turn around area exists within one half mile that would allow the operator to grade towards the noxious weed infestation, then the operator will leave the material that is being moved within the boundaries of the noxious weed infestation.

- By following label instructions, imazapic (herbicide) will be applied on medusahead rye only when cattle are not actively grazing affected allotments (in the Fall).

Cultural Resources

- In implementing this project, BLM would follow procedures for cultural protection and management outlined in the KFRA ROD/RMP (page 43), and protect identified sites by buffering.

- In accordance with guidelines and directives in the Klamath Falls Resource Area RMP, BLM regulations, and the National Historic Preservation Act, areas not included in previous archaeological surveys will be surveyed before any ground-disturbing action is undertaken.

- If subsurface cultural resources are unearthed during operations, activity in the vicinity of the cultural resource will cease and a BLM representative notified immediately. Pursuant to 43 C.F.R. 10.4 the holder of this authorization must notify the authorized officer, by telephone, with written confirmation, immediately upon the discovery of human remains, funerary items, sacred objects, or objects of cultural patrimony. Further, the project leader/operator/permittee/etc. must stop activities in the vicinity of the discovery and protect it for 30 days or until notified to proceed by the authorized officer. The holder will be responsible for the cost of evaluation and any decision as to proper mitigation measures that are made by the authorized officer (BLM).

- The project leader/operator/permittee/etc. is responsible for informing all persons associated with this project that they will be subject to prosecution for knowingly disturbing Native American Indian shrines, historic and prehistoric archaeology sites, or for collecting artifacts of any kind, including historic items and/or arrowheads from Federal lands pursuant to the 1906 American Antiquities Act (P.L. 59-209; 34 Stat. 225; 16 U.S.C. 432, 433), the Archaeological Resources Protection Act of 1979 (P.L. 96-95; 93 Stat. 721; 16 U.S.C. 47Oee as amended), and/or other federal laws and regulations.

Wildlife - Terrestrial Species

Snag Retention

- Approximately 2.4 snags per acre will be retained with a minimum diameter at breast height (DBH) of 16", or largest available if less than 16" (1995 RMP/ROD, Page 26-27).

Snag Retention for Special Status Species

- Provide 2.5 snags/acre as per the NWFP and 1995 KFRA RMP for white-headed woodpecker, black-backed woodpecker, pygmy nuthatch, and flammulated owl.

Coarse Woody Debris (CWD)

- In timber sale units, approximately one hundred and twenty (120) linear feet of down logs per acre will be retained. Logs shall be greater than or equal to sixteen (16) inches in diameter and sixteen (16) feet long (RMP/ROD, Page 22) where available.

Seasonal Restrictions, Wildlife

Seasonal restrictions will be required where the following wildlife species are actively nesting: bald eagle, northern spotted owl, northern goshawk, osprey, and special status species. There are no known nests of these species in the project area. If any are found prior to or during implementation, these protection measures would apply. Seasonal restrictions for specific species can be found on pages 231-240 of the 1995 KFRA FEIS.

Nesting Areas

Protect nesting areas as described on page 38 of KFRA RMP.

For Hazardous Fuel Treatment Units Adjacent To Or Containing Bald Eagle Nest Sites .

- No treatments will be planned within the core area (as identified by the BLM wildlife biologist) of a bald eagle nest site during the nest season. Nesting season is considered January 1st – August 15th. The wildlife biologist may adjust these dates if the young have fledged prior to Aug. 15th (usually the fledging date plus 2 weeks). The core area will consist of the withdrawn area around the nest and the disturbance area around the nest. Generally the disturbance area is considered ¼-mile or ½ mile line-of sight. This distance may vary depending on topography and site-specific information.
- Smoke management will be planned in such a way to avoid adverse effects of residual smoke on nest sites adjacent to burn units.
- A BLM wildlife biologist will be consulted about eagle use of the area before the fuel treatments are initiated to ensure the eagle situation is closely monitored.
- A biologist/designee will monitor the nest area during the burns to ensure that objectives and PDF's are met (smoke management, fire intensity, etc).
- In areas where prescribed fire activities are being planned, remove the brush, ladder fuels and large down woody debris within the dripline of the eagle nest trees and potential or identified perch/roost trees to reduce ladder fuel. The brush would be scattered away from the nest and burned.

In order to reduce fire activity immediately adjacent to the nest trees during the broadcast burning of the area, personnel will be required to complete one or more of the following:

- Pull back of 10 and 100 hour fuels 30' from the base of the nest trees/ perch trees.
- Construct fire line around the nest trees/perch trees.
- Use foam, water, or other retardants to protect the nest tree (unless in a riparian zone).
- Ladder fuels would be removed from the dripline
- If the nest is occupied or spring burning is preferred because of excess fuel loading or to meet other resource objectives, then spring burning will not be allowed until site-specific discussions/consultations are completed with USFWS on this matter.
- In instances when verifying nesting status is necessary prior to activities taking place, survey protocols used by Oregon Eagle Foundation annual bald eagle survey flights would be followed.
- Fuel treatments can proceed in the core area, if no nesting has occurred by May 6 (last date documented for initiation of incubation, Frank Isaacs, personal communication)

For units adjacent to or containing northern spotted owl Nesting, Roosting, Foraging (NRF) habitat:

- Burn prescriptions will require proper fuel moisture and atmospheric conditions so that adequate large woody debris will be retained for prey habitat. General objective for burn would be to create a mosaic of burned and unburned habitat in the unit to maintain some habitat for prey production.

- In nesting, roosting, foraging (NRF) habitat, maintain visual screening along open roadways to minimize disturbance. In northern spotted owl NRF habitat, maintain the understory structure by retaining a diversity of the sub-merchantable understory conifer trees (Douglas-fir, white-fir, sugar pine, cedar, ponderosa pine). In mechanical treatment areas, this would be done by site-specific designs described in the individual task orders.
- During prescribed fire activities, the overall objective is to create a mosaic of burned and unburned areas. Ignition techniques and pull back on smaller trees may also be used to maintain the understory structure.
- Maintain habitat connectivity and corridors.
- In NRF and dispersal habitat stands conduct burns so as to avoid overstory and mid story trees group torching, and the pre-burn canopy closure is maintained.
- In NRF and dispersal stands it may be necessary to line thermal clumps in order to meet the above objectives.

Forest Stand Structural Diversity

In stands treated with density management prescriptions, or commercial thinning prescriptions, retain untreated areas up to five acres in size, and cumulatively comprising up to 15% of the total unit acreage. These areas (thermal clumps) would be selected and delineated around areas of important and limited structural features such as snag patches, patches of unusually high tree density, rock outcrops, high concentrations of CWD, etc. Where possible, thermal clumps would be overlain on top of areas retained for protection of known sites of special status plants and fungi, and protected mollusk habitat.

Great Gray Owl Project Design Features for Units 11-2X and 1-4X (approximately 98 acres) under the Proposed Action and Alternative 1.

- A seasonal restriction on operations during the GGO breeding season (March 1 –July 31) within 660 feet of foraging habitat (natural grassy openings larger than 10 acres).
- Apply a modified prescription to the portions of units within 660 feet of foraging habitat. This prescription would include:
    - Retention of ALL trees, regardless of size, with visible nests or mistletoe platforms that are larger than 12 inches in diameter.
    - Retention of ALL flat-topped snapped- out snags that are greater than 12 inches diameter at the snap out and at least 15 feet tall. Individual snags that meet this description and that constitute a safety hazard could be cut after being checked for nests by KFRA wildlife biologists.
    - Retention of ALL green trees with deformed or multiple tops that have deformities or structures that are sufficiently large enough to support a nest that is 12 inches in diameter.
    - Retention of ALL trees larger than 23 inches DBH.

APPENDIX C: Great Gray Owl Survey History of the Hayden Fox Project

Most of the portion of the project area that required pre-disturbance surveys for this species was surveyed in spring 2012, using USDA/USDI 2004 survey protocol for the great gray owl (GGO). The units requiring surveys that did not receive surveys in 2012 were units 1-4X and 11-2X, which were added to the project in summer and fall of 2012 after the GGO survey season. From summer 2012 until late April 2013 the project was considered to have had all the necessary GGO surveys (with the exception of units 11-2X and 1-4X). The plan was to survey units 11-2X and 1-4X in the spring of 2013 and thus complete the required surveys.

In late April 2013, the 9th Circuit Court of Appeals affirmed a D.R. Johnson Company appeal of the 2011 "Survey and Manage Settlement Agreement" between environmental group plaintiffs and the BLM. The 9th court's action invalidated most of the provisions of an earlier (2011) Survey and Manage suit Settlement Agreement, including the provision of that agreement that allowed for an abbreviated effort for pre-disturbance surveys for GGOs. The Settlement Agreement allowed for a one-year-only survey effort instead of the 2 year survey effort spelled out in the Jan. 12, 2004 interagency GGO survey protocol.

Since the approval of the 2011 Survey and Manage Settlement Agreement, KFRA had used the one-year-only GGO survey provision on some planned timber sales, including Hayden Fox. This meant that, as of late April 2013, portions of the Hayden Fox project that now needed two consecutive years of survey effort had not received that level of survey effort. Most units requiring surveys had been surveyed for one season only (2012). The exceptions were units 1-4X and 11-2X which had received no survey effort because they were added late to the project (Fall 2012).

For this sale to proceed, KFRA either needed to do the additional required GGO surveys mentioned above (8 routes, 6 times in spring 2013 and one route, 6 times in each of two consecutive springs-2013 and 2014) or modify the Proposed Action and/or selected action such that the project (or unit(s)) no longer required GGO surveys. Due to insufficient staffing, insufficient funding, local weather and access issues, and the survey season time constraints of the survey window within the 2004 survey protocol, KFRA chose to employ both approaches described above and do only limited surveys in spring of 2013. Units surveyed in spring 2013 (second consecutive year of survey as per 2004 survey protocol) were 27-1, 33-1, and 33-2. The rest of the units requiring surveys (including units 1-4X and 11-2X) had their proposed treatment prescriptions changed in the EA planning process so as to no longer require additional GGO surveys. Those modified treatment prescriptions and seasonal restriction would have covered 804 acres.

On February 18, 2014 Judge Coughenour of the Western District Court in Seattle issued an order indicating that for projects for which the planning process and/or wildlife surveys had started prior to the 9th Circuit Court's April 2013 ruling that invalidated the 2011 Settlement Agreement, and that were relying on that Settlement Agreement in the planning and survey process, those projects could proceed as if the settlement agreement were still in effect. The Hayden Fox project falls into this category because wildlife surveys (including for GGO) were

started under the provisions of the 2011 Settlement Agreement. The effect of Judge Coughenour's order on Hayden Fox GGO surveys and management is that now, once again, a one-year-only survey effort for GGO is sufficient. This means that all the units surveyed for GGO for at least one full breeding season (2012) in Hayden Fox are deemed to be unoccupied and do not require any further surveys and do not require any special management or prescription change for GGO. The only Hayden Fox units which contain habitat that is required to be surveyed, and that have not been surveyed for at least one breeding season are 11-2X and 1-4X, which were added to the project after the breeding/survey season in 2012 and have had no GGO survey effort.

Survey results

Individual Great gray owls were infrequently detected during the 2012 surveys, but no nests were located, and no sites were established as per the current interagency survey protocol. Accordingly, Under Judge Coughenour's order of Feb.18, 2014, the only modifications to the Hayden Fox project for this species were the modifications (project design features) outlined above in Appendix B that were developed so as to protect potential nesting GGOs without surveying parts of the proposed sale area (units 11-2X and 1-4X).

Why the PDFs make GGO surveys unnecessary

The 2004 GGO survey protocol lists 3 criteria on pg. 7 that must be met in order to trigger the need for pre-disturbance surveys. The PDFs listed above are designed to reduce the treatment associated effects to potential nesting GGOs in unsurveyed habitat such that criterion #3 is not met. The 660 foot figure is from pg. 10 of the protocol "*Great Gray Owls tend to select nest sites in mature or remnant old-growth mixed conifer forests near openings (within 200 meters of openings)…*". 200 meters = 660 feet. The prohibition on cutting trees larger than 23 inches DBH is based on the nest tree size table on pg. 13 of the survey protocol, using the figure for the Oregon East Cascades Province. The prohibition on cutting trees with defects and structures and nests is designed to prevent GGO nests and substrates for potential future nest from being removed from the stands. The seasonal restriction is intended to prevent disturbance to potential undetected nesting GGOs.