REVISED

ENVIRONMENTAL ASSESSMENT

for the

PILOT THOMPSON PROJECT

UNITED STATES
DEPARTMENT OF THE INTERIOR
BUREAU OF LAND MANAGEMENT
MEDFORD DISTRICT OFFICE
ASHLAND RESOURCE AREA

(DOI-BLM-OR-M060-2013-0003-REA)

This revised environmental assessment (REA) for the proposed Pilot Thompson Project was prepared utilizing a systematic interdisciplinary approach integrating the natural and social sciences and the environmental design arts with planning and decision-making.

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MEDFORD DISTRICT OFFICE

REA COVER SHEET

RESOURCE AREA: Ashland

ACTION/TITLE: Pilot Thompson Project

EA NUMBER: DOI-BLM-OR-M060-2013-0003-REA

LOCATION: Thompson Creek and a portion of Slagle Creek (Ferris Gulch) drainages of the Middle Applegate River Watershed.

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APPENDIX C – ACRONYMS & GLOSSARY

APPENDIX D – RESPONSE TO COMMENTS

SUMMARY OF REVISIONS

CHAPTER 1

- Defined the term "Ecological Forestry" (p. 1-1).
- Updated Survey and Manage compliance language and affected resource analysis sections to reflect the Ninth Circuit Court of Appeals opinion issued on April 25, 2013, that reversed the District Court for the Western District of Washington's approval of the 2011 Survey and Manage Settlement Agreement (pp.1-8 to 1-9).
- Updated the Collaboration and Public Involvement section to incorporate additional public meetings and events that have taken place (pp. 1-13 to 1-14).

CHAPTER 2

- Reduced the amount of treatment area proposed to reflect the eliminations of RA-32 habitat (2 acres) for both Alternative 2 (pp. 2-2 and 2-3) and Alternative 3 (pp.2-14 and 2-15).
- Corrected Map 2-6 to accurately reflect that Alternative 3 does not include road construction (p. 2-20).
- Updated the project description for Alternative 3 to reflect the use of a swing trail at the end of road 39-4-20 to harvest Unit 19-4 (p. 2-21).
- Recognized that there must be some allowance for error in age estimation (p. 2-25).
- Added a PDF to include no broadcast burning in NRF habitat to insure that Coarse Woody Debris (CWD) is maintained (p.2-41).
- Updated the Monitoring Section (Chapter 2, pp.2-48 to 2-51).

CHAPTER 3

- Updated Ongoing and Foreseeable Future Actions section (p. 3-3) to include the Habitat Restoration Project on private lands along Thompson Creek.
- Updated the Fire and Fuels section to provide further clarification on the changes in micro-climate due to proposed harvesting activities (p.3-30 to 3-31).
- Revised the Soils analysis to correctly reflect the use of a tractor swing trail off of road 39-4-20 to access Unit 19-4 (under Alternative 3)(p.3-59).
- Updated the Wildlife analysis section to correctly reflect (1) the amount of proposed NRF downgrade under Alternative 2 (p. 3-106 to 3-108), (2) the amount of Critical Habitat downgrade (p.3-111), (3) the changes in Survey and Manage (p. 3-93, and 3-113 to 3-114), (4) the discovery of a new great gray owl reproductive site (p. 3-98 and 3-113), (5) the effects to Pacific fisher, and (6) the consideration of effects to wildlife corridors identified in the Middle Applegate Watershed Analysis (p. 3-108).
- Updated the Botany analysis section to reflect the changes in Survey and Manage (p. 3-122 to 3-124, 3-131 to 3-132).
- Updated the Literature Cited section to include Dugger et al 2011, Johnson and Franklin 2009, Johnson and Franklin 2012, Johnson and Franklin 2013, USDI 2013, USDI 2013a, USFWS 2013, and Wiens 2012.

CHAPTER 1 - PURPOSE AND NEED

A. INTRODUCTION

1. Middle Applegate Watershed Pilot

The Middle Applegate Watershed Pilot is a collaborative project between the Medford District Bureau of Land Management (BLM), the Applegate Partnership and Watershed Council, the Southern Oregon Forest Restoration Collaborative, the US Fish and Wildlife Service, the National Marine Fisheries Service, the Rogue River-Siskiyou National Forest, and others. Informed by the results of the collaborative Applegate Fire Learning Network's landscape assessments and multiple values mapping, a project was identified and nominated by local collaborative groups to the Secretary of the Interior for consideration as a landscape level restoration pilot.

In December 2010, the Secretary of the Interior designated Forestry Pilot Demonstration Projects in the Medford, Roseburg, and Coos Bay BLM Districts in southwest Oregon to demonstrate the application of principles of restoration developed by Drs. Jerry F. Franklin and K. Norman Johnson *(Applying Restoration Principles on the BLM O&C Forests in Southwest Oregon (2010)*). In collaboration with Drs. Franklin and Johnson, the BLM's goal is to demonstrate how the Franklin/Johnson forest restoration principles can provide both ecological and economic benefits.

Franklin and Johnson define "restoration" broadly to encompass activities that are designed to restore forests and landscapes to conditions that are both more resistant and resilient to disturbances and that provide the diversity needed to restore and maintain native biodiversity and essential ecosystem functions. The primary focus of these pilot projects is the overarching goal of ecosystem restoration at the stand and landscape scale, rather than singular goals such as fuel and wildfire abatement, timber production, or wildlife habitat.

Drs. Franklin and Johnson's proposals are based on "Ecological Forestry" concepts, which incorporate principles of natural forest development, including the role of natural disturbances, in the initiation, development, and maintenance of stands and landscape mosaics. Ecological Forestry starts with an ecological foundation and then factors in economic and cultural considerations. In this way, Ecological Forestry contrasts with Production Forestry, which utilizes agronomic and economic models in the efficient production of wood. Key elements of Ecological Forestry include (Franklin and Johnson 2012): (1) retaining structural and compositional elements of the pre-harvest stand during regeneration harvests; (2) utilizing natural stand development principles and processes in manipulating established stands to restore or maintain desired structure and composition; (3) using return intervals for silvicultural activities consistent with the recovery of desired structures and processes; and (4) planning management activities at landscape scales, using knowledge of spatial pattern and ecological function in natural landscapes (Johnson and Franklin 2013, p.4).

The Medford BLM has chosen to implement the Middle Applegate Watershed Pilot in separate phases; each phase focuses on a sub-watershed within the 5th field Middle Applegate River Watershed. Planning for the first phase of the pilot, called the Pilot Joe Demonstration Project, was completed in 2011. The project proposed to treat 889 acres in the south half of the Humbug Creek sub-watershed, of which 299 acres were proposed for commercial timber harvest. Presently, all commercial treatments, except for one seven acre unit (to be completed this summer 2013), have been harvested. Non-commercial treatments have begun and are scheduled to be completed in 2013. The Pilot Thompson Project is the second phase of the secretarial pilot.

This Revised Environmental Assessment (REA) documents the environmental analysis conducted to estimate the site-specific effects on the human environment that may result from the implementation of the Pilot Thompson Project on BLM-administered lands. The analysis documented in this REA will provide the BLM responsible official, the Ashland Resource Area Field Manager, with current information to aid in the decision-making process. This REA complies with the Council on Environmental Quality's (CEQ) Regulations for

Implementing the Procedural Provisions of the National Environmental Policy Act (NEPA; 40 CFR Parts 1500-1508) and the Department of the Interior's regulations on Implementation of the National Environmental Policy Act of 1969 (43 CFR part 46).

B. WHAT IS BLM PROPOSING AND WHERE IS THE PROJECT LOCATED?

As part of the broader Middle Applegate Watershed Pilot, the Pilot Thompson Project in the Medford District BLM proposes to treat 2,354 to 2,720 acres of Dry Forest vegetation using various commercial and non-commercial forest management methods described in detail in Chapter 2. The ecological forestry project will be achieved by implementing a series of forest prescriptions that define the size of material, the species and the conditions that guide selection of trees to be removed or retained. Each prescription is tailored to a specific forest type based on plant associations. The implementation of these prescriptions is referred to as a "treatment" or "thinning."

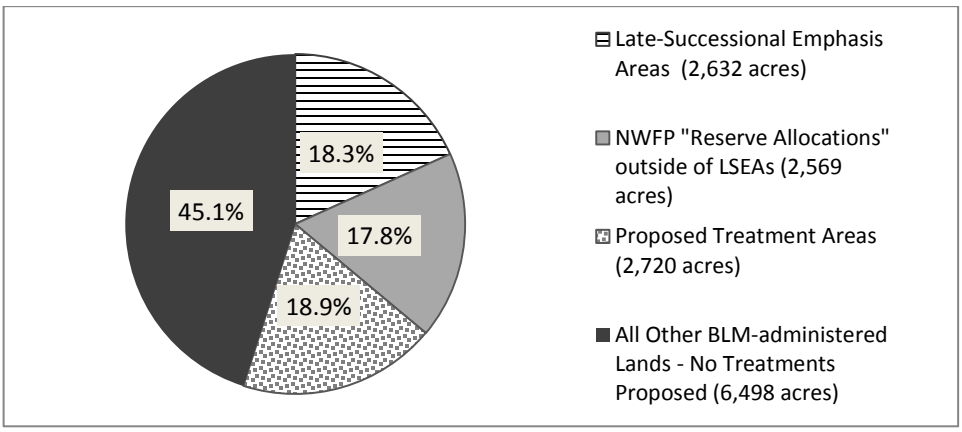
The project has been developed within the Middle Applegate River Watershed which covers approximately 80,000 acres. The Pilot Thompson Project has been planned within the Thompson Creek and the Slagle Creek (Ferris Gulch portion) sub-watersheds and covers 23,268 acres or 36.4 square miles. BLM-administered lands comprise about 14,419 acres within this area. The remainder, approximately 8,849 acres, is held by private landowners and the Rogue-Siskiyou National Forest. Jackson County land use planning data within the project planning area shows about 74% of the land is zoned forest resource, 8% woodland resource, 17% exclusive farm use, and 1% rural residential.

The project is on BLM administered lands within the Applegate Adaptive Management Area (AMA) land allocation as defined in the Northwest Forest Plan and the Medford District BLM Resource Management Plan (RMP). The main objective of the Applegate AMA is to develop and test forest management practices including partial cutting, prescribed burning, and low impact approaches to forest harvest that provide for a broad range of forest values, including late-successional forest and high quality riparian habitat. The AMA is also intended to be used to develop and test management approaches that integrate and achieve ecological and economic health and other social objectives (USDI 1995, p. 36).

Within the BLM ownership, Oregon and California Lands (O&C) comprise 88% of the planning area with Public Domain (PD) at 12%. The project proposal would treat approximately 1,691 acres of O&C and 664 acres of PD lands under Alternative 2 and approximately 2,057 acres of O&C and 666 acres of PD lands under Alternative 3.

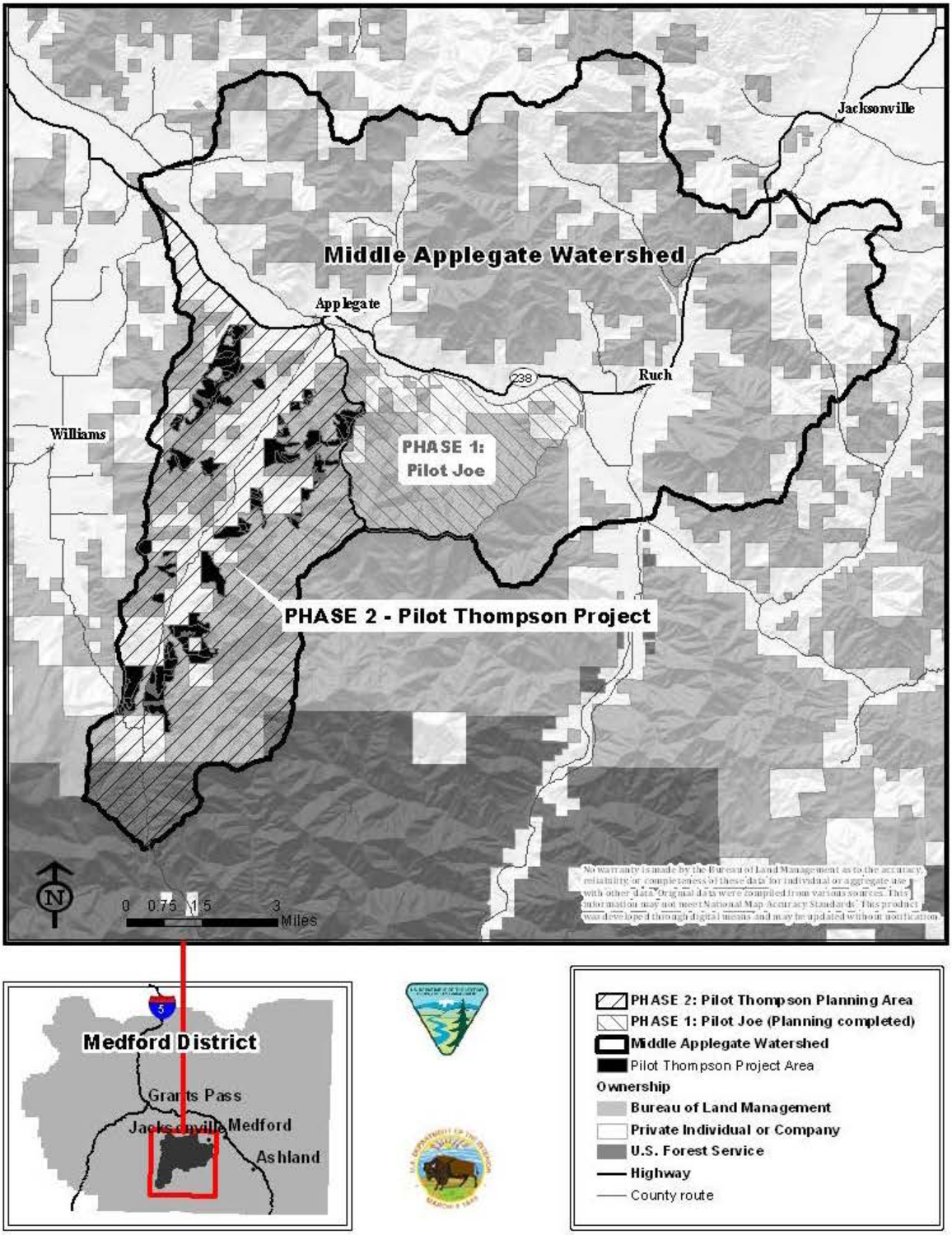
The Public Land Survey System (PLSS) description of the Pilot Thompson Project is T38S-R04W-Sections 19, 20, 27-31, 33, 34; T39S-R05W-Sections 12, 25; and T39S-R04W-Sections 3-6, 8, 9, 19, 30, 31 in Jackson County, Oregon, Willamette Meridian (Map 1-1).

Figure 1-1. Summary of BLM Lands in the Pilot Thompson Planning Area



Late-Successional Emphasis Areas, or LSEAs, are large blocks (300-500 acres) of land identified during the planning process that would serve as areas of dense, closed-canopy contiguous forests within which little or no treatments would be proposed (see Section D. 1 for more information). The Northwest Forest Plan (NWFP) "Reserve Allocations" capture lands set aside to protect the Northern Spotted Owl, Great Gray Owl, Siskiyou Salamander, and includes Riparian Reserves.

Map 1-1. Vicinity Map – Pilot Thompson Project



C. WHY IS THE BLM PROPOSING THIS PILOT PROJECT?

The Pilot Thompson Project is intended to accomplish several things.

The first purpose is to demonstrate the application of ecosystem restoration principles developed by Drs. Jerry Franklin and Norm Johnson. The intent of these principles is to move the current conditions toward desired forest conditions that include the maintenance of older trees, restoration of characteristic structure and composition, and increased heterogeneity (see Chapter 2, Section C.1 for more information).

The second purpose is to provide commercially-viable timber sales that provide jobs in local communities from forest management, logging, and wood processing and provide additional employment from stewardship or service contracting. As one of the Secretarial Pilot Demonstration Projects, the Pilot Thompson Project is also intended to help inform deliberations about sustaining regional forest workforce and wood products manufacturing capacity and the potential of these efforts to provide revenues for county governments.

The third purpose is to gauge the degree to which active forest management, with a focus on ecosystem restoration, has a broader base of social acceptance than traditional management practices.

Need for the Middle Applegate Watershed Pilot Projects

In general the genesis for the pilot projects is the need to focus on activities that achieve environmental, economic, and social benefits by improving ecosystem diversity and functionality and increasing societal options on federal forest lands as well as improving ecosystem resilience and sustainability in the face of environmental change. The need for ecosystem restoration varies across the forest landscape between "Dry Forests" and "Moist Forests" (See Chapter 2 of this REA for Dry Forest Silvicultural Prescriptions).

Dry Forests

Drs. Franklin and Johnson have stated that active management of older forests on Dry Forest sites is often needed to reduce the potential for uncharacteristic and ecologically damaging wildfire and insect outbreaks. These events can result in large scale losses of habitat for wildlife including the northern spotted owl, large scale losses of hard-to-replace stand components, losses of harvestable timber now and into the future, and negative impacts to the sustainability of the current ecosystem dynamics. Drs. Franklin and Johnson suggest increasing the resistance/resilience of Dry Forests to wildfire, drought, insects, etc. by reducing stand densities, altering fuel structures, increasing overall diversity and the proportion of drought- and fire-tolerant tree species, and increasing stand diameter. Through the 2011 Revised Recovery Plan for the Northern Spotted Owl, the U.S. Fish and Wildlife Service has identified that active management framed within ecosystem restoration could contribute to northern spotted owl recovery by restoring forest function and natural processes (USFWS 2011). There is a need for federal forests to contribute to the recovery of the northern spotted owl.

In addition, harvest activity on BLM administered lands has shifted from a mix of commercial thinning and regeneration treatments as proposed in the Northwest Forest Plan to almost exclusively commercial thinnings. Even at the annual sale quantity levels currently in effect, a thinning-only harvest regime cannot be sustained in the long term. Other problems associated with a thinning-only regime include reduced variety of material generated, lower market value products, greater production costs per unit of output, and questions about their contribution to ecological goals. Additionally, commercial thinning treatments have been increasingly subject to administrative and legal challenge. These circumstances combine to chronically limit the predictability and the commercial viability of BLM timber sales. As a result the contributions that such sales might make to the Treasury, to potential revenue sharing with the counties, and to economic and employment conditions within southwest Oregon are fewer and less reliable. So there is a need to demonstrate the capability of ecosystem restoration to yield economically viable treatments that, when expanded across a broader landscape, could be predictable and sustainable. Franklin and Johnson acknowledge that restoration activities will have to provide economic returns if they are to be widely implemented, with such benefits typically coming from commercial timber harvest (2012, p.1).

Forest management on federal lands in the Northwest continues to be stymied by conflicting interests that pit timber production against habitat protection and result in the legal and administrative gridlock noted by both the Secretary and the Oregon Congressional Delegation. BLM's ability to move from traditional forest management practices to a greater focus on ecosystem restoration and economic recovery depends, in part, on the social acceptability of restoration techniques. So there is a need to demonstrate how the restoration techniques developed by Drs. Franklin and Johnson would compare in terms of social acceptability to the more traditional forest management practices and projects.

D. DEVELOPMENT OF THE PILOT THOMPSON PROJECT

The Pilot Thompson Project has been planned and designed under the conceptual framework of the Ecosystem Restoration Strategy as described by Drs. Jerry F. Franklin and K. Norman Johnson (2010). Their approach in the Dry Forests calls for:

- An active management program to restore more ecologically desirable and sustainable conditions in forests and landscapes. Existing Dry Forest landscapes in the Middle Applegate Watershed are characterized by dense maturing forests with relatively simple structure and low tree species diversity; landscape heterogeneity is low and northern spotted owl habitat is at risk. Functionality, diversity, and sustainability of these forests and landscapes can be improved with management that structurally and compositionally enriches these forests and reduces their vulnerability to wildfire, insects, and other disturbances. Ecosystem restoration**,** planned and implemented at the landscape scale**,** is needed rather than actions focused primarily upon fire or any other singular objective.
- Landscape-level planning to insure that desirable and sustainable mixtures of forest and non-forest conditions are maintained on the landscape. These efforts can guide restoration of landscapes to desired and heterogeneous conditions, from their current largely homogeneous and high risk state. The desired condition includes retention of denser forest patches needed to provide critical habitat for many organisms, such as the northern spotted owl and some of its prey species; these dense, multi-layer patches are best maintained by embedding them in a forest matrix that resists, rather than facilitates, the spread of insect epidemics and stand-replacement wildfire**.**
- Stand-level ecological restoration including:
    1. Retention of older (>150-year-old) trees and other ecologically important features, such as large hardwood trees, and eliminating competing younger trees and ground and ladder fuels from their vicinity;
    2. Provision of "skips" where no thinning is done so as to protect important features (e.g., riparian habitats) and provide hiding cover and heavily shaded habitat niches;
    3. Thinning the remaining stand to a) reduce overall stand densities to a more sustainable level (based upon the plant association), b) shift stand composition toward greater diversity, including a greater proportion of more fire- and drought-tolerant species, and c) increase average stand diameter; and
    4. Creating "gaps" of small to moderate size (e.g., ¼ to 2 acres) to provide opportunities for regeneration of sun-loving trees, such as ponderosa pine and Jeffrey pine.

The BLM's silviculturist, wildlife biologist, road engineer, logging systems specialists, and fuels management specialists spent many hours inventorying the Pilot Thompson planning area to develop a pool of potential treatment areas. This work included:

1. Identifying where Late-Successional Emphasis Areas (LSEAs) would be located;
2. Conducting a landscape review of vegetation condition for all acres in the planning area and identifying where restoration treatments are needed;
3. Conducting an initial review of the transportation system in the planning area; and

4. Consideration of public input from two scoping periods (September 2011and April 2012) and from numerous public meetings and field trips (see *Collaboration and Public Involvement* section).

1. Late-Successional Emphasis Areas (LSEAs)

An important component of the Franklin and Johnson's "Dry Forest Restoration Principles" calls for the retention of denser forest patches needed to provide important habitat for many organisms, such as the northern spotted owl (NSO) and some of its prey species; these dense, multi-layer patches are best maintained by embedding them in a forest matrix that resists, rather than facilitates, the spread of insect epidemics and stand-replacement wildfire.

As part of the landscape planning process, the planning area was examined and evaluated in an effort to delineate a proportion of the landscape that would serve as areas of dense, closed-canopy contiguous forests, within which minimal to no treatments would be proposed. These areas, which are called Late-Successional Emphasis Areas (LSEAs), are designed to provide larger blocks (300-500 acres) of dense forest conditions where succession continues largely uninterrupted by active management, and provide fairly contiguous blocks of mature and late-successional habitat to support those species that rely on and are associated with these forest habitats, such as the NSO and the Pacific fisher.

The identification of the LSEAs required the planning team to delineate areas that 1) currently contain high concentrations of high quality mature and late-successional habitat and 2) select locations across the landscape where these habitats would be expected to persist longer than similar habitat situated in more fire-prone landscape positions. In order to determine the best locations for these LSEAs, several data layers were used to inform the delineation process: spotted owl survey records, existing conservation areas, habitat maps, fire probability, and the Relative Habitat Suitability (RHS) map (developed by the US Fish and Wildlife Service during preparation of the *Revised Recovery Plan for the Northern Spotted Owl*, June 28, 2011).

The identification of LSEAs for this planning effort does not mean a new land allocation is being created, nor is it possible to do so under this environmental assessment. Land use allocations are determined at the Resource Management Plan (RMP) level.

2. Landscape Review of Vegetative Condition/ Restoration Needs Assessment

As part of the landscape planning process, current vegetation condition and stand description information (plant series/association, existing vegetation/physical characteristics (saplings, poles, mature, etc.), past treatment history review, and stand condition (structure, density, etc.) was updated.

A set of criteria for reviewing potential commercial and non-commercial treatments was established and includes: density, stand structure, species composition, landscape proximity (contiguous strategic treatment), and management history (recently thinned/economics).

The following sets of screens (areas to exclude from treatment) were developed to identify potential commercial and non-commercial treatment areas.

Screens for potential non-commercial treatments

- LSEAs
- Recently Thinned or Hazardous Fuels Treated Areas
- Fish-bearing Riparian Reserves

Screens for potential <u>commercial</u> treatments

- LSEAs
- Fish-bearing Riparian Reserves

- Low Productivity Sites/Timber Production Capability Classification (TPCC) withdrawn lands
- Stands dominated by old trees (>150 years)
- Low density stands with poor economics
- Poor access (greater than 0.25 mile from existing roads)
- Conservation Allocations and Reserves (ex; Siskiyou salamander, northern spotted owl)

3. Review of the Transportation System

A multi-party transportation working group comprised of members from BLM, industry, local environmental organizations, our collaborative partners, and the Thompson Creek community, was established to increase the transparency in road management decisions for the Pilot and to seek community ownership in the transportation system by providing a collaborative opportunity to assess the transportation system needs in the Pilot Thompson planning area.

The transportation group met on several occasions to collaboratively discuss the current transportation system needs for road decommissioning, obliteration, closures, construction, and reconstruction. All of the meeting notes are available on the Pilot website (www.blm.gov/or/districts/medford/forestrypilot). Opportunities to more appropriately manage the road system and some trails were incorporated into the proposed action alternatives described in Chapter 2.

E. DECISION FRAMEWORK

This Revised Environmental Assessment will provide the information needed for the responsible official, the Ashland Resource Area Field Manager, to select a course of action to be implemented for the Pilot Thompson Project. The Ashland Resource Area Field Manager must decide whether to implement action based on the action alternatives, select the No-Action alternative, or choose a combination of components found within those alternatives analyzed.

The decision will also include a determination whether or not the impacts of the actions are significant to the human environment. If the impacts are determined to be within the range analyzed in the Medford District Resource Management Plan Environmental Impact Statement (EIS) (USDI 1994) and the Northwest Forest Plan Supplemental Final EIS (USDA and USDI 1994), or otherwise determined to be insignificant, a Finding of No Significant Impact (FONSI) can be issued and the decision implemented. If the responsible official determines that the significance of impacts are unknown or greater than those previously analyzed and disclosed in the RMP/EIS and the Northwest Forest Plan, then a project specific EIS must be prepared.

A decision record will be prepared after the Decision Maker has reviewed the REA. The decision record will document the actions authorized by the Responsible Official (the Ashland Resource Area Field Manager) along with the rationale for selecting a course of action. The selected course of action will be based on how well the alternatives meet the purpose and need for action and the effects documented in the REA.

F. LEGAL REQUIREMENTS

1. Conformance with Land Use Plans

Resource Management Plan

The Pilot Thompson Project is designed to be in conformance with the *1995 Medford District Record of Decision and Resource Management Plan* (RMP). The 1995 Medford District Resource Management Plan incorporated the *Record of Decision for Amendments to Forest Service and Bureau of Land Management Planning Documents Within the Range of the Northern Spotted Owl and the Standards and Guidelines for*

Management of Habitat for Late-Successional and Old-Growth Forest Related Species Within the Range of the Northern Spotted Owl (Northwest Forest Plan) (USDA and USDI 1994).

Survey and Manage

The Pilot Thompson Project is consistent with the 2001 *Record of Decision and Standards and Guidelines for Amendments to the Survey and Manage, Protection Buffer, and other Mitigation Measures Standards and Guidelines* (2001 ROD), as incorporated into the Medford District Resource Management Plan.

On December 17, 2009, the U.S. District Court for the Western District of Washington issued an order in *Conservation Northwest, et al. v. Sherman, et al.*, No. 08-1067-JCC (W.D. Wash.) (Coughenour, J.), granting Plaintiffs' motion for partial summary judgment and finding a variety of NEPA violations in the *Final Supplemental to the 2004 Supplemental Environmental Impact Statement to Remove or Modify the Survey and Manage Mitigation Measure Standards and Guidelines* (USDA and USDI 2007). In response, parties entered into settlement negotiations in April 2010, and the Court filed approval of the resulting Settlement Agreement on July 6, 2011.

The Ninth Circuit Court of Appeals issued an opinion on April 25, 2013, that reversed the District Court for the Western District of Washington's approval of the 2011 Survey and Manage Settlement Agreement. The case is now remanded back to the District Court for further proceedings. This means that the December 17, 2009, District Court order which found NEPA inadequacies in the 2007 analysis and record of decision removing Survey and Manage is still valid.

Previously, in 2006, the District Court (Judge Pechman) had invalidated the agencies 2004 RODs eliminating Survey and Manage due to NEPA violations. Following the District Court's 2006 ruling, parties to the litigation had entered into a stipulation exempting certain categories of activities from Survey and Manage standard (hereinafter "Pechman exemptions").

Judge Pechman's Order from October 11, 2006 directs: "Defendents shall not authorize, allow, or permit to continue any logging or other ground-disturbing activities on project to which the 2004 ROD applied unless such activities are in compliance with the 2001 ROD (as the 2001 ROD was amended or modified as of March 21, 2004), except that this order will not apply to:

A. Thinning projects in stands younger than 80 years old (emphasis added);
B. Replacing culverts on roads that are in use and part of the road system, and removing culverts if the road is temporary or to be decommissioned;
C. Riparian and stream improvement projects where the riparian work is riparian planting, obtaining marterial for placing in-stream, and road or trail decommissioning; and where the stream improvement work is the placement of large wood, channel and floodplain reconstruction, or removal of channel diversions; and
D. The portions of projects involving hazardous fuel treatments where prescribed fire is applied. Any portion of a hazardous fuel treatment project involoving commercial logging will remain subject to the survey and management requirements except for thinning of stands younger than 80 years old under subparagraph a. of this paragraph."

Following the District Court's December 17, 2009 ruling, the Pechman exemptions still remained in place. The Pilot Thompson Project meets the provisions of the last Record of Decision, specifically the 2001 Record of Decision and Standards and Guidelines for Amendments to the Survey and Manage, Protection Buffer, and other Mitigation Measures Standards and Guidelines (not including subsequent Annual Species Reviews). Proposed non-commercial treatment units would conduct hazardous fuels treatments where prescribed fire is applied without commercial logging, The non-commercial portion of the project meets Exemption D of the Pechman Exemptions (October 11, 2006 Order). Proposed road decommissioning activities are covered under Exemption B & C.

Details of the project surveys are described below:

Table 1-1. Survey and Manage Wildlife and Botany Species

Species	S&M Category	Survey Triggers			Survey Results			Site Management
		Within Range of the Species?	Contains Suitable habitat?	Habitat Disturbing* ?	Surveys Required?	Survey Date (month/year)	Sites Known or Found?	
Vertebrates								
Great Gray Owl (Strix nebulosa)	C	Yes	Yes	Yes	Yes	3-7/1997, 3-7/2012, 3-7/2013	5	Yes
Mollusks								
Chace Sideband (Monadenia chaceana)	B4	Yes	Yes	Yes	Yes	Spring 2012, Fall 2012	No	N/A
Oregon Shoulderband (Helminthoglypta hertleini)	B4	Yes	Yes	Yes	Yes	Spring 2012, Fall 2012	No	N/A
Other S & M Sites (Not Category A or C)								
Bryoria tortuosa	D	Yes	Yes	Yes	No	1998-2001	10	Yes
Chaenotheca ferruginea	B	Yes	Yes	Yes	No	4/2012 6/2012	1	Yes[1]
Chaenotheca subroscida	E	Yes	Yes	Yes	No	6/2012	1	Yes[1]
Leptogium teretiusculum	E	Yes	Yes	Yes	No	5/2012	1	Yes[1]
Vascular Plants								
Cypripedium fasciculatum	C	Yes	Yes	Yes	Yes	6/1997 5/2008 5/2012 6/2012	6	Yes[1]
Cypripedium montanum	C	Yes	Yes	Yes	Yes	6/1997 5/2006 5/2012	3	Yes[1]
Eucephalis vialis	A	Yes	Yes	Yes	Yes	7/2011	2	Yes[1]

[1] See plant protection table in Chapter 3 of Pilot Thompson EA

Revised Recovery Plan

In June 2011, the USFWS (U.S. Fish and Wildlife Service) finalized the *Revised Recovery Plan for the Northern Spotted Owl*, which contains 33 Recovery Actions. Recovery Actions are recommendations to guide activities needed to accomplish the recovery objectives and ultimately lead to delisting of the species. Specifically, Recovery Action 32 (RA 32) in the Recovery Plan recommends "maintaining and restoring the older and more structurally complex multilayered conifer forests" (U.S. Fish and Wildlife Service 2011, III-67). The intent of RA 32 is to maintain substantially all of the older and more structurally complex multi-layered conifer forests on federal lands in order not to further exacerbate the competitive interactions between spotted owls and barred owls. The Pilot Thompson Project defers proposed treatment in RA 32 stands identified by interagency survey guidance (USDA and USDI 2010) and is consistent with consultation completed with the U.S. Fish and Wildlife Service (USFWS), (USFWS 2011b and USFWS 2012b), therefore, the project is consistent with the *Revised Recovery Plan for the Northern Spotted Owl*.

Special Status Species

The Pilot Thompson Project is consistent with BLM Manual 6840 (USDI 2008), the purpose of which is to provide policy and guidance for the conservation of BLM special status species and the ecosystems upon which they depend on BLM-administered lands. BLM special status species include those species listed or proposed for listing under the Endangered Species Act (ESA), as well as those designated as Bureau sensitive by the State Director(s). The objectives of the BLM special status policy are:

- To conserve and/or recover ESA-listed species and the ecosystems on which they depend so that ESA protections are no longer needed for these species; and
- To initiate proactive conservation[1] measures that reduces or eliminates threats to Bureau sensitive species to minimize the likelihood of and need for listing of these species under the ESA (USDI 2008: section 0.02).

2. Statutes and Regulations

The Proposed Action is designed in conformance with the direction given for the management of public lands in the Medford District and the following:

- **Oregon and California Lands Act of 1937 (O&C Act)**. Requires the BLM to manage O&C lands for permanent forest production. Timber shall be sold, cut, and removed in accordance with sustained-yield principles for the purpose of providing for a permanent source of timber supply, protecting watersheds, regulating stream flow, contributing to the economic stability of local communities and industries, and providing recreational facilities.

- **Federal Land Policy and Management Act of 1976 (FLPMA)**. Defines BLM's organization and provides the basic policy guidance for BLM's management of public lands.

- **National Environmental Policy Act of 1969 (NEPA)**. Requires the preparation of environmental impact statements for major Federal actions which may have a significant effect on the environment.

- **Endangered Species Act of 1973 (ESA)**. Directs Federal agencies to ensure their actions do not jeopardize species listed as "threatened and endangered" or adversely modify designated critical habitat for these listed species.

- **Clean Air Act of 1990 (CAA)**. Provides the principal framework for national, state, and local efforts to protect air quality.

- **National Historic Preservation Act of 1966 as Amended (NHPA).** Requires Federal agencies to take into account the effect of their Federal or federally licensed undertakings on historic properties, whether those properties are federally owned or not.

- **Archaeological Resources Protection Act of 1979 (ARPA)**. Protects archaeological resources and sites on federally-administered lands. Imposes criminal and civil penalties for removing archaeological items from federal lands without a permit.

- **Safe Drinking Water Act (SDWA) of 1974 (as amended in 1986 and 1996)**. Protects public health by regulating the Nation's public drinking water supply.

- **Clean Water Act of 1987 (CWA)**. Establishes objectives to restore and maintain the chemical, physical, and biological integrity of the nation's water.

1 Conservation: as applied to Bureau sensitive species, is the use of programs, plans, and management practices to reduce or eliminate threats affecting the status of the species, or improve the condition of the species' habitat on BLM-administered lands (USDI 2008, Glossary p. 2).

3. Relevant Assessments and Plans

The following documents contain information related to existing conditions and management practices in the Middle Applegate Area. These documents are incorporated by reference into the project documentation.

Middle Applegate Watershed Analysis (1995)

Watershed Analysis is a procedure used to characterize conditions, processes and functions related to human, aquatic, riparian and terrestrial features within a watershed. Watershed Analysis is issue driven. Analysis teams of resource specialists identify and describe ecological processes of greatest concern in a particular "fifth field" watershed, and recommend restoration activities and conditions under which other management activities should occur. Watershed Analysis is not a decision making process. Rather, Watershed Analyses provides information and non-binding recommendations for agencies to establish the context for subsequent planning, project development, regulatory compliance and agency decisions (See Federal Guide for Watershed Analysis 1995, p. 1).

The Pilot Thompson project area falls within the Middle Applegate Watershed Analysis Area. The Watershed Analysis focused on the use of existing information available at the time the analysis was conducted, and provides baseline information. Additional information, determined to be necessary for completing an analysis of the Pilot Thompson Project, has been collected and is considered along with existing information provided by the 1995 Middle Applegate Watershed Analysis.

U.S. Department of Interior, Bureau of Land Management, Western Oregon Districts, Transportation Management Plan (1996, updated 2002).

This transportation management plan is not a decision document; rather, it provides guidance for implementing applicable decisions of the 1995 Medford District Resource Management Plan (which incorporated the Northwest Forest Plan).

Southwest Oregon Fire Management Plan

The Southwest Oregon Fire Management Plan (FMP) provides Southwest Oregon with an integrated concept for coordinated wildland fire planning and protection among Federal, State, local government entities and citizen initiatives. The Fire Management Plan is not a Decision document.

The FMP introduces fire management concepts addressing fire management activities in relation to resource objectives stated in the current Land and Resource Plans (parent documents) of the Federal agencies, the laws and statutes that guide the state agencies and private protective associations, and serves as a vehicle for local agencies and cooperators to more fully coordinate their participation in relation to those activities.

Applegate Adaptive Management Area (AMA) Ecosystem Health Assessment (USDA and USDI 1994)

An increase in dead and dying forest trees in southwest Oregon in the early 1990's prompted land managers from the Bureau of Land Management and Forest Service to appoint an interagency group to conduct an ecological assessment of the Applegate Watershed. The assessment was based on existing information and addressed primarily the terrestrial components of the ecosystem, focusing on long term health. Stand level recommendations for the attainment of forest health and fuels reduction are included in the Ecosystem Health Assessment (p. 64-68, and 70).

Applegate Communities' Collaborative Fire Protection Strategy (2002 Applegate Fire Plan)

The Applegate Fire Plan is the result of a collaborative effort between local citizens, county, state, and federal agencies to develop a strategy for addressing the high fire danger throughout the Applegate Valley. The main components of the plan include fire protection and suppression, fuel hazard reduction, and emergency communications. The plan is based on a foundation of neighbors cooperating with neighbors. The Applegate Fire Plan developed recommendations for nineteen strategic planning areas across the Applegate Watershed.

The Pilot Thompson Project Area falls within the Thompson and Slagle Strategic Planning Areas of the Applegate Fire Plan. Recommendations for the Thompson and Slagle Strategic Planning Areas include completing the thinning and fuel hazard reduction work in the Thompson and Slagle Creek drainages.

Applegate River Watershed Assessment: Aquatic, Wildlife, and Special Plant Habitat (USDI and USDA 1995)

The Applegate River Watershed Assessment, based on existing information, is not a decision document; the assessment provides an overview of conditions and trends related to aquatic, wildlife, and special plant habitats in the Applegate Watershed. The assessment includes recommendations for maintaining these habitats over the long-term.

Applegate Adaptive Management Area (AMA) Guide (USDI and USDA 1998)

The Applegate AMA Guide was developed as a working document outlining how agencies expect to do business in the Applegate Watershed. The guide is not a decision document. Key questions and strategies as outlined in the AMA Guide provide an overview of the physical, biological and social setting of the Applegate Watershed and includes key questions and strategies or approaches for management.

Medford District Integrated Weed Management Plan of 1998

The Medford District Integrated Weed Management Plan provides a proactive ecosystem based approach to reduce populations of alien plant species to a level which will allow for the restoration of native plant species and provide for overall ecosystem health.

G. COLLABORATION AND PUBLIC INVOLVEMENT

Collaboration has played a large role in the Pilot process. The Medford District has participated in long-term efforts with the Applegate Partnership and the Southern Oregon Forest Restoration Collaborative to increase public support for forest projects that are socially acceptable, ecologically appropriate and economically viable. Those community groups, as well as other interested stakeholders, have had substantial participation in the Pilot process. Numerous public meetings, workshops and field trips have occurred as part of the planning process to inform interested stakeholders and the public about the Pilot, its goals, and its foundational principles.

1. Scoping Periods

Scoping is the process the BLM uses in the context of NEPA document preparation to identify issues related to the proposal (40 CFR 1501.7) and determine the extent of environmental analysis necessary for an informed decision. It is used early in the NEPA process to identify (1) the issues to be addressed ; (2) the depth of the analysis of past, present, and reasonably foreseeable actions by others that could have a cumulative effect together with the BLM proposed action; (3) alternatives or refinements to the proposed action; and (4) potential environmental impacts of the Proposed Action. Scoping is performed not to build consensus or get agreement on a project proposal, but rather to solicit relevant site specific comments that could aid in the analysis and final design of the proposal.

While there are widely varying opinions and ideas on how to manage the forest land in the project area, the primary purpose of the Pilot Thompson Project is to demonstrate the application of ecosystem restoration principles developed by Drs. Jerry Franklin and Norm Johnson.

During the first scoping period in September 2011, a letter was mailed to the list of individuals, agencies, and organizations expressing interest in the Medford Pilot projects and landowners within ¼ mile of the Pilot Thompson Project planning area. During this 30 day scoping period, the BLM received 59 comments, of which 46 were identical form letters.

A second scoping period occurred in April 2012 when we sent an update letter to the list of interested individuals, agencies, and organizations. The letter included a more detailed description of the project proposal and the process used to develop the proposal. During this 30 day scoping period we received 13 comments.

In an effort to maximize transparency in the planning and implementation of the Middle Applegate Pilot, all comments received during scoping were posted to the Pilot website. A Final Scoping Report outlining the disposition of comments received was posted to the Pilot website in August 2012.

The following articles were submitted for BLM-review during the scoping process. The BLM examined these documents, and considered the information in developing the Action Alternatives:

- Colombaroli, D.C. and D.G. Gavin. 2010. Highly Episodic Fire and Erosion Regime Over the Past 2,000 Years in Siskiyou Mountains, Oregon. PNAS, 107 (2010), pp. 18909-18915.
- Kellog, L., Han, H.S., Mayo, J., and J. Sissel. Residual Stand Damage from Thinning- Young Stand Diversity Study. Cascade Center for Ecosystem Management.
- Baker, W.L. 2012. Implications of spatially extensive historical data from surveys for restoring dry forests of Oregon's eastern Cascades. Ecosphere 3(3); 23. http://dx.doi.org/10.1890/ES11-00320.1

2. Public Meetings and Events

On October 25, 2011 the Applegate Partnership, the Southern Oregon Forest Restoration Collaborative, and the BLM co-hosted an open house/informational meeting in the Applegate to introduce the Middle Applegate Pilot to interested stakeholders.

On November 9, 2011 the Medford District BLM and our partners jointly hosted a public field trip to potential treatment areas. The group visited several different stand types and discussed current stand conditions and how the stands might benefit from restoration treatments. About 20 people attended this event.

On February 22, 2012 the Medford District BLM and our partners jointly hosted a public meeting in the Applegate to share information about and engage interested persons in the design and implementation of the project. BLM specialists presented information on how the proposal is being developed and what goes into the landscape assessment process used to identify areas for treatment and areas to be designated as LSEAs. About 35 people attended this event.

In February/March 2012, the BLM hosted several public field trips to view the Pilot Joe timber sale harvesting operations. The first phase of the Pilot, also known as the *Pilot Joe Demonstration Project*, was analyzed in 2011 (*see the Pilot website for more info*). Lessons learned from the first phase have and will continue to be incorporated into the planning and project implementation of current and future pilot projects proposed under the Middle Applegate Watershed Pilot Projects.

On April 25 and May 2, 2012, small gatherings took place in neighborhoods around the project area. The goal of these meetings was to engage our neighbors in conversations about BLM's proposal and answer any questions or provide clarity where needed in a small group setting.

On October 10, 2012, the Medford District BLM and our partners jointly hosted a public field trip to review a selection of Riparian Reserve Thinning treatment units and proposed road locations. Members of BLM's Interdisciplinary Team (IDT) were present to answer any questions. Approximately 5 members of the public were present, as well as a representative from the US Fish and Wildlife Service and the National Marine Fisheries Service.

On February 27, 2013, the Applegate Partnership, the Southern Oregon Forest Restoration Collaborative, and the BLM co-hosted an open house at the Applegate School to share how scoping concerns are being addressed by the BLM and to provide an opportunity for the public to ask questions regarding the content and/or analysis in the Environmental Assessment. About 30 people attended this event.

On March 5, 2013, The Medford District BLM and our partners hosted a field trip to several project units identified as concern areas by interested parties. About 16 people attended this field trip.

On April 18, 2013, a smaller group of interested public attended a field trip to review additional project units identified as concern areas. About 10 people attended this field trip.

On May 23, 2013, Drs. Franklin and Johnson co-hosted a public field trip and an evening presentation with the Medford District BLM and our partners. About 50 people attended the field trip to review a project unit (19-4) and discuss concerns. In the evening, the Drs. presented the results of a recent study conducted in the Middle Applegate Watershed and provided more insight into their strategy for dry forests in southwestern Oregon. About 20 people attended the evening meeting.

3. Pilot Website

A website for the Middle Applegate Watershed Pilot was established in March 2011 to inform the public about the Pilot project. The website provides background information and maps, lists upcoming events, and contains regular updates.

To date, the BLM has posted all meeting notes from BLM's interdisciplinary team meetings, from public meetings and events, as well as any public comments received during the planning process. Information such as the applicable watershed assessment, the project initiation letter and the public scoping letter, and correspondence with Drs. Franklin and Johnson has also been posted to the website.

The website for the Middle Applegate Watershed Pilot Project can be accessed at:
http://www.blm.gov/or/districts/medford/forestrypilot/

4. Relevant Issues

Issues were identified through specialist review and public input received during Scoping, public meetings and tours. The following issues were determined to be relevant to the Pilot Thompson project development and/or analysis. Other issues were also identified that were relevant concerns but were not pertinent to the analysis; these issues were identified in the Final Scoping Report published in August 2012. Issues were also considered and addressed during project development (including Project Design Features) and environmental analysis (documented in this REA in Chapter 3).

Some issues identified as relevant to this project proposal were analyzed at a broader scale in association with the 1994 *Final Environmental Impact Statement for the Bureau of Land Management Medford District Proposed Resource Management Plan*. This REA will focus on addressing those issues ripe for decision at this level of environmental review, and will incorporate by reference broader level NEPA analysis where appropriate.

The following list of relevant issues is organized by topic.

Aquatic Systems: Hydrology, Water Quality, and Fish

- Road densities increase the potential for fine sediment input to aquatic habitat.
- Unauthorized OHV access and use causes erosion and sedimentation. New roads and yarding corridors could attract more unauthorized use.
- Road building and using equipment in riparian zones could impact threatened and sensitive fish species and their critical habitat near and downstream of the project.

Forest Health

- Harvesting large trees may reduce forest resiliency.

- Agency prescriptions may compromise naturally occurring clumps reducing biodiversity.
- Removing too many mid-seral trees may increase drought stress, and may result in solar heating that shocks existing overstory trees and leads to mortality.

Logging Systems

- Cable yarding methods may result in increased erosion, compaction, disturbance, and soil loss.
- Ground-based logging systems could cause higher incidences of root damage and tree scarring.
- Cable yarding may result in loss of the skips which prevents the prescription from being properly implemented.

Safety

- Logging trucks may pose a safety risk to others using the road.

Transportation System

- Specific to the proposed roads in this project, why is BLM contemplating to build such a long segment of road in 39-5-6, if you are only accessing density management (described on scoping notice at page 14)? A road is not required for those activities. We are primarily concerned with this road segment and the road in 39-5-25, which seems to be a low priority area for treatment.
- The effects of timber harvest and road construction, when combine with other past, ongoing, and reasonably foreseeable future actions on public and private lands, could potentially contribute to adverse cumulative effects to soils, water quality, hydrologic function, and aquatic and terrestrial habitats and associated organisms.
- New roads will add to the road maintenance backlog.
- New road building may cause erosion, stream sedimentation, increased OHV use, illegal poaching and dumping, noxious weed spread, and wildlife harassment.

Wildfire and Fuel Hazard

- Removal of trees over about 10 inches in diameter may be unnecessary in order to effectively reduce the potential for high-intensity fire.
- The probability of a thinned area encountering a high severity fire patch during its 20-year effectiveness period is about 3%; therefore, thinning may not effectively prevent the effects of wildfire.
- Without follow-up treatment, natural plant response and post-harvest slash will increase the fire risk due to elevated fuels levels.

Wildlife and Special Status Animal Species

- Project activities could reduce the complexity of forest structure, snags, and downed wood which provide important wildlife habitat.

Special Status Plant Species

- Degrading habitat for threatened, endangered, sensitive or survey and manage species may result in further population declines and/or trends away from recovery of the species.
- Habitat alteration including reduced canopy cover and soil compaction associated with harvest activities degrades habitat for native plant (including Special Status and Survey and Manage plant and fungi species) populations.

- Ground disturbance associated with harvest activities may impact stems and propagules of native plant species (including Special Status and Survey and Manage plant and fungi species).

Non-native Plants and Noxious Weeds

- Forest management and logging activities can increase the risk of introduction and spread of non-native plants and noxious weeds.
- Ground disturbance and road building provide vectors for expansion of invasive plant populations.

CHAPTER 2 - ALTERNATIVES

A. INTRODUCTION

This Chapter describes the potential Action Alternatives developed by the BLM to achieve the objectives identified in the Purpose and Need statements in Chapter 1. In addition, a "No-Action" Alternative is presented to form a base line for analysis. Project Design Features (PDFs), which apply the Best Management Practices as described in Appendix D of the RMP, are an essential part of the Proposed Action. The PDFs are included as features of the Proposed Action in the analysis of anticipated environmental impacts.

B. ALTERNATIVES ANALYZED IN DETAIL

1. Alternative 1 – No-Action

The No-Action Alternative describes a baseline against which the environmental effects of the action alternatives can be compared. The No-Action alternative discusses the consequences of not taking the proposed action. No-Action assumes the current resource trends will continue into the future. Under the No-Action Alternative, no vegetation management would be implemented; there would be no commercial cutting of trees and there would be no density management or fuels reduction treatments. Normal programmed road maintenance would be performed. Other activities authorized by separate NEPA analyses could happen. The analysis of the No-Action Alternative answers the question: What would occur to the resources of concern if the Proposed Action does not take place?

Selection of the No-Action Alternative would not constitute a decision to reallocate these lands to non-commodity uses. The decision maker does not need to make a specific decision to select the "No-Action" Alternative. If that is the choice, the Proposed Action would simply be dropped and the NEPA process ended. Future harvesting, young stand forest development work, fuels reduction treatments, other connected actions, and road management in this area would not be precluded and could be analyzed under a subsequent NEPA document.

2. The Action Alternatives

This section describes the two action alternatives considered in detail. The narrative summary of each alternative is followed by tables listing the commercial and non-commercial harvest units, a road use table, and a table detailing proposed new road construction and/or road decommissioning (where applicable). Components that are common to both action alternatives, including Project Design Features (PDFs), commercial harvest methods, and post-harvest fuels reduction work, are described in further detail under Section C (Components Common to the Action Alternatives).

a. Alternative 2

Alternative 2 was developed to achieve the objectives described in Chapter 1, the Purpose and Need for the Pilot Thompson Project, which is to demonstrate the application of ecosystem restoration principles developed by Drs. Jerry Franklin and Norm Johnson and to provide a commercially-viable timber sale that will provide jobs in the local communities.

Under this alternative, 2,354 acres of vegetation would be treated using various commercial and non-commercial silvicultural prescriptions as described under Section C (Components Common to the Action Alternatives). About 1,226 acres are proposed for commercial treatments. Approximately 2,214 acres are proposed for non-commercial treatments, of which 1,086 acres are within commercial harvest units and 1,128 acres are strictly non-commercial stands (Table 2-1). This alternative proposes to construct new roads to access stands that show a need for restoration that would otherwise only be accessed by helicopter yarding systems.

The cutting and removal of trees is accomplished in commercial conifer forests by a timber sale contract which sells material over eight (8) inches DBH (diameter at breast height). Trees to be retained or removed are designated in accordance with the marking guidelines outlined in Appendix A. Depending on stand conditions, individual trees are marked for retention (leave tree marking) or for harvest (cut tree marking). Non-commercial vegetation (material less than eight (8) inches DBH) would be removed through contracts that hire out cutting and piling of material. Tops and limbs of trees cut would be treated to reduce fire risk by piling and burning the material in a controlled manner. BLM will burn the piles during wet weather conditions. Some material could be made available for firewood, pulp or woody biomass depending on market conditions and demand.

Riparian Reserve Thinning

Under Alternative 2, trees would be harvested in Riparian Reserve Thinning (RRT) units using the silvicultural prescription described in Section C (Components Common to the Action Alternatives). Commercial sized conifers would be harvested and sold under a timber sale or stewardship contract.

Table 2-1 summarizes the project by silvicultural treatment prescriptions and timber harvest methods. Unit specific information is displayed in Table 2-2 and 2-3 and Maps 2-1 to 2-3.

Table 2-1. Alternative 2: Summary of Acres by Silvicultural Prescription and Harvest Method

Commercial Prescriptions	**Est. Acres**
Variable Density Thinning (VDT)	824
Density Management – Intermediate Treatment (DMI)	319
Riparian Reserve Thinning (RRT)	83
Total	**1226**
Non-commercial Prescriptions	**Est. Acres**
Understory Reduction (UR)	1086
Density Management – Non Plantation (DM)	957
Density Management – Plantation (DM)	171
Total	**2214**
Timber Harvest Method	**Est. Acres**
Cable Yarding	1052
Tractor Yarding	174
Helicopter Yarding	0
Total	**1226**

Table 2-2. Alternative 2: Non-Commercial Units by Prescription, Plant Series, and NSO Habitat

Unit	Non-Commercial Prescription	Plant Series	NSO Habitat Type[1]	NSO Habitat Effects	Acres
3-3	DM/Non Plantation	Pine	NRF	T&M	34
4-1	DM/Non Plantation	Pine	Dispersal	T&M	33
5-2	DM/Non Plantation	White Oak	Dispersal	T&M	14
5-3	DM/Non Plantation	Pine	Dispersal	T&M	20
5-4	DM/Plantation	Pine	Dispersal	T&M	10
6-2	DM/Non Plantation	Douglas-fir	Capable	Disturbance Only	9
8-3	DM/Plantation	Douglas-fir	Capable	Disturbance Only	12

[1] NSO habitat types are defined in the Terrestrial Wildlife section of Chapter 3 (p. 3-96).

Unit	Non-Commercial Prescription	Plant Series	NSO Habitat Type[1]	NSO Habitat Effects	Acres
9-3	DM/Non Plantation	White Oak	Capable	Disturbance Only	16
19-3	DM/Non Plantation	White Oak and Pine	Dispersal	T&M	97
19-7	DM/Non Plantation	Douglas-fir	Dispersal	T&M	8
19-8	DM/Plantation	Pine	Capable	Disturbance Only	22
19-9	DM/Non Plantation	Pine	Dispersal	T&M	36
19-10	DM/Non Plantation	Douglas-fir	NRF	T&M	18
19-11	DM/Non Plantation	Pine	Dispersal	T&M	7
19-12	DM/Plantation	Douglas-fir	Dispersal	T&M	14
19-13	DM/Plantation	Pine	Dispersal	T&M	8
20-2	DM/Non Plantation	White Oak and Pine	Capable	Disturbance Only	164
20-3	DM/Plantation	Pine	Capable	Disturbance Only	23
25-5	DM/Non Plantation	Douglas-fir	Dispersal	T&M	108
25-6	DM/Non Plantation	Douglas-fir	Dispersal	T&M	67
25-7	DM/Non Plantation	Douglas-fir	NRF	T&M	5
28-3	DM/Non Plantation	Pine	Dispersal	T&M	6
28-4	DM/Non Plantation	Douglas-fir	Dispersal	T&M	7
28-5	DM/Non Plantation	White Oak	Capable	Disturbance Only	1
28-6	DM/Non Plantation	White Oak	Capable	Disturbance Only	1
29-3	DM/Plantation	Douglas-fir	Capable	Disturbance Only	15
29-4	DM/Non Plantation	Douglas-fir	Dispersal	T&M	25
29-5	DM/Non Plantation	Douglas-fir	Dispersal	T&M	12
29-6	DM/Non Plantation	Pine	Capable	Disturbance Only	12
30-1	DM/Non Plantation	White Oak	Capable	Disturbance Only	1
31-3	DM/Plantation	Douglas-fir	Capable	Disturbance Only	11
31-4	DM/Non Plantation	Douglas-fir	Dispersal	T&M	4
31-5	DM/Non Plantation	Douglas-fir	Capable	Disturbance Only	15
31-6	DM/Plantation	Pine	Capable	Disturbance Only	29
33-5	DM/Non Plantation	Douglas-fir, White Oak, Pine	Capable	Disturbance Only	133
33-6	DM/Plantation	Douglas-fir	Capable	Disturbance Only	18
33-7	DM/Non Plantation	Douglas-fir	Capable	Disturbance Only	19
33-8	DM/Non Plantation	Douglas-fir	Capable	Disturbance Only	2
33-9	DM/Non Plantation	Pine	Dispersal	T&M	8
33-10	DM/Non Plantation	Pine	Capable	Disturbance Only	4
34-4	DM/Non Plantation	Douglas-fir	Capable	Disturbance Only	2
34-5	DM/Non Plantation	Douglas-fir	Capable	Disturbance Only	20
34-6	DM/Non Plantation	Douglas-fir	Dispersal	T&M	29
34-7	DM/Non Plantation	Douglas-fir	Capable	Disturbance Only	20
34-8	DM/Plantation	Douglas-fir	Dispersal	T&M	9
DM = Density Management, NRF= Resting, Roosting, and Foraging T&M = Treat and Maintain				**Total Acres**	**1128**

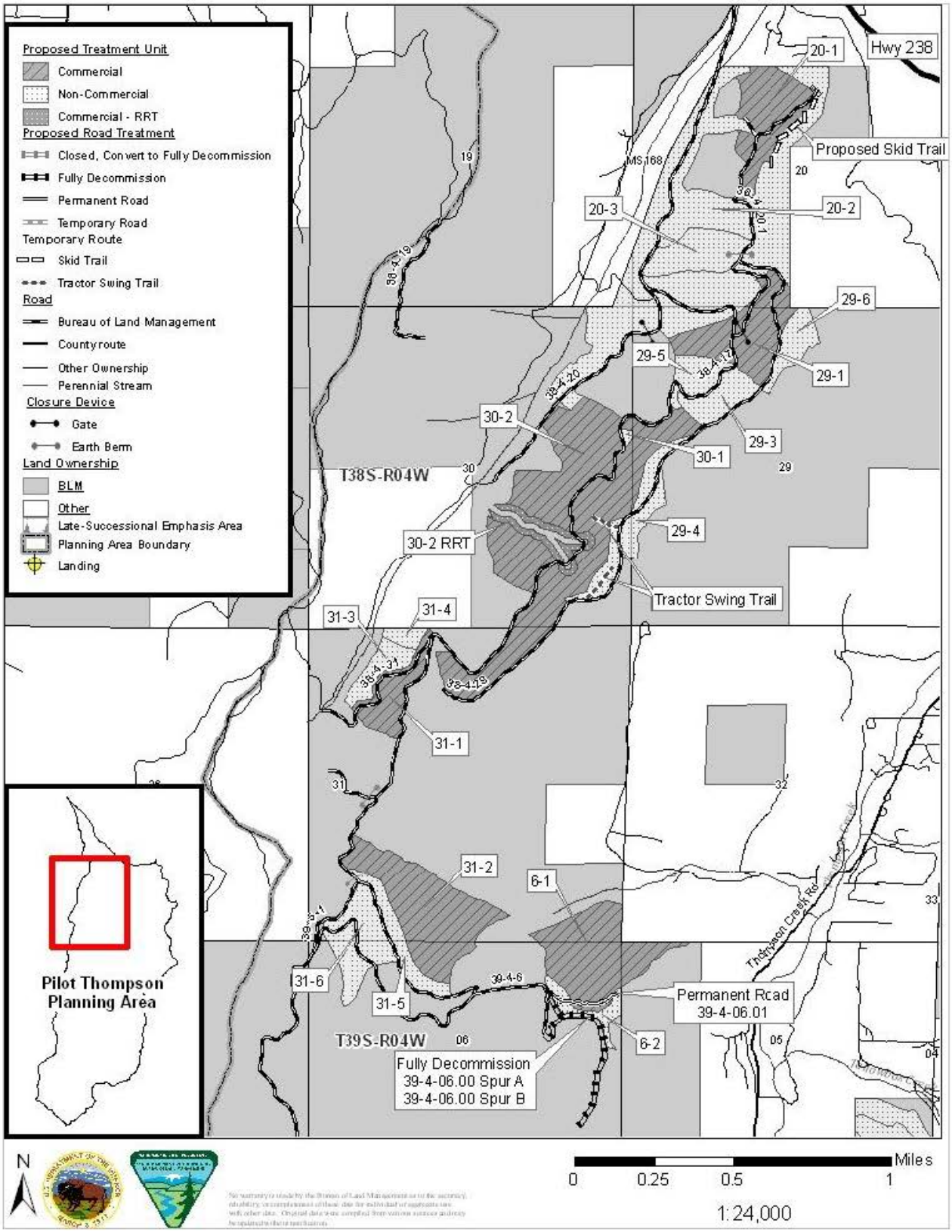
Table 2-3. Alternative 2: Commercial Harvest Units by Silvicultural Prescription, Harvest Method, and NSO Habitat

Unit	Harvest Method	Silvicultural Prescription	Associated Non-Commercial Prescription	NSO Habitat Type[2]	NSO Habitat Effects	Acres	Riparian Acres *
3-1	Tractor\ Cable	VDT, RRT	Activity, UR	NRF	Downgrade/ T&M	4	10
3-2[3]	Tractor	VDT	Activity, UR	Dispersal	T&M	19	N/A
3-4	Cable	VDT, RRT	Activity, UR	Dispersal	T&M	3	2
3-5	Cable	VDT, RRT	Activity, UR	Dispersal/ NRF	T&M	6	7
5-1	Cable	VDT	Activity	NRF	T&M	21	N/A
6-1	Cable	VDT	Activity, UR	Dispersal	T&M	52	N/A
8-1	Cable	VDT	Activity, UR	Dispersal/ NRF	T&M	20	N/A
9-1	Tractor\ Cable	VDT, RRT	Activity, UR	Dispersal/ Capable	T&M/ Disturbance Only	18	9
9-2	Cable	DMI	Activity, UR	Dispersal	T&M	4	N/A
9-4	Tractor	DMI	Activity, UR	Capable	Disturbance Only	3	N/A
12-1	Cable	VDT	Activity, UR	Dispersal	T&M	42	N/A
19-1	Cable	VDT	Activity, UR	Dispersal/ NRF	T&M/ Downgrade	46	N/A
19-2	Cable	VDT, RRT	Activity, UR	NRF	T&M	2	5
19-4	Cable	VDT	Activity	NRF	Downgrade	36	N/A
19-5	Tractor	DMI	Activity, UR	Dispersal	T&M	10	N/A
19-6	Tractor	VDT	Activity, UR	Dispersal/ NRF	T&M	18	N/A
20-1	Cable/Tractor[4]	VDT	Activity, UR	Dispersal/ NRF	T&M/ Downgrade	37	N/A
25-1	Cable	DMI, RRT	Activity, UR	Dispersal	T&M	164	25
25-2	Tractor	DMI	Activity, UR	Dispersal	T&M	8	N/A
25-3	Tractor\ Cable	VDT, RRT	Activity, UR	Dispersal	T&M	18	4
25-4	Tractor	DMI	Activity, UR	Dispersal/ NRF	T&M	38	N/A
25-8	Tractor\ Cable	DMI, RRT	Activity, UR	NRF	T&M	10	2
25-9	Tractor\ Cable	DMI, RRT	Activity, UR	NRF	T&M	19	5
25-10	Cable	DMI	Activity, UR	Dispersal	T&M	14	N/A
28-1	Cable	DMI	Activity, UR	Capable	Disturbance Only	29	N/A
28-2	Cable	VDT	Activity, UR	Capable	Disturbance Only	19	N/A
29-1	Cable	VDT	Activity, UR	Dispersal/ NRF	T&M/ Downgrade	41	N/A

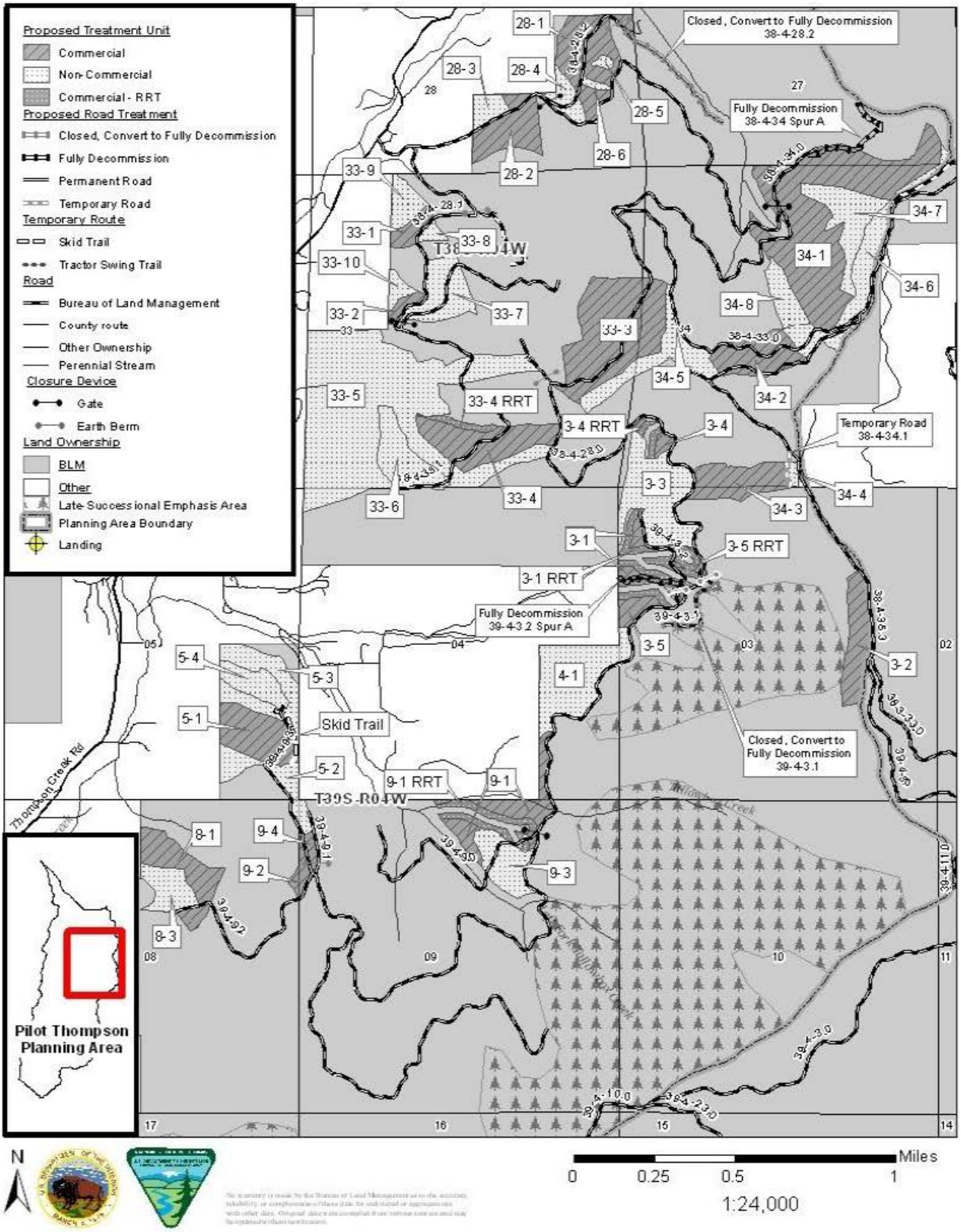
[2] NSO habitat types are defined in the Terrestrial Wildlife section of Chapter 3 (p. 3-96).
[3] An LSR Assessment will be completed prior to any habitat manipulation in unit 3-2 (p. 2-40)
[4] 9 acres are considered Tractor as they would be yarded with a bull-line up to a designated skid trail.

Unit	Harvest Method	Silvicultural Prescription	Associated Non-Commercial Prescription	NSO Habitat Type[2]	NSO Habitat Effects	Acres	Riparian Acres *
30-2	Cable	VDT, RRT	Activity, UR	Dispersal/ NRF	T&M/ Downgrade	149	11
31-1	Cable	DMI	Activity, UR	NRF	T&M	20	N/A
31-2	Cable	VDT	Activity, UR	Dispersal/ NRF	T&M/ Downgrade	60	N/A
33-1	Cable	VDT	Activity, UR	Dispersal	T&M	6	N/A
33-2	Cable	VDT	Activity, UR	Capable	Disturbance Only	3	N/A
33-3	Cable	VDT	Activity, UR	Dispersal	T&M	55	N/A
33-4	Cable	VDT, RRT	Activity, UR	Dispersal	T&M	23	3
34-1	Cable	VDT	Activity, UR	Dispersal/ NRF	T&M	88	N/A
34-2	Cable	VDT	Activity, UR	Dispersal	T&M	19	N/A
34-3	Cable	VDT	Activity, UR	Dispersal	T&M	19	N/A
DMI = Density Management Intermediate VDT = Variable Density Thinning RRT = Riparian Reserve Thinning UR = Understory Removal NRF = Nesting, Roosting, Foraging T&M = Treat and Maintain					**Total Acres**	**1143**	**83**

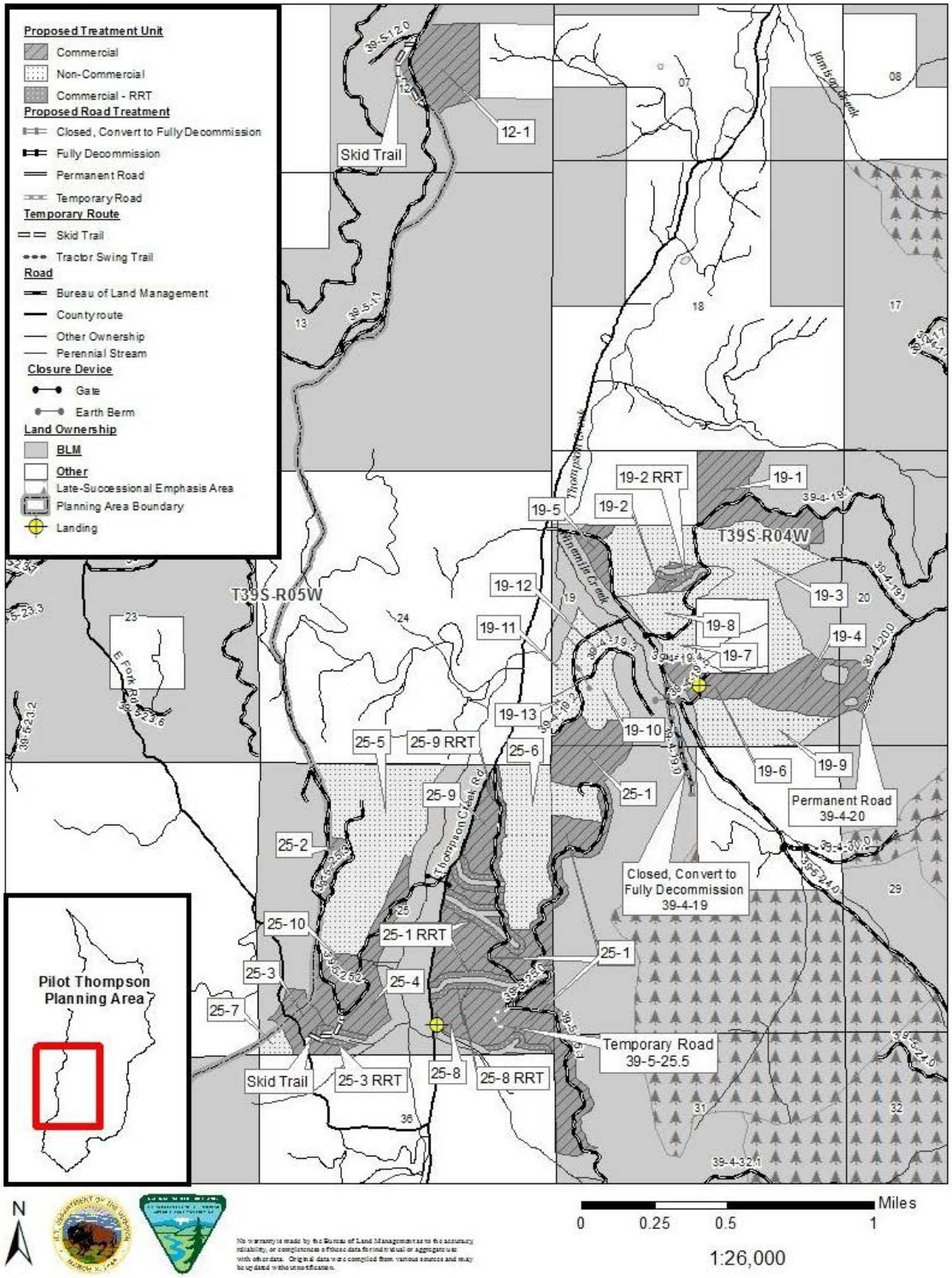
Map 2-1. Pilot Thompson Project – Alternative 2 – Ferris Gulch Area



Map 2-2. Pilot Thompson Project – Alternative 2 – Hinkle Gulch/Tallowbox Creek Area



Map 2-3. Pilot Thompson Project – Alternative 2 – Ninemile Creek Area



Under Alternative 2, an estimated 45 miles of existing roads would be used as haul routes and improved as needed to meet BLM standards (Table 2-4). Road improvements could include such items as spot rocking, cleaning road drainage ditches and culvert basins, repairing and installing water dips, grading and shaping roads.

Renovation of approximately 3.30 miles of road would occur on existing BLM roads to access commercial harvest units (Table 2-4). Renovation of roads would include reshaping the road with a blade, brushing, and restoring water drainage.

Alternative 2 would construct approximately 0.62 miles of new road to provide access to proposed harvest units. About 0.37 miles of road constructed would be permanently added to the road system and approximately 0.25 miles of temporary road construction is proposed (Table 2-5). Approximately 2.55 miles of road would be fully decommissioned (Table 2-6). All road treatment activities would adhere to associated PDF's identified in Section C (Components Common to the Action Alternatives).

Following use, all newly constructed and renovated permanent roads would be effectively blocked to preclude use. Blockage would consist of placing logs, slash, boulders, berms, and other material both at the entrance so that it is camouflaged, and at sufficient intervals along the roads length. Temporary roads used or constructed would be fully decommissioned or obliterated at the completion of timber harvest activities.

Fully decommissioning would include decompacting the surface to a depth of 12 inches, and slash and other debris would be placed along the road's length to provide ground cover and discourage OHV use. Blockage at the entrance would consist of placing earthen berms, logs, slash, boulders, and other material so the entrance is camouflaged and vehicle use is precluded. Obliterated roads would be treated similar to fully decommissioning; however, where fill occurs, recontouring and outsloping the travelway to disperse runoff would occur. Both methods would include the removal of all drainage structures. Treatments described may be modified by the authorized officer with consultation with appropriate earth scientists or aquatic specialists.

Approximately 2.55 miles of road would be fully decommissioned (Table 2-6). Fully decommissioning would occur as described above. All road treatment activities would adhere to associated PDF's identified in Section C (Components Common to the Action Alternatives).

Two new landings would be constructed; one on road 39-4-19.5 and one on a non-system road in T39S-R4W-S25 SE ¼ (Map 2-3) to avoid blocking roads used to access adjacent private land. Landings would be located outside of riparian reserves, would not exceed 0.5 acres, and would adhere to associated PDF's.

Under Alternative 2, tractor swing routes would be utilized in 2 locations (T38S-R4W-30) to access unit 30-2. Logs would be harvested using a skyline system from a yarding position determined to be optimal. From the optimal yarding position, logs would then be moved via a skid trail to a roadside landing using ground-based equipment. Both routes are along a ridge top on an existing footprint; the first route would be 0.09 miles in length, and the second route would be 0.15 miles. On tractor swing routes, where determined necessary, any berms or ruts would be leveled to match the existing topography and slash and other debris scattered to discourage use and protect the surface from erosion (p. 2-35).

Four skid trails are proposed to access units 5-1 (0.18 miles), 12-1 (0.29 miles), 20-1 (0.28 miles), & 25-3 (0.18 miles). Other than the skid trail in unit 25-3, all skid trails are on ridge tops. The designated skid trail in unit 25-3, which is needed to access the western portion of the unit, would cross a short duration intermittent stream. Prior to harvest, bump logs would be placed in the channel to minimize disturbance. Following harvest any berms or ruts would be leveled to match the existing topography and slash and other debris scattered so that 80 percent ground cover is achieved. The bump logs would be removed and any loose soil removed from within the channel. Straw bales would be positioned downstream of the skid trail to arrest downstream sediment movement (p.2-35). All skid trails would be water barred according to BLM standards. Skid trails would be blocked with an approved barricade and camouflaged with slash and other debris where they intersect haul roads (p.2-34).

Table 2-4. Alternative 2: Proposed Haul Routes on Existing Roads in the Project Area

Road Number	Approximate Length (miles)	Existing Surface: Depth (inches) and Type	Control	Possible Road Stabilization or Drainage improvements	Seasonal Restriction (for log hauling)
38-4W-17.00A	0.47	BST	BLM	3	0
38-4W-17.00B	0.76	BST	BLM	3	0
38-4W-17.00C	2.35	BST	BLM	3	0
38-4W-17.00D1	0.51	ASC	BLM	3	1
38-4W-17.00D2	0.07	ASC	BLM	3	1
38-4W-20.0A	0.16	GRR	BLM	3	1
38-4W-20.0B	0.71	GRR	BLM	3	1
38-4W-20.01	0.79	NAT	BLM	Open closed road, brush and blade, improve drainage, close after use	1
38-4W-20.02	0.07	NAT	BLM	Open closed road, brush and blade, improve drainage, close after use	2
38-4W-28.00A1	0.15	ASC	BLM	3	1
38-4W-28.00A2	1.72	ASC	BLM	3	1
38-4W-28.00A3	1.03	ASC	BLM	3	1
38-4W-28.00B1	1.16	ASC	BLM	3	1
38-4W-28.00B2	0.34	ASC	BLM	3	1
38-4W-28.00B3	1.89	GRR	BLM	3	1
38-4W-28.00B4	2.16	GRR	BLM	3	1
38-4W-28.01A1	0.10	PRR	BLM	3	1
38-4W-28.01A2	0.30	PRR	BLM	3	1
38-4W-28.01B	0.56	ASC	BLM	3	1
38-4W-28.01C	0.29	NAT	BLM	3	1
38-4W-28.02	0.48	GRR	BLM	Open closed road, brush and blade, improve drainage, close after use	1
38-4W-29.00A	1.11	ASC	BLM	3	1
38-4W-29.00B	1.43	GRR	BLM	3	1
38-4W-31.00	0.56	NAT	BLM	3	1
38-4W-31.01	0.64	NAT	BLM	3	1
38-4W-33.00	1.19	PRR	BLM	3	1
38-4W-33.01	1.00	ASC	BLM	3	1
38-4W-33.03	0.17	NAT	BLM	Open closed road, brush and blade, improve drainage, close after use	1
38-4W-34.00	0.26	ASC	BLM	Open closed road, brush and blade, improve drainage, close after use	1
38-4W-34.01	0.11	NAT	BLM	Open closed road, brush and blade, improve	1

Road Number	Approximate Length (miles)	Existing Surface: Depth (inches) and Type	Control	Possible Road Stabilization or Drainage improvements	Seasonal Restriction (for log hauling)
				drainage, close after use	
38-4W-34.02	0.26	NAT	BLM	Open closed road, brush and blade, improve drainage, close after use	1
38-4W-35.03C1	0.17	NAT	BLM	3	1
38-4W-35.03C2	1.27	NAT	BLM	3	1
38-4W-35.03D	0.03	NAT	BLM	3	1
38-4W-35.03E	0.60	NAT	BLM	3	1
39-4W-03.02	0.40	NAT	BLM	Open closed road, brush and blade, improve drainage, close after use	1
39-4W-06.00	1.25	ASC	BLM	3	1
39-4W-09.00A	0.27	ASC	BLM	3	1
39-4W-09.01A	0.26	ASC	BLM	3	1
39-4W-09.01B	0.21	NAT	BLM	Open closed road, brush and blade, improve drainage, close after use	1
39-4W-09.03	0.62	NAT	BLM	Open closed road, brush and blade, improve drainage, close after use	1
39-4W-17.00	0.37	NAT	BLM	3	1
39-4W-19.01A	1.35	ASC	BLM	3	1
39-4W-19.01B1	0.13	ASC	BLM	3	1
39-4W-19.01B2	1.28	ASC	BLM	3	1
39-4W-19.01C	2.40	NAT	BLM	3	1
39-4W-19.02	0.57	ASC	BLM	3	1
39-4W-19.03	0.18	NAT	BLM	3	1
39-4W-19.04	0.13	NAT	BLM	3	1
39-4W-19.05	0.18	NAT	BLM	3	1
39-4W-20.00	0.28	NAT	BLM	3	1
39-5W-01.00A1	0.52	ASC	BLM	3	1
39-5W-01.00A2	0.76	ASC	BLM	3	1
39-5W-01.00B	0.65	ASC	BLM	3	1
39-5W-01.01A	0.26	ASC	BLM	3	1
39-5W-01.01B	0.80	ASC	BLM	3	1
39-5W-01.01C	0.30	ASC	BLM	3	1
39-5W-02.00A	0.87	ASC	BLM	3	1
39-5W-24.00A1	0.02	ASC	BLM	3	1
39-5W-24.00A2	0.63	ASC	BLM	3	1
39-5W-24.00A3	0.10	ASC	BLM	3	1
39-5W-24.00B1	0.18	ASC	BLM	3	1
39-5W-25.00A	1.53	PRR	BLM	3	1

Road Number	Approximate Length (miles)	Existing Surface: Depth (inches) and Type	Control	Possible Road Stabilization or Drainage improvements	Seasonal Restriction (for log hauling)
39-5W-25.00B	0.66	PRR	BLM	3	1
39-5W-25.01A	0.13	PRR	BLM	3	1
39-5W-25.01B	0.98	PRR	BLM	3	1
39-5W-25.02A	1.14	ASC	BLM	3	1
39-5W-25.02B	0.51	ASC	BLM	3	1
39-5W-25.03	0.43	ASC	BLM	3	1
Total mileage	**45.22**				

Abbreviations:

Existing Surface: NAT=natural; ASC=Aggregate Surface Course; BST=Bituminous Surface Treatment; GRR=Grid Rolled Rock; PRR=Pit Run Rock

Control: BLM=Bureau of Land Management; PVT=Private

Possible Improvements: 3=no road stabilization/drainage improvements. All BLM roads proposed for haul routes would be maintained to BLM-Standards

Seasonal Restrictions: (for log hauling) 0=no restrictions
1=hauling restricted between 10/15 and 6/1
2=hauling restricted between 11/15 and 5/15

Note: If Purchaser furnishes and places additional rock, seasonal restrictions could be modified as approved by the Authorized Officer.

Table 2-5. Alternative 2: Proposed New Road Construction.

Road Number	Approximate Length (miles)	Existing Surface: Depth (inches) and Type	Control	Comments
39-4-20	0.12	NAT	BLM	Extend Existing Road
39-4-06.1	0.25	NAT	BLM	Barricade After Use
Total mileage:	**0.37**			
39-5-25.5	0.13	NAT	BLM	Temporary Road, Fully Decommission After Use
38-4-34.1	0.12	NAT	BLM	Temporary Road, Fully Decommission After Use
Total mileage:	**0.25**			

Abbreviations:

Existing Surface: NAT=Natural

Control: BLM=Bureau of Land Management

Table 2-6. Alternative 2: Proposed Road Decommissioning.

Road Number	Approximate Length (miles)	Existing Surface: Depth (inches) and Type	Control	Comments
38-4-34 Spur A	0.46	NAT	BLM	Fully Decommission After Harvest

Road Number	Approximate Length (miles)	Existing Surface:	Control	Comments
39-4-3.2 Spur A	0.2	NAT	BLM	Fully Decommission
39-4-06 Spur A	0.57	NAT	BLM	Fully Decommission
39-4-06 Spur B	0.11	NAT	BLM	Fully Decommission
38-4-28.2	0.46	NAT	BLM	Closed, convert to Fully Decommission
39-4-19	0.4	NAT	BLM	Closed, convert to Fully Decommission
39-4-3.1	0.35	NAT	BLM	Closed, convert to Fully Decommission
Total mileage:	**2.55**			

Abbreviations:
Existing Surface: NAT=Natural
Control: BLM=Bureau of Land Management

b. Alternative 3

Alternative 3 was developed to achieve the objectives described in Chapter 1, the Purpose and Need for the Pilot Thompson Project. Alternative 3 was designed to address the desire for no road building and provides a comparison of the environmental effects of building roads versus not building roads. It also provides a comparison of the differences in the cost for completing forest thinning, including helicopter logging opportunities.

Under this alternative, 2,720 acres of vegetation would be treated using various commercial and non-commercial silvicultural prescriptions as described under Section C (Components Common to the Action Alternatives). About 1,592 acres are proposed for commercial treatments. Approximately 2,320 acres are proposed for non-commercial treatments, of which 1,192 acres are within commercial harvest units and 1,128 acres are strictly non-commercial stands (Table 2-7).

The cutting and removal of trees is accomplished in commercial conifer forests by a timber sale contract which sells material over eight (8) inches DBH (diameter at breast height). Trees to be retained or removed are designated in accordance with the marking guidelines outlined in Appendix A. Depending on stand conditions, individual trees are marked for retention (leave tree marking) or for harvest (cut tree marking). Non-commercial vegetation (material less than eight (8) inches DBH) would be removed through contracts that hire out cutting, and piling of material. Tops and limbs of trees cut would be treated to reduce fire risk by piling and burning the material in a controlled manner. BLM will burn the piles during wet weather conditions. Some material could be made available for firewood, pulp or woody biomass depending on market conditions and demand.

Riparian Reserve Thinning
Under Alternative 3, trees would be harvested in Riparian Reserve Thinning (RRT) units using the silvicultural prescription described in Section C (Components Common to the Action Alternatives). All commercial sized conifer trees less than 14 inches DBH would be harvested and sold under a timber sale or stewardship contract. Conifer trees that are 14 inches and greater would be directionally felled toward the channel and left on-site for down wood recruitment.

Table 2-7 summarizes the project by silvicultural treatment prescriptions and timber harvest methods. Unit specific information is displayed in Table 2-8 and 2-9 and Maps 2-4 to 2-6.

Table 2-7. Alternative 3: Summary of Acres by Silvicultural Prescription and Harvest Method

Commercial Prescriptions	Est. Acres
Variable Density Thinning (VDT)	1190
Density Management – Intermediate Treatment (DMI)	319
Riparian Reserve Thinning (RRT)	83
Total	**1592**
Non-commercial Prescriptions	**Est. Acres**
Understory Reduction (UR)	1192
Density Management – Non Plantation (DM)	957
Density Management – Plantation (DM)	171
Total	**2320**
Timber Harvest Method	**Est. Acres**
Cable Yarding	981
Tractor Yarding	174
Helicopter Yarding	437
Total	**1592**

Table 2-8. Alternative 3: Non-Commercial Units by Prescription, Plant Series, and NSO Habitat

Unit	Non-Commercial Rx	Plant Series	NSO Habitat Type[5]	NSO Habitat Effects	Acres
3-3	DM/Non Plantation	Pine	NRF	T&M	34
4-1	DM/Non Plantation	Pine	Dispersal	T&M	33
5-2	DM/Non Plantation	White Oak	Dispersal	T&M	14
5-3	DM/Non Plantation	Pine	Dispersal	T&M	20
5-4	DM/Plantation	Pine	Dispersal	T&M	10
6-2	DM/Non Plantation	Douglas-fir	Capable	Disturbance Only	9
8-3	DM/Plantation	Douglas-fir	Capable	Disturbance Only	12
9-3	DM/Non Plantation	White Oak	Capable	Disturbance Only	16
19-3	DM/Non Plantation	White Oak and Pine	Dispersal	T&M	97
19-7	DM/Non Plantation	Douglas-fir	Dispersal	T&M	8
19-8	DM/Plantation	Pine	Capable	Disturbance Only	22
19-9	DM/Non Plantation	Pine	Dispersal	T&M	36
19-10	DM/Non Plantation	Douglas-fir	NRF	T&M	18
19-11	DM/Non Plantation	Pine	Dispersal	T&M	7
19-12	DM/Plantation	Douglas-fir	Dispersal	T&M	14
19-13	DM/Plantation	Pine	Dispersal	T&M	8
20-2	DM/Non Plantation	White Oak and Pine	Capable	Disturbance Only	164
20-3	DM/Plantation	Pine	Capable	Disturbance Only	23
25-5	DM/Non Plantation	Douglas-fir	Dispersal	T&M	108
25-6	DM/Non Plantation	Douglas-fir	Dispersal	T&M	67

[5] NSO habitat types are defined in the Terrestrial Wildlife section of Chapter 3 (p. 3-96).

Unit	Non-Commercial Rx	Plant Series	NSO Habitat Type[5]	NSO Habitat Effects	Acres
25-7	DM/Non Plantation	Douglas-fir	NRF	T&M	5
28-3	DM/Non Plantation	Pine	Dispersal	T&M	6
28-4	DM/Non Plantation	Douglas-fir	Dispersal	T&M	7
28-5	DM/Non Plantation	White Oak	Capable	Disturbance Only	1
28-6	DM/Non Plantation	White Oak	Capable	Disturbance Only	1
29-3	DM/Plantation	Douglas-fir	Capable	Disturbance Only	15
29-4	DM/Non Plantation	Douglas-fir	Dispersal	T&M	25
29-5	DM/Non Plantation	Douglas-fir	Dispersal	T&M	12
29-6	DM/Non Plantation	Pine	Capable	Disturbance Only	12
30-1	DM/Non Plantation	White Oak	Capable	Disturbance Only	1
31-3	DM/Plantation	Douglas-fir	Capable	Disturbance Only	11
31-4	DM/Non Plantation	Douglas-fir	Dispersal	T&M	4
31-5	DM/Non Plantation	Douglas-fir	Capable	Disturbance Only	15
31-6	DM/Plantation	Pine	Capable	Disturbance Only	29
33-5	DM/Non Plantation	Douglas-fir, White Oak, Pine	Capable	Disturbance Only	133
33-6	DM/Plantation	Douglas-fir	Capable	Disturbance Only	18
33-7	DM/Non Plantation	Douglas-fir	Capable	Disturbance Only	19
33-8	DM/Non Plantation	Douglas-fir	Capable	Disturbance Only	2
33-9	DM/Non Plantation	Pine	Dispersal	T&M	8
33-10	DM/Non Plantation	Pine	Capable	Disturbance Only	4
34-4	DM/Non Plantation	Douglas-fir	Capable	Disturbance Only	2
34-5	DM/Non Plantation	Douglas-fir	Capable	Disturbance Only	20
34-6	DM/Non Plantation	Douglas-fir	Dispersal	T&M	29
34-7	DM/Non Plantation	Douglas-fir	Capable	Disturbance Only	20
34-8	DM/Plantation	Douglas-fir	Dispersal	T&M	9
DM = Density Management, NRF= Resting, Roosting, and Foraging T&M = Treat and Maintain				**Total Acres**	**1128**

Table 2-9. Alternative 3: Commercial Harvest Units by Silvicultural Prescription, Harvest Method, and NSO Habitat

Unit	Harvest Method	Silviculture Rx	Non-Commercial Rx	NSO Habitat Type[6]	NSO Habitat Effects	Acres	Riparian Acres
3-1	Tractor/ Cable	VDT, RRT	Activity, UR	NRF	Downgrade/ T&M	4	10
3-2[7]	Tractor	VDT	Activity, UR	Dispersal	T&M	19	N/A
3-4	Cable	VDT, RRT	Activity, UR	Dispersal	T&M	3	2
3-5	Cable	VDT, RRT	Activity, UR	Dispersal/ NRF	T&M	6	7

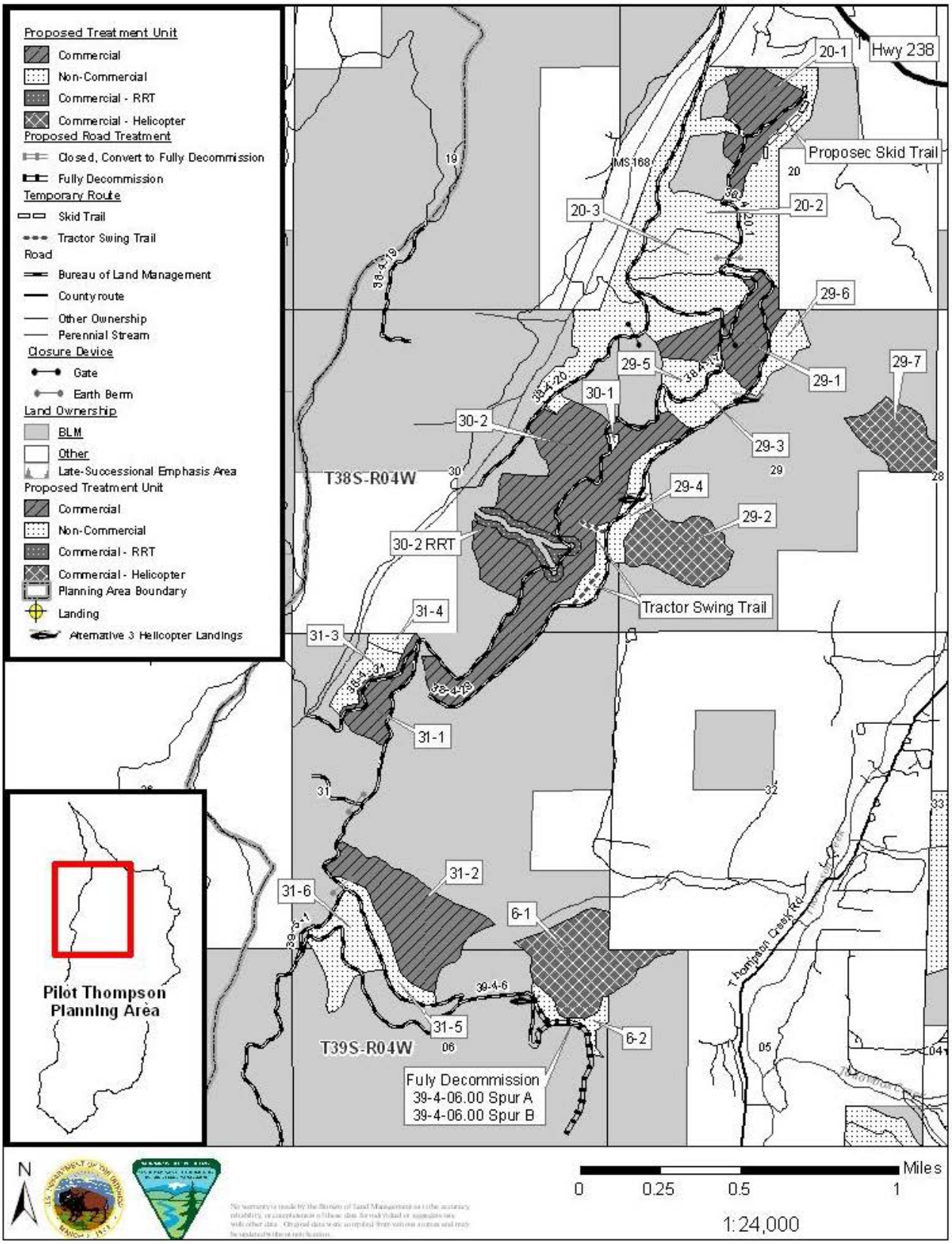
[6] NSO habitat types are defined in the Terrestrial Wildlife section of Chapter 3 (p. 3-96).
[7] An LSR Assessment will be completed prior to any habitat manipulation in unit 3-2 (p. 2-40)

Unit	Harvest Method	Silviculture Rx	Non-Commercial Rx	NSO Habitat Type[6]	NSO Habitat Effects	Acres	Riparian Acres
5-1	Cable	VDT	Activity	NRF	T&M	21	N/A
6-1	Helicopter	VDT	Activity, UR	Dispersal	T&M	52	N/A
8-1	Cable	VDT	Activity, UR	Dispersal/ NRF	T&M	20	N/A
8-2	Helicopter	VDT	Activity, UR	NRF	T&M	71	N/A
9-1	Tractor/ Cable	VDT, RRT	Activity, UR	Dispersal/ Capable	T&M/ Disturbance Only	18	9
9-2	Cable	DMI	Activity, UR	Dispersal	T&M	4	N/A
9-4	Tractor	DMI	Activity, UR	Capable	Disturbance Only	3	N/A
12-1	Cable	VDT	Activity, UR	Dispersal	T&M	42	N/A
12-2	Helicopter	VDT	Activity	Dispersal	T&M	13	N/A
12-3	Helicopter	VDT	Activity	NRF	Downgrade	40	N/A
13-1	Helicopter	VDT	Activity	NRF	Downgrade	26	N/A
17-1	Helicopter	VDT	Activity	Dispersal/ NRF	T&M	154	N/A
19-1	Cable	VDT	Activity, UR	Dispersal/ NRF	T&M/ Downgrade	46	N/A
19-2	Cable	VDT, RRT	Activity, UR	NRF	T&M	2	5
19-4	Cable	VDT	Activity	NRF	Downgrade	36	N/A
19-5	Tractor	DMI	Activity, UR	Dispersal	T&M	10	N/A
19-6	Tractor	VDT	Activity, UR	Dispersal/ NRF	T&M	18	N/A
20-1	Cable/Tractor[8]	VDT	Activity, UR	Dispersal/ NRF	T&M/ Downgrade	37	N/A
25-1	Cable	DMI, RRT	Activity, UR	Dispersal	T&M	164	25
25-2	Tractor	DMI	Activity, UR	Dispersal	T&M	8	N/A
25-3	Tractor/ Cable	VDT, RRT	Activity, UR	Dispersal	T&M	18	4
25-4	Tractor	DMI	Activity, UR	Dispersal/ NRF	T&M	38	N/A
25-8	Tractor	DMI, RRT	Activity, UR	NRF	T&M	10	2
25-9	Tractor/ Cable	DMI, RRT	Activity, UR	NRF	T&M	19	5
25-10	Cable	DMI	Activity, UR	Dispersal	T&M	14	N/A
28-1	Cable	DMI	Activity, UR	Capable	Disturbance Only	29	N/A
28-2	Cable	VDT	Activity, UR	Capable	Disturbance Only	19	N/A
29-1	Cable	VDT	Activity, UR	Dispersal/ NRF	T&M/ Downgrade	41	N/A
29-2	Helicopter	VDT	Activity, UR	Dispersal	T&M	35	N/A
29-7	Helicopter	VDT	Activity	NRF	Downgrade	27	N/A
30-2	Cable	VDT, RRT	Activity, UR	Dispersal/	T&M/	149	11

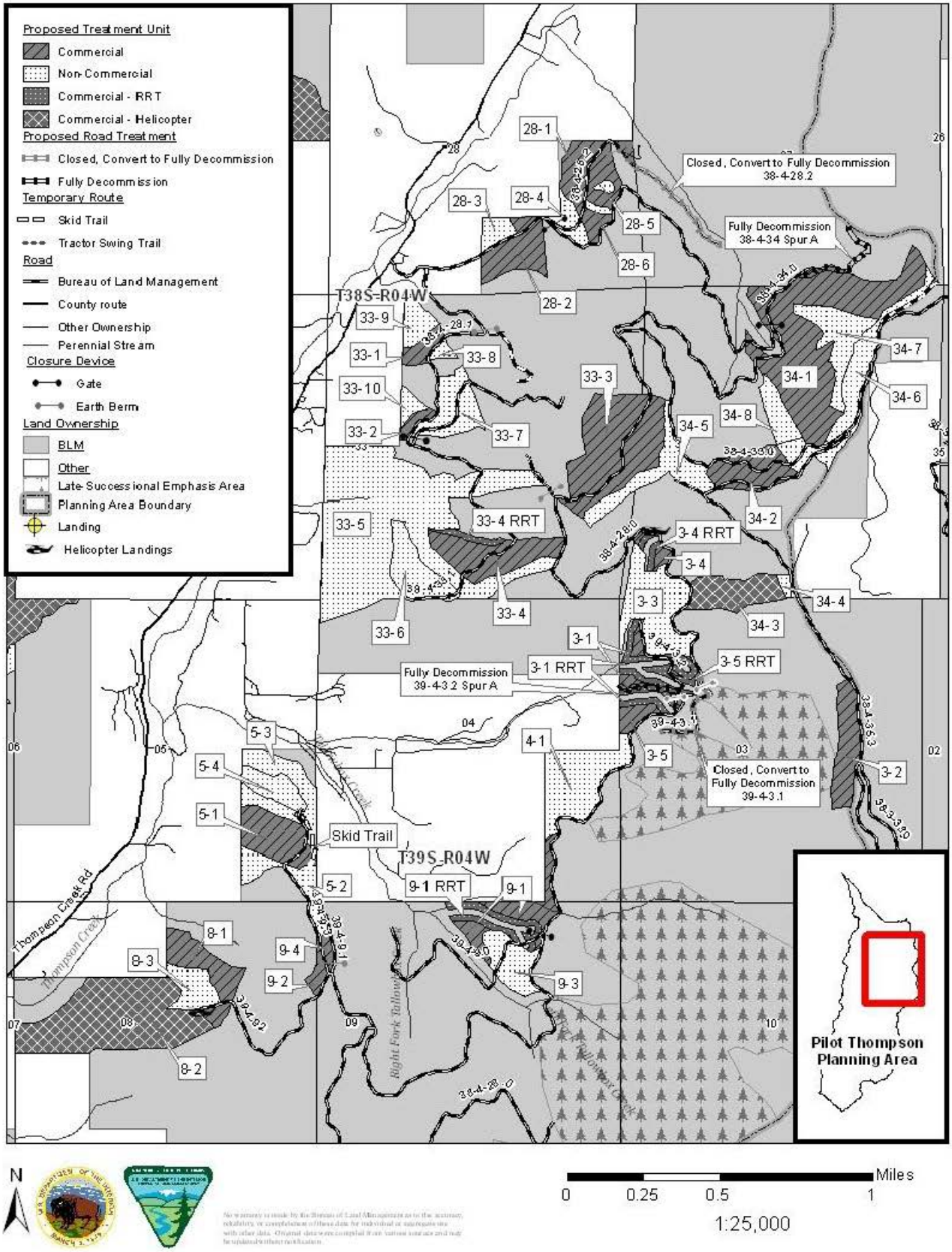
[8] 9 acres are considered Tractor as they would be yarded with a bull-line up to a designated skid trail.

Unit	Harvest Method	Silviculture Rx	Non-Commercial Rx	NSO Habitat Type[6]	NSO Habitat Effects	Acres	Riparian Acres
				NRF	Downgrade		
31-1	Cable	DMI	Activity, UR	NRF	T&M	20	N/A
31-2	Cable	VDT	Activity, UR	Dispersal/ NRF	T&M/ Downgrade	60	N/A
33-1	Cable	VDT	Activity, UR	Dispersal	T&M	6	N/A
33-2	Cable	VDT	Activity, UR	Capable	Disturbance Only	3	N/A
33-3	Cable	VDT	Activity, UR	Dispersal	T&M	55	N/A
33-4	Cable	VDT, RRT	Activity, UR	Dispersal	T&M	23	3
34-1	Cable	VDT	Activity, UR	Dispersal/ NRF	T&M	88	N/A
34-2	Cable	VDT	Activity, UR	Dispersal	T&M	19	N/A
34-3	Helicopter	VDT	Activity, UR	Dispersal	T&M	19	N/A
VDT = Variable Density Thin DM = Density Management DMI= Density Management/Intermediate Activity = pile & burn tree tops and limbs to reduce fuels as needed			UR = Understory Reduction RRT = Riparian Reserve Thin		**Total Acres**	**1509**	**83**

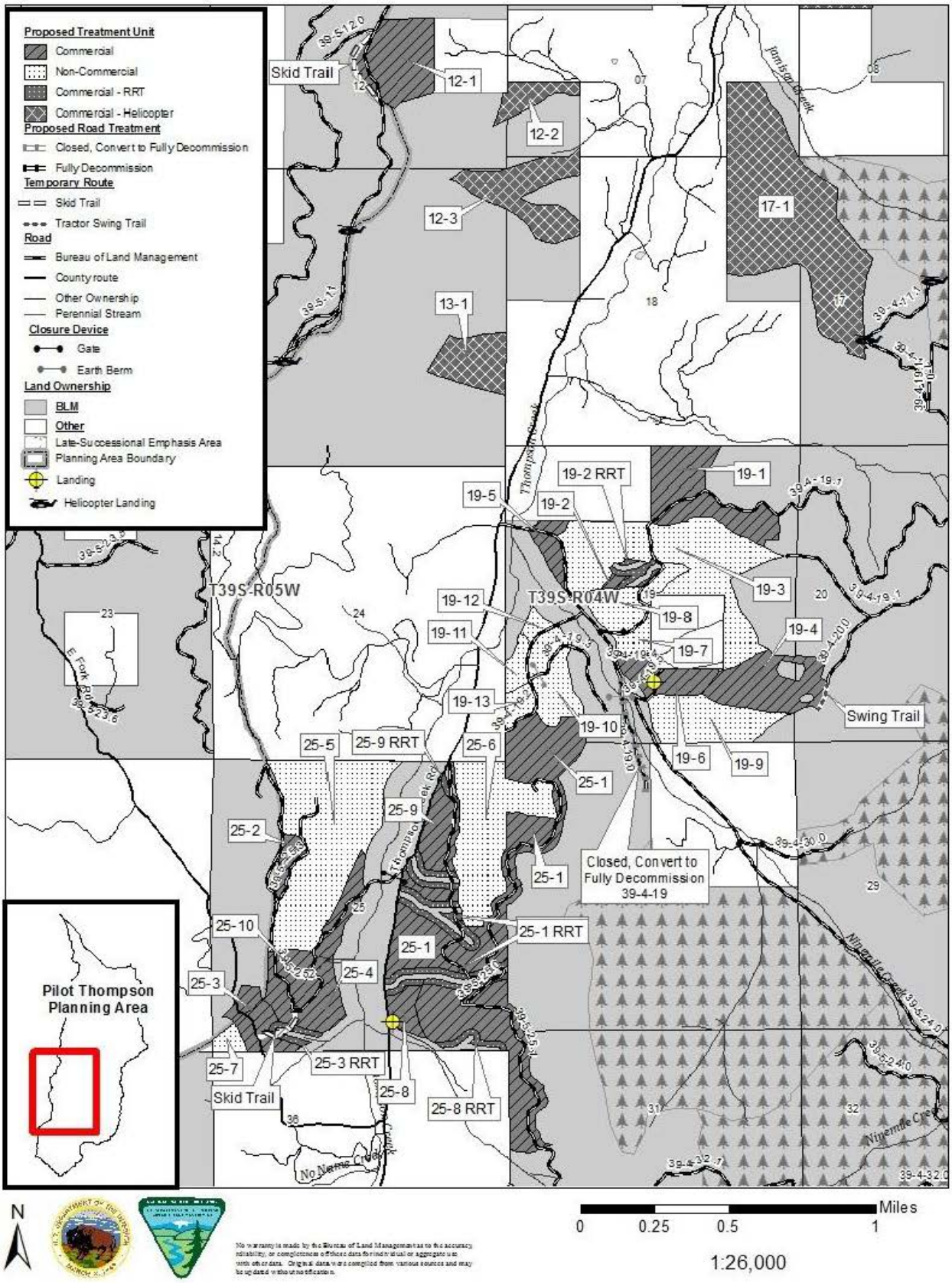
Map 2-4. Pilot Thompson Project – Alternative 3 – Ferris Gulch Area



Map 2-5. Pilot Thompson Project – Alternative 3 – Hinkle Gulch/Tallowbox Creek Area



Map 2-6. Pilot Thompson Project – Alternative 3 – Ninemile Creek Area



Under Alternative 3, an estimated 46.7 miles of existing roads would be used as haul routes and improved as needed to meet BLM standards (Table 2-10). Road improvements could include such items as spot rocking, cleaning road drainage ditches and culvert basins, repairing and installing water dips, grading and shaping roads.

Renovation of approximately 3.37 miles of road would occur on existing BLM roads to access commercial harvest units (Table 2-10). Renovation of roads would include reshaping the road with a blade, brushing, and restoring water drainage. At the end of project activities, all roads would be closed and barricades would be constructed to block vehicular traffic.

Approximately 2.55 miles of road would be fully decommissioned (Table 2-11). Fully decommissioning would include decompacting the surface to a depth of 12 inches and slash and other debris would be placed along the roads length to provide ground cover and discourage OHV use. Blockage at the entrance would consist of placing earthen berms, logs, slash, boulders, and other material so the entrance is camouflaged and vehicle use is precluded. All drainage structures would be removed. Treatments described may be modified by the authorized officer with consultation with appropriate earth scientists or aquatic specialists. All road treatment activities would adhere to associated PDFs identified in Section C (Components Common to the Action Alternatives).

Two new landings would be constructed; one on road 39-4-19.5 and one on a non-system road in T39S-R4W-S25 SE ¼ (Map2-6) to avoid blocking roads used to access adjacent private land. Landings would be located outside of riparian reserves, would not exceed 0.5 an acres, and would adhere to associated PDFs.

Under Alternative 3, tractor swing routes would be utilized in 3 locations; two swing routes would be located in T38S-R4W-30 to access unit 30-2, and one swing route would be located in T39S-R4W-S20 to access unit 19-4 (instead of building a road, as proposed under Alternative 2). Logs would be harvested using a skyline system from a yarding position determined to be optimal. From the optimal yarding position, logs would then be moved via a skid trail to a roadside landing using ground-based equipment. The two routes proposed to access unit 30-2 are along a ridge top on existing footprints; the first route would be 0.09 miles in length, and the second route would be 0.15 miles. The third route proposed to access unit 19-4 is on a ridge top as well and would be about 0.12 miles in length. On tractor swing routes, where determined necessary, any berms or ruts would be leveled to match the existing topography and slash and other debris scattered to discourage use and protect the surface from erosion (p. 2-35).

Four skid trails are proposed to access units 5-1 (0.18 miles), 12-1 (0.29 miles), 20-1 (0.28), & 25-3 (0.18 miles). Other than the skid trail in unit 25-3, all skid trails are on ridge tops. The designated skid trail in unit 25-3, which is needed to access the western portion of the unit, would cross a short duration intermittent stream. Prior to harvest, bump logs would be placed in the channel to minimize disturbance. Following harvest any berms or ruts would be leveled to match the existing topography and slash and other debris scattered so that 80 percent ground cover is achieved. The bump logs would be removed and any loose soil removed from within the channel. Straw bales would be positioned downstream of the skid trail to arrest downstream sediment movement (p.2-35). All skid trails would be water barred according to BLM standards. Skid trails would be blocked with an approved barricade and camouflaged with slash and other debris where they intersect haul roads (p.2-34).

Table 2-10. Alternative 3: Proposed Haul Routes on Existing Roads in the Project Area

Road Number	Approximate Length (miles)	Existing Surface: Depth (inches) and Type	Control	Possible Road Stabilization or Drainage improvements	Seasonal Restriction (for log hauling)
38-4W-17.00A	0.47	BST	BLM	3	0
38-4W-17.00B	0.76	BST	BLM	3	0
38-4W-17.00C	2.35	BST	BLM	3	0
38-4W-17.00D1	0.51	ASC	BLM	3	1

Road Number	Approximate Length (miles)	Existing Surface: Depth (inches) and Type	Control	Possible Road Stabilization or Drainage improvements	Seasonal Restriction (for log hauling)
38-4W-17.00D2	0.07	ASC	BLM	3	1
38-4W-20.0A	0.16	GRR	BLM	3	1
38-4W-20.0B	0.71	GRR	BLM	3	1
38-4W-20.01	0.79	NAT	BLM	Open closed road, brush and blade, improve drainage, close after use	1
38-4W-20.02	0.07	NAT	BLM	Open closed road, brush and blade, improve drainage, close after use	2
38-4W-28.00A1	0.15	ASC	BLM	3	1
38-4W-28.00A2	1.72	ASC	BLM	3	1
38-4W-28.00A3	1.03	ASC	BLM	3	1
38-4W-28.00B1	1.16	ASC	BLM	3	1
38-4W-28.00B2	0.34	ASC	BLM	3	1
38-4W-28.00B3	1.89	GRR	BLM	3	1
38-4W-28.00B4	2.16	GRR	BLM	3	1
38-4W-28.01A1	0.10	PRR	BLM	3	1
38-4W-28.01A2	0.30	PRR	BLM	3	1
38-4W-28.01B	0.56	ASC	BLM	3	1
38-4W-28.01C	0.29	NAT	BLM	3	1
38-4W-28.02	0.48	GRR	BLM	Open closed road, brush and blade, improve drainage, close after use	1
38-4W-29.00A	1.11	ASC	BLM	3	1
38-4W-29.00B	1.43	GRR	BLM	3	1
38-4W-31.00	0.56	NAT	BLM	3	1
38-4W-31.01	0.64	NAT	BLM	3	1
38-4W-33.00	1.19	PRR	BLM	3	1
38-4W-33.01	1.00	ASC	BLM	3	1
38-4W-33.03	0.17	NAT	BLM	Open closed road, brush and blade, improve drainage, close after use	1
38-4W-34.00	0.26	ASC	BLM	Open closed road, brush and blade, improve drainage, close after use	1
38-4W-34.01	0.11	NAT	BLM	Open closed road, brush and blade, improve drainage, close after use	1
38-4W-34.02	0.26	NAT	BLM	Open closed road,	1

Road Number	Approximate Length (miles)	Existing Surface: Depth (inches) and Type	Control	Possible Road Stabilization or Drainage improvements	Seasonal Restriction (for log hauling)
				brush and blade, improve drainage, close after use	
38-4W-35.03C1	0.17	NAT	BLM	3	1
38-4W-35.03C2	1.27	NAT	BLM	3	1
38-4W-35.03D	0.03	NAT	BLM	3	1
38-4W-35.03E	0.60	NAT	BLM	3	1
39-4W-03.02	0.40	NAT	BLM	Open closed road, brush and blade, improve drainage, close after use	1
39-4W-06.00	1.25	ASC	BLM	3	1
39-4W-09.00A	0.27	ASC	BLM	3	1
39-4W-09.01A	0.26	ASC	BLM	3	1
39-4W-09.01B	0.21	NAT	BLM	Open closed road, brush and blade, improve drainage, close after use	1
39-4W-09.02	0.72	ASC	BLM	3	1
39-4W-09.03	0.62	NAT	BLM	Open closed road, brush and blade, improve drainage, close after use	1
39-4W-17.00	0.37	NAT	BLM	3	1
39-4W-17.01	0.35	ASC	BLM	3	1
39-4W-19.01A	1.35	ASC	BLM	3	1
39-4W-19.01B1	0.13	ASC	BLM	3	1
39-4W-19.01B2	1.28	ASC	BLM	3	1
39-4W-19.01C	2.40	NAT	BLM	3	1
39-4W-19.03	0.18	NAT	BLM	3	1
39-4W-19.04	0.13	NAT	BLM	3	1
39-4W-19.05	0.18	NAT	BLM	3	1
39-4W-20.00	0.28	NAT	BLM	3	1
39-5W-01.00A1	0.52	ASC	BLM	3	1
39-5W-01.00A2	0.76	ASC	BLM	3	1
39-5W-01.00B	0.65	ASC	BLM	3	1
39-5W-01.01A	0.26	ASC	BLM	3	1
39-5W-01.01B	0.80	ASC	BLM	3	1
39-5W-01.01C	1.27	ASC	BLM	3	1
39-5W-02.00A	0.87	ASC	BLM	3	1
39-5W-24.00A1	0.02	ASC	BLM	3	1
39-5W-24.00A2	0.63	ASC	BLM	3	1
39-5W-24.00A3	0.10	ASC	BLM	3	1

Road Number	Approximate Length (miles)	Existing Surface: Depth (inches) and Type	Control	Possible Road Stabilization or Drainage improvements	Seasonal Restriction (for log hauling)
39-5W-24.00B1	0.18	ASC	BLM	3	1
39-5W-25.00A	1.53	PRR	BLM	3	1
39-5W-25.00B	0.66	PRR	BLM	3	1
39-5W-25.01A	0.13	PRR	BLM	3	1
39-5W-25.01B	0.98	PRR	BLM	3	1
39-5W-25.02A	1.14	ASC	BLM	3	1
39-5W-25.02B	0.51	ASC	BLM	3	1
39-5W-25.03	0.43	ASC	BLM	3	1
Total mileage	**46.69**				

Abbreviations:

Existing Surface: NAT=natural; ASC=Aggregate Surface Course; BST=Bituminous Surface Treatment

Control: BLM=Bureau of Land Management; PVT=Private

Possible Improvements: 3=no road stabilization/drainage improvements. All BLM roads proposed for haul routes would be maintained to BLM-Standards

Seasonal Restrictions: (for log hauling) 0=no restrictions
1=hauling restricted between 10/15 and 6/1
2= hauling restricted between 11/15 and 5/15

Note: If Purchaser furnishes and places additional rock, seasonal restrictions could be modified as approved by the Authorized Officer.

Table 2-11. Alternative 3: Proposed Road Decommissioning

Road Number	Approximate Length (miles)	Existing Surface: Depth (inches) and Type	Control	Comments
38-4-34.00 Spur A	0.46	NAT	BLM	Fully Decommission After Harvest
39-4-03.02 Spur A	0.2	NAT	BLM	Fully Decommission
39-4-06.00 Spur A	0.57	NAT	BLM	Fully Decommission
39-4-06.00 Spur B	0.11	NAT	BLM	Fully Decommission
38-4-28.02	0.46	NAT	BLM	Closed, convert to Fully Decommission
39-4-19.00	0.4	NAT	BLM	Closed, convert to Fully Decommission
39-4-3.1	0.35	NAT	BLM	Closed, convert to Fully Decommission
Total mileage:	**2.55**			-

Abbreviations:

Existing Surface: NAT=Natural

Control: BLM=Bureau of Land Management

C. COMPONENTS COMMON TO THE ACTION ALTERNATIVES

1. Silvicultural Objectives and Dry Forest Prescriptions

All of the prescriptions included under the Pilot Thompson Project were designed to achieve the following over-arching objectives:

- Conserve and improve survivability of older trees (trees greater than 150 years of age) by reducing nearby fuels and competing vegetation[9].
- Increase resistance/resilience of forest stands and landscape to wildfire, drought, insects, etc. by reducing stand densities, ladder fuels, and shifting tree species diversity.
- Restore more sustainable structure and composition by reducing stand densities and enhancing tree diversity, including retention of hardwoods and desirable understory species.
- Accelerate development of structural complexity such as larger tree structures and decadence.
- Develop spatial heterogeneity within stands (e.g. fine-scale structural mosaic).
- Create conditions that are favorable for the initiation, creation, and retention of snags, down wood, large vigorous hardwoods, and understory vegetation diversity in areas where these are lacking.
- Contribute to fulfilling the intent of the Endangered Species Act by conserving ecosystems upon which species depend and incorporating elements of active management proposed by the US Fish and Wildlife Service in the Revised Recovery Plan for the Northern Spotted Owl.

The vegetation treatments proposed under the Pilot Thompson Project are divided into two categories: commercial and non-commercial treatments. Commercial refers to treatment areas where the trees to be removed are of sufficient size to be sold as saw logs to produce dimensional lumber or plywood veneer. Non-commercial refers to treatment stands where the material to be removed is smaller than eight inches diameter breast height (DBH).

The vegetation treatments proposed use a variety of silvicultural techniques based on the existing and potential vegetation at each site. A group of silvicultural prescriptions have been developed that match the potential and existing characteristics of each site with the forest vegetation goals. These prescriptions take into account changes in the potential vegetation based on factors such as aspect, slope, available moisture and soil type. The prescriptions guide which trees are to be left and which trees are to be removed. The target density for trees left on each site is based on the individual site's ability to sustain healthy trees long term.

The silvicultural prescriptions are as follows:

Commercial Prescriptions

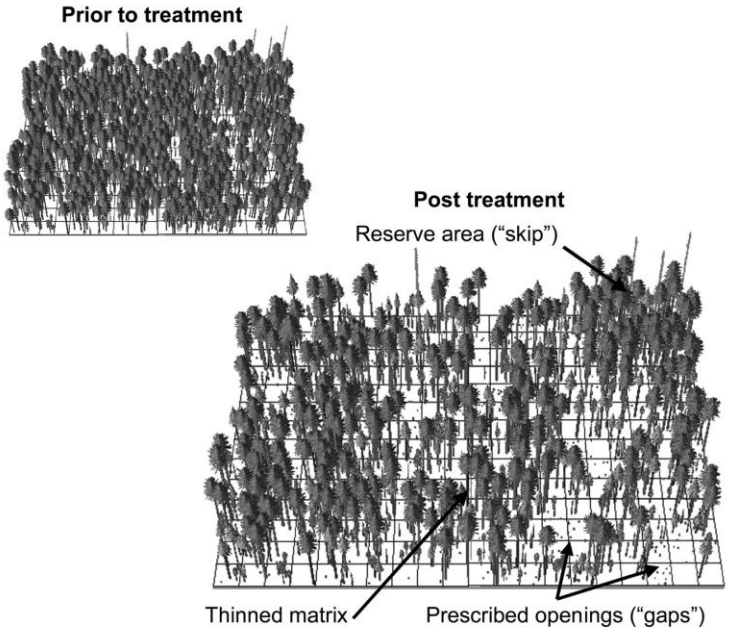
Variable Density Thinning:

The silvicultural prescriptions for this project are designed to move the current condition of crowded, uniform forest stands to site conditions that are more open and spatially heterogeneous (clumpy) in nature. The silvicultural strategies that will be applied to achieve the desired dry forest restoration goals include the use of variable-density management. This uneven-aged management approach encourages the creation of spatial heterogeneity and structural mosaics characteristic of historic dry forest stands. This prescription is used to accomplish dry forest restoration goals in stands greater than 80 years old that have reached a mid seral condition. Variable-density thinning is designed to move the current condition of crowded and/or uniform forest stands to site conditions that are more open and spatially heterogeneous (clumpy) in nature. Stands would be thinned to an acceptable density level based on site conditions or plant community. Stand level features that are desired include a diversity of age class and species within the forest canopy. Variable-density thinning (VDT) for this project will

[9] There must be some allowance for errors in age estimation (Franklin and Johnson, 2012).

combine thinning with gaps (small openings) and skips (untreated patches) to replicate historical patterns commonly found in mixed species and mixed-age stands. The thinned matrix (or the area between skips and gaps) will be thinned proportionally or from below (Figure 2-1).

Figure 2-1. Graphic of a stand before and after thinning with skips and gaps.



Elements of the Variable Density Thinning prescription call for (see Appendix A for general marking guide):

- Retaining the older trees (conifer and hardwood) and improving their survival potential by eliminating nearby competing vegetation and ground/ladder fuels.
- Retaining other key structural/compositional elements in the stand.
- Leaving areas in the stand untreated ("skips") to provide:
  - ✓ diversity in structural conditions (e.g. heavily shaded areas);
  - ✓ desirable snag and down wood features;
  - ✓ hiding cover and break up visuals (e.g., for wildlife); and
  - ✓ Protection of sensitive areas (e.g., seeps, rock outcrops, special status species sites)
- Thinning the remainder of the stand (after old tree protection and skips) to:
  - ✓ Favor more drought-and fire-tolerant tree species;
  - ✓ Protect hardwood species with high wildlife value (many require removal of some dominant/co-dominant conifers);
  - ✓ Increase the average diameter of the residual stand; and
  - ✓ Reduce overall stocking levels to a target basal area or density.
- Creating some small openings for shade intolerant tree regeneration (e.g. pines) and plant if seed sources are limited or absent.
- Treating activity fuels, such as by broadcast burning or pile-and-burn.
- Enhancing heterogeneity and avoid creating homogeneity within a stand.

Variable Density Thinning (VDT)/Douglas-fir Series:

Dry Douglas-fir stands are typically found on west, southwest, east, and southeast aspects in Douglas-fir plant associations. Douglas-fir is the predominant conifer species and ponderosa pine is often present in these stands. On dry ridges and westerly aspects in the Douglas-fir plant association, especially where manzanita is found, trees would be thinned to retain no more than 80 ft^2 basal area per acre. Treatment of activity fuels following completion of thinning activity is an essential component of this prescription. Specifically, the VDT prescription on dry Douglas-fir sites aims to achieve the following goals:

- Leave 60-120 ft^2 basal area per acre at the stand level. Low basal areas (e.g., 60-80 ft^2) are acceptable in the "driest" Douglas-fir plant associations where the goal is to restore a pine and oak component within the stand.
- Protect large or exceptional (e.g cavity-bearing) hardwoods. (See Appendix A)
- Generally leave all codominant and dominant pine, cedar, and oak; suppressed individuals can be cut.
- Leave **skips** (+/-15 percent of the treatment area) to provide dense/shaded forest patches as habitat, hiding cover, and visual barriers; and ecologically significant patches, such as seeps, rock outcrops, and hardwood groves.
- Provide **gaps** (+/-15 percent of the treatment area) to create some larger (0.5 to 2 acres) open areas to the extent of about one acre opening every six or seven acres (or approximately +/-15 percent of the treatment area) for establishing pine regeneration and other understory components. Complete removal of overstory is not encouraged; i.e., generally leave some scattered trees remaining. Low density planting of fire resilient or drought tolerant species may be utilized in such gaps, where seed sources are limited or absent. The objective is to maintain a multi-aged and multi-species mix of drought tolerant and fire resilient species in dry forest stands. If no pines or cedars are available for retention, planting would increase species and structural diversity. Following initial treatment (variable-density thinning) units would be assessed for planting needs based on the available planting space and lack of species diversity in the stand. Tree planting spacing would be clumped and random, rather than evenly spaced. Seedlings would be planted no more than 100 trees per acre and planting sites would be dictated by microsite conditions.

Density Management /Intermediate Treatment:

This prescription is used to accomplish dry forest restoration goals in young to mid seral stands (40-80 years old) with high stem densities that are experiencing intense competition from conifer and hardwoods. These stands are heterogeneous in stand structure, while others are less patchy with high densities in the mid and lower tree layers. Treatment consists of cutting trees and shrubs (generally less than 20 inches diameter for conifer and less than 6 inches diameter for hardwoods) with chainsaws and disposing of excess material by burning or biomass removal. In rare cases Pacific madrone up to 12 inch DBH may be cut under drip lines of ponderosa pine, sugar pine, white oak, and black oak greater than 16 inch DBH. Density management of these stands would remove fuel accumulations in patches while thinning lower and middle tree layers to accelerate development of a mature multi-layered stand structure. Treatment of activity fuels following completion of thinning activity is an essential component of this prescription.

- Leave 60-100 ft^2 basal area per acre at the stand level. Low basal areas (e.g., 60-80 ft^2) are acceptable in the "driest" Douglas-fir plant associations where the goal is to restore a pine and oak component within the stand.
- Protect large or exceptional (e.g cavity-bearing) hardwoods. (See Appendix A)
- Generally leave all codominant and dominant pine, cedar, and oak; suppressed individuals can be cut.
- Leave **skips** (+/-15 percent of the treatment area) to provide dense/shaded forest patches as habitat, hiding cover, and visual barriers; and ecologically significant patches, such as seeps, rock outcrops, and hardwood groves. **Gaps** will not be prescribed for these stand types or units.

Riparian Reserve Thinning

This prescription is used to implement management within specified Riparian Reserves consistent with Aquatic Conservation Strategy (ACS) objectives, while meeting site specific restoration objectives for dry forest stands. Treatments would be limited to non-perennial streams and based on site specific stand/vegetation conditions. Treatments would be designed to maintain or improve aquatic systems, achieving consistency with short and long term ACS objectives. Vegetation treatments would be limited to thinning in young to mid seral stands to reduce stand density and acquire desired vegetation characteristics. These vegetation treatments will increase species diversity and tree vigor within dry Douglas-fir stands that exhibit uncharacteristic stand structure and species composition. Treatment consists of cutting small diameter conifers (generally less than 14 inches), non-riparian hardwoods, and shrubs. Stands would be thinned to a canopy cover range of 50-60 percent. This will remove fuel accumulations in patches while thinning lower and middle tree layers to accelerate development of a mature multi-layered stand structure. Vegetation would be treated in designated Riparian Reserves outside of a no treatment buffer (50 ft.). Designated no treatment buffers would be maintained to provide for additional SKIPS, thus filtering runoff, protecting habitat for riparian-dependent species, and maintaining large wood for distribution to downstream fish-bearing waters. GAPS will not be prescribed in Riparian Reserves. Riparian Reserve widths would conform to the interim widths prescribed in the Northwest Forest Plan (pg. C-30). Riparian Reserve thinning will occur between the no treatment buffer (50 ft. slope distance) from a non-perennial channel and a site potential tree height distance (155 ft. slope distance) from a non-perennial channel. Riparian Reserve thinning will occur within specified commercial treatment areas and be treated according to Riparian Reserve Thinning guidelines only (refer to Appendix A).

Non-Commercial Prescriptions

Understory Reduction - Non-commercial Removal within Commercial Stands:

Non-commercial understory vegetation reduction would occur in some stands that also receive commercial variable-density thinning. These areas would be treated using manual techniques (cutting with saws) to achieve desired tree densities. The objective is to maintain a multi-layered mix of conifer, hardwood and shrub species appropriate to the plant series. Conifer, hardwood, and shrub spacing widths and retention will vary depending on site conditions and plant community.

Understory vegetation density would be reduced by cutting and spacing Douglas-fir less than 8 inches DBH, Pacific madrone less than 6 inches DBH, and canyon-live oak less than 4 inches DBH. Spacing widths may vary from 15 to 25 feet for Douglas-fir and 25 to 35 feet for Pacific madrone and canyon-live oak. Within this range, the wider spacing would be used for species such as pine or oak, which thrive in open, sunny conditions. These species will be spaced off trees greater than or equal to 8 inches DBH and within the dripline of ponderosa pine and sugar pine greater than or equal to 8 inches DBH. The spacing of conifers will be independently spaced from hardwoods.

Vegetation diversity would be obtained by maintaining species occurring at low frequencies in the stand (i.e. incense cedar, sugar pine, white oak, black oak). All shrub species other than whiteleaf manzanita, buckbrush and deerbrush ceanothus will be reserved from cutting. All conifer and hardwood species other than Douglas-fir, Pacific madrone, and canyon-live oak are reserved from cutting. If competition to pine trees exists, black oak less than 6 inches DBH and unhealthy pine less than 8 inches DBH will be cut. Black oak will generally not be cut unless competing at high stem densities with other black oak. In some stands all hardwoods will be reserved. Refer to the density management prescription below for the required reserve (no cut) vegetation for understory reduction. The slash created from the understory reduction treatment, including harvest activity slash, would be hand-piled and burned (HP/B) or underburned (UB). In some cases, material would be removed from the unit and yarded to the road and used as woody biomass. Activity slash will be treated within 12-18 months of creation.

Density Management (Plantation and Non-Plantation):

Density management is used to accomplish forest health thinning and fuels reduction treatments in conifer forests, hardwood woodlands, and shrublands. Density management consists of cutting small trees (generally less than 8 inches diameter) and vegetation with chainsaws and disposing of the material by hand-piling and burning or use of a lop and scatter method in lighter fuels. Density management increases tree growth rates and promotes horizontal and vertical structural diversity in stands and capitalizes on existing stand diversity to promote further stand diversity over time. Density management is also used in stands where pines and shade-intolerant hardwood species are diminishing in vigor and numbers because of overcrowded stand density conditions.

Conifer, hardwood, and shrub spacing widths will vary depending on site conditions and plant community. Spacing widths may vary from 15 to 25 feet for conifers and 25 to 45 feet for hardwoods and shrubs. Within this range, the wider spacing would be used for larger leave trees or for species such as pine or oak which thrive in less dense conditions. Hardwoods greater than or equal to 6 inches DBH and conifers greater than or equal to 8 inches DBH are reserve vegetation and shall not be cut. These trees shall be included in spacing requirements. A minimum of one-quarter to one-half acre "skips" or no-treatment areas (15 percent +/- at the stand level) would be untreated to further facilitate diversity. Plant buffers, hardwood areas, rock outcrops, wet areas, and areas with large woodrat nests would contribute to or serve as these leave areas. Pre-existing small openings experiencing encroachment would be targeted first to restore open patches.

Thinning treatment should maintain species composition similar to the potential vegetation or dominant plant association for the site. Retained stems per acre will vary widely, ranging from 70-200 trees per acre. When considering a group of conifer trees for thinning, select leave trees by the following order of species preference: sugar pine, ponderosa pine, incense cedar, Douglas-fir, and white fir. When considering a group of hardwood trees for thinning, select leave trees by the following order of species preference: black oak, canyon live oak, and Pacific madrone. Depending on plant community one or more species may be reserved from cutting (see below). Vegetation reserved from cutting will always be maple species, dogwood, pacific yew, silk tassel, hazel, willow, and ocean spray, regardless of spacing (i.e., not included in spacing or considered leave trees). All white oak, mountain mahogany and manzanita greater than 12 inches single stem at one foot above ground would be left. Any species of conifer, hardwood or shrubs considered as rare (less than 5 percent coverage) within the entire unit shall be left. The slash created from the density management treatment would be hand piled and burned or if markets exist removed and used as woody biomass fuel. In dry forest stands (conifer dominated) tree planting of drought tolerant and fire resilient species would be planned if planting space is available and lack of species diversity is observed following treatment. Tree planting spacing would be clumped and random, rather than evenly spaced. Seedlings would be planted no more than 100 trees per acre and planting sites would be dictated by microsite conditions

Douglas-fir Series

Target Plant Association:

Douglas-fir – Ponderosa Pine/Poison Oak

Douglas-fir – Canyon Live Oak/Dwarf Oregongrape

Douglas-fir – Canyon Live Oak/Poison Oak

Douglas-fir – Incense-Cedar/Piper's Oregongrape

Douglas-fir – Creambush Ocean-Spray/Whipplevine-Sword-fern

Goals:

1. Reduce fuels and fire hazard adjacent to conifer stands.
2. Promote a mix of more mature hardwoods and conifers (black oaks and ponderosa pine).

3. Maintain historic hardwood and conifer species

Prescription Description and Objectives:

Non-commercial - Douglas-fir (Non-Plantations):

Heterogeneous Douglas-fir stands greater than 40 years old (pole 5-11 inches DBH through mid seral size 11-21 inches DBH) experiencing intense competition from conifer and hardwoods need to be managed to reduce stand densities, promote species diversity, and maintain vigorous crowns. Densities in these stands are heterogeneous in stand structure, while others are less patchy with high densities in the mid and lower tree layers. Density management of these stands would remove fuel accumulations in patches while thinning lower and middle tree layers to accelerate development of a mature multi-layered stand structure. Thinning would benefit species of shade intolerance and provide adequate growing space for large hardwoods and conifers alike. Non-commercial sized vegetation (generally less than 8 inches diameter) would be cut to accelerate growth, promote stand differentiation, and maintain the hardwood component for future stand diversity. Spacing widths may vary from 15 to 25 feet for conifers and 25 to 45 feet for hardwoods and shrubs. The largest and healthiest best formed trees shall be selected as leave trees. Acceptable leave tree standards apply (i.e. greater than 3 feet tall, no broken tops, 30 percent crown or more). The spacing of conifer trees is independent of hardwood trees. Sprout clumps would be thinned to the largest stem and spaced within the 25-45 feet range. Select trees for leave with good form and vigor (non-chlorotic) that are free of disease and fire damaged. When acceptable leave trees are not available, shrub clumps at least one foot high and 3 to 10 feet in crown diameter shall be selected as leave vegetation.

Non-commercial - Douglas-fir (Plantations):

Homogeneous Douglas-fir stands 15-40 years old that are sapling through pole size (0-11 inches DBH) are experiencing intense competition from shrubs and hardwoods and need to be managed to reduce stand densities, promote species diversity, and maintain vigorous crowns. Densities in these younger seral stands are highly homogenous in stand structure, while others are more patchy with high densities in the mid and lower tree layers. Density management of these stands would retain the most vigorous large trees in patches while thinning lower and middle tree layers to accelerate development of a multi-layered structure.

Thinning activity would speed the natural processes of stand development toward an uneven-age and would benefit species of shade intolerance. Vegetation would be cut to accelerate growth, promote stand differentiation, and maintain the hardwood component for future stand diversity. Thinning and brushing would release residual conifers and hardwoods. Spacing widths may vary from 18 to 20 feet for conifers and 30 to 40 feet for hardwoods and shrubs. Leave trees shall be selected based upon tree species preference and quality. When considering a group of trees for thinning, species preference and individual tree quality has precedence over tree DBH or height. For example, a healthy 4 foot tall sugar pine should be left instead of an 8 foot tall Douglas-fir tree. Spacing is to be independent of trees greater than 8 inches DBH (e.g. acceptable to have a four inch DBH tree next to 15 inch DBH tree). Acceptable leave tree standards apply (i.e. greater than three feet tall, no broken tops, 30 percent crown or more). The spacing of leave trees less than 8 inches DBH is independent of hardwood and conifer trees greater than or equal to 8 inches DBH. Retained stems per acre will vary widely, ranging from 100-150 trees per acre. Hardwood stems not selected as leave trees and all surplus trees up to 8 inches DBH would be cut. Sprout clumps or shrub-form hardwoods would be thinned to the largest stem and spaced within the 30-40 feet range. The straightest stems with the largest diameter at two feet above ground level and the best formed crowns with origins closest to the base of the stump would be selected for leave within sprout clumps.

Ponderosa Pine Series

Target Plant Association:

Ponderosa Pine – Black Oak

Ponderosa Pine – Douglas-fir

Goals:

1. Reduce fuels and hence fire hazard adjacent to conifer stands.
2. Promote a mix of more mature hardwoods and conifers (black oaks and ponderosa pine).
3. Maintain Historic Hardwood and Conifer Species

Prescription Description and Objectives:

Non-Commercial – Ponderosa Pine (Plantations and Non-Plantations):

These units now have a mix of conifers, hardwoods, (Pacific madrone and black oak) and shrub species such as deerbrush, ceanothus, buckbrush and manzanita. High densities are evident and due to post fire sprouting. This prescription is intended to reduce fuel hazard and promote growth of hardwoods and conifers by thinning hardwood stems in clumps and singly and by thinning the conifers where found. Shrub species will be reduced primarily when competing with tree species and/or pose as a ladder fuel hazard. Conifers less than 8 inches DBH will be spaced 20-25 feet in overly dense patches of natural regeneration. Pacific madrone less than six inches DBH and canyon live oak less than 4 inches DBH and non-reserve shrub species should be spaced 25-45 feet apart. Slash multiple stem hardwoods less than 6 inches DBH, leaving one or two of the healthiest stems per clump. Black Oak will generally not be cut unless competing with itself at high densities. Trees selected for removal will usually be small and suppressed. Leave trees shall include primarily singles, however, clumps and groups shall also be considered as leave trees for spacing. Thin clumps to the most vigorous one or two stems. Spacing of conifer leave trees will be variable depending on size. Favor pine and oaks to leave in spacing selection. Pacific madrone will be retained when oak and pine are not present.

White Oak Series

Target Plant Association:

White Oak – Hedgehog Dogtail Grass

White Oak – Douglas-fir/Poison Oak

Goals:

1. Reduce fuels and fire hazard adjacent to private residences.
2. Promote a species mix that includes ponderosa pine, white oak, and native grasses.
3. Restore woodland/shrubland communities to sustainable density levels.
4. Create more open mosaic of historic vegetation.
5. Remove decadent shrubs and use prescribed fire, where appropriate, to stimulate re-growth and new sprouting of a mixture of shrub species to provide improved wildlife forage.
6. Improve native plant communities in the herb/forb/grass layer.

Prescription Description and Objectives:

Non-Commercial – White Oak:

This prescription is aimed at reducing fire-hazard within the full range of woodlands with oak and other hardwood components. Depending on initial conditions, the resultant stands may show a large reduction in shrubs and small trees. Underburning will be required for maintaining these sites in a low-fuel condition. Plant communities typically consist of open grown ponderosa pine and white oak with dominant ground cover of buck brush, the full range of woodlands with oak and other hardwood components. A mosaic of white oaks, deerbrush, buckbrush, and manzanita are found.

Due to fire suppression and stand dynamics, Douglas-fir has encroached in these communities and growth is seriously affected by moisture/competition stress. Slash all Douglas-fir trees less than 7 inches DBH. Encourage pine and oak longevity by thinning around these species. Pacific madrone less than 6 inches DBH and canyon live oak less than 4 inches DBH and non-reserve shrub species should be spaced 25-45 feet apart. Hardwoods shall be favored over shrub species to encourage grasses and forbs. Black Oak will not be cut unless competing with itself at high densities. Trees selected for removal will be small and suppressed. Leave trees shall include primarily singles, however, clumps and groups shall also be considered as leave trees. Absolutely no removal of white oak, mountain mahogany and manzanita greater than 12 inches single stem at one foot above ground will take place. Conifer, hardwood and shrub snags less than 6 inches DBH shall be felled. In areas where white oak or other reserve vegetation does not exist, leave clumps of shrubs with a 15 to 25 foot diameter spaced 45 feet apart. Suppressed or low vigor ponderosa pines can be cut. Leave chaparral shall include primarily single shrubs; however, clumps and groups shall also be considered as leave shrubs. Leave chaparral shall be left as 15 to 25 foot diameter singles or groups spaced 45 feet apart. Leave no large clumps within 50 feet of private property line.

Northern Spotted Owl Treat and Maintain Habitat Units (Commercial and Non-Commercial)

Treat and maintain NRF or Dispersal Habitat is the treatment defined when an action or activity in NRF or dispersal habitat removes some trees, but does not change the conditions that would classify the stand as NRF or dispersal post-treatment, as defined by Thomas et al. (1990). The NRF stand will retain at least 60 percent canopy cover, large trees, multistoried canopy, standing and down dead wood, diverse understory adequate to support prey. Stands with a QMD of > 16 " DBH will maintain a basal area between 180-240 ft2/ acre in NRF (McKelvey 1) and between 150-240 ft2/acre in Foraging (McKelvey 2). The reduction of basal area will not be more than 20 percent and will depend on site specific information to ensure NRF, foraging, and dispersal stands will still function post treatment. NRF treat and maintain units with a QMD <16" DBH will maintain 60% canopy cover and other structural components necessary to retain functional condition at current NSO habitat classification (NRF will continue to function as NRF). Dispersal habitat will retain at least 40 percent canopy, flying space, and trees 11 inches diameter at breast height (dbh) or greater, on average. The habitat classification of the stand following treatment will be the same as the pretreatment habitat classification.

2. Commercial Harvest Methods:

Trees designated for removal as a result of application of the forest stand prescriptions described above would be moved from forest stands to landing areas using a combination of cable and tractor yarding methods.

Cable (skyline) Yarding*:* This harvest method drags trees with one end suspended, and one end on the ground, up the slope to a landing area on or near a road. This requires narrow skyline corridors about every 150 to 200 feet, and parallel to each other, through the treatment unit to operate the skyline cable. Corridors are about 9 to 15 feet wide, depending on the size of trees to be removed and the terrain, and are pre-located and approved by the BLM. Trees removed are end-lined (dragged) to the corridor.

Tractor Yarding: utilizes tractors to drag trees to landing locations. Tractor yarding only occurs on lands with less than 35 percent slopes. This method requires narrow skid trails (about 9 to 12 feet wide). Skid trail locations are approximately 150 feet apart, but vary depending on the site-specific terrain, and are pre-located and approved by the BLM Contract Administrator. Pre-located skid trails minimize the area of ground a tractor operates on, thus, minimizing soil disturbance.

Tractor Swing Route*:* refers to a logging system in which harvested logs are moved from one landing to another. Under both action alternatives, logs would be harvested using a skyline system from a yarding position determined to be optimal. From the optimal yarding position, logs would then be moved via a skid trail to a roadside landing using ground-based equipment.

Helicopter Yarding: lifts trees bunched together by a cable, moving the trees from the treatment unit to a landing area near a road. Helicopter yarding allows for full suspension of the trees from the treatment unit

to the landing area and does not create skid trails or corridors. Trees posing safety hazards would be removed when operationally required.

3. Post-Harvest Fuels Reduction Treatments

Small diameter slash (generally 3 inches diameter and less) created from commercial forest thinning (activity slash) would be cut, handpiled, and covered with plastic following completion of timber harvest operations; slash piling usually occurs within one month to six weeks of harvesting. Pile burning is usually completed within 6 months to one year of timber harvesting depending on the time of year the harvest occurred; slash needs a period of time to cure before burning can take place. Some material could be made available for firewood, pulp or woody biomass depending on market conditions and demand.

Follow-up maintenance underburning may take place within 5 years following initial treatments. Underburning involves the controlled application of fire to understory vegetation and downed woody material when fuel moisture, soil moisture, and weather and atmospheric conditions allow for the fire to be confined to a predetermined area at a prescribed intensity to achieve the planned resource objectives. Prescribed underburning usually occurs during late winter to spring when soil and duff moisture conditions are sufficient to retain the required amounts of duff, large woody material, and to reduce soil heating. Occasionally, these conditions can be met during the fall season.

Each of the foregoing fuels reduction treatments may be used as stand-alone treatments or in combination. Post-harvest evaluations would determine the extent and method of treatments needed (hand pile and burning, and/or underburning).

4. Project Design Features

Project Design Features (PDFs) are an integral part of the Action Alternatives (Alternatives 2 & 3). They are developed to avoid or reduce the potential for adverse impacts to resources. Most PDFs reflect Best Management Practices and standard operating procedures.

The PDFs with an asterisk (*) are Best Management Practices (BMPs) to reduce nonpoint source pollution to the maximum extent practicable. Best Management Practices (BMPs) are required by the Federal Clean Water Act (as amended by the Water Quality Act of 1987) to reduce nonpoint source pollution to the maximum extent practicable. BMPs are considered the primary mechanisms to achieve Oregon water quality standards. Implementation of PDFs in addition to establishment of Riparian Reserves would equal or exceed Oregon State Forest Practice Rules. A review of forest management impacts on water quality concluded that the use of BMPs in forest operations was generally effective in avoiding significant water quality problems; however, the report noted that proper implementation of BMPs was essential to minimizing non-point source pollution (Kattelmann 1996). BMPs would be monitored and, where necessary, modified to ensure compliance with Oregon Water Quality Standards. The PDFs listed below apply to the both action alternatives, Alternative 2 and 3. The alpha-numeric designator in parenthesis following some PDFs indicates the timber sale contract stipulation designator used to implement that particular PDF. Some PDFs related to road work are referenced to either Appendix C or D of the timber sale contract, which is the section of the contract detailing road work. Non-commercial density management is implemented through service or stewardship contracting and some road decommissioning would be implemented through a contract other than the timber sale. These project design features would be carried forward into contract stipulations in a similar way.

Riparian Reserves

Northwest Forest Plan (NWFP) Riparian Reserves, as incorporated by the Medford District RMP, are located on federal lands throughout the planning area. A BLM stream survey crew conducted surveys within the Pilot Thompson project area in order to ensure that all areas needing Riparian Reserve protection were identified. The survey crew assessed stream conditions, documented the location of wetland and unstable areas, and

determined whether stream channels were perennial, intermittent, or dry draws (USDA and USDI 1994:C30-C31). Stream maps were updated with the new information.

Site specific widths for each Riparian Reserve have been mapped in GIS and would be implemented under the action alternatives. Riparian Reserve widths were established based on a site potential tree height of 155 feet for the Middle Applegate Watershed. Therefore, Riparian Reserves for the Pilot Thompson project area are as follows:

(1) Fish-bearing streams: 310 feet slope distance on each side of the stream.

(2) Perennial nonfish-bearing streams: 155 feet slope distance on each side of the stream.

(3) Intermittent nonfish-bearing streams: 155 feet slope distance on each side of the stream. Intermittent streams have a defined channel, annual scour and deposition, and are further described as short duration or long duration:

   a. ***Short Duration Intermittent***: A stream that flows only during storm or heavy precipitation events. These streams can also be described as ephemeral streams.

   b. ***Long-duration intermittent stream***: A stream that flows seasonally, usually drying up during the summer.

(4) Unstable and potentially unstable ground: the extent of the unstable and potentially unstable ground.

(5) Springs, seeps and other non-stream wetlands less than one acre in size, the wetland and the area from the edges of the wetland to the outer edges of the riparian vegetation. For this project, a buffer of 100 feet is being implemented to meet this requirement.

(6) Constructed ponds and reservoirs, wetlands greater than one acre in size – Riparian Reserves consist of the body of water or wetland and: the area to the outer edges of the riparian vegetation, or the extent of the seasonally saturated soil, or the extent of unstable or potentially unstable areas, or to 155 feet slope distance from the edge of the wetland greater than 1 acre or the maximum pool elevation of constructed ponds and reservoirs, whichever is the greatest. For this project, a buffer of 155 feet, the height of one site potential tree, is being implemented to meet this requirement.

Harvest and Yarding

Objective 1: Protect Off-site Soil Erosion and Soil Productivity Loss

- When operationally feasible, all units would be yarded in such a way that the coarse woody debris remaining after logging would be maintained at or greater than current levels in order to protect the surface soil and maintain productivity (L-7MC).*
- Wherever trees are cut to be removed, directional felling away from Riparian Reserves, dry draws and irrigation ditches would be practiced. Maximum operational suspension would be practiced to alleviate gouging and other disturbance on draw side slopes and headwalls. Trees would be felled to the lead in relation to the skid trails (L-26). *
- All skid trail locations would be approved by BLM. Maximum area per unit in skid trails would be 12 percent. Existing skid trails would be utilized when possible. Tractors would be equipped with integral arches to obtain one end log suspension during log skidding. Skid trail locations would avoid ground with slopes over 35 percent and areas with high water tables. The intent is to minimize areas affected by tractors and other mechanical equipment (disturbance, particle displacement, deflection, and compaction) and thus minimize soil productivity loss. * (L-7MC)
- Skid trails would be water barred according to BLM standards. Main tractor skid trails would be blocked with an approved barricade and camouflaged with slash and other debris where they intersect

haul roads. The intent is to minimize erosion and routing of overland flow to streams by decreasing disturbance (e.g. unauthorized use by OHVs) (E-1).*

- Tractor yarding would occur between May 15 to October 15 or on approval by the Authorized Officer. Some variations in these dates (early or later) would be permitted dependent upon weather and soil moisture conditions (less than 30 percent moisture at 3 inches depth). The intent is to minimize off-site erosion and sedimentation to local waterways. The authorized officer can approve operations outside of the above dates based on input from BLM's staff watershed specialist's (hydrologist, fisheries biologist, or soil scientist)* (L-18).
- For all cable yarding, maximum operational suspension would be maintained on slopes greater than 50 percent. Minimum corridor widths *(*generally less than 15 feet in width) would be utilized to assure silvicultural prescriptions and objectives are met. Corridors will be preapproved by the BLM; consider not using pre-existing corridors where impacts to established oak and pine species would occur (L-7MC).
- Skyline and tractor yarding would be avoided up and down dry draws (L-7MC). The intent is to minimize the occurrence of erosion and compaction in existing areas of concentrated surface or substrate flow.
- All cable yarding corridors located in units 20-1, 29-1, and 30-2 within Ferris Gulch would have slash and other debris scattered along their length sufficient to preclude OHV use, specifically motorcycles. This may include falling trees less than 8 inches in diameter across such features.
- Dust abatement required by timber sale contracts would use water or lignin (E-1).
- On tractor swing trails, where determined necessary, any berms or ruts would be leveled to match the existing topography and slash and other debris scattered to discourage use and protect the surface from erosion (E-1).

Objective 2: Protect Riparian Reserves

- Minimize yarding corridors within Riparian Reserves. Full suspension of logs is required across all stream channels (L-7MC).
- No harvest would be allowed within Riparian Reserves of perennial channels (AR-1). Where harvest occurs adjacent to other types of streams, no trees would be cut within 50 feet of either side of the channel (L-7MC).
- No ground based equipment would be permitted off of roads within Riparian Reserves (L-9). An exception is a designated skid trail in unit 25-3 that would cross a short duration intermittent stream and is necessary to treat the western portion of this unit. Prior to harvest, bump logs would be placed in the channel to minimize disturbance. Following harvest any berms or ruts would be leveled to match the existing topography and slash and other debris scattered so that 80 percent ground cover is achieved. The bump logs would be removed and any loose soil removed from within the channel. Straw bales would be positioned downstream of the skid trail in unit 25-3 to arrest downstream sediment movement. These straw bales would be placed in channel prior to skid road construction and throughout harvest activities (L-7MC and/or E-1).
- Trees would be directionally felled away from the stream channel and end-lined from outside the Riparian Reserve (L-26 and/or L-7MC). Where excess ground disturbance has been identified as a potential source of sediment, slash and other approved material would be scattered to maintain a minimum of 80 percent ground cover (E-1).
- Logging slash would be piled outside the 50 feet no treatment buffer within Riparian Reserve Thinning units (L-9).

Non-Commercial Treatments (Uplands Only)

Objective 1: Protect Off-site Soil Erosion and Soil Productivity Loss

- Vegetation would be thinned using manual techniques of cutting material by hand crews with chainsaws. Slash created by the project would be hand piled and burned if cut by hand crews. No piling in dry draws would be allowed.
- Old skid trails would not be opened or driven on without the approval of the authorized officer. When this is permitted, slash and other material would be scattered along the segment where use occurred to camouflage the feature and preclude use by OHVs.
- Old skid trails would not be treated near the intersections with system roads in order to provide a visual screen and discourage vehicular access.

Non-commercial Treatments (Riparian Reserves)

Objective 1: Protect Function and Character of Riparian Reserves

- Manual vegetation treatments would not occur in the following portion of Riparian Reserves: within 50 feet of fish-bearing and perennial streams; within 50 feet from the edge of springs, seeps, and wetlands; within Riparian Reserves for unstable and potentially unstable areas; and within 30 feet of long-duration intermittent streams (Table 2-12). *
- Riparian hardwood species such as willow, ash, maple, alder, and black oak would not be thinned.
- Down large woody debris over 16 inches diameter would not be damaged, driven over, or used for fire wood.

Table 2-12. Riparian Reserve Buffer Distances – Non-Commercial Treatment Areas

	Manual treatments	Pile burning
Fish-bearing	50' buffer	50' buffer
Perennial	50' buffer	50' buffer
Long-duration intermittent	30' buffer	30' buffer
Short-duration intermittent	Where necessary (treating through is OK, as prescribed)	No piles in the channel or draw bottoms
Springs/seeps/wetlands	50' buffer	50' buffer
Unstable areas	Not allowed in RR	50' buffer

- The non-commercial units proposed in section 19 (T39S R4W), on the west side of Ninemile Creek, would be accessed by foot or by a temporary bridge only. Motorized vehicles would not be allowed to use the low-water ford on the 39-4-19.2 road as part of this project.

Objective 2: Protect Off-site Soil Erosion and Soil Productivity Loss

- Thinned material may be lopped and scattered in specific areas where pile burning is not desirable. This would occur if material is near stream channels or other wet or potentially wet areas.
- Crossing channels with vehicles or equipment, including ATVs and pickups, would be limited to existing system roads shown on EA maps. *
- Piles would not be placed in channel bottoms.

Prescribed Fire

Objective 1: Protect Riparian Reserves

- With underburns, no ignition would occur within Riparian Reserves.
- No pile burning would occur in the bottom of dry draws.

Objective 2: Reduce Soil Erosion and Soil Productivity Loss

- Underburns would be conducted only when a light to moderate burn can be achieved (spring-like conditions when soil and duff are moist), with the objective of maintaining on-site course woody material.
- Firelines for underburns would be constructed manually.
- Water bars and firelines would be constructed according to District guidelines (USDI 1995, p. 167).
- Piles would be dispersed across treatment areas (SD-1c).
- Piles would be burned when soil and duff moisture are high.
- No mechanical piling allowed off of roads or landing areas (SD-1c and SD-1e).
- Any containment lines constructed for fuels projects shall be sufficiently blocked along their entire length to preclude use by OHVs. This would include such measures as placing logs and slash, falling trees less than 8 inches DBH (excluding riparian reserves) or other actions as necessary.

Objective 3: Prevent Chemical Water Pollution

- Foam retardant would not be used in Riparian Reserves.*

Roads and Landings

Objective 1: Protect Riparian Reserves

- No construction of new landings or expansion of old landings would be allowed in Riparian Reserves (L-11). *
- Landings within Riparian Reserves used during project implementation would be treated to reduce soil erosion. Treatment of the running surface would be dependent on site conditions and would include subsoiling to lift and fracture the compacted surface in place to a depth of 18 inches. Mulching and seeding with native grasses or other approved material would be required. Where feasible, the landings shall then be blocked sufficiently to preclude vehicles (L-11 and E-1).

Objective 2: Prevent Off-site Soil Erosion

- All road and landing construction and renovation would not occur during the winter months (October 15 to May 15) when the potential for soil erosion and water quality degradation exists. An extension (earlier or later) of these dates may be considered under dry conditions and a specific erosion control plan is prepared and accepted (e.g. rocking, water barring, seeding, mulching, barricading). All construction activities would be stopped during a rain event of 0.2 inches or more within a 24-hour period or if determined by the administrative officer that resource damage would occur if construction is not halted. If on-site information is inadequate, measurements from the nearest Remote Automated Weather Station would be used. Construction activities would not occur for at least 48 hours after rainfall has stopped and on approval by the Authorized Officer (L-18). *
- All landings would be treated to reduce soil erosion. Treatment of the surface would be dependent on site conditions and would include one or more of the following: subsoil, till, or rip, effectively block

access, disperse runoff or other drainage improvements, and seeding and mulching with native grasses or other species (E-1).

- Fill slopes of helicopter landings would be seeded with native grasses or other approved seed mixes and mulched, except where rock occurs (E-1).
- Following use, all newly constructed and renovated permanent roads would be effectively blocked to preclude use. Blockage would consist of placing logs, slash, boulders, berms, and other material both at the entrance so that it is camouflaged, and at sufficient intervals along the roads length (Exhibit C).
- Temporary roads used or constructed would be either fully decommissioned or obliterated at the completion of log haul and site preparation. Full decommissioning may include decompacting the surface to a depth of 12 inches and slash and other debris would be placed along the roads length to provide ground cover and discourage OHV use. Blockage at the entrance would consist of placing earthen berms, logs, slash, boulders, and other material so the entrance is camouflaged and vehicle use is precluded. Obliterated roads would be treated similar to full decommissioning; however, where fill occurs, recontouring and outsloping the travelway to disperse runoff would occur. Both methods would include the removal of all drainage structures. Treatments described may be modified by the authorized officer with consultation with appropriate earth scientists or aquatic specialists (Exhibit C).
- Newly constructed roads would be outsloped where possible (generally road grades that are less than 8 percent). (Exhibit C).
- For proposed road 39-4-6.01, material shall not be sidecast. Extra material not needed for the fill will be end-hauled to a stable location (Exhibit C).
- In order to reduce the amount of road-related soil disturbance, decommissioning would occur during the dry season (usually May 15 to October 15) (L-18 when associated with timber sale contract).
- Preservation of existing vegetation - Some road sections proposed for decommissioning have large amounts of naturally generated trees, brush and debris on them that is beneficial for long-term erosion control. This material would be preserved as much as possible but the priority would still be to convert all existing man-made drainage structures such as ditches, culverts and dips to a long-term no maintenance drainage configuration such as large dips, outsloping road surface, and well drained, high-capacity waterbars. Barricades, additional planting, seeding, and mulching would be done as needed to reduce erosion. Open areas would be ripped where feasible (Exhibit C when associated with timber sale contract).*
- Obliteration or fully decommissioning roads may include decompacting the surface, outsloping or recontouring the travelway, removing drainage structures, seeding and/or planting, mulching, placing logs, slash and other debris, and constructing water bars, barricades, and other drainage features (E-1 and Exhibit C when associated with timber sale contract).
- Areas of disturbed ground on all decommissioned roads within Riparian Reserves would be seeded with native or approved seed and mulched (E-1). No fertilizer would be spread within Riparian Reserves (Section 26).
- Excavated material from (removing) stream crossings would be removed to at least bankfull width. Stream side slopes would be reestablished to natural contour then seeded (with native or approved seed) and mulched (Exhibit C when associated with timber sale contract).
- Decommissioned roads would be water barred on each side of stream crossings in order to adequately filter road surface runoff and minimize sediment transport to streams (Exhibit C when associated with timber sale contract).
- OHV use on decommissioned roads would be discouraged by placement of debris or other appropriate barriers (Exhibit C when associated with timber sale contract).

- Current off road vehicle routes that occur in proposed units would be blocked, where applicable, after completion of the project to prevent further off road vehicle use. Blockage would consist of placing logs, slash and other material both at the entrance so that it is camouflaged, and at sufficient intervals along the routes length.
- Natural surface and rocked haul routes and related ditch lines that could deliver sediment into Southern Oregon/Northern California Coasts critical habitat would have sediment barriers (e.g., hay bales, silt fence, settling ponds) installed to prevent sediment from reaching these streams. Specifically these sediment barriers would be applied to BLM road # 39-5-25.2 (Exhibit C).
- Avoid blading and vegetation removal unless necessary to remove drainage impediments when maintaining inboard ditches. Control sediment by spreading straw in ditchlines, where ditchline blading is required within 100 feet of streams (Exhibit C).
- All ground disturbance due to road maintenance, renovation, or decommissioning within 200 feet of any stream shall be mulched with weed free straw or native materials. A minimum of 80 percent ground cover shall be maintained following such activities. Where the potential for surface erosion is high, consider seeding with native grass seed (E-1 and/or Exhibit C when associated with timber sale).

Objective 3: Protect Natural Discharge Patterns

- Where possible, rolling grades and out sloping would be used on road grades that are less than 8 percent (Exhibit C). These design features would be used to reduce concentration of flows and minimize accumulation of water from road drainage.

Objective 4: Protect Stream Banks and Stream Channel Integrity

- Stream crossings would be re-established to the natural stream gradient. This would be accomplished by removing the culvert and the road fill within the stream crossing areas (Exhibit C when associated with timber sale contract).

Hauling

Objective 1: Prevent Off-site Soil Erosion

- Hauling would be allowed on natural surfaced roads during the dry season (June 15 to October 15). This would protect the roads from damage and decrease the potential for off-site sediment movement. An extension of these dates may be permitted by the Authorized Officer with a conditional waiver dependent upon weather, soil moisture, and surface condition of the roads (L-18).
- Hauling would be allowed between May 15 and November 15 on roads surfaced with at least 6 inches of pit-run rock or 8 inches of crushed rock. An extension of these dates may be permitted by the Authorized Officer with a conditional waiver dependent upon weather, soil moisture, and surface condition of the roads (L-18).
- To protect Coho Critical Habitat, the following roads would not be eligible for conditional waivers: 39-5-25.2, 39-5-24 (non-BST), and 38-4-28.2. These roads would only be eligible for dry season haul (L-18a).
- Dust abatement would include water or lignin (E-1).

Quarries

Objective 1: Protect Riparian Reserves

- No quarry development or expansion would occur within Riparian Reserves.

Objective 2: Prevent Off-Site Soil Erosion

- Rock used to stabilize selected roads and landings and minimize erosion would be obtained from existing quarries or purchased.

Oil and Hazardous Materials Emergency Response

- During operations described in the Proposed Action, the operator would be required to have a BLM-approved spill plan or other applicable contingency plan. In the event of any release of oil or hazardous substance, as defined in Oregon Administrative Rules (OAR) 340-142-0005 (9)(d) and (15), into the soil, water, or air, the operator would immediately implement the site's plan. As part of the plan, the operator would be required to have spill containment kits present on the site during operations. The operator would be required to be in compliance with OAR 629-605-0130 of the Forest Practices Act, Compliance with the Rules and Regulations of the Department of Environmental Quality (E-1).
- Notification, removal, transport, and disposal of oil, hazardous substances, and hazardous wastes would be accomplished in accordance with OAR 340-142, Oil and Hazardous Materials Emergency Response Requirements, contained in Oregon Department of Environmental Quality regulations (E-1).

Silviculture

Objective 1: Protect Residual Leave Trees

- In forest stands with a pine component, logging slash should be handpiled outside of the driplines of individual pine trees and burned.
- Prescribed burns should be performed when moisture conditions are high enough and prescription windows are at a level so that no more than 50 percent of the mound depth/duff layer around pine trees is consumed during burning.
- No more than 25 percent of the pine tree live crown should be scorched for trees 8 inches DBH and larger.
- Implement prescribed underburning when soil and duff moisture and weather conditions allow for low intensity burning in order to minimize tree stress and adverse effects on tree roots and foliage.

Objective 2: Create growing sites and reduce competing vegetation for natural seedlings

- In forest stands with a pine component, treat logging slash and fuel loading to prepare suitable seedbeds for reproduction.

Objective 3: Protect unique features during stand treatment

- During timber harvest, hardwood trees reserved from harvest need to be carefully treated around to prevent damage to limbs, tops, and stems. Logging corridors should be placed to the extent feasible to avoid or minimize damage to trees reserved from harves of both conifer and hardwood species (IR-1 and L-7MC).
- Snags (standing dead trees) not considered a safety hazard shall be protected and remain standing (IR-6).
- Fuels treatment activities such as handpiling and burning are not allowed within "skips" (AR-1). Skips are designated areas or sites within a stand that should be avoided for treatment or management.

Terrestrial Wildlife

Objective 1: Protect Northern Spotted Owl Nest Reserves

- Limit actions that would manipulate habitat in designated 100-acre core areas for northern spotted owl sites designated as known sites on January 1, 1994 until a late-successional reserve assessment is completed (USDI 1995, p. 32-33).
- Seasonally restrict habitat modifying activities from March 1 to September 30 within 0.25 miles of known northern spotted owl sites. The seasonal restriction could be waived if the BLM determines the site is not occupied or owls are not nesting (Table 2-13) (L-18a and E-6).

Table 2-13. Commercial Units with Seasonal Restrictions for the Northern Spotted Owl (L-18a).

Unit	TRS	Restriction Dates
3-1	39S-4W-3	March 1 – September 30
3-5	39S-4W-3	March 1 – September 30
8-1	39S-4W-8	March 1 – September 30
31-1	38S-4W-31	March 1 – September 30
31-4	38S-4W-31	March 1 – September 30

Objective 2: Reduce Disturbance (noise and habitat) Impacts to Northern Spotted Owl

- Work activities that produce noise above ambient levels will **not** occur within specified distances (Table 2-14) of any nest site or activity center of known pairs and resident single between March 1 and June 30 (or until two weeks after the fledgling period) unless protocol surveys have determined the activity center is not occupied, the NSO pair is not nesting or failed in their nesting attempt. The wildlife biologist has the authority to extend the seasonal restriction beyond June 30 if surveys indicate the NSO young have not developed sufficient mobility by June 30 (L-18a).

Table 2-14. Noise Disturbance Distance Buffers for the Northern Spotted Owl

Type of Activity	Zone of Restricted Operation
Blast of more than 2 pounds of explosive	1 mile
Blast of 2 pounds or less of explosive	360 feet
Impact pile driver, jackhammer, or rock drill	180 feet
Helicopter or single-engine airplane	360 feet
Chainsaws	195 feet
Heavy Equipment	105 feet

- Prescribed burning during the nesting season within 0.25 miles of occupied habitat would be dependent upon area biologist review and concurrence. The Service will be notified of all such occurrences.

Objective 3: Provide Wildlife Trees & Habitat for Cavity Dependent Species

- All snags would be retained in all harvest units. If it is necessary to fall snags for safety reasons, they would remain on site as coarse woody debris (CWD) (IR-6).
- Do not mark large, green broken-top trees and large snags with loose bark. Retain and protect these structures where possible (IR-6).
- All trees damaged during felling operations that were not originally marked for treatment will be retained for future snag and cavity recruitment unless they pose a safety hazard (AR-1, IR-1 and IR-2).
- In NRF habitat, no broadcast burning would occur post-harvest to insure that CWD is maintained.

Objective 4: Protect Special Status Wildlife Species

- Seasonally restrict disturbance activities from March 1 to July 15 within 0.25 miles of known and occupied nest sites of other raptors (e.g., goshawk, red-tailed hawk, Coopers hawk, flammulated owl). No known nests exist within 0.25 miles of treatment units. This restriction would be implemented in the event of the discovery of such a nest prior to treatment activities (E-4).
- Seasonally restrict harvest activities up to 0.25 miles no line of sight and 0.5 miles line of sight around active bald or golden eagle nest sites from February 1 to August 15. No known nests exist within 0.5 miles of treatment units. This restriction would be implemented in the event of the discovery of such a nest prior to treatment activities (E-4).

Objective 5: Protect Townsends Big-eared Bat

- Protect occupied sites (mine adits) from disturbance and management activities that may alter micro-site conditions with a 250 foot no treatment buffer (USDI 1995: 57). This is anticipated to effect units 4-1 and 9-1.

Objective 6: Protect Survey and Manage Wildlife Species and Habitat

- Known great gray owl nests would be protected with a 0.25 mile radius (or equivalent area) protection zone (approx. 100 acres).
- Meadows and natural opening will be protected with a no harvest 300 foot buffer.

Table 2-15. Commercial Units with Seasonal Restrictions for Great Gray Owls (L-18a)

Unit	TRS	Restriction Dates
20-1	T38S-4W-20	March 1 – July 31
20-3	T38S-4W-20	March 1 – July 31
29-3	T38S-4W-29	March 1 – July 31
29-4	T38S-4W-29	March 1 – July 31
29-5	T38S-4W-29	March 1 – July 31
30-2	T38S-4W-30	March 1 – July 31
31-2	T38S-4W-31	March 1 – July 31
31-5	T38S-4W-31	March 1 – July 31
3-1	T39S-4W-3	March 1 – July 31
3-5	T39S-4W-3	March 1 – July 31
4-1	T39S-4W-4	March 1 – July 31
5-1	T39S-4W-5	March 1 – July 31
5-2	T39S-4W-5	March 1 – July 31
5-3	T39S-4W-5	March 1 – July 31
5-4	T39S-4W-5	March 1 – July 31
6-1	T39S-4W-6	March 1 – July 31
6-2	T39S-4W-6	March 1 – July 31
8-1	T39S-4W-8	March 1 – July 31
8-3	T39S-4W-8	March 1 – July 31
9-2	T39S-4W-9	March 1 – July 31

- Known locations of Survey and Manage and Bureau Sensitive snails *Monadenia chaceana, Helminthoglypta hertleini*, *Monadenia fidelis celeuthia, Vespericola sierranus* and *Deroceras hersperium* (a slug) would be protected through the application of a no treatment buffer.

Objective 7: Protect General Wildlife Habitat

- Coarse woody debris (CWD) would be retained and protected from disturbance to the greatest extent possible during logging (L-7MC), burning and other project activities.
- Limit to the extent possible ground disturbing activities in areas with rock accumulations / talus. This includes designating skid roads and yarding corridors away from rock accumulations / talus wherever feasible (L-7MC).
- Leave approximately 10 percent of the hand-piles created from hazardous fuels reduction treatments unburned across treatment areas to provide refugia for small mammals and other species.

Botanical Resources

Objective 1: Protection of Bureau Special Status and Survey and Manage Plant Species

- Ground-disturbing activities outside proposed unit boundaries shall require Field Manager approval in consultation with the Resource Area botanist (L-9).
- Directionally fall harvest trees away from plant buffers (L-26).

Table 2-16. Bureau Special Status and Survey and Manage Plant Protection

Species name	# of sites[1]	Protection[2]
Chaenotheca ferruginea	1	25 ft. no treatment buffer
Chaenotheca subroscida	1	25 ft. no treatment buffer
Cypripedium fasciculatum	6	50-100 ft. no treatment buffer
Cypripedium montanum	3	25-100 ft. no treatment buffer
Eucephalis vialis	2	25 ft. no treatment buffer
Fritillaria spp. leaves	2	100 ft. no treatment buffer
Leptogium teretiusculum	1	25-50 ft. no treatment buffer
Zigadenus fontanus	1	25 ft. no treatment buffer

[1] number of plant sites per species in the project area

[2] no treatment buffers = no cutting, slashing, logging activity, nor equipment entry

Objective 2: To Minimize the Spread of Noxious Weeds

- Vehicle and equipment use off existing roads in the project area would be limited to the dry season (L-18).
- Pressure wash vehicles and equipment that will travel off system roads prior to entry onto BLM-managed lands (E-1). Equipment moving from a weed infested work site to or through a non-infested area shall be field washed before moving. Field washing station shall include a high pressure pump, containment mat, filter system, and a holding tank.
- Seed or plant highly disturbed areas during project implementation with native plant materials (E-1 and Exhibit C).
- Mulch highly disturbed areas after treatment with weed-free straw or hay (63 FR 124:51102). Straw or hay must be obtained from the BLM or purchased from growers certified by Oregon Department of Agriculture's Weed-Free Forage Program. If hay is used, it must be from native grasses only (Exhibit C).

- Treat noxious weed infestations as resources allow using the most effective methods to promote healthy native plant communities.

Cultural Resources

Objective 1: Avoid Impacts and Protect Cultural Resources

- There are recorded cultural sites in the project area which would be buffered prior to project implementation. Flagging would be placed 25 feet from the site boundary. No treatments will occur within this buffer.
- No fire line construction, prescribed burning, or hand piling/burning would occur within the flagged boundaries of the recorded cultural resources.
- Trees will be directionally felled away from cultural resource site buffers for one tree length (average 160 feet) (L-26 and L-7MC).
- If during project implementation the contractor encounters or becomes aware of any objects or sites of cultural value on federal lands, such as historical or pre-historical ruins, graves, grave markers, or artifacts, the contractor shall immediately suspend all operations in the vicinity of the cultural value and notify the COR. The project may be redesigned to protect the cultural resource values present, or evaluation and mitigation procedures would be implemented based on recommendations from the Resource Area Archaeologist with concurrence by the Ashland Field Manager and State Historic Preservation Office (E-3).
- Sites which have been determined **not** eligible, and having received State Historic Preservation Office (SHPO) concurrence, will be managed according to BLM Manual 8100.
- Sites that are within treatment units may be hand-treated to reduce fuel loading, and to lessen their visibility on the landscape. These sites will be identified prior to project implementation by district archaeological staff. All materials cut from sites will be piled off-site for burning purposes. The District archaeological staff will work with other Resource Area staff to identify suitable areas for pile burning.
- If new areas of ground disturbance are identified (such as helicopter or other landings, skid trails, etc. located outside of treatment units) these areas may need to be surveyed for cultural resources prior to their construction.
- Sites that are located within units that are scheduled to be treated by prescribed fire will have hand lines constructed around them as necessary to protect the resource from fire.
- Only existing breaches or areas along ditch systems designated by District archaeological staff shall be used during project implementation. If new crossings are needed to facilitate access, these areas will be developed with the archaeological staff and in consultation with SHPO if necessary.
- Brush and tree removal within ditch systems will be discussed with archaeological staff prior to removal. Any wooden features within ditches must remain in place and will be protected. All brush and other woody materials will be piled away from the ditches for burning.
- Prior to any underburning activities, all ditches or ditch segments will be examined by the District archaeologists to identify any wooden features. Appropriate mitigation for such features will be developed by District archaeologists.

Recreation

Objective 1. Ensure Public Safety

- On all major haul routes, signs will be posted to alert the public of logging operations, including the presence of trucks on roadways and recommended slow speeds (i.e. to proceed with caution) (L-21).

Objective 2. Maintain public safety for recreationists using trails

- Place signs on haul routes where trail crossing exists on the route; 1) to alert drivers to the presence of the recreation trail crossing and, 2) to alert equestrian riders and hikers to the presence of logging operations and logging truck travel. The following roads are to be signed during logging operations; Hinkle Gulch Road (38S-4W-28.0), Misty C Spur (38S-4W-28.01), Section 33 Spur (38S-4W-33.01), Keeler Creek Spur (38S-4W-35.03) Ninemile Rd (39S-5W-24.0) Thompson Divide Rd (39S- 5W-25.2_East Fork County Road, Panther Gulch Rd.(39W-5S-2.0), Lower Ferris Rd (38S-4W-20) and Ferris Gulch Road (38S-4W-20) (L-21).

5. Project Design Features – For Alternative 3 Only

Riparian Reserves

Objective 1. To Maintain and Restore Habitat to support Riparian-Dependent Species

- All commercial sized conifer trees less than 14 inches DBH would be harvested and sold under a timber sale or stewardship contract.
- Conifer trees that are 14 inches and greater would be directionally felled toward the channel and left on-site for down wood recruitment.

D. ACTIONS AND ALTERNATIVES CONSIDERED BUT ELIMINATED FROM DETAILED ANALYSIS

In the development of the Proposed Action, BLM considered numerous ways to meet the Purpose and Need. What is presented in this Environmental Assessment (EA) as the Proposed Action reflects what the planning team determined to be the best balance and integration of resource conditions, resource potential, competing management objectives and expressed interests of the various communities that have a stake in the project. Other actions or alternatives were discussed and eliminated from detailed study for the reasons given below.

1. Treat more acres by building new roads. Multiple routes of new road construction were considered to reach additional treatment units but were ultimately eliminated from the proposed action.

Rationale for Elimination:

- Three additional units were identified for inclusion in this project but ultimately dropped from Alternative 2. The first unit was in the eastern portion of section 38S-04W-29 and would have been accessed by building about 0.4 miles of new road on BLM land to provide cable logging access to treat 22 acres. The second unit was in the eastern portion of section 39S-05W-12 and would have been accessed by building about 0.47 miles of new road on BLM land to provide cable logging access to treat 44 acres. The third unit was in the southwest portion of section 39S-05W-13 and would have been accessed by building about 0.08 miles of new road on BLM land to provide cable logging access to treat 27 acres. The upper portions of these three units had open stand conditions with large older trees evenly distributed from previous cable harvesting operations, while the lower portions contained higher tree densities that were good candidates for restoration forestry prescriptions. These lower portions would be available only to helicopter operations and would likely benefit ecologically from these prescriptions. Stand examinations were completed in the upper portions of these units to determine the ecological and economic benefits from treatment. Stand exam reports revealed marginally poor volume figures per acre with little to no positive benefit to stand development and health. The upper portions of these units contained 7 bureau sensitive plant buffers (100 ft. radial buffers); these buffers would reduce the amount of acres available for treatment, thus reducing the economic benefit further. The upper portion of these units had more wider spaced trees that are not facing much competitive stress. The portions of these

units were ultimately rejected from potential road building and not high priority candidates for restoration forestry prescriptions.

- Two of the initially proposed new roads were eventually eliminated from detailed analysis as it was determined that the roads could not be built. The two new roads were initially proposed after reviewing contour maps in the office. Once the assigned Engineer reviewed the locations in the field it was determined that one road had a 35 percent grade where the road needed to go. The other road had side slopes greater than 80 percent with rock outcrops.
- After considerable interdisciplinary team discussions, and with input from concerned adjacent landowners and other members of the public, it was decided that a skid trail would be used to access portions of unit 25-3 rather than constructing a temporary road. The reasons for this are; a skid trail would not require constructing a landing on the west side of the intermittent stream, would require less excavation, and may allow for more effective restoration to mitigate disturbance and discourage OHV use.

2. ***Compare the application of Franklin/Johnson's principles against other forest management strategies.***

Rationale for elimination: The intent of this project is not to compare treatment methods, but to demonstrate one type of treatment method, the application of Drs. Jerry Franklin and Norm Johnson's principles. This action would not meet the purpose and need for this project.

3. ***Impose only fire and no thinning as a restoration method. This alternative would have treated vegetation within the planning area using only prescribed fire to reduce vegetation densities and hazardous fuels.***

Rationale for Elimination: Based on the composition, age and structure of the stands in the Pilot Thompson project area, using prescribed fire alone would not be effective in reducing stand densities to improve the vigor and health of stands. The energy release from prescribed fire as the initial entry would exceed desired intensity levels and have undesirable effects on vegetation and soil. The precision when using fire alone is not enough to achieve the desired species composition and structure intents. A combination of mechanical or manual treatments with prescribed fire is necessary to insure all resource objectives are met. Prescribed underburning alone would not meet the need to supply timber for our communities which is a stated purpose of the project. Therefore no alternative was developed to use prescribed fire to thin the forest.

4. ***Replicate and evaluate the ecological principles applied to the project for all dry forest O&C lands.***

Rationale for Elimination: This is out of scope of this project because the project does not propose to treat the broad landscape, but only one portion of the Middle Applegate Watershed. Issues about broad applications of management are land use planning issues to be addressed through resource management plan (RMP) efforts.

5. ***Exclude commercial harvest and only remove small non-commercial sized trees.***

Rationale for Elimination: Comments have been received for this project that suggests no commercial products should be removed from federal lands. One of the purposes of this pilot project is to offer commercially-viable timber sales that provide jobs in local communities from forest management, logging, and wood processing. Excluding commercial harvest would effectively eliminate removing any material that could be sold for saw logs which would not meet the purpose and need. It also would not meet the need of increasing forest health, reducing fuel loadings and improving tree vigor because it would not remove enough of the vegetation to reduce competition or reduce fuel loads. Only removing the smaller trees would not meet the

desired goal of increasing stand and landscape level heterogeneity. Therefore, this action was eliminated from detailed study.

6. Impose a diameter limit for commercial tree harvest.

Rationale for Elimination: Imposing an upper diameter limit for harvesting trees was suggested by the public to 1) assure that no trees over 150 years old are harvested, 2) protect and recover ESA habitat, 3) ensure the retention of adequate numbers of mid-seral trees, which will become future old-growth, and 4) because there is no need to treat greater than 20 inches DBH to meet Franklin and Johnson's goals. This alternative would have imposed an upper diameter limit on timber harvesting trees greater than some set limit measured by diameter breast height (DBH). Suggestions included 20 inches DBH and 16 inches DBH limit. The prescriptions and approach advanced by Franklin and Johnson recognizes the importance of older trees but frames it in an ecological context rather than imposing any strict diameter limit. The decision to retain it or remove any individual tree is based on the capabilities of the site and the adjacent existing forest structure and composition. The intent of the Pilot Project is to implement this approach and imposing other conditions would not be an accurate rendering of that approach. Therefore no alternative was developed to apply diameter limits. Consultation with the USFWS on how this project would affect the northern spotted owl has occurred. The proposed action is largely in alignment with the Recovery Plan's dry forest restoration treatment principles (USDI FWS 2011, p. III-34-35) and strategy for Habitat Management in Dry Forests (USDI FWS 2011, pp. III-20—III39); thus, the USFWS anticipates that the proposed action will result in long-term benefits to the conservation of spotted owl habitat in the action area.

7. Increase or decrease the amount of harvesting. Numerous suggestions of approaches to forest management were received. These ranged from aggressive, purely economic driven management to cutting or girdling commercial sized trees and leaving them in the forest for coarse wood but not removing them for use as wood products.

Rationale for Elimination: The dual purpose of blending ecosystem restoration and providing commercially viable timber sales is the intent of the Pilot Thompson Project. Variations in approach that would not achieve those objectives would not be analyzed because they would not meet the stated Purpose and Need. Therefore no alternative was developed to demonstrate other approaches to forest management in this project beyond what Franklin and Johnson have proposed.

8. Treat forest stands identified as RA-32

This action would have treated stands identified by resource area biologists as Recovery Action 32 (RA 32) forest stands. In 2008, and revised in 2011, the U.S. Fish and Wildlife Service issued a Recovery Plan for the Northern Spotted Owl (NSO). The Recovery Plan includes Recovery Actions, which are recommendations to guide activities that would help to further the recovery objectives for the northern spotted owl. Recovery Action 32 recommends maintaining substantially all of the older and more structurally complex multi-layered conifer forests on Federal lands outside of Managed Owl Conservation Areas. The purpose of RA 32 is to provide refugia for northern spotted owls as they adapt to competitive pressures from an increasing population of barred owls.

Rationale for Elimination: The Ashland Resource Area BLM decided to defer forest management in stands identified as RA 32 stands at this time. Using the Draft RA 32 Habitat Evaluation Methodology (version 1.3) developed jointly by the Medford Bureau of Land Management, Rogue River-Siskiyou National Forest, and the Roseburg Office of the US Fish and Wildlife Service, BLM wildlife biologists identified areas within the Pilot Thompson Project that met the intent of Recovery Action 32. Stands identified as RA 32 forest stands were removed from consideration for timber harvest and detailed analysis under the Proposed Action.

E. MONITORING PLAN

Miriam-Webster defines monitoring as:

To watch, observe, listen to, or check (something) for a special purpose over a period of time.

The Medford District BLM has committed to monitoring the Middle Applegate Watershed Pilot Projects. Monitoring is essential to demonstrate the ability of the Franklin and Johnson principles to accomplish dry forest restoration goals. Monitoring is also important in the context of adaptive management, enabling project learning to inform future planning efforts and management decision-making.

1. Baseline monitoring

Baseline monitoring establishes a set of pre-treatment characteristics that can be compared to post treatment conditions to understand how conditions changed based on the treatment. Collecting baseline information prior to treatment is essential to drawing conclusions concerning changes that may have occurred from the treatments. Pre-treatment data collection is included as a component of effectiveness monitoring (see Effectiveness Monitoring section).

2. Implementation Monitoring

Immediate post-treatment implementation monitoring will be used to assess progress towards established goals, including whether proposed restoration principles were implemented as planned. In addition to ecological goals, appropriate economic and social goals will be defined and monitored.

Much of implementation monitoring is accomplished in the day to day work by BLM employees. Project supervisors, contract inspectors, and timber sale administrators review the work being done and assure compliance with the regulations and stipulations in the applicable administrative documents. The majority of actions described under the alternatives are implemented through a timber sale, service, or stewardship contract. In the case of contracts, implementation monitoring is accomplished through BLM's contract administration process. PDFs included in the project description are carried forward into contracts as required contract specifications. BLM contract administrators and inspectors monitor the daily operations of contractors to ensure that contract specifications are implemented as designed. If work is not being implemented according to contract specifications, contractors are ordered to correct any deficiencies. If unacceptable work continues, suspension of contracts and/or monetary penalties can be applied.

One Key element of the dry forest restoration strategy is to protect and conserve older trees (greater than 150 years of age). Implementation monitoring was conducted during the marking and cruising process to determine how well markers achieved the age-based criteria in commercial harvest units. Any trees determined to be 150 years or older were reserved from cutting.

3. Effectiveness Monitoring

Within three years of implementation, effectiveness monitoring will be used to evaluate success and trends related to the implementation of restoration principles, including the degree to which desired outcomes are being achieved. Effectiveness monitoring will consider not only forest restoration goals, but also will address sustainability, social and economic goals. Summary findings from effectiveness monitoring will include recommendations on how learning can be shared with communities and incorporated into future restoration planning and implementation (adaptive management). All effectiveness monitoring is funding dependent. The BLM and our collaborative partners are continually seeking ways to fund this important component of adaptive management.

The Southern Oregon Forest Restoration Collaborative and the Applegate Partnership and Watershed Council have also committed to monitoring the Middle Applegate Pilots projects through a multi-party framework. A

pilot steering team was created and a community meeting was convened (June 14, 2011) to begin shaping a plan for this additional community-based effort to assess on-the-ground progress toward pilot project goals.

The multi-party monitoring team has developed the following monitoring objectives and indicators to address the purpose and need of the pilot (Chapter 1). Project monitoring can be time consuming, complicated and expensive. While the following indicators have been identified as good measures to assess objective attainment, it is not confirmed that funding will be available for monitoring using the following indicators (Table 2-18).

Table 2-18. Multi-Party Monitoring Team Objectives and Indicators

Objective 1: ***Increase forest ecosystem resistance and resilience***	**Objective 2:** ***Increase spatial heterogeneity to benefit biodiversity and species of concern at the stand and landscape scale***	**Objective 3:** ***Conserve and improve northern spotted owl (NRF) habitat through LSEA (late successional emphasis area) design***	**Objective 4:** ***Generate jobs and support regional manufacturing infrastructure***	**Objective 5:** ***Gauge public support for active management in federal forests***
Indicators: ▪ Fire behavior ▪ Stand density ▪ Tree vigor ▪ Mean diameter ▪ Composition of tree and understory diversity	**Indicators:** ▪ Canopy cover ▪ Stand level skips and gaps ▪ Stand level structural complexity ▪ Seral stage composition at landscape scale ▪ Snag and down woody material abundance ▪ Bird species composition	**Indicators:** ▪ Fire behavior in LSEA's ▪ Percentage of NRF, dispersal, and unsuitable habitat ▪ Spotted Owl reproduction and pattern of use	**Indicators:** ▪ Jobs created or maintained ▪ Board feet and ton weight of material harvested ▪ Market utilization by product category	**Indicators**: ▪ Awareness and support of engaged public ▪ Success of community outreach and engagement ▪ Scoping and EA comments

Objective 1

Research questions: 1) How well did the demonstration of the Dry Forest Principles conform to the intent to move current conditions toward the desired conditions? 2) Did the implementation of the Dry Forest prescription increase resistance/resilience of forest stands and landscape to wildfire, drought, insects, etc. by reducing stand densities, ladder fuels, and promote shifted tree *species diversity?*

Objective 2

Research questions*:* 1) How do the Pilot's restoration treatments affect spatial heterogeneity at the stand and landscape scales? 2) How do any changes in stand- and landscape-level spatial heterogeneity affect the diversity and abundance of plants and animals?

Objective 3

Research questions: 1) Did the landscape design, through the establishment of Late Successional Emphasis Areas (LSEA) and adjacent strategic placement of treatments, contribute to fulfilling the intent of the Endangered Species Act by conserving ecosystems upon which species depend and incorporating elements of active management proposed by the US Fish and Wildlife Service in the Revised Recovery Plan for the Northern Spotted Owl?

Objective 4

***Research questions**:* 1) How well did the demonstration do in providing commercially viable timber sale(s) opportunities? Additionally were there opportunities for commercial activities generated such as stewardship and service contracting? 2) How can this work be done more efficiently so as to improve economic benefits?

Objective 5

Research questions/learning component: A series of guided conversations would be convened to capture collective learning related to the design and implementation of the Pilots. The purpose is to gauge the level of public support for active forest restoration and to capture key pilot participant perspectives to inform and improve future project design and implementation. The learning conversations are designed at two scales: (1) at the scale of the Middle Applegate watershed to capture learning from the Pilot projects to benefit future phases of the Medford District BLM pilot and ecological forestry project activities; and (2) at the scale of the Medford, Roseburg and Coos Bay Districts to comparatively summarize Secretarial Pilot Project accomplishments. These substantive, forward-looking conversations can help determine whether pilot project goals were met, and offer a unique opportunity to learn from key participants of ways to improve future forest management planning, design and implementation.

Monitoring Methodology

FIREMON(Fire Effects Monitoring and Inventory) Plots

In order to understand how well the proposed treatments move the current conditions toward the desired conditions, BLM intends to install a series of plots that will measure forest vegetative characteristics within forest stands in the project area. Prior to project implementation, permanent 0.1 acre fixed-radius plots will be established within some of the Pilot Thompson treatment areas. Data collected for each plot will include general site attributes, an inventory of tree characteristics (species, density, size, and age), vegetation composition, fuel loading and photo points following methods outlined in FIREMON protocols. These permanent plots will be re-sampled following project implementation, and available for long-term monitoring. Plot data will be analyzed to determine if objectives were achieved.

Spatial Heterogeneity Plots

Pre-treatment and post treatment monitoring and data analysis is planned for stand-level spatial heterogeneity. Spatial heterogeneity is an essential attribute of the prescriptive approach. A spatial monitoring protocol was also developed to assess stand level changes and plots will be established in conjunction with the aforementioned FIREMON plots centers. The spatial monitoring work intends to assess; 1) variation in canopy closure, 2) regularity of tree distribution ("clumpiness factor"), 3) percent of area occupied by canopy openings ("gaps"). The protocol consists of five sample points for each plot with multiple photos of vegetation and canopy characteristics along with an assessment of "clumpiness" at each of the five points.

Fire Modeling

Fire spread will be modeled for both the pre-treatment and post treatment landscape to determine the effects of restoration treatments and project design on potential fire spread and effects, particularly adjacent to Late Successional Emphasis Areas (LSEAs).

Photo Points

Photos provide a visual record across multiple phases of project implementation and generate a baseline to identify change over time through repeat photography. Photos provide opportunities to assess project implementation and change over time. They can also provide a tool to build public understanding of the dynamic nature of stand response to active management over time. Initial photo points may be established in the spatial heterogeneity plots, non-commercial units, yarder corridors, and commercial units.

Northern Spotted Owl Surveys

Oregon State University, BLM, US Fish and Wildlife Service, and the US Forest Service are undertaking a minimum three year monitoring effort in the Middle Applegate watershed to assess Northern Spotted Owl presence and absence with an eye toward population dynamics.

- The objective of the study is to identify both direct and indirect effects on spotted owls from the ecological forestry treatments.
- The goal of the study design is to do surveys before and after treatment. The three phases of the pilot project helps with this before and after study design. We will be surveying to determine occupancy and reproductive success (how many young are produced and successfully leave the nest).
- The first season of surveys began in April, 2013 in the Pilot Thompson planning area. The initial data will serve as a baseline for future surveys, and occupancy dynamics during and after treatments have occurred
- The sampling scheme for barred and spotted owl occupancy surveys will follow methods outlined by Wiens et al. 2010, with calling stations placed 500-800 m apart along logging roads and forest trails within randomly selected 500 ha hexagonal sample units.
- Also due to limited funding in 2013, barred owl surveys likely won't start until 2014. Barred owl surveys are part of this project to document the barred owl density in the landscape and to determine possible indirect effects on the spotted owls. We have identified approximately 399 points to survey this season.

Other Monitoring Efforts

Oregon State University undertook a large scale study (120 plots) in the Middle Applegate watershed during the summer of 2011 to evaluate historic stand development. Results from this study are expected to be published in 2013.

BLM has also committed to a third party ‘case study’ of the Pilot Project timber removal methods. This study would assess harvest units on the ground after implementation along with a review of project records to evaluate how the project has met the ecological, environmental, social and economic objectives of the project. This review would include such factors as the effects from skyline yarding on stand condition, soil impacts, use of support trees and tail trees, timber volume removed and utilized, and the effects of skyline corridors on protection of leave trees, and general observations of the equipment used, and what worked well, and what aspects were difficult to implement.

CHAPTER 3 - AFFECTED ENVIRONMENT AND ENVIRONMENTAL EFFECTS

A. INTRODUCTION

This chapter describes the present conditions of each affected resource, followed by a comparison of the estimated environmental effects of implementing the No-Action Alternative and the action alternatives. The Environmental Effects portion of this chapter provides the analytical basis for the comparisons of the alternatives (40 CFR § 1502.16) and the reasonably foreseeable environmental consequences to the human environment that each alternative would have on the relevant resources. Impacts can be beneficial, neutral or detrimental. The affected environment is described to the level of detail needed to determine the significance of impacts to the environment of implementing the Proposed Action. The analysis of the direct, indirect, and cumulative effects are organized by resource and the analysis areas for actions proposed under this REA vary by resource. Analyses for all resources include the project area, which encompasses the areas where actions are proposed for the Pilot Thompson Project.

1. Project Area and Analysis Area

The terms **project area, planning area,** and **analysis area** are used throughout this chapter. The following defines each term:

The terms **project area** and treatment area are used interchangeably to describe where action is proposed, such as units where forest thinning is proposed and where road construction or road improvements are proposed.

The term **planning area** is used to describe the overall area of consideration that was reviewed for the development of the Pilot Thompson Project.

Analysis areas vary by resource and include those areas that could potentially be affected by the proposed action. In some cases the analysis area is confined to the project area and in others the analysis area extends beyond the project area.

2. Consideration of Past, Ongoing, and Reasonably Foreseeable Actions in Effects Analysis

The current condition of the lands affected by the proposed action is the result of a multitude of natural processes and human actions that have taken place over many decades. A catalogue and analysis, comparison, or description of all individual past actions and their effects which have contributed to the current environmental conditions would be practically impossible to compile and unduly costly to obtain. Ferreting out and cataloguing the effects of each of these individual past actions would be a time consuming and expensive task which will not add any clearer picture of the existing environmental conditions.

Instead of incurring these exorbitant costs in terms of time and money, it is possible to implement simpler, more accurate, and less costly ways to obtain the information concerning the effects of past actions, which is necessary for an analysis of the "impact on the environment which results from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions."(See definition of "cumulative impact" in 40 CFR § 1508.7)

43 CFR § 46.115 states that when considering cumulative effects analysis, one must analyze the effects in accordance with relevant guidance issued by the Council on Environmental Quality (CEQ). As the CEQ points out in guidance issued on June 24, 2005, the "environmental analysis required under NEPA is forward-looking," and review of past actions is required only "to the extent that this review informs agency decision-making regarding the proposed action." Use of information on the effects on past action may be useful in two ways according to the CEQ guidance: (1) for consideration of the proposed action's cumulative effects, and (2) as a basis for identifying the proposed action's direct and indirect effects.

The CEQ stated in this guidance that "[g]enerally, agencies can conduct an adequate cumulative effects analysis by focusing on the current aggregate effects of past actions without delving into the historical details of individual past actions." This is because a description of the current state of the environment inherently includes the effects of past actions. The CEQ guidance specifies that the "CEQ regulations do not require the consideration of the individual effects of all past actions to determine the present effects of past actions." The importance of "past actions" is to set the context for understanding the incremental effects of the proposed action. This context is determined by combining the current conditions with available information on the expected effects of other present and reasonably foreseeable future actions.

Effects analyses completed for resources potentially affected by the Pilot Thompson Project describe indicators of importance along with the spatial (analysis area) and temporal scale of importance for determining the effects of multiple actions (past, current, and reasonably foreseeable) on affected resources. As discussed above, the current condition assessed for each affected resource inherently includes the effects of past actions.

The analysis of the effects of other present and reasonably foreseeable actions relevant to the effects of the proposed action is necessary. How each resource analysis uses information concerning other ongoing or reasonably foreseeable activities is, however, dependent on the geographic scale of concern and attributes considered during each resource analysis.

a. Ongoing and Foreseeable Future Actions

In addition to the proposals outlined in this document, there are ongoing activities in the Thompson Creek and Ferris Gulch drainages that were planned prior to the current Pilot Thompson Project. Some of the work has been evaluated in project specific NEPA documents. Others are evaluated within programmatic NEPA documents or are part of BLM's general administrative activities. One project is a community-based habitat restoration project on private lands.

Road Maintenance and Culvert Replacement

There are seasonal road maintenance activities occurring on the BLM-administered road system that include grading and shaping, cleaning drainage ditches and culvert basins, spot rocking, repairing damaged areas, and other maintenance actions. These activities are dependent on the previous years' weather, damage received, budget allocations and current use patterns of roads. There is a road reconstruction contract in place. Work began in the fall of 2012 and is scheduled to be completed in 2013. The contract work includes removing cross drain culverts and replacing them with armored rolling water dips, and converting insloped, ditched roads to outsloped roads without ditches. At project completion, there will be a total of 95 armored rolling dips installed, 10.26 miles of insloped to outsloped road conversion, and 7.15 miles of road rocked with gravel surfacing within the Ferris Gulch, Hinkle Gulch, and Ninemile drainages.

Timber Sales

There are currently no proposals developed for additional timber sales or landscape level projects in the Pilot Thompson planning area. Future work would build on the foundation established with the current proposal, continuing to create restoration opportunities.

There are plans to develop additional landscape level projects based on Drs. Franklin and Johnson's ideas in other planning areas within the greater Middle Applegate watershed. A landscape level assessment in these other drainages would need to occur before any proposals and alternatives can be developed.

The Grants Pass Resource Area of the Medford District BLM is planning a project in the Williams Creek 5th field watershed which is adjacent to the Pilot Thompson planning area (Thompson Creek 6th field watershed). The project proposes to implement forest management activities that would restore ecological systems of forest in southwest Oregon, reduce wildfire danger, and contribute to continuous timber production. The project

proposes both commercial and non-commercial treatments, would include both skyline and tractor yarding, and proposed temporary route construction and existing route re-construction.

Thompson Creek Habitat Restoration Project

The Applegate Partnership and Watershed Council have been coordinating a community-based habitat restoration project with private landowners in the Thompson Creek drainage. The project aims to improve fish habitat along approximately1.8 miles of Thompson Creek. This work will benefit Coho salmon and its critical habitat, steelhead, and trout. Instream placement of 100 large wood pieces and riparian restoration on 22 project acres will address limiting factors on water quality (303d listed for summer stream temperature), floodplain connectivity, channel complexity, and the lack of large wood. Riparian restoration will reduce stream temperatures through shading and provide long-term large wood recruitment. Large wood placement will scour complex pools, deposit spawning gravels, slow stream velocities, and increase side channel connectivity.

B. SILVICULTURE

1. Affected Environment

a. Landscape Pattern

The Pilot Thompson Project is located in the Middle Applegate Watershed, which is a tributary to the Rogue River. The analysis area for silviculture considers BLM-administered lands within the southern portion of the Ferris/Slagle sub-watershed and the Thompson Creek sub-watershed of the Middle Applegate Watershed, which are tributaries to the Rogue River and represent 7th field hydrologic units. The total size of the planning area is 23,268 acres or 36.4 square miles. BLM administered lands comprise 14,419 acres within this area (Table 3-1).

The current landscape pattern of the vegetation in the Middle Applegate Watershed is a result of highly dissected topography, fires, wind events, timber harvesting, and forest pathogens. The present day vegetation pattern across the watershed landscape results from the dynamic processes of nature and human influences over time. There is a natural diversity of vegetation condition classes[1] within stands and between stands whose patterns and boundaries are generally dictated by soils, aspect, past disturbance, and fire suppression. Historically, forest stands had fewer trees per acre, trees of larger diameter, and a different species composition because of the more open conditions (USDI 1995a). These stands were composed of more ponderosa pine, oak species, and incense cedar and native grasses. Table 3-1 lists the vegetation condition classes defined in the Medford District Watershed Analysis Guidelines (USDI 1994a).

Table 3-1. Vegetation Condition Classes – Pilot Thompson Analysis Area; BLM-administered lands

Vegetation Condition Class	Acres
Grass, Shrubs, Non-forest Land	432
Hardwood/Woodland	2,125
Early (0-5 years) and Seedlings/Saplings (0-4.9 inches DBH)	907
Poles (5-11 inches DBH)	1,981
Mid (11-21 inches DBH)	6,471
Mature (21+ inches DBH)	2,503
Total Acres	14,419
Total Forest Land Acres	11,862

[1] Vegetation Condition Class - The BLM Medford District Watershed Analysis Committee designated 8 vegetation condition classes to describe the types of and size of vegetation present on the landscape. The condition classes are as follows: grass and herbaceous vegetation; shrub lands; Hardwood/Woodlands; early seral stage trees (0 to 5 years of age); seedlings/saplings (0 to 4.9 inches DBH); poles (5 to 11 inches DBH); mid (11 to 21 inches DBH); and mature/Old-growth (21 inches DBH and larger trees). (DBH=diameter at breast height)

Since landscape vegetative patterns are in constant development, current observations of the landscape vegetation are a snapshot at one single point in time. Although current vegetation stem densities are high and are mostly in the mid and mature seral stages, the vegetation condition classes of today are atypical when compared to historic patterns. Species that appeared at an early stage of a site are almost entirely nonexistent in future successional stages. Natural succession is a process where vegetation types and conditions change over time in a given site. The species that initially appear on a site are largely dependent on the seed availability (windblown seed sources, seedbed, serotinous cones, etc.), the type and severity of disturbance that brought the stand into an early seral stage (either following a fire, wind event, harvest, insect infestation, disease, or other disturbance), and other biotic or abiotic factors. Species that once occupied the early seral stage of development in a landscape gap will give way to other species as the landscape further develops. Ridges with westerly to southerly aspects and areas with shallow soils have severe growing conditions with shrubs and grasses dominating these sites. As a result, the majority of the timber stands are separated by grasslands, shrub lands or oak woodlands. These influences create a coarse-grained pattern across the landscape with a mosaic pattern of different vegetation types and seral stages.

The analysis area is comprised of three plant series types: Douglas-fir, ponderosa pine, and white oak (Table 3-2). Plant association, defined as a stand or group of stands made up of plants characterized by a definite floristic composition consisting of uniformity in physiognomy and structure and uniform habitat conditions, descriptions within these series can be found in the Field Guide to the Forested Plant Associations of Southwestern Oregon (Atzet et al. 1996).

Table 3-2. Tree Series and Plant Associations Common to the Pilot Thompson Analysis Area

Douglas-fir Series / Plant Associations	Ponderosa Pine Series / Plant Associations	White Oak Series/Plant Associations
PSME-QUCH2/RHDI6 (Douglas-fir-Canyon live oak/poison oak)	PIPO–PSME (Ponderosa Pine/Douglas-fir)	QUGA (Oregon White Oak)-PSME/RHDI6
PSME- QUCH2/BENE (Dwarf Oregon Grape)	PIPO-QUKE (California Black Oak)	QUGA/CYEC (Hedgehog Dogtail)
PSME-PIPO/RHDI6 (Ponderosa Pine)		
PSME-CADE27/BEPI (Incense cedar/Pipers Oregon Grape)		
PSME/HODI/WHMO-SWO (Ocean Spray/Whipplevine)		
PSME-ABCO/SYMO (White Fir/Creeping Snowberry)		
PSME-ABCO (White Fir)		

Douglas-fir plant associations comprise 83 percent of forestland in the analysis area. These associations are predominantly found in warm and dry site conditions. Ponderosa pine is commonly found in the drier and warmer Douglas-fir sites; however, Douglas-fir dominates the understory component of these associations. Of

the total acreage from the Douglas-fir Series plant series, 28 percent of all Douglas-fir stands are in the stem exclusion (i.e. competitive exclusion) stage of forest development. In the stem exclusion stage, overstory trees grow very vigorously at the beginning, actively occupying all available growing space, and vigorously compete with neighbors (Oliver and Larson 1996). Shade intolerant trees such as ponderosa pine and sugar pine struggle to survive against more shade tolerant fir species under increasingly lessening light conditions. Pine and other shade intolerant species become suppressed and eventually are excluded from the stand, giving way to a pure or nearly pure fir forest. Shrubs and herbaceous species are present in the understory but there is little natural tree regeneration. This stage has the fewest plant species. Without disturbances to release growing space, shade intolerant species such as pine continue to decline in number, reducing stand-level species diversity. This is most evident in the Douglas-fir plant series in the analysis area. In acreage, PSME-PIPO/RHDI6 plant association is the largest represented forest land plant association in the analysis area at 24 percent. According to the Field Guide to the Forested Plant Associations of Southwestern Oregon, this association is one of the drier Douglas-fir associations, and is found on most slope positions. California black oak, ponderosa pine, and Pacific madrone are frequently present with covers usually greater than 20 percent. Currently 5 percent of forestland in the Middle Applegate Watershed is in the ponderosa pine forest type. Ripple (1994) found that historically, 23 percent of the Rogue River Basin was composed of the ponderosa pine forest type.

b. Forest Stand Condition and Ecosystem Disturbance Processes

Forest fires have played a major role in creating the present day landscape pattern, by influencing species composition and soil productivity. Fire suppression since the early 1900's has resulted in overstocked forest stands, allowed Douglas-fir to replace pine species, and possibly delayed the release of nutrients to the soil. The Klamath Geological Province, of which the Middle Applegate Watershed is a part, is characterized by historically high fire frequencies (10-30 year return interval) (USDI 1995a). As a result of fire exclusion, the analysis area has missed multiple cycles over the last 100 years in the upland forest, as well as the riparian forest.

The absence of fire has converted open savannahs and grasslands to hardwood woodlands and initiated the recruitment of conifers. As hardwoods and shrubs encroach into open savannahs and grasslands, over time, shade tolerant conifers begin proliferating through the understory and converting the site to a mixed hardwood/conifer woodland condition. As a result, Oregon white oak is now a declining species largely due to fire suppression and encroachment by Douglas-fir on most sites. These sites generally do not support shade tolerant conifers in terms of stocking densities, soil composition, moisture, and aspect. Douglas-fir, therefore, does not grow to normal size, form, and vigor. Conversions from pine to fir are also evident and occur in the same sequence as the conversion from hardwoods to conifers. The conversion from pine to fir has created stands that are stressed for both upland and riparian areas. These non-vigorous conifers become susceptible to insect and disease mortality or prematurely die off due to overstocked conditions. The absence of fire due to suppression efforts has changed the forest composition from a fire dependent ecosystem to a densely forested fire intolerant condition. Shade-tolerant conifers have decreased the numbers of ponderosa pine, Oregon white oak, and sugar pine in the analysis area.

The absence of disturbance has altered the structural complexity, health, and fire resiliency of the forest. Throughout southwestern Oregon and most of the western United States, fire is no longer a natural agent of ecosystem stability and has resulted in major shifts in forest structure and function. A lack of disturbance, either natural or manmade, alters the vegetation condition of the forest. Frequent fires prevent fuel from accumulating and prepare a seedbed favorable for perpetuating pine species (Waring and Schlesinger 1985). High severity fire regimes on the other hand, exhibit infrequent, intense, large, stand-replacing fires that denude entire forests. These occur when tree densities and surface and ladder fuels build up to a level where fire resiliency is compromised and the entire stand is threatened by intensified burning conditions. Without disturbance, Douglas-fir now dominates most sites because of its higher tolerance to shade and understory competition than pine species. These long-lived shade tolerant species accumulate to abnormally high densities and, together with an increase of dead material, can easily transmit fire to the upper canopies. Fire exclusion has been associated with

high survival rates in Douglas-fir recruited during the late 19th and early 20th centuries, resulting in the establishment of a closed-canopy forest. Douglas-fir recruitment since the mid-20th century has been declining and those that have recruited have been growing very slowly in the shaded understory (Messier et al. 2012). Of the total land acreage of vegetation series exhibited in the analysis area, stands in the Douglas-fir Series comprised 79 percent compared to stands in the Ponderosa Pine Series at 11 percent (10 percent in the White Oak Series).

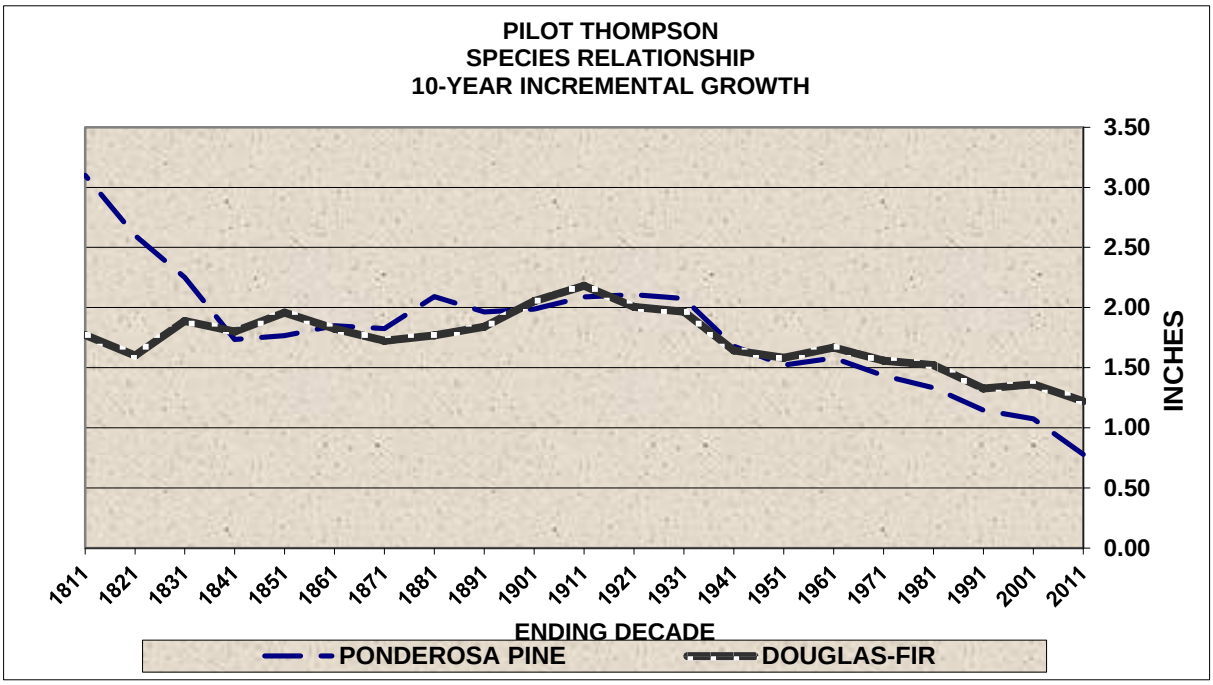
Competition in a stand has been directly correlated with stand density. The more stems (i.e., trees) that exist per acre on a site, the fewer resources are available per stem to sustain it. Each stem draws water and nutrients from the soil and occupies a place in the stand that captures sunlight. Absent disturbance, such as results from fire suppression, these sites become occupied by shade tolerant species capable of outlasting their shade intolerant neighbor trees. Various scientific methods have been developed over the decades that can predict or identify a threshold when a forest stand will decline in production and health due to factors such as competition. Relative Density Index (RDI: the ratio of actual stand density to the maximum stand density attainable in a stand with the same mean tree volume) and the Waring Tree Vigor Index are two such measures of both stand and tree level health and productivity. Undisturbed populations eventually compete for growing space and gradually reduce the population as individuals die in a self-thinning process (Barbour et al. 1987). Drew and Flewelling (1979) concluded that the correlative density index rating of 0.55 for any given stand marks the initial point of imminent mortality and suppression. A productive forest stand absent of natural or human density control will continue growing until it reaches a condition where the vegetation in the stand occupies all the available growing space. The aftermath results in widespread competition and declining productivity as evident in dense stem exclusion stands. A decrease in stand vigor is expected with continued overstocking and increasing stand age. The relative density index of Douglas-fir stands should range between 0.25 and 0.55. Stand densities should be lower on pine sites, ridges, and droughty areas in order to maintain maximum health and stand resiliency.

The Applegate Adaptive Management Area Ecosystem Health Assessment (USDA 1994a) recommends 60 to 120 ft^2 basal area per acre (BA/AC) as an acceptable level of basal area on these sites. On these sites the relative density index may be below 0.35 because there is evidence that heavy thinning to a relative density index of 0.25 is necessary for the development of the understory and vertical diversity (Hayes et.al. 1997). In contrast, this is considered to be a heavy thinning in Douglas-fir stands and landscape designing should be used for locating the desired areas for heavily thinned stands. Over eighty percent of the forested stands that were inventoried in the analysis area have relative density indices between 0.55 and 0.99, which bounds the zone of imminent competition-mortality (Drew and Flewelling 1979). Forest stands were inventoried in both upland and riparian zones. Currently, the relative densities of stands throughout the analysis area are high for both upland and riparian zones. The overall average relative density for the forested stands inventoried is 0.71, indicating that physiologically the trees have entered the zone of imminent competition-induced suppression and mortality.

Riparian areas are high priority for the development and maintenance of large diameter trees and multiple canopy layers due to favorable site conditions combined with the lower risk of fire. There is a high risk of accelerated insect activity and stand replacement fire in Riparian Reserves if left untreated. Fire and insect activity in Riparian Reserves will result in failure to meet Aquatic Conservation Strategies. Large-scale catastrophic disturbance by fire and insects in these intermittent stream riparian buffers will destroy or limit the ability of the reserves to sustain viable forest species populations and seriously impact ecosystem health throughout the Applegate basin (USDA 1994). Reducing stand densities to meet Aquatic Conservation Strategy objectives in intermittent Riparian Reserves, would promote desirable characteristics of the pre-settlement forest structure and composition for forest stands in low- and mixed-severity fire regimes. Because most riparian forests have not burned for 70-100 years, many trees that would have been killed by low- or moderate-severity fires are now too large to be killed by low severity prescribed fires. Mimicking the stand structure produced by the low- and mixed-severity fire regimes that were present in the pre-settlement period would promote the recruitment of shade-intolerant, fire resistant tree species, increase overall tree vigor, increase structural

diversity, and create a more discontinuous forest canopy, restricting the spread of high-severity crown fires (Messier et al. 2012).

Figure 3-1. Species Relationship of 10-Year Incremental Diameter Growth



Pine species in the analysis area are becoming scarce. Forest stands in the analysis area that were identified as pine and Douglas-fir plant associations where pine are naturally encountered, shade tolerant species are encroaching and successfully competing against pine and oak species for soil nutrients, water, and growing space. Douglas-fir continues to advance into the shaded forest floor, occupying the growing space in the understory, and excluding the shade intolerant species from naturally regenerating. Pine species currently exhibit poor vigor and their individual tree growth rates are declining.

c. Forest Insects and Pathogens

Most conifers have an associated bark beetle that is capable of killing the tree under the right conditions (The Southwest Oregon Forest Insect and Disease Service Center). The bark beetles successfully colonize live trees when their host is under some form of physiological stress. Dolph (1985) found that bark beetle attack occurred in unmanaged stands when trees grew a slow 20 or more annual rings per inch (less than or equal to one inch diameter growth per decade). Entomologists and silviculturists have found that at least 1.5 inches of tree diameter growth per decade decreases the risk of bark beetle attack (Cochran 1992; Chadwick and Eglitis 2007; USDA 1998).

Pine bark beetles are initially attracted to pines that are under stress. Once a stressed tree has been successfully invaded, pheromones emitted by invading beetles attract additional beetles to the same tree, overpowering its defenses. A vigorous tree is able to eject invading beetles with its pitch; a tree under stress has a reduced capability of responding to the invasion. As a general rule, stands where growth rates are greater than or equal to 1.5 inches of diameter growth per decade or with less than 150 square feet of basal area[2] per acre are less

[2] Basal Area - a) Of a tree: the cross-sectional area, expressed in square feet, of a tree stem measured at breast height. b) Of a forest stand: the total cross-sectional area of all the trees in a stand, measured at breast height, expressed in square feet per acre. Measurement of how much of a site is occupied by trees; directly related to stand volume and density.

prone to pine bark beetle attack. Stands on south and east aspects below 3,500 foot elevations are particularly vulnerable when their densities are high (USDA 1998). Douglas-fir bark beetles and flat-headed wood borers are attacking Douglas-fir at low to mid elevations in the Analysis area. Western pine beetle (*Dendroctonus brevicomis)* is attacking ponderosa pine in the Analysis area, particularly in pine dominated stands and savannahs. According to DeMars and Roettgering (1982), western pine beetles "breed in and kill scattered, overmature, slow-growing, decadent, or diseased trees and trees weakened by stand stagnation, lightning, fire, or mechanical injury." The beetles can aggressively attack and kill ponderosa pine of all ages and vigor classes, including vigorous host trees from 6 inches in diameter and larger. Group mortality can occur in dense overstocked stands or in dense pockets within a stand. Extensive mortality adversely affects distribution of trees and stocking level, depletes timber supplies, and increases fuel loading which can lead to catastrophic fires. DeMars and Roettgering describe tree resistance as one of the biotic conditions affecting outbreaks and beetle caused mortality. Vigorous trees produce sufficient oleoresins to expel beetles from their boring chambers inhibiting larval and fungal development. They suggest that prevention is the preferred method of control. "By maintaining thrifty, vigorous trees or stands that do not afford a suitable food supply for the beetle," land managers can prevent susceptibility of hosts to insect damage.

The susceptibility of trees to damage by bark beetles can be mitigated by stocking control which is tied closely together with tree vigor (Larsson et al. 1983). Stocking control increases growing space, water and nutrient availability, sunlight penetration, and photosynthesis rates. Altogether, site disturbance such as fire and thinning improves tree vigor. Trees with vigor ratings above 70 can emit sufficient oleoresins to repel invading beetles and survive even relatively heavy insect attacks. Beetle infestations are occurring in the analysis area and causing mortality in small pockets. Although there is not a current widespread beetle infestation, treatments are designed to improve the vigor of trees to withstand potential outbreaks. Treatments primarily bring the vigor of ponderosa pine to a level where they can withstand attacks of any intensity in order to ensure the survival and perpetuation of pine in the analysis area. DeMars and Roettgering (1982) recommend that "reducing stand stocking to 55 to 70 percent of the basal area needed for full site utilization will relieve the competitive stress among the remaining trees, improve their vigor, and make them less prone to successful bark beetle attack." Whenever stand basal area exceeds 120 square feet per acre on drier sites or 140 square feet per acre on moister sites, the risk of beetle infestation is high (USDI 1995a).

Waring and Schlesinger (1985) establish that a reduction in canopy leaf area following a disturbance such as a silvicultural system, fire, insect, or disease induced mortality increases the penetration of radiation and precipitation to the forest floor thereby increasing soil temperature and available water supply. The overall rate of decomposition in a forest ecosystem is largely determined by temperature and moisture with temperature of primary importance; increasing the soil temperature and moisture stimulates microbial activity and mineralization (Waring and Schlesinger 1985). As forests recover, nutrient and water uptake per unit of leaf area increases as well as the rate of wood production per unit of leaf area.

In the last decade the average diameter growth in the Pilot Thompson analysis area for Douglas-fir was 1.22 inches/decade. As a general rule, stands with growth rates equal to or greater than 1.5 inches of diameter growth per decade are less prone to bark beetle attack (USDA 1998). This growth rate falls short of the 1.5 inches of diameter growth per decade required to withstand bark beetle attack. If all influencing variables - temperature, precipitation, soils, elevation, and densities - remain constant or worsen in terms of optimal forest productivity, diameter growth within the analysis area will continue to decline.

Bark beetle infestations are prevalent in the Pilot Thompson analysis area. Western pine beetles (*Dendroctonus brevicomis*) are attacking pines, while flat-headed wood borers (*Phaenops drummondi*) and Douglas-fir beetles (*Dendroctonus pseudotsugae*) are killing Douglas-fir. Drought conditions and high stocking levels are severely stressing the trees physiologically, enabling the beetles to enter and kill the trees. In the forest stands where tree core measurements were taken, the average tree vigor rating as measured by leaf area index for Douglas-fir was 50. Of the 342 Douglas-fir trees measured in these stands, 82 percent of the trees had vigor ratings below 70 and 22 percent had ratings below 30. Trees with vigor ratings below 30 will succumb to attack from bark beetles of

relatively low intensity. Trees with vigor ratings from 30-70 can withstand progressively higher attacks but are still in danger of mortality from infestation (Christiansen et al. 1987; Waring and Pitman 1985). Trees with a vigor rating of between 70-100 can generally survive one or more years of relatively heavy attacks and trees with ratings above 100 cannot be killed by bark beetles. Based on Waring's vigor rating index, the data indicates that Douglas-fir in the Analysis area can withstand progressively higher attacks but are still in danger of mortality from infestation. The 10-year diameter growth rates of ponderosa pine and Douglas-fir in the last decade indicates that these species are predisposed to bark beetle attack in the Pilot Thompson analysis area.

Forest pathogens and subsequent beetle kill continue to shape forest stand structure and forest development patterns by creating openings of varied sizes and allowing light to reach the forest floor. Douglas-fir dwarf mistletoe (*Arceuthobium douglasii*) and *Phellinus pini* (red ring rot) also create similar patterns in the analysis area, affecting Douglas-fir growth and vigor of all age and size classes. The most severe cases of red ring rot appear to be more common on dry sites when trees are stressed, while Douglas-fir dwarf mistletoe is more commonly found above 3500 feet in elevation in the analysis area. These forest pathogens continue to persist on site until a disturbance shifts their populations.

d. Coarse Woody Material

Many ecological processes have created the even and uneven-aged forest stand structure over the last century. These same processes are responsible for the variable amounts of coarse woody material (CWM) across the landscape. The Guidelines for Snag and Down Wood Prescriptions in Southwestern Oregon (White 2001) states that amounts of coarse woody material across landscapes are highly variable and should vary over time with stand development. Amounts of CWM are influenced by forest stand history, soils and respective plant associations, climate, and topography.

All stand prescriptions will have the intermediate (thinning) silviculture method applied to them. Information Bulletin No. OR-97-064 for the implementation of coarse woody debris standards and guidelines (USDI 1996) states that "prescriptions should account for current habitat conditions and the timing and development of subsequent snags and coarse woody material (CWM) until the next stand once again begins to contribute CWM." All of the intermediate harvest method forest stands will have no less than 30 live trees (largest diameter trees available) per acre remaining after harvest and are not prescribed for final harvest in this project. Many of these trees will be available to supply future CWM or snags to the sites. Approximately twenty-two thousand feet of woody material transects were sampled in the analysis area. The average amount of coarse woody material is 7.1 tons per acre (decay classes 1 through 5; 5-inch intercept minimum; 8-foot length minimum). This may well reflect average conditions for mature seral stands on harsh sites. The coarse woody material large end stem diameters range from 3 to 50 inches and averaged 1,597 feet per acre for all decay and diameter classes. Coarse woody material was most often found to be in decomposition classes 3 and 4. Tons per acre of CWM range from 0.3 to 21.7. As a general rule, the amount of CWM increases with stand maturity. In addition to CWM on the ground, the average number of live damaged (trees with physical defects and pathogens) trees per acre is 19 and ranges from 0 in some young pole stands to 69 damaged trees per acre in older, mature forest stands. The average number of snags (3 inch DBH trees and larger) per acre is 11 and ranges from 0 to 46 (3.0 to 40 inches DBH). The present amounts of CWM fall within the ranges discussed in White's publication (2001) for respective plant association groups (PAG).

2. Environmental Effects

a. Alternative 1- No Action

Alternative 1 (No Action) would allow forest stands to remain at the current relative density index, allowing density dependent mortality to occur and leaving forested stands more susceptible to insect and disease agents. Stand densities would continue on their current trajectory of stand development and remain overpopulated. The current average relative density for the area indicates that physiologically the trees have entered the zone of

imminent suppression and mortality. No action would allow forest stands to remain overstocked and individual tree vigor and growth would remain poor.

When stand density increases, competition for resources and space increases as well. Growing conditions become so stagnant (at or above stand density index of 0.55) that intense competition follows and the stand begins excluding the weakest trees. During competition, trees commit their energy sources for survival above their competing neighbors. This exhaustive effort predisposes a tree to damage or mortality by incoming insects and diseases. An assessment of ecosystem health was done in 1995 on the Applegate Adaptive Management Area by a team of interdisciplinary scientists. The team concluded that stand densities have increased two to three fold from historic levels. Tree mortality rates, insect and disease populations, and fire hazard have also increased. These conditions are considered outside the range of natural variability for the conifer stands in the analysis area. Once outside the range of natural variability, ecosystem stability, biological diversity, resilience and ecosystem health are reduced (Atzet and Martin 1992). The No Action alternative allows stands to remain outside the natural range of variability.

Without management action, individual legacy trees including ponderosa pine, sugar pine, and Douglas-fir trees, with younger trees within their drip line, will continue to struggle to compete for resources. Uncharacteristic levels of plant competition around these legacy features compromise the longevity of these important dry forest stand components. These older trees should develop large crowns, large diameter limbs, and deep fissures in the bark. Maguire et al. (1991) found that large branches develop only on widely spaced trees or on trees adjacent to gaps or openings. Deep fissures in the bark and prominent fire scars are characteristic of large diameter Douglas-fir trees in dry forest stands.

Without action, forest structure and species composition will not be managed. Pines require at least 25 percent full sunlight, so shade tolerant Douglas-fir would continue to encroach and stands would remain in the stem exclusion stage of development in the absence of disturbance. Because Douglas-fir (less drought tolerant and fire resilient) is growing on sites better suited for early seral species (ponderosa pine, oaks), the more shade tolerant species exhibit poor vigor and require more moisture than the site can deliver, become easily stressed, and succumb to density mortality or beetle kill. The data indicates that based on Waring's vigor rating indices, last decade's growth rate, and relative density indices, conifer stands in the analysis area are threatened.

High stand density levels in these forested communities also present a high fuel hazard across the landscape. The Medford District RMP describes the Forest Condition (Forest Health) Restoration Objective that requires management emphasis on treatments and harvests that restore stand condition and ecosystem productivity. It directs management actions to include density management and understory reduction operations that reduce competition, increased use of understory prescribed fire, and fertilization (USDI 1995). No action contradicts the Medford District Resource Management Plan forest condition objectives in regard to forest health.

Shade intolerant pine and oak species would continue to decline in number from competition with encroaching shade tolerant species, such as Douglas-fir. Leaf area index would decline as live tree crowns decrease in size from tree competition. With large tree mortality, forest stand structure would gradually shift to the understory re-initiation stage. This is a transition phase when trees in the main canopy layer start to die, either singly or in small groups, from root diseases, lightning, wind-throw, and insects. This is ecologically significant in that resources previously used by a dead tree are reallocated to the surviving vegetation. These small diameter trees, instead of dying out, would continue developing into a dense unhealthy forest structure prone to a perpetual cycle of root disease infection, catastrophic fire, and eventual dieback from intense competition.

Fire suppression has altered landscape structural densities and species composition. Without any form of density control, including the crown bulk density of older stands that contribute to stand replacing fires, slow tree growth and poor vigor would result in individual tree and stand mortality. A decrease in stand vigor is expected with continued overstocking and increasing stand age. With regard to species and biological diversity, forested stands in the Analysis area have become predisposed to stand replacing fires and insect and disease epidemics.

When left undisturbed, stands continue to grow and produce new seedlings, although in unhealthy and dense conditions. Douglas-fir, a shade tolerant species, continues to occupy densely populated and thus shaded sites, even sites that previously saw far fewer numbers of Douglas-fir than exist today.

In the No Action alternative, abundance of shade intolerant species such as pine and oak would be reduced due to lack of regeneration opportunities and large tree mortality (Russell and Honkala 1990). Regeneration of these ecosystem components would continue to be limited by lack of canopy gaps (light to the forest floor) and high duff/litter layers (North et al. 2004). The longevity of large, pre-fire exclusion pines and black oaks would be shortened by competition from post-fire exclusion vegetation. Thus, stand diversity in terms of species abundance and vertical structure would continue to be reduced.

Past Actions

Since the implementation of the Medford District ROD/RMP in 1995, harvest has occurred on 3,859 acres of the 11,862 acres of BLM-administered forested lands within the Pilot Thompson planning area of the Middle Applegate fifth field watershed. Density reduction treatments (e.g. commercial thinning, density management, and restoration thinning) occurred on approximately 66 percent of the treatment acres, selection harvest about 15 percent, regeneration harvest on 9 percent, mortality salvage about 8 percent, and clearcut harvest on about 2 percent. Commercial thinning and density management has redistributed growth from many small trees to fewer large healthy trees. Additionally, 587 acres of pre-commercial thinning has been completed since 1995 on BLM-administered lands within the Pilot Thompson planning area of the Middle Applegate fifth field watershed. Because pre-commercial thinning removes only a portion of the trees 7 inches in diameter and smaller, the effects of treatment would be less than a commercial harvest. Past vegetation treatments to reduce hazardous fuels on BLM-administered land is discussed later in the Fire and Fuels section of this EA.

On roughly 282 acres of private industrial timber lands in the planning area, harvest activities have ranged from partial harvests to clearcuts. Most of the private industrial timber lands have been logged over the past five years. Within these stands, management objectives are to maximize volume growth per acre. Of the 6,479 acres of privately owned lands within the Pilot Thompson planning area of the Middle Applegate fifth field watershed, varying levels of harvest have occurred over the past 60 to 80 years. Conifer growth and timber yield rates for these lands are unknown. Most of these lands are located near valley bottoms and generally occur in the lowest elevations in the watershed.

Present Actions

Currently there is no commercial or pre-commercial thinning occurring on BLM-administered lands in the Pilot Thompson planning area of the Middle Applegate fifth field watershed. Present vegetation treatments that reduce hazardous fuels on BLM-administered land are discussed later in the Fire and Fuels section of this EA. On private industrial timber lands the amount and duration of logging activity is unknown. On lands owned by private individuals, the amount of logging is unknown, but harvesting is generally limited to small areas and individual trees are used for lumber or firewood.

Future Actions

No future timber sales are being planned by the BLM in the Pilot Thompson planning area of the Middle Applegate fifth field watershed within the 5-year planning cycle. Vegetative treatments such as protection, maintenance, pre-commercial thinning, and release may occur. Within such stands, brush and hardwood control and pre-commercial thinning are the two primary management activities most likely to occur, both of which would reduce stand densities, increase conifer growth, and redirect forest stands towards conditions that would be more resilient to landscape disturbances. These treatments would enhance seedling survival, reduce vegetative competition, and allow for increased conifer growth. Future vegetation treatments that reduce hazardous fuels on BLM-administered land are discussed later in the Fire and Fuels section of this EA.

On private industrial forest lands, harvest plans are unknown. However, in stands with an average 8-inch DBH and greater, we can reasonably expect commercial harvest within the next 5 to 10 years. Industrial landowners would most likely use silvicultural methods (e.g., clearcut and overstory removal) that create early seral stands. Post-harvest activities, such as conifer planting, applying herbicides to control brush and hardwoods, and pre-commercial thinning, would likely be scheduled to insure the survival, establishment, and maximum growth per acre of conifers. In stands less than 8 inches DBH, little commercial logging is expected in the next 15 to 20 years. On privately owned lands, limited harvesting activities are expected. Occasional logging of large individual trees would occur and would most likely be limited to small areas.

b. Alternative 2

Refer to Chapter 2, Section C.1 for Silvicultural Prescriptions of the proposed action for the Pilot Thompson Project.

Effects of Management on Stand Growth and Vigor

Stands were modeled in a growth and yield modeling system called ORGANON (Hann 2003). Developed at Oregon State University, College of Forestry, the model predicts forest growth outputs based on scientific formulas programmed into it. This model was used to better capture the difference of effects of forest treatments vs. no forest treatments. The Southwest Oregon variant was used to model stands in the analysis area. Results of predicted outputs can be viewed in Table 3-3. Similar stands of each vegetation type were studied to develop the prescriptions. Currently, the relative densities of stands throughout the analysis area are high. This is primarily due to the lack of large-scale natural disturbance, fire suppression, and lack of silvicultural treatments. Table 3-3 shows the current trees per acre to demonstrate the relationship of relative density index (RDI) of a stand and the amount of trees occupying that same stand. As relative density is reduced the amount of trees will follow the same decreasing trend. Table 3-3 shows the growth of conifer stands in the Pilot Thompson analysis area with and without management intervention.

Table 3-3. ORGANON Modeled Stands; Thinned vs. Un-thinned

UNIT # POLES MID MATURE	STAND AGE	CURRENT TREES PER ACRE	CURRENT BA/AC (FT^2)	PROJECTED BA/AC (FT^2) AFTER INITIAL HARVEST	CURRENT RELATIVE DENSITY INDEX	PROJECTED RDI AFTER INITIAL HARVEST	PROJECTED RDI IN 30 YEARS UNTHINNED	PROJECTED RDI IN 30 YEARS THINNED
POLES								
112319✠	80	1033	183	117	0.792	0.377	0.668	0.406
158080†	49	570	105	95	0.451	0.349	0.756	0.667
158088✠	76	974	144	110	0.645	0.349	0.813	0.506
MID								
157194✝	110	339	280	136	0.891	0.434	0.831	0.460
157197**	120	651	159	127	0.643	0.442	0.615	0.464
125566**	100	499	189	131	0.702	0.414	0.583	0.461
157559✝	110	254	168	117	0.558	0.371	0.509	0.395
157650**	101	638	225	127	0.847	0.434	0.576	0.402
155156✝	106	556	216	116	0.799	0.380	0.807	0.490
155163✝	94	565	299	140	0.990	0.416	0.880	0.500
155165✝	106	410	217	122	0.754	0.345	0.714	0.411
MATURE								
157233✝	140	191	179	120	0.555	0.387	0.590	0.441

UNIT # POLES MID MATURE	STAND AGE	CURRENT TREES PER ACRE	CURRENT BA/AC (FT^2)	PROJECTED BA/AC (FT^2) AFTER INITIAL HARVEST	CURRENT RELATIVE DENSITY INDEX	PROJECTED RDI AFTER INITIAL HARVEST	PROJECTED RDI IN 30 YEARS UNTHINNED	PROJECTED RDI IN 30 YEARS THINNED
158074✠	140	585	266	131	0.956	0.383	0.765	0.426
158548✠	150	110	201	135	0.548	0.359	0.577	0.397
125065✠	140	151	175	95	0.522	0.295	0.557	0.351
157636✠	146	148	231	126	0.649	0.314	0.707	0.396
129191✠	144	1528	175	139	0.822	0.377	0.879	0.458

✠ VARIABLE DENSITY THINNING PRESCRIPTION
✠ DENSITY MANAGEMENT INTERMEDIATE PRESCRIPTION
† DENSITY MANAGEMENT PRESCRIPTION
** RIPARIAN RESERVE THINNING PRESCRIPTION

Table 3-4 displays the difference between no action and a Density Management Intermediate treatment that involves the management of small trees (less than 20 inches DBH) in young and mid seral stands. No action exhibits tree loss through competition mortality versus a thinning treatment that reduces stand densities uncharacteristic of dry forest condition. Table 3-4 compares the difference between the treated and untreated condition of stand 112319 throughout a 50 year time period. The decreasing trend of trees per acre over a 50 year time period is a direct effect of competition mortality that naturally occurs as stands develop and forest management treatments are not applied. However, without stand treatments that reduce trees per acre, relative densities remain above the 0.55 RDI threshold and leaves stands more vulnerable to disease and insect threat. The untreated stand, immediately following treatment, projects a reduction in relative density and an increase in quadratic mean diameter (QMD).

e. Tree Growth and Vigor

Trees in the Middle Applegate Watershed are growing at the slowest rates since the 1800s. Tree vigor is decreasing because timber stands are significantly overstocked. Decreases in tree vigor and growth have contributed to an overall decline in forest health. Forest health is quantified by assessing the physical environment itself, the forest's resistance to catastrophic change, tree mortality, changes in tree growth and vigor, changes in species composition, erosion, water drainage, stream flow, and nutrient cycling (USDI 1995a). A healthy forest ecosystem has the physical environment, biotic resources, and trophic networks necessary to sustain processes and viable populations of indigenous species. When these criteria are met, the ecosystem is able to maintain its productivity and resilience over time when exposed to drought, wildfire, insect attack, or human-induced changes. As mentioned earlier, vegetation densities are very high and ladder fuels are abundant for both upland and riparian forest stands in the Project Area. Stand species composition and structure shifts previously discussed in the vegetation class description sections could also be considered unhealthy. The replacement of ponderosa pine by Douglas-fir increases the percentage of drought-susceptible trees in a stand; therefore, the risk of beetle infestation and/or wildfire also increases.

Waring et al. (1980) developed a vigor rating using a physiological index of growth efficiency. The Waring Tree Vigor Index is a measure of health defined as the ratio of annual growth of stemwood to the area of leaves present to capture sunlight (Waring et al. 1980). The vigor ratings can be accurately applied to individual trees and are comparable among conifers (Larsson et al. 1983). Vigorous trees have higher levels of productivity and increased incremental growth. Trees with high ratios of live crown will have more photosynthetic surface area and thus more photosynthetic capacity, subsequently increasing carbohydrate production for storage, seed production, and stem wood growth. Vigorous trees can also fight off beetle attacks with greater success. Waring

and Pitman (1985) concluded that trees attacked and killed by bark beetles had such low carbohydrate reserves that they lacked the ability to produce sufficient oleoresins which protect the tree against beetles.

Vigor rating index numbers are calculations of stem growth per unit of leaf area expressed as grams of stem growth per meter squared per year (g/m²/yr). Trees with vigor ratings below 30 (g/m²/yr) will succumb to attack from bark beetles of relatively low intensity. Trees with vigor ratings from 30-70 can withstand progressively higher attacks but are still in danger of mortality from infestation. Trees with a vigor rating of 70-100 can generally survive one or more years of relatively heavy attacks and trees with ratings above 100 cannot be killed by bark beetles (Christiansen et al. 1987; Waring and Pitman 1985).

Core measurements were taken from 342 Douglas-fir sample trees representing all vegetation condition classes. Sample tree cores were taken from forest stands across the analysis area representing all vegetation condition classes, major conifer species, and plant association groups across the analysis area. The average diameter at breast height (DBH) for of all Douglas-fir sample trees equaled 20.3 inches and the average age cored was 99 years. Each core was measured to determine individual tree age and growth rates. The 10-year incremental growth data for Douglas-fir reveals a current rate of 1.22 inches per decade (Figure 3-1). Individual tree vigor of Douglas-fir was determined from these measurements. Vigor ratings were derived using the Waring Tree Vigor Index and growth rates were tabulated by decade. Figure 3-1 illustrates the 10-year growth rate of all Douglas-fir sample trees, spanning a period from the year 1811 to 2011.

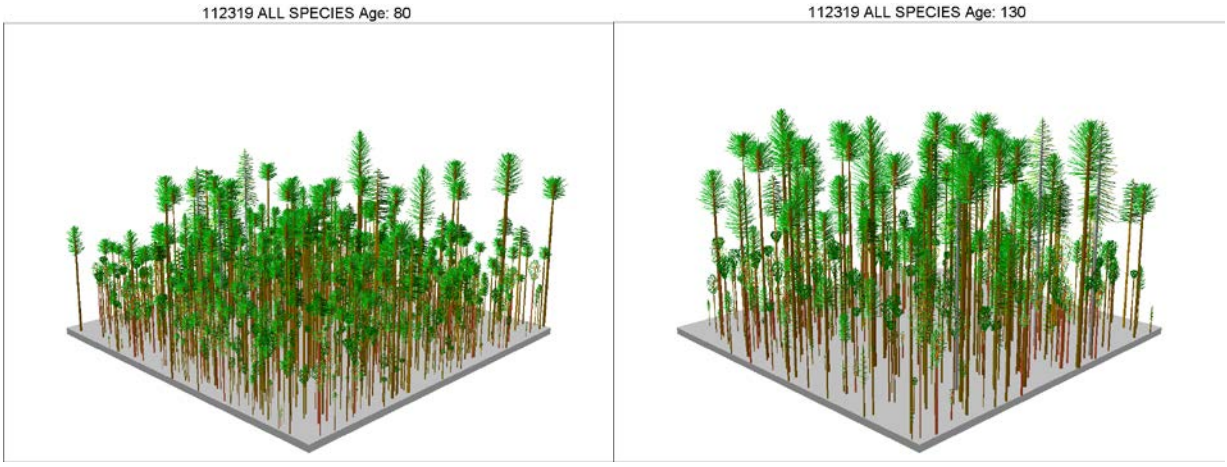
Core measurements were taken from 86 ponderosa pine sample trees representing all vegetation condition classes. The 10-year incremental growth data for ponderosa pine reveals a current rate of 0.78 inches per decade (Figure 3-1). The current average ponderosa pine tree vigor rating is 22.07 g of annual wood production per square meter of foliage. The data indicates that, based on Waring's vigor rating indices, last decade's growth rate, and relative density indices, ponderosa pine survival in the analysis area is threatened. Ponderosa pine species in the analysis area are growing at a rate that leaves them prone to and at increased risk of bark beetle attack. Regarding tree vigor in general, a vigor index of 19.53 grams of stem growth per meter squared per year (g/m²/yr) is very low.

Table 3-4. Description of Stand 112319 with and without Density Management Intermediate Treatment

Existing Stand: 112319 (Pole Stand)										
Stand Age	Trees Per Acre	Basal Area	Relative Density Index			Quadratic Mean Diameter			Mean Live Crown Ratio	
80	1,033	183	0.792			5.7			0.250	
Growth of Stand if Not Treated (note the decline in trees / acre from natural mortality)						Growth of Stand if Thinned				
Stand Age	TPA	BA	RDI	QMD	Mean Live Crown Ratio	TPA	BA	RDI	QMD	Mean Live Crown Ratio
80	1,033	183	0.792	5.7	0.250	151	117	0.377	11.9	0.238
110	489	178	0.668	8.2	0.318	112	138	0.406	15	0.340
130	373	191	0.669	9.7	0.323	100	159	0.446	17	0.321

The Stand Visualization System (SVS) illustrates the prescriptions to portray what existing forest stands look like today and after application of the proposed prescriptions (USDA and University of Washington, 1995). ORGANON plot data was input into the SVS program for the simulations. The following images represent the current and projected post-harvest condition of stand 112319 (Figure 3-2(c)).

Figure 3-2. Stand 112319



(a): Original Stand Condition **(b): 50-Year Untreated Stand Condition**

Figure 3-2 illustrates the pre and post-harvest stand conditions of a mid seral Douglas-fir stand in the Douglas-fir-ponderosa pine/poison oak plant association. Currently, the stand has 1033 TPA, a relative density index of 0.792, and a quadratic mean diameter of 5.7 (Figure 3-2(a)). The species composition after a 50 year untreated stand projects 48 percent conifer (Douglas-fir and cedar), 50 percent hardwoods, and 2 percent pine species (Figure 3-2 (b)).

Figure 3-2(cont.) Stand 112319

(c): Post Harvest Stand Condition **(d): 50-Year Post Harvest Stand Condition**

The stand immediately after harvest produces an outcome that lowers the RDI to 0.377 (Figure 3-2 (c)). Immediately following harvest the stand exhibits a projected 151 TPA, a basal area of 117 ft^2 per acre, and a quadratic mean diameter of 11.9 (Figure 3-2 (c)). The species composition after a 50 year post harvest stand projects 66 percent conifer (Douglas-fir and cedar), 20 percent hardwoods, and 14 percent pine species (Figure 3-2 (d)).

Table 3-5. Description of Stand 158074 with and without Variable Density Thinning

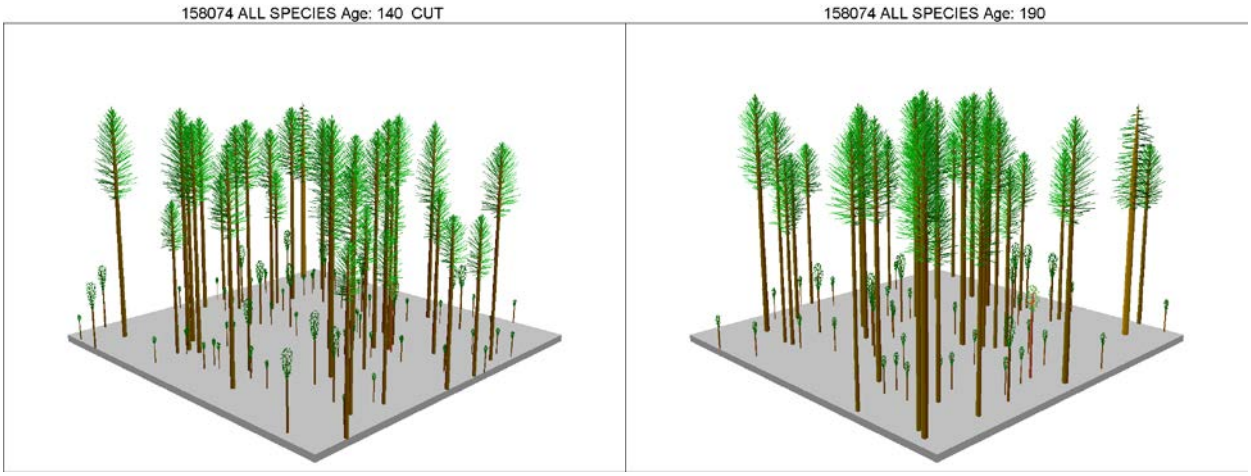
Existing Stand: 158074 (Mature Stand)										
Stand Age	Trees Per Acre	Basal Area	Relative Density Index			Quadratic Mean Diameter				Mean Live Crown Ratio
140	585	266	.956			9.1				.211
Growth of Stand if Not Treated (note the decline in trees / acre from natural mortality)						Growth of Stand if Thinned				
Stand Age	TPA	BA	RDI	QMD	Mean Live Crown Ratio	TPA	BA	RDI	QMD	Mean Live Crown Ratio
140	585	266	.956	9.1	.211	104	131	.383	15.1	.334
170	183	269	.765	16.4	.271	80	159	.426	19	.388
190	132	280	.742	19.7	.272	72	178	.457	21.3	.373

Table 3-5 displays the difference between no action and a Variable Density Thinning treatment and compares the difference between the treated and untreated condition of stand 158074 throughout a 50 year time period. The original stand exhibited a RDI of 0.956 (a RDI from 0.55 to 1.00 bounds the zone of imminent mortality and suppression) and 585 trees per acre. The untreated stand, 50 years later, projects a reduction in trees per acre each decade resulting from competition induced mortality. Each decade compounds the competition as a result of uncontrolled densities. However, in comparison, the fewer numbers of trees lost per acre per decade occurs in the treated stand due to a prescription that lowers the RDI from 0.956 to 0.383. After 50 years, the untreated stand holds 132 TPA at a stand RDI of 0.742. In contrast, the 50 year treated stand holds 72 trees per acre at a stand RDI of 0.457 (still below the threshold of 0.550; anything at 0.55 and greater results in mortality from competition between trees for limited resources).

Figure 3-3 illustrates the pre and post-harvest stand conditions of a mature Douglas-fir stand in the Douglas-fir-ponderosa pine/poison oak plant association. The stand immediately after harvest produces an outcome that lowers the RDI to 0.383 (Figure 3-3 (c)). Immediately following harvest the stand exhibits a projected 104 TPA, a basal area of 131 ft² per acre, and a quadratic mean diameter of 15.1 (Figure 3-3 (c)).

Figure 3-3. Stand 158074

(a): Original Stand Condition **(b): 50-Year Untreated Stand Condition**



(c): Post Harvest Stand Condition **(d): 50-Year Post Harvest Stand Condition**

Table 3-6 displays the difference between no action and a Riparian Reserve Thinning treatment that involves the removal of trees in a "thin from below" management strategy. No action exhibits current stand densities above the recommended level versus a thinning treatment that reduces stand densities characteristic of dry forest condition. The untreated stand, immediately following treatment, projects a reduction in relative density and an increase in quadratic mean diameter.

Table 3-6. Description of Stand(s) with and without Riparian Reserve Thinning

Riparian Reserve (Intermittent) Stands										
Growth of Stand if Not Treated						Growth of Stand if Thinned				
Unit #	TPA	Canopy Cover	RDI	QMD	Basal Area	TPA	Canopy Cover	RDI	QMD	Basal Area
157650	638	100	0.847	8.0	224	223	54	0.434	10.2	127
125566	499	90	0.702	8.3	189	152	55	0.414	9.9	131
157197	651	84	0.643	6.7	159	238	52	0.442	9.9	127

Alternative 2 includes 1,226 acres of various levels of commercial harvest, representing 9 percent of the BLM-administered lands in the analysis area. Under this alternative 10 percent of the forest land base in the analysis area is proposed for commercial treatment. This amount constitutes 5 percent of the planning area (10,636 acres of forestland in the analysis area are not being treated commercially). Non-commercial treatments are proposed on 2,214 acres, representing 15 percent of the land base in the analysis area under this alternative. The total footprint for all non-commercial vegetation treatments on BLM-administered lands for this alternative is 1,128 acres or 5 percent of the planning area. Additionally, 1,086 acres of Understory Reduction (UR) treatments are prescribed in stands with commercial thinning. Thus, the total footprint of all non-commercial vegetation treatments in the analysis area for this alternative is 2,214 acres or 10 percent of the planning area.

Stand densities would be reduced on about 2,354 acres of BLM matrix lands. In commercial harvest stands (variable density thinning, density management/intermediate treatment, and riparian reserve thinning) and non-commercial stands (density management plantation and non-plantation), the number of trees per acre would be reduced toward levels the site has water and nutrients to sustain. With a reduction of tree density below 55 percent relative density, the annual mortality rate would decline by about 50 percent. These silvicultural treatments would generally result in stands with fewer but larger trees and trees with increased growth rates. The healthiest large conifers and hardwoods would be maintained by reducing adjacent competing vegetation, insuring the long-term ecological benefits of large trees are present within the landscape for the foreseeable

future. The trend of forest conditions in the treated stands would improve and approach the range of natural variation associated with the plant series, leading to more complex stand structures. With an increase in tree vigor, the treated stands would be less susceptible to insects and disease. Tree species diversity would be maintained or enhanced with these proposed treatments to maintain shade intolerant species such as pine. Alternative 2 would limit the effects described above in the No-Action Alternative. These treatments combined with past, present (hazardous fuel reduction), and future density reduction treatments in the watershed would improve stand and landscape resistance and resiliency to environmental disturbances. Commercial and non-commercial thinning would reduce stand densities on BLM-administered lands. Tree growth and vigor would improve by reducing the competition for limited site resources. This would increase the resiliency of stands and larger, older trees to ensure their longevity.

Variable Density Thinning treatments would increase diversity in horizontal and vertical stand structure through the incorporation of “skips” and “gaps.” Variable Density Thinning and Density Management would also help to accelerate the development of multi-layered stand structure and reduce hazardous ladder fuels. The incorporation of “skips” (untreated areas) would provide diverse horizontal spatial arrangement in homogeneous stands and protect ecologically significant patches. The creation of “gaps” (open areas) would mimic natural openings that once existed in the dry forest environment and provide opportunities for drought tolerant and shade intolerant species to survive and regenerate. Creating variable forest stand structure through thinning would allow suitable growing conditions for shade intolerant oak and pine species to regenerate, thereby increasing species diversity within the stand. The no action alternative would compromise these benefits to wildlife which requires a range of conditions, from dense closed canopy forest to more open areas and gaps. Alternative 2 would break up surface and crown fuels that have been created under a regime of fire exclusion. The excess, small diameter conifer trees less than 8 inches DBH would be cut from under the drip lines of old-growth trees and shade intolerant pines to assure their survival. Elsewhere, the excess tree stems would be thinned to a desired stocking level to improve the growth and vigor of the remaining trees. Thinning would bring stands out of the stem exclusion or closed-canopy stage and accelerate the development of conditions found in late seral forests (Hayes et al. 1997). These treatments are designed to increase drought resistant conifer and hardwood species such as ponderosa pine, black oak and incense cedar. Maintaining these drought resistant species ensures the resiliency of forest stands during cycles of drought.

Depending on site conditions the response of vegetation from proposed treatments, including gaps, will vary dramatically. Understory species and/or early seral species will respond to increased light environments, just like they do in response to natural disturbances. Some gaps will eventually become occupied with tree species, while others could fill in with grasses and forbs. Aspect, elevation, and soil type will dictate the outcome or vegetation response in gaps. Gaps make up a relatively small percentage of area (15% +/-) and are scattered throughout the matrix of a stand. These gaps may result in increased fuels; however, the spatial arrangement of these gaps do not create a horizontal contiguous fuel load at the stand level. Nitrogen fixing species, such as deerbrush (brush), may occupy gaps, creating a natural and suitable environment for tree species in the future. Outside of gaps (matrix) the stands will be thinned to a level that creates a light environment more suitable for tree species, rather than grasses and shrub (brush) species. In some stands, ground and ladder fuels will eventually return in the form of tree and shrub species and will require a follow up non-commercial or intermediate treatment to reduce stand densities (see Fire and Fuels section for more details).

Alternative 2 proposes 0.37 mile of permanent road construction. Permanent road construction would remove all vegetation within the road prism. The new roads would be converted from conifer forests to non-forested lands and would no longer contribute to future conifer growth or yield. Approximately 0.37 mile of permanent road construction would convert about 0.67 acres of forested land to non-forested lands.

If surrounding private lands are lost from wildfire, BLM-administered lands would have patches of treated forest and would continue to provide long-term forest complexity and variable habitat. If active forest management occurs in stands proposed for treatment in the project area the risk of wildfire reaching Late Successional Emphasis Areas (see wildlife section) would be reduced. Surrounding BLM-administered lands in the Middle

Applegate Watershed would be managed with similar prescriptions to assure forest health. Additionally, minimizing the spread of insects and fire to adjacent lands would reduce cumulative effects of insects and fire. These effects would be beneficial to forest stands, rather than detrimental.

This alternative allows for active forest management in dry forest stands to occur that will meet multiple stand and landscape level objectives discussed in Chapter 2. There is no single stand level objective under this prescription. Fairly uniform thinning of trees and a strict "thin from below" is not prescribed here. There are multiple objectives that need to be met in order to avoid neglecting the integrity of dry forest function and processes. The prescribed treatments under this proposed action allows flexibility in managing stands in the long-term. The retention of drought tolerant and fire resilient species of older age classes and the contribution of developing spatially heterogeneous stands, allows for more silvicultural options in the future, versus an even-age management approach in dry forests. Maintaining the longevity and health of these stands into the future is critically important in balancing ecological, social and economic values.

c. Alternative 3

Refer to Chapter 2, Section C.1 for Silvicultural Prescriptions of the proposed action for the Pilot Thompson Project.

The stand level effects described in Alternative 2 are the same for Alternative 3, with some differences in the landscape level effects. Alternative 3 includes 1,593 acres of various levels of commercial harvest, representing 11 percent of the BLM-administered lands in the analysis area. Under this alternative, 13 percent of the forest land base in the analysis area is proposed for commercial treatment. This amount constitutes 7 percent of the planning area (10,269 acres of forestland in the analysis area are not being treated commercially). Non-commercial treatments are proposed on 2,322 acres, representing 16 percent of the land base in the analysis area under this alternative. The total footprint for all non-commercial vegetation treatments on BLM-administered lands for this alternative is 1,128 acres or 5 percent of the planning area. Additionally, 1,192 acres of Understory Reduction (UR) treatments are prescribed in stands with commercial treatment. Thus, the total footprint of all non-commercial vegetation treatments in the Analysis Area for this alternative is 2,322 acres or 10 percent of the planning area. Alternative 3 would limit the effects described above in the No-Action Alternative, similar to Alternative 2. However, stand densities would be reduced on about 2,720 acres of BLM matrix lands, 366 more acres treated in Alternative 3 than Alternative 2 (2,354). These additional acres are a result of treatment units proposed for helicopter yarding. Because stand level objectives and prescriptions in Alternative 3 are similar to Alternative 2, cumulative effects from vegetation treatments would have the same effects at the stand level.

C. FIRE AND FUELS

1. Affected Environment

The landscapes that comprise the project area evolved with frequent fires affecting the vegetation and other key components of the ecosystem. Since the establishment of Euro-American settlement in this area, human relations and interactions with these landscapes have affected many of the processes that had previously played a large part in the evolution of the site. Of these interactions one management decision that has affected one of the evolutionary processes has been that of fire exclusion.

Fire is recognized as a key natural disturbance process throughout Southwest Oregon (Atzet and Wheeler 1982). Human-caused and lightning fires have been a source of disturbance to the landscape for thousands of years. Native Americans influenced vegetation patterns for over a thousand years by igniting fires to enhance values that were important to their culture (Pullen 1996). Early settlers to this area used fire to improve grazing and farming and to expose rock and soil for mining. Fire has played an important role in influencing successional processes.

Historically, frequent, low intensity fires maintained dry Douglas-fir and pine forest types in more open conditions than exist today (Agee 1993). Frequent, low intensity fires served as a thinning mechanism, thereby

naturally regulating the density of the forests. A more open crown structure would have allowed fire to travel more rapidly across the site with intensities that were short-lived. The light flashy surface fuels (grasses, shrubs, and conifer/hardwood litter), the repeated reduction of conifer reproduction underneath the overstory, and the repeated consumption of large fuels and duff build-up, would have reduced the post-fire effects (also described as fire severity) found on these sites historically. The qualities of the open crown structure would also provide better avenues for the heat intensity to vent out of the site without scorching the crowns to the lethal limit.

Fire Regimes

Climate and topography combine to create the fire regime found throughout the project area. Fire regime refers to the frequency, severity and extent of fires occurring in an area. Agee (1993) suggests that variable fire history, complex geology, land use history and steep environmental gradients of Douglas-fir hardwood forests of the southwest Oregon and Northern California Siskiyous prevents generalizations about fire and its ecological effects (Agee 1993, pp. 283-284). This is also true for the lower to mid elevations of the planning area which is characterized by steep terrain, Douglas-fir and pine forest types, and a history of anthropogenic fire use. However, plant association groups are a credible link to historic ecological process, including fire regimes that occurred on sites in the past (Franklin and Agee 2003). Historic fire regimes, and the departure from them, correlate to the change from historical to current vegetative structure. The change in vegetation also helps to describe the difference in fuel loading (dead fuels and live in the form of increased vegetation) from historical to current conditions.

These changes in vegetation and fuel conditions help to determine the expected change in fire behavior and its effects. This difference in many respects is attributed to fire exclusion, but also includes all human practices that would affect the extent, severity, or frequency of fire events compared to historical accounts. These practices include road building, livestock grazing, and some logging practices as well as fire suppression.

Three historic fire regimes are found within the analysis area (Schmidt et al. 2002):

Fire Regime 1: 0-35 years fire return interval, Low Severity

Typical climax plant communities include ponderosa pine, pine-oak woodlands, and oak woodlands. Large stand-replacing fire can occur under certain weather conditions, but are rare events (i.e. every 200 years).

Fire Regime 2: 0-35 years fire return interval, High Severity

This regime includes true grasslands and savannahs with typical return intervals of less than 10 years and ceanothus and Oregon chaparral with typical return intervals of 10-25 years. Fire severity is generally high to moderate.

Fire Regime 3: < 50 years fire return interval, Mixed Severity

Typical plant communities include mixed conifer and dry Douglas-fir forests. Lower severity fire tends to predominate in many events. This regime usually results in heterogeneous landscapes. Large, stand-replacing fires may occur but are usually rare events.

Dry pine and mixed-conifer forests comprise most of the Wests low-severity fire regimes (frequent fire, but low severity). In these fire regimes, fire suppression beginning after 1910 allowed far more trees to persist and logging concentrated on large, old trees (Biswell et al. 1973). These forests may have been deprived of 10 or more fire cycles. The historically low-severity fire regime has turned into a high-severity or mixed-severity fire regime over millions of hectares in the West (Morgan et al. 1996; Hann et al. 1997). Forest canopies in low-severity fire regimes are often closed, fuel loads are both higher and more contiguous, and fire return intervals are longer (McKenzie et al. 2000). Higher severity fires in low-severity fire regimes are more apt to have

detrimental effects on soils, watersheds, and wildlife habitat (Brown et al. 2004). All of the acres that are proposed for non-commercial treatments are in this fire regime.

Mixed-severity fire regimes (mosaics of frequent low severity and infrequent but high severity) are more difficult to describe due to complexities that result in a mosaic of fire effects. In forests characterized by mixed-severity fire regimes, stand-age maps may be combined with fire-scar reconstructions to characterize both high-severity and low-severity fire cycles (Baker and Ehle 2001). Severe fires currently on the landscape are more apt to result with severe effects than would have occurred historically (Agee 1998; Agee 2002). All the stands that are proposed for commercial harvest are in the dry-Douglas fir series.

a. Predicted Climate Changes

Several studies that model climatic change into the next century also caution land managers in the Pacific Northwest to plan for increased temperatures and possibly some increase in winter moisture in the form of rain over the coming years in the Pacific Northwest (Mote et al. 2003; Hessl et al. 2004; Mote et al. 2003). These forecasts would indicate and suggest that climatic factors may, in the future, have a more dramatic impact on wildland fire extent and severity. With increases in warmer winter moisture to inspire vegetation growth along with warmer and dryer conditions in the summer months, what is considered to be extreme drought conditions now, could easily be experienced with Pacific Dacadal Oscillations (PDO) or El Nino Southern Oscillation (ENSO) in the first half of this century. Change in ecosystem structure and spatial distribution is expected to result from this climatic variation, and wildland fire will be one of the agents that cause the changes in the ecosystems. Silviculture and fuels management treatments are one way land managers can enhance ecosystem resilience and protect private property.

b. Condition Class

The process for making an assessment on how much fire exclusion, along with other management activities, has affected an ecosystem is through classifying the current condition of the site based on a reference usually pre-dating when fire exclusion became an influence. Condition class descriptions are used to describe these affected ecosystems. Condition classes are a function of the degree of departure from historical fire regimes resulting in alterations of components such as species composition, structural stage, stand age, and canopy closure. There are three condition classes:

> Condition Class 1 - Fire regimes are within or near an historic range. The risk of losing key ecosystem components is low. Vegetation species composition and structure are intact and functioning within an historical range.
>
> Condition Class 2 - Fire regimes have been moderately altered from their historical range (more than one return interval). This change results in moderate changes to one or more of the following: fire size, frequency, intensity, severity, or landscape patterns.
>
> Condition Class 3 - Fire regimes have been significantly altered from their historical range. The risk of losing key ecosystem components is high. This change results in dramatic changes to fire size, frequency, severity, or landscape patterns.

Two action alternatives are proposed for this project. The amount of acres proposed for treatment range from approximately 2,354 to 2,720 acres. As a result of past fuels treatments, 659 acres proposed for treatment are in condition class 1. The remaining acres proposed for treatment, primarily dry Douglas-fir, mixed conifer and pine stands (Fire Regime 3), are in condition class 2 and 3. Stand densities are very high in some areas due to the absence of fire.

c. Fire Hazard

Fire hazard assesses vegetation by type, arrangement, volume, condition, and location. These characteristics combine to determine the threat of fire ignition, the spread of a fire, and the difficulty of fire control. Fire hazard is a useful tool in the planning process because it helps in the identification of broad areas within a watershed that could benefit from fuels management treatment. Hazard ratings were developed for the BLM-administered lands within the project area and reflect the results of past human and natural disturbances. On approximately 44 percent of the BLM-administered lands the existing fuel profile within the project area represents a moderate to high resistance to control under average climatic conditions. The following table shows the existing fire hazard of BLM-administered lands within the analysis area.

Table 3-7. Fire Hazard Rating Categories for the Pilot Thompson Analysis Area

Fire Hazard Rating	Percentage by Hazard Category
Low hazard	36%
Moderate / High Hazard	44%

d. Fire Risk

Fire risk is the probability of when a fire will occur within a given area. Historical records show that lightning and human caused fires are common in the project area. Activities within this area such as increased development of homes in the wildland urban interface dispersed camp sites, recreational use, and major travel corridors add to the risk component for the possibility of a fire occurring from human causes. The time frame most conducive for fires to occur in the project area is from July through September.

Information from the Oregon Department of Forestry database from 1960 to 2010 shows a total of 91 fires occurred throughout the project area. Lightning accounted for 43 percent of the total fires and human caused fires accounted for 57 percent. Fifty three percent of the fires started on BLM managed lands. Lightning accounted for 32 of the 48 fires which started on BLM land.

2. Effects of Past Management

Practices that have profoundly changed the structure and composition of low to mid elevation forests in the project area are historical and current land uses that encompass logging and road construction, in concert with the policies of fire suppression and results of drought events. These structural changes have contributed to the shift from low-intensity surface fires to severe stand-replacing fires (Kauffman 2004).

Past actions that have cumulatively contributed to the current wildfire behavior and potential include timber harvesting, fuels reduction, and fire suppression. Drought, in combination with dense forest stands, has resulted in high tree mortality, especially in the areas of pine and Dry Douglas-fir stands. This has resulted in increased fuel loads in these areas. Road building and land development (on private lands) have contributed to the current level of risk by expanding human influence further into the wildlands. Fire history recorded over the past 30 years in southwest Oregon indicate a trend of more large fires which burn at higher intensities in vegetation types associated with low to mixed severity fire regimes.

In the late 1990s, two landscape projects were implemented in the Lower and Middle Thompson Creek drainage. Approximately 3,859 acres of commercial timber land were thinned and followed up with prescribed burning. Oak woodlands and shrublands (approximately 2,364 acres) were also thinned and followed up with prescribed burning. Approximately 52 percent of all BLM-administered lands within the Thompson Creek drainage have had fuels reduction work completed on them since 1995. The fire hazard on these treated acres has been greatly reduced. The major ridge lines in the lower and middle Thompson drainage have had fuel breaks established and have been maintained with prescribed burning over the past 15 years.

a. Fire Suppression

Human-caused and lightning fires have been a source of disturbance to the landscape for thousands of years. Native Americans influenced vegetation patterns for over a thousand years by igniting fires to enhance values that were important to their culture (Pullen 1996). Early settlers to this area used fire to improve grazing and farming and to expose rock and soil for mining. Fire has played an important role in influencing successional processes. Historically, large fires were a common occurrence in the area; based on fire scars and vegetative patterns, fires were of varying severities.

As a result of the absence of fire, there has been a build-up of unnatural levels of fuel and a change to fire-prone vegetative conditions. This is particularly true for ponderosa pine and the dry mixed-conifer forest types. Historically, frequent, low intensity fires maintained the low to mid elevation forests in more open conditions, which were dominated by large-diameter trees. In the early 1900s, uncontrolled fires were considered to be detrimental to forests. Suppression of all fires became a major goal of land management agencies. In ecosystems that historically burned frequently, particularly the ponderosa pine and the dry mixed-conifer forest types found in the lower and mid elevation areas of the Medford District BLM (Sensenig 2002; Huff and Agee 2000), the exclusion of fire combined with periods of higher than normal precipitation has promoted increases in fuel quantity and changes in fuel continuity and arrangement. As a result of the absence of fire, there has been a build-up of fuels and a change to more fire-prone vegetative conditions. This is particularly true for ponderosa pine, dry Douglas-fir, and mixed-conifer forest types.

Trees facing more intense competition often become weakened and are highly susceptible to insect epidemics and tree pathogens. Increased tree mortality contributes to increased dead and down fuel loadings and increased fire behavior. The additional surface fuels provide for longer duration heat intensity (residence time), which in turn affects the severity with which the site burns, and the increased canopy closure along with the lower canopy heights allow for more scorching in the canopy and when environmental conditions are conducive to crown fire initiation and sustained crown fire runs. High intensity fires can damage soils and can impact riparian vegetation as well.

Ponderosa pine trees that thrive in fire prone environments are being shaded out by the more shade tolerant Douglas-fir or white fir species in the absence of fire. As a result, more fire resilient pine species are declining across the landscape. Trees growing at lower densities, as in ponderosa pine stands, tend to be more vigorous and fire resilient.

Sites that have a less frequent fire regime display much the same fuel quantity and arrangement increase and possibly may burn with similarity in patch-size and intensity to their historical pattern under some weather conditions, and with more severe characteristics and larger patch size under severe fire weather conditions.

The Bureau of Land Management has a master cooperative fire protection agreement with the Oregon Department of Forestry (ODF). This agreement gives the responsibility of fire protection of all lands within the project area to the Oregon Department of Forestry. This contract directs ODF to take immediate action to control and suppress all fires. Their primary objective is to minimize total acres burned while providing for fire fighter safety. The agreement requires ODF to control 94 percent of all fires before they exceed 10 acres in size.

Due to ownership patterns and political constraints in southwest Oregon, the use of wildfire to meet resource objectives is not possible. There are stipulations within the protection agreement with ODF that allows BLM to designate areas that require special fire management activities during suppression efforts in order to insure damage to resources is minimized. It is recognized that restrictions could increase the cost of suppression which the Bureau of Land Management would incur and would require a modification of the contract. During suppression activities conducted on BLM-administered lands the following guidelines would be followed:

- BLM resource advisors will be dispatched to fires which occur on BLM-administered lands. These resource advisors are utilized to ensure that suppression forces are aware of all sensitive areas and to insure damage to resources is minimized from suppression efforts.
- When feasible, existing roads or trails will be used as a starting point for burn-out or backfire operations designed to stop fire spread. Backfires will be designed to minimize fire effects on habitat. Natural barriers will be used whenever possible and fires will be allowed to burn to them.
- In the construction of fire lines, minimum width and depth will be used to stop the spread of fire. The use of dozers should be minimized and resource advisors will be consulted when appropriate. Live fuels will be cut or limbed only to the extent needed to stop fire spread. Rehabilitation of fire lines will be considered.
- The felling of snags and live trees will only occur when they pose a safety hazard or will cause a fire to spread across the fire line.
- The construction of helispots should be minimized. Past locations or natural openings should be used when possible. Helispots will not be constructed within Riparian Reserves, or areas of special concern.
- Retardant or foam will not be dropped on surface waters or on occupied spotted owl nests.
- Resource advisors will determine rehabilitation needs and standards in order to reduce the impacts associated with fire suppression efforts.

b. Logging

Past harvest techniques such as clearcutting, which were conducted before 1990 have resulted in stands of young, more flammable trees, which contribute to the current fire hazard ratings for the fire analysis area.

In the late 1990s two landscape projects were implemented in the Thompson Creek drainage. Approximately 3,859 acres were commercially thinned and followed up with prescribed burning. An additional 2,364 acres of oakwoodlands and shrublands were also thinned and burned.

Timber harvest can increase fire severity, *if not* accompanied by adequate reduction of fuels, by increasing surface dead fuels (SNEP 1996, pp. 61-72). Studies that correlate logging with increased fire behavior (Weatherspoon and Skinner 1995) are mostly based on the forest practice of not treating logging and thinning debris (slash). Thus it is the added ground fuel in a drier, hotter microclimate, as a result of opening forest canopy that significantly contributes to fire behavior in a wildfire situation.

Opening forest canopies results in microclimatic changes particularly at the forest floor. A more open stand allows more wind and solar radiation resulting in a drier microclimate compared to a closed stand. This change in fuel moistures plays a major role in fire intensity and crown fire initiation. A drier microclimate generally contributes to more severe fire behavior. The degree of effects of microclimate change on fire behavior is highly dependent on stand conditions after treatment, mitigation to offset the effects of microclimate change, and the degree of openness. For example, Pollet and Omi (1999) found that more open stands had significantly less fire severity, while Weatherspoon and Skinner (1995) found greater fire severity.

In Pollet and Omi's study, more open stands had significantly less fire severity compared to the more densely stocked untreated stands. The degree of openness in the studied treated stands may not have been sufficient to increase fire activity. Weatherspoon and Skinner found commercially thinned stands in a mixed-conifer forest in the South Fork Trinity River watershed of the Klamath NF in northwest CA burned more intensely and suffered higher levels of tree mortality than unlogged areas (Weatherspoon and Skinner 1995). The partial cuts they examined were typically overstory removals, where large (mature and old-growth) trees were removed

leaving smaller trees. The study simply validates that smaller trees, due to thinner bark and crowns closer to the ground, will suffer more damage than large trees. Logging slash was not treated in the study areas.

Plantations are more susceptible to severe fire effects than unmanaged older forests (Weatherspoon and Skinner 1995). However, the same study indicated substantially less damage from wildfires where surface fuels were also treated. Once again, the structural attributes of young trees (crowns close to ground, crown consisting mostly of fine fuels), and the amount and location of forest floor fuels (logging/thinning debris, forest floor vegetation) are important factors.

c. Fuels Reduction and Fire Restoration

Restoration to an historical range is inappropriate because the same set of historical conditions no longer exist (i.e. climate, population, species mix). A forest that is fire-resilient has characteristics that limit fire intensity and increase resistance of the forest to mortality. Increasing forest resiliency means managing surface fuels to limit the flame length, removing ladder fuels to keep flames from transcending to tree crowns where trees have no defense against fire; decreasing crown density making tree to tree crowning less probable; and keep large diameter trees, which are more fire resistant.

Logging is not a surrogate for natural fire process. No mechanical means of fuel reduction –grazing, timber harvest, thinning, or biomass utilization—can duplicate the unique ecological effects of wildland fire, such as soil heating, nutrient cycling and alteration of community composition and structure (Kauffman 2004).

A number of ecological functions can be corrected by simply re-introducing fire in the ecosystem. However, reintroduction of prescribed fire without thinning will be problematic due to the existing conditions of overly dense stands of trees (Agee and Huff 1986).

Fuel composition, amount and structure are the only drivers of wildfires that can be modified through management activities. Thinning alters the vertical and horizontal vegetative structure. Prescribed fire alters the amount and arrangement of forest floor fuels. There is little peer-reviewed research to support thinning alone as a treatment to reduce unwanted fire behavior. However, there is general consensus from more than 90 years of fire research that fires burn hotter and spread faster when there is more fuel available to feed it. The basic objective of thinning is to remove material from the stand, thereby reducing the amount of fuel available for burning.

In a recent study on the effects of thinning on fire behavior, Graham et al. (1999) concluded that "depending on intensity, thinning from below and possibly free thinning can most effectively alter fire behavior by reducing crown bulk density, increasing crown base height, and changing species composition to lighter crowned and fire-adapted species." Thinning accompanied by removal of thinning residues and slash and followed by periodic prescribed burning are effective (Omi and Martinson 2002; Pollet and Omi 2002*;* Agee 1993; Alexander and Yancik 1977). Treatments that result in forests with a lower density and larger trees show lower potential for crown fire initiation and propagation and for less severe fire effects (Pollet and Omi 2002).

Thinning is most apt to be appropriate where understory trees are sufficiently large or dense that attempts to kill them with fire (alone) would run a high risk of also killing the overstory trees (Christensen 1988; Arno et al. 1995; Fulé et al. 1997; Moore et al. 1999). Low-elevation pine and mixed-conifer forests offer the highest priorities for thinning, in conjunction with prescribed fire, to contribute to restoration of wildlife habitat while making forests more resistant to uncharacteristically severe fire (Miller and Urban 2000). Principles of fire-safe forest are most effective within plant groups assigned to the ponderosa pine series, the Douglas-fir dry plant association group and the grand fir dry association plant group (Brown et al. 2004).

Fuels reduction through "commercial thinning" is believed by some to be experimental and controversial (DellaSala and Frost 2001). DellaSala et al. (1998) recommended an upper diameter limit of 35 cm (13.7 inches) for thinning operations to reduce fire hazard in mixed conifer in southern Oregon. Additionally,

DellaSala and Frost (2001) recommend that only small trees generally less than 12 inches should be considered for removal and no roads be built to conduct mechanical treatments. The efficacy of 12 inch diameter limits is untested (Brown et al. 2004), and is often touted more as a social solution rather than a tested ecological solution.

Anecdotal evidence on the effectiveness of thinning on fire spread and intensity has been mixed. Interpretations and observations of the same fire (e.g. Squires Peak Fire) yield stories of both the success and failure of thinning treatments. This mix of observations cannot be called scientifically valid nor should they be applied as scientific justification, but they can be interpreted as a trend. Anecdotal evidence on Squires fire in Southern Oregon, the Hayman fire in Colorado and Rodeo-Chediski fire in Arizona all show that treatments to reduce fire behavior may have merit.

Patterns of fuel treatments can affect fire intensity or rate of spread, and this topology has implications for designing landscape-level fuel-treatment patterns (Finney 2001). In the 2002 Hayman fire in Colorado, many areas where fuels had been treated before the fire experienced lower-severity effects than adjacent untreated areas (Graham et al. 2005). Areas that had been commercially thinned and the slash removed by prescribed burning experienced lower-severity effects during the Squires Fire in Southern Oregon than untreated areas or areas that had been felled and bucked but the trees had not been removed and fuels treatments had not occurred. The same areas that had been thinned and burned also allowed firefighters to use direct attack measures due to the decrease in fire behavior.

The 2010 journal article *Alternative Community States Maintained by Fire in the Klamath Mountains* and submitted personal communication between Odion and Klamath Siskiyou Wildlands Center (2012) assert that long absence of fire predicts low severity of fire effects, and that thinning makes "little difference to fire…It is not nearly the magnitude of impact that the agencies claim. Given that fire is being suppressed, there is less high severity fire occurring than likely did historically" (Odion 2012). However, a 2012 USDA Forest Service Airtanker Assessment states that "[w]ith the changing climate, fire seasons will likely become longer and more severe. This has already started to occur with the Western fire season now, on average, 78 days longer than in the mid-1980s. The trend for the number of acres burned annually by wildfire indicates a doubling of acres burned since 1960" (USDA 2012). Further, the 2010 article fails to account for the effects of topography, aspect, soils, season of burn, or time of burn, all of which play important roles in fire behavior in the Klamath Province (Mitchell 2012). Studies continue to confirm the efficacy of fuels reduction treatments across the West (Omi and Martinson 2002; JFSP 2007).

3. Environmental Effects

a. Alternative 1 - No Action

Because no new management is proposed under this alternative, the effects described reflect current conditions and trends that are shaped by ongoing management and events unrelated to the project described under the Affected Environment. This section will highlight key findings related to the question "What would it mean to not meet the objective of fire hazard reduction.

The current trend of increasing stand density which results in increased mortality to stands would continue for approximately 2,356 to 2,785 acres. Trees growing under these conditions often become weakened and are highly susceptible to insect epidemics and tree pathogens. High numbers of younger trees (mostly conifers) contribute to stress and mortality of mature conifers and hardwoods.

The proposed acres for commercial thinning and fuels reduction under the two proposed alternatives would not be treated so the fuels reduction objectives for the 1,697 to 2,256 acres that had not been treated in the past would not be accomplished. Without treatment the condition class of these acres would continue to deteriorate to a condition class 3.

With no forest management actions, there would be no temporary increase in surface fuels from timber harvest activities. Although there would be no harvest created slash, the existing surface, ladder, and canopy fuels would remain untreated for 1,697 to 2,256 acres.

Fire suppression would continue because there are no policies in place or being proposed that will allow fires to burn naturally within the project area. The entire project area is within the Wildland Urban Interface (WUI) and is a priority for fire suppression especially in close proximity to homes. The BLM's 1995 RMP assumes that all suitable forested lands on industrial forest land ownership would be logged at about 60 year tree-growing rotations, although, there are no private industrial lands that are known to be scheduled for timber harvest at this time. Any private land timber harvest would meet Oregon Department of Forestry standards for post-harvest fuels reduction. Defensible space and driveway treatments would likely continue by private land owners, but the amount is unknown. As a result of ongoing programs to implement defensible space around structures, driveways and roads for potential escape/evacuation routes, the risk of structure and human loss during wildfire events continually decreases.

b. Alternatives 2 and 3

Two action alternatives are proposed for this project. Alternative 3 has an additional 366 acres proposed for thinning utilizing helicopter logging, and 71 acres previously designated for cable yarding would be helicopter logged. Differences in impacts on fire hazard and fire behavior between the two alternatives are minimal. All fuels reduction work proposed under both Alternatives 2 and 3 are consistent with the objectives identified in the Applegate and Jackson County Wildfire Protection Plans. The current trend of increasing stand density which results in increased mortality to stands would continue for the 366 acres that would not be logged under Alternative 2.

The purpose of vegetation treatments under the two action alternatives is to reduce vegetative horizontal and vertical structure and to increase fire resiliency. The current science in determining extent and severity of wildland fire is based on three environmental variables: weather, topography and fuels (Rothermel 1972; Albini 1976). Management activities on landscapes and within ecosystems seeking to affect wildland fire extent and severity have focused on treating of fuels for obvious reasons. Forest fuels (including live and dead material), can be changed in terms of fire behavior and fire effects characteristics by silvicultural and fuels treatments (Agee 1996; Weatherspoon 1996), fire exclusion practices, and natural events.

Weather and topographic effects on fire behavior and severity are interrelated with the amount and distribution of fuels on a site with respect to the aspect, steepness of slope, and position on slope, along with atmospheric elements of temperature, relative humidity in relation to fuel moisture, and wind speed and direction. When the environmental and atmospheric conditions are conducive to drying fuels and/or heating them to the ignition point during a fire we refer to them as available fuels. The interrelationship between slope and wind with the amount and arrangement of available fuel is critical in terms of allowing a fire to spread and increase in intensity. Without fuel loading becoming available to burn in a fire due to the effects of extreme weather there are no adverse effects to the vegetation or other site qualities. For example in some desert areas where vegetation is sparse and extreme fire weather is the norm (high temperatures, low relative humidity, windy unstable atmospheric conditions) fires often don't spread except under unusual wind conditions, due to the lack of continuous fuels. While the historic condition of the landscape is considered, the objective of thinning treatments proposed under Alternatives 2 and 3 is not to restore those historic conditions, but rather to reduce hazardous fuels consistent with the 1995 RMP, and to develop and test new manage management approaches as directed by the Medford District RMP for the Applegate Adaptive Management Area land allocation (USDI 1995, p. 36).

Activity Fuels / Surface Fuels

Timber harvest can increase fire severity, if not accompanied by adequate reduction of fuels, by increasing dead surface fuels (SNEP 1996, pp. 61-72). Treatments designed to reduce canopy fuels through density

management increase and decrease fire hazard simultaneously. Slash generated from the commercial thinning of timber stands, if not treated, would create surface fuels that would be greater than current levels. The existing surface fire behavior fuel model in the majority of stands proposed for commercial thinning is represented by a Timber Group fire behavior fuel model. Fuel amounts are measured in tons per acre for different size material. Material up to 3 inches in diameter has the greatest influence on the rate of spread and flame length of a fire, which has direct impacts on fire suppression efforts.

It is anticipated that fuel loadings (material 3 inches and less) after logging would be temporarily increased by approximately 3-11 tons to the acre prior to the scheduled fuel disposal activities to be completed. This would change the existing fuel model of most of the timbered stands to a Logging Slash Group which in turn would create higher rates of spread and greater flame lengths in the event of a wildfire. However, despite the temporary increase in ground fuels, research indicates that a reduction in crown fuels outweighs any increase in surface fire hazard (Omi and Martinson 2002). This temporary increase in surface fuels usually lasts less than one year (but can be up to 2 years); which is the time period that it takes to implement the fuel treatments to dispose of the surface and ladder fuels in these stands.

Utilizing the modeling tool BEHAVE, with the parameters of a 6 mph wind speed and one hour fuels moisture of 6 percent , flame lengths in a slash fuel model are four feet compared to a one foot flame length in a timber litter model. Direct attack can be used under both of these scenarios. The rate of spread of a fire increases by 5 chains per hour in a slash fuel model. The size of a fire in a one hour period for a fire that is not suppressed would be 0.3 acres in a timber fuel type versus two acres in a slash fuel model. This difference is minimal in regards to impacts to the stand. Less than 1 percent of the BLM land in the project area is proposed for treatment. Fire history in the area shows that 48 fires have occurred on BLM-administered lands in the project area over the past fifty years. Due to the small amount of acres being treated and the rare occurrence of a wildfire in the project area, the probability of a fire occurring in a harvested unit is very remote.

Fuels treatments for stands that are commercially harvested would occur within one year after a unit is harvested. Units that are handpiled by the timber sale purchaser are required by contract to be completed within four weeks after a unit has been harvested. Treatments would take place where slash created from thinning operations exceeds 3 tons per acre. Treatments should ensure that under most climate conditions, flame lengths would be less than three feet allowing for direct attack of a wildfire. The reduction of this material, along with reduced fire ladders and canopy fuels from forest thinning, would reduce fire behavior such as flame length, rate of spread, and fire duration. With the reduction of flame length and fire duration, the chance of a crown fire initiating in treated stands would be greatly reduced. Also, mortality of the smaller diameter conifers would be reduced. Thinning treatments may be followed with prescribed burns. The reduction in stand density would make it possible to use prescribed fire as a tool to further reduce fire hazard in these stands. The reduction of flame length in treated stands would also increase the chance that direct attack of a wildfire could occur which would reduce acres burned in the event of a wildfire.

Riparian Reserve Thinning

Under Alternative 3, within Riparian Reserve Thinning units, trees greater than 14 inches DBH that are marked for cutting would be felled toward the channel and left on-site for down wood recruitment. The limbs and tops of these trees would be handpiled if the tons per acre exceed 3 tons per acre. Leaving the boles of these trees on site would have minimal impact to fire behavior. Under Alternative 2, trees greater than 14 inches would be harvested and sold under a timber sale or stewardship contract.

In a study on the effects of thinning on fire behavior, Graham et al. (1999) concluded that “depending on intensity, thinning from below and possi bly free thinning can most effectively alter fire behavior by reducing crown bulk density, increasing crown base height, and changing species composition to lighter crowned and fire-adapted species.” Thinning accompanied by removal of thinning residues and slash and followed by periodic prescribed burning are effective (Omi and Martinson 2002; Pollet and Omi 2002; Agee 1993; Graham

1999; VanWagtendonk 1996). Treatments that result in forests with a lower density and larger trees show lower potential for crown fire initiation and propagation and for less severe fire effects (Pollet and Omi 2002).

Anecdotal observations should not be applied the same as rigorously tested scientific study, but they can be used to report and interpret trends. Anecdotal evidence on the Squires Peak Fire, which occurred in Southern Oregon, showed that treatments to reduce fire behavior may have merit. Fire weather conditions during the Squires Peak Fire, as measured by the Energy Release Component Indices, were in the 89th to 90th percentile during the Squires Peak F ire event as measured by the Star and Provolt RAWS stations. This percentile is recognized as high but not extreme fire weather conditions. Even though winds were reported the evening the fire reached the treated area in the Kin's Wood project area, fire behavior decreased when it reached the treated area. Mortality to the residual stand was minimal due to the decreased fire behavior.

Fire Resiliency

A forest that is fire-resilient has characteristics that allow it to readily recover from a fire event. A forest's resiliency to fire can be increased by applying fire safe principles. This means managing surface fuels to limit the flame length, removing ladder fuels to keep flames from transcending to tree crowns where trees have no defense against fire; decreasing crown density making it less probable for a crown fire to move from tree to tree; and keeping large diameter trees that are more fire resistant (Agee and Skinner 2005; Agee 1996; Agee 1993).

The implementation of thinning under both the action alternatives would promote fire resilient forest stands by thinning from below to remove suppressed, diseased, and/or over crowded intermediate and co-dominant trees while generally retaining the larger co-dominant and dominant trees within treated stands. Forest thinning prescriptions would result in a reduction in ladder fuels, an increase in the height to the base of tree crowns, and the reduction of crown bulk density (canopy fuels). All of these are important factors in reducing the potential for initiating and sustaining a crown fire in these stands (Omi and Martinson 2002; Agee 1996; Agee and Skinner 2005; Agee et al. 2000). Thinning from below, removing the smaller diameter trees within a stand, would increase the average tree diameters as soon as treatments are completed. Over time, tree diameters would continue to increase with the growth of the residual stand. Larger diameter trees are more tolerant to surface fires so there would be less tree mortality in the event of a surface fire. Commercial thinning would also favor more fire tolerant species such as pine. Lowering basal area through thinning and prescribed fire can increase the long term vigor in the residual trees within a stand.

While the silvicultural prescriptions and objectives vary by prescription type, they are all designed to retain healthy large trees (see Chapter 2). The maintenance of pine species on dry Douglas-fir and pine sites contributes to the fire resiliency of forest stands. The larger the ponderosa pine, the greater its resilience to fire due to increasing bark thickness (Agee 1993; Agee 1996). Its bark is one of the key defense mechanisms against mortality from low intensity fire. Thus, removal of larger non-pine species, in this context, actually improves the ecological role of fire and subsequent fire resiliency of the stand by reducing competition for moisture and growing spaces. The fire resilience of the project area as a whole is improved due to the overall reduction in fire hazard within treatment units combined with previous fuels reduction treatments on about 52 percent of the Thompson Creek drainage.

The entire project area is within the wildland urban interface. While Cohen (2000) found that even severe fires will not directly ignite structures at distances beyond 200 feet, fire brands from beyond 200 feet may land on combustible surfaces and ignite structures. Although the other ongoing fuels reduction work around privately owned lands and homes would still provide improved protection from wildland fire compared to no treatment at all, fuels reduction work planned under this REA would increase the effectiveness of other ongoing fuels reduction work around private lands. The thinning proposed with this project, along with the continued maintenance of stands that have had previous fuels treatments within the urban interface, reduces the chances that embers originating beyond the immediate defensible zone will ignite structures. In combination with homeowner treatments, fuels reduction beyond the home defense zone is reducing the chance of structural loss or damage in a wildfire situation.

In the study "Patterns of Fire Severity and Forest Conditions in the Western Klamath Mountains, California", Odion et al. (2004) found closed canopy forests had less high-severity fire than open canopy forests and non-forest vegetation types. Based on this finding, they also concluded that a long absence of fire is also a predictor of low severity fire effects. However, this study used no local and specific weather data except for an acknowledgement that a multi-year drought preceded the 1987 wildfires.

Weatherspoon and Skinner (1995), who studied the same fires and area, also reported lower fire severity in uncut forests, and stated their finding was likely attributable to the absence of activity fuels and the relatively closed canopy conditions which reduces wind speeds and fuels drying of fuels. They admitted some findings to be less than conclusive due to the lack of local weather information from the time of the fires, reporting that the reconstruction of the highly variable weather conditions was not possible due to the smoky inversions and shortages of people during the first few days of the fire when much of the area burned. However, their findings emphasized the need for effective fuels treatments after management actions. They found partial cut stands with some fuels treatment suffered less damage than partial cut stands with no treatment.

Changes in Micro-climate and Effectiveness of Fuels Treatments

Management of forest stands can result in altered micro climates. Increasing spacing between the canopies of trees can contribute to increased wind speeds, increased temperatures, drying of topsoil and vegetation, and increased shrub and forb growth (Agee 1996). A more open stand allows more wind and solar radiation resulting in a drier microclimate compared to a closed stand. A drier microclimate generally contributes to more severe fire behavior.

The degree of effects of microclimate change on fire behavior is highly dependent on stand conditions after treatment, mitigation to offset the effects of microclimate change, and the degree of openness. For example, Pollet and Omi (2002) found that more open stands had significantly less fire severity, while Weatherspoon and Skinner (1995) found greater fire severity. In Pollet and Omi's study, more open stands had significantly less fire severity compared to the more densely stocked untreated stands. The degree of openness in the studied treated stands may not have been sufficient to increase fire activity. Weatherspoon and Skinner found commercially thinned stands in a mixed-conifer forest in the South Fork Trinity River watershed of the Klamath NF in northwest CA burned more intensely and suffered higher levels of tree mortality than unlogged areas (Weatherspoon and Skinner 1995). The partial cuts they examined were typically overstory removals, where large (mature and old-growth) trees were removed leaving smaller trees. The study simply validates that smaller trees, due to thinner bark and crowns closer to the ground, will suffer more damage than large trees. Logging slash was not treated in the study areas. The proposed action for this project proposes to treat slash generated by the treatments and forest thinning would harvest some commercial sized ladder fuels.

Moisture content of live vegetation is an important consideration. The moisture content of live fuels compared to fine dead and down fuels is generally much greater. Where overstory canopy reduction results in the growth of live understory, vegetation could contribute to reduced or increased surface fire behavior. Live fuels with higher moisture content can have a dampening effect on fire behavior compared to dead fine fuels (Agee et al. 2002; Agee 1996). Cured grasses and forbs can increase fire line intensity (Agee 1996); however, due to project design where ladder fuels have been removed and crown base heights increased, the risk of crown fire initiation and fire severity is reduced (Agee 1996; Omi and Martinson 2002; VanWagtendonk 1996; Agee et al. 2000). While site conditions may be slightly drier post treatment, less fuel would be available as a result of those same treatments.

Two landscape projects were implemented in the late 1990's within the Pilot Thompson project area. These treatments included the commercial thinning of approximately 3,859 acres of "Dry Forest". The majority of these acres were handpiled, burned and then followed up with underburning to reduce the fuel loading that was created from the commercial thinning operations. These stands have been visited on a regular basis since they were harvested to determine if maintenance burning was needed in the event of a heavy response of undergrowth. The main response of undergrowth in these stands has been the re-sprouting of madrone trees in

the areas were madrone trees were cut during the commercial thinning operations. In isolated areas, in some of the units, there has been some growth of brush since the fuels treatments. These areas had a brush component before they were harvested and burned. This response was expected. The overall fire hazard has not increased since the commercial harvesting occurred and none of the acres that were thinned have needed a maintenance burn.

The basal area that was retained in these stands varied from 40 square feet per acre to areas that exceeded 200 square feet per acre. The basal area that would be retained under the Pilot Thompson Project ranges from 80 square feet to 120 square feet per acre. Based on what has occurred in the past there is no reason to expect a heavy response of dense undergrowth after the Pilot Thompson Project is implemented. Just as the acres in the past have been monitored, any acres that are treated under this project would also be monitored to determine if maintenance burning would be needed in the future.

Two other landscape projects (Buncom and Forest Creek) completed in the Applegate have had the same results. Both these projects had large acres along major ridgelines that were logged to approximately 80 to 100 square feet of basal area per acre. None of these acres have shown heavy response to undergrowth and have not needed any maintenance burning.

The Buncom and Forest Creek projects also treated approximately 2,364 acres of Oak woodlands, shrublands and Pine sites. These areas had a heavy component of brush. The fuels treatments that occurred on these sites targeted this brush component. In most of these stands the brush component re-sprouted after approximately five years. These acres have been burned at least once and on some acres, several times over the past 15 years to manage the re-sprouting of brush.

Effects of Canopy Reduction on Fuel Moistures

Silvicultural prescriptions proposed for stands under both the action alternatives vary on how much canopy cover will remain after commercial thinning occurs. Under Alternative 2, approximately 75 percent of acres proposed for treatment would have a canopy cover of less than 50 percent. Under Alternative 3, about 70 percent of acres proposed for treatment would have a canopy cover of less than 50 percent. Estimates of fuel moisture can be made from the measured ambient air temperatures and relative humidity within a stand. The following example is used to demonstrate the effects of canopy cover on fuel moisture. An ambient air temperature of 90 to 109 degrees and a relative humidity of 15 to 19 percent would result in 3 percent fuel moisture for 1-hour time lag fuels. The fuel moisture of 10-hour fuels would be 5 percent; and the 100-hour fuel moisture would be 7 percent.

Corrections to fuel moistures are then needed to account for slope, aspect, time of day, month, and percent shading. Percent shading is calculated by using greater than 50 percent shading (shaded) or less than 50 percent shading (exposed). Cloud cover as well as timber overstory (canopy closure) is utilized in calculating percent shading.

Utilizing the example from above (1 hour time lag fuels at 3 percent) to correct fuel moisture on a site that has the attributes of (a) north slope, (b) slope greater than 31 percent, (c) 12:00 p.m. in August, (d) shading less than 50 percent, and (d) no cloud cover, one would add 3 percent to the fuel moisture for a total of 6 percent.

Utilizing the same parameters but for an area that has shading greater than 50 percent one would add 4 percent for a fine fuel moisture of 7 percent. The difference between the two sites is one percent, and would have minimal impacts to fire behavior.

Smoke Impacts

Alternative 2 and 3 propose to use prescribed fire so consequently there would be some smoke related impacts. Under both alternatives, prescribed burning would comply with the guidelines established by the Oregon Smoke Management Plan (OSMP) and the Visibility Protection Plan. Prescribed burning is not expected to affect

visibility within the Crater Lake National Park and neighboring wilderness smoke sensitive Class I areas (Kalmiopsis and Mountain Lakes Wilderness Areas) during the visibility protection period (July 1 to September 15). Prescribed burning is not routinely conducted during this period primarily due to the risk of an escape wildfire.

Prescribed burning emissions are not expected to adversely affect annual PM-2.5 attainment within the Grants Pass, Klamath Falls, and Medford/Ashland SSRA. Any smoke intrusions into these areas from prescribed burning are anticipated to be light and of short duration.

Prescribed burning would be scheduled primarily during the period starting in November and ending in June. This treatment period minimizes the amount of smoke emissions by burning when duff and dead woody fuel have the highest moisture content, which reduces the amount of material actually burned. Smoke dispersal is easier to achieve due to the general weather conditions that occur at this time of year.

The greatest potential for impacts from smoke intrusions is from underburning to localized drainages within and adjacent to the project area. Because underburning requires a low intensity burn, there is not the energy to lift the smoke away from the project site. Smoke retained on site could be transported into portions of non-attainment areas if it is not dispersed and diluted by anticipated weather conditions. Localized concentration of smoke in rural areas away from non-attainment areas may continue to occur during prescribed burning operations.

Smoke emissions and effects are further reduced because burn sites would include mop-up to be completed as soon as practical after the fire, and hand piles would be covered to keep material dry to permit burning during the rainy season where there is a stronger possibility of atmospheric mixing and/or scrubbing. The use of aerial ignition (helicopters) in broadcast burn units would also reduce the total emissions by accelerating the ignition period and reducing the total combustion process due to the reduction in the smoldering stage.

Finally, prescribed burning operations would follow all requirements of the Oregon Smoke Management Plan and the Department of Environmental Quality Air Quality and Visibility Protection Program.

Because of actions to minimize smoke effects and because of DEQ smoke regulations, smoke associated with Alternatives 2 and 3 would not reduce the air quality of the Medford/Ashland Area. However, despite these measures, a few individuals would still be affected by a few hours (short duration) of smoke, perhaps causing discomfort.

Because smoke impacts are well within PM-2.5 standards there are no direct or indirect effects of any consequence to incrementally add to past, ongoing, and reasonably foreseeable air quality impacts. Hence, there are no cumulative effects from Alternatives 2 or 3.

Use of Plastic Covering for Burn Piles

The Oregon Department of Forestry Smoke Management Plan addresses the issue of utilizing plastic to cover piles. In section 629-048-0210, Best Burn Practices; Emission Reduction Techniques, it states that “Best burn Practices” involves methods that ensure the most rapid and complete combustion of forest fuels. Covering of handpiles is a “Best Burn Practice.” Also in this section it states “When covers will not be removed and thus will be burned along with the piled forest fuels, the covers must not consist of materials prohibited under OAR 340-264-0060 (3), except that polyethylene sheeting that complies with the following may be used: a) Only polyethylene may be used. All other plastics are prohibited”.

An addendum to the original Wrobel and Reinhart literature review (2003) on the use of polyethylene sheeting to enhance combustion efficiency, discusses the rules affecting polyethylene (PE) burning. Oregon and New Mexico are the only western states that allow burning of PE pile covers. Oregon has addressed the issue based on the findings reported by Wrobel and Reinhart. The Oregon Department of Environmental Quality and the Oregon Department of Forestry developed an MOU for PE that was adopted in 2005. The MOU suggests that

the plastic material is removed prior to burning when practicable. Adequate debris/slash is placed over the plastic sheeting to ensure the plastic remains covering the piles until the piles are burned. As stated above this ensures the most rapid and complete combustion of slash debris. Due to the difficulty of removing the plastic cover from below the debris, especially after long-term exposure to the elements, it is operationally and economically impractical to remove the plastic prior to burning. Therefore, the plastic is usually left in place and burned along with the pile. As required, polyethylene sheeting is used to cover piles. Jung et al. (2009) concluded that no increase in any hazardous chemical species as a function of low density polyethylene was found.

Commenters have suggested that Kraft Paper should be used in place of PE to cover the burn piles. Combustion studies involving lignocellulosic materials suggest that uncoated Kraft Paper may produce some of the same substances as polyethylene (Garcia et al. 2003). It also states that from an operational standpoint, Kraft paper is a more expensive, less durable, and less effective means of minimizing moisture intrusion into the pile because of its tendency to degrade more rapidly than PE. In turn, fuel moisture is increased, combustion efficiency is reduced, and more accelerants may be needed for pile ignition.

Additionally, the weight and means of packaging Kraft paper contributes to decreased production and increased per unit cost of covering piles. The use of Kraft paper averages 55 pounds per square bundle compared to 12 pounds per roll for polyethylene use. It takes 3 bundles of Kraft paper (165 pounds) to cover the same number of piles that one roll of PE (12 pounds) will cover. Kraft paper bundles are 4 by 4 foot square and are awkward to pack into a unit compared to a roll of polyethylene that can be easily packed into the unit. The size and shape of Kraft paper bundles combined with increased weight could also contribute to increased potential for worker injuries (e.g. knee, back, and ankle sprains) during operations.

Fall versus Spring Underburning

Future maintenance of all areas treated in the project area would be needed in order to maintain low fuel loadings and species dependent on fire. Underburning is the preferred method for maintaining these areas. The season in which underburning is implemented is based on achieving hazard reduction objectives while minimizing impacts to the site. Fall underburning is utilized when fuel loadings are low enough to allow for a low intensity burn similar to that which was historically common in these fire regimes. Due to the long absence of fire, fuel loadings in most cases are too high to initially burn a unit in the fall.

The surface fuel loading in a unit dictates fire intensity. A common method to reduce fuel loadings before underburning is implemented is to use manual treatment (cutting, hand piling and burning). Even after manual treatments surface fuel levels in the 1-, 10- and 100-hour fuels (1/4 inches to 3 inches) are often too high to accomplish a low intensity fall burn. When this is the case underburning is done in the spring.

Burning in the fall with high surface fuel loadings would have adverse impacts to numerous resources due to fires being of higher intensity. Large down woody debris consumption is higher in the fall. Duff consumption is higher and soil heating tends to be higher. Mortality to the residual stand as well as other vegetation is higher due to higher intensity fires low live fuel moisture. Snag retention is difficult due to the low dead fuel moistures and higher fire intensity. With higher fire intensities and lower live and dead fuel moistures the risk of escape is greatly increased.

Prescriptions are developed for spring burning to consume the smaller fuels (1/4 inches to 3 inches) and retain the majority of large down woody debris due to the higher dead fuel moistures. Soil moisture is also higher in the spring so duff consumption is also minimal. Burning under these conditions keep fire intensity low, so impacts to the residual vegetation is minimal and the chance of escape is also minimized. Visual observations of areas that have been underburned in the spring in the Ashland Resource Area over the past decade have not shown any negative impacts to the site.

Other activities associated with underburning such as fireline construction and mop-up operations after the burn have minimal impacts to the site. Firelines are 1 to 2 feet in width and are waterbarred to minimize soil erosion. Re-growth of vegetation on the firelines normally occurs within one growing season. Mop-up operations are normally limited to a 100-foot perimeter around a burned unit. Soil disturbance is scattered in localized areas within this perimeter. Because prescribed fire will occur in the spring if fall burning conditions might result in unwanted intensities, damage from prescribed fire will be minimal due to higher moisture levels, and benefits from prescribed fire will be maximized.

Any areas planned for fuels treatment may be reexamined by resource specialists at any stage of treatment to determine if the planned fuels treatment is still applicable. At the discretion of resource specialists, planned treatments may be changed to better meet the objectives outlined in this REA. Proposed changes will be limited to treatments and their anticipated effects analyzed under this REA.

Road Side Brush Removal

Road side brush removal throughout the project area is done for safety measures. Material that has grown into the roadbed is cut to increase sight distances for vehicle traffic. The material that is cut is scattered on the downhill side of the road. The amount of material cut varies but in most cases is not continuous along the entire road. Based on past projects the amount of material is less than 2 tons per acre. The largest area potentially impacted by roadside brush removal is approximately one half acre per mile of road brushed. The amount of material left would have little to no impact on fire behavior. The material is on the downhill side of the road and the road would act as a fire barrier if a fire started in this material and burned up hill. In the event of a fire starting in this material and burning downhill, the fuel loading below this material is what would impact fire behavior. It is acknowledged that newly cut material in the first year would be more flammable than if not cut.

D. SOIL RESOURCES

1. Affected Environment

The analysis area (approximately 23,268 acres) is located in the Thompson Creek Sixth Field Watershed and a portion in the Slagle Creek-Applegate River Sixth Field Watershed. Of the total analysis area, 14,419 acres are BLM-administered lands, 6,761 acres are privately owned and 2,088 acres are managed by the Forest Service (this is in the most upper reaches of the Thompson Creek Watershed).

The topography in the project area is mainly hillslopes ranging in slope between about 5 and 75 percent slope. Elevation ranges between 1,400 and 5,000 feet above mean sea level. The mean annual precipitation is 30 to 45 inches, the mean annual temperature ranges from 40 to 54 degrees, and frost free days range from 100 to 180 throughout the project area.

a. Description of Soils Series

A table of the predominant soils identified in proposed harvest units is listed below (Table 3-8), followed by a general description of the soil series recognized by the Natural Resource Conservation Service. See the soils map (Map 3-1) for the location of the soils on the landscape. There may be minor amounts of other soil series included within the proposed units.

Table 3-8. Soil Series and Characteristics within Proposed Treatment Units

Map Unit #	Soil Series Name	Depth (in.)	Soil Texture	Soil Sensitivity Category
1	Abegg	66	Gravelly loam, very gravelly loam, extremely gravelly loam, extremely gravelly clay loam.	2
7 *	Beekman	25	Gravelly loam, very gravelly loam, fractured	1 (S), 2

Map Unit #	Soil Series Name	Depth (in.)	Soil Texture	Soil Sensitivity Category
			metamorphic bedrock	
7 *	Colestine	34	Gravelly loam, gravelly clay loam, fractured metamorphic bedrock	1 (S), 2
25, 26	Caris	31	Gravelly loam, very gravelly clay loam, extremely gravelly loam	1 (S), 2
25, 26	Offenbacher	34	Gravelly loam, loam	1 (S), 2
50, 51 *	Jumpoff	55	Clay loam, clay	
108 (53 and 54 *)	Manita	58	Loam, clay loam	3
113	McMullin	< 20	Gravelly loam, gravelly clay loam	1
157, 158, 158	Ruch (less than 3 acres in project area)	70	Gravelly silt loam, loam,	3
195, 196, 197 (78 and 79 *)	Vannoy	38	Silt loam, clay loam	3
197 (79 *)	Voorhies	36	Very gravelly loam, very gravelly clay loam, very cobbly clay loam	3
208	Xerorthents-Dumps complex (less than 5 acres in project area)	60	Very cobbly clay loam, extremely cobbly clay loam The dumps soil consist mostly of gravel, cobbles, and stones and include little, if any, material of finer texture.	2

Abbreviations:

1= (highly sensitive): burn only in spring-like conditions when soil and duff are moist. Maximize retention of duff layer. Assure retention of minimum levels of coarse woody debris and recruitment of snags as specified in the Standards and Guidelines.

2= (moderately sensitive): burn only in spring-like conditions when soil and duff are moist. Maximize retention of duff layer. Assure retention of minimum levels of coarse woody debris and recruitment of snags as specified in the Standards and Guidelines. Write fire prescriptions that reduce disturbance and duration and achieve low fire intensity.

3= (least sensitive): burn to avoid high intensity (severe) burns to protect a large percentage of the nutrient capital. Maximize retention of duff layer. Assure retention of minimum levels of coarse woody debris and recruitment of snags as specified in the Standards and Guidelines (USDI 1995, p. 168).

S= slopes ≥ 65%

* soils in Josephine County

Also included in the project units is the Camas-Newberg complex and the Witzel-rock outcrop complex. Both are less than one acre of the project units.

Abegg Series

The Abegg soil is a very deep and well drained soils on alluvial fans. These soils formed in alluvium and colluvium derived from altered sedimentary and volcanic rock. Slopes are 2 to 12 percent. Typically, there is a ½ inch or less layer of slightly decomposed organic material composed of twigs, needles and leaves. With depth,

the gravel content increases from a gravelly loam (at the surface) to an extremely gravelly loam (down to 38 inches) from 38 inches to 66 inches, the soil texture changes to an extremely gravelly clay loam. Bedrock depth is at 66 inches. Permeability is moderate to a depth of 56 inches and moderately rapid below this depth. Available water capacity is about 4 to 6 inches. Effective rooting depth is 60 inches or more. Runoff is slow, and the hazard of water erosion is slight.

Beekman Series

The Beekman soil consists of moderately deep, well drained soils on mountainsides. These soils formed in colluvium weathered from altered sedimentary and extrusive igneous rock. Slopes are 50 to 100 percent (although slopes in project units are generally under 75 percent). The soil is a gravelly to very gravelly loam to a depth of 25 inches. Bedrock is fractured metamorphic bedrock at 25 inches. Permeability of the Beekman soil is moderate. Available water capacity is about 1 inch to 4 inches. Effective rooting depth is 20 to 40 inches. Runoff is rapid, and the hazard of water erosion is high.

Caris Series

The Caris soil is moderately deep and well-drained, but has the potential for rapid to very rapid runoff. It is formed in colluvium weathered from altered sedimentary and extrusive igneous rocks. Slopes within this soil type range from 50 to 90 percent in the project area, but are lower than 65 percent in the project units. Typically, there is a 0- to 1-inch thick organic horizon composed of partially decomposed needles and twigs. The surface layer is a gravelly loam approximately 12 inches thick. The subsoil, approximately 19 inches thick, is a very gravelly clay loam to an extremely gravelly loam with depth. Bedrock is at a depth of approximately 31 inches and consists of hard, fractured metamorphosed volcanic bedrock. Permeability is moderate in the Caris soil. Available water capacity is about 2 inches. The effective rooting depth is 20 to 40 inches. Runoff is rapid, and the hazard of water erosion is high.

Colestine Series

The Colestine soil consists of moderately deep, well drained soils on mountainsides. These soils formed in colluvium weathered from altered sedimentary and extrusive igneous rock. Slopes are 50 to 80 percent. The topsoil is a gravelly loam down to 12 inches. From 12 to 34 inches the soil texture is a gravelly clay loam. Bedrock is fractured metamorphic rock. Permeability of the Colestine soil is moderate. Available water capacity is about 2 to 7 inches. Effective rooting depth is 20 to 40 inches. Runoff is rapid, and the hazard of water erosion is high.

Jumpoff Series

The Jumpoff series consists of deep, moderately well drained soils on hillsides. The soils formed in colluvium weathered from tuff and volcanic breccia: Slopes are 7 to 50 percent. The mean annual precipitation is about 40 inches, and the mean annual air temperature is about 49 degrees F. The surface is typically covered with 1 inch of less of litter composed of needles and twigs. The soil texture ranges from clay loam down to 18 inches to a clay to 55 inches. The bedrock is highly weathered saprolite derived from tuff and volcanic breccia. Permeability of the Jumpoff soil is slow. Available water capacity is about 5 to 10.5 inches. Effective rooting depth is 40 to 60 inches. Runoff is rapid, and the hazard of water erosion is high. A water table is at a depth of 30 to 42 inches in winter and spring.

Manita Series

The Manita soil consists of deep, well drained soils on alluvial fans and hillslopes. These soils formed in alluvium and colluvium derived from altered sedimentary and volcanic rock. Slopes are 2 to 50 percent. The topsoil is a loam to a depth of 8 inches. From 8 to 58 inches the soil texture is a clay loam. Bedrock is a partially weathered siltstone at 58 inches. Permeability is moderately slow in the Manita soil. Available water capacity is about 8 inches. The effective rooting depth is 40 to 60 inches. Runoff is slow, and the hazard of water erosion is slight.

McMullin Series (with Rock outcrop)

The McMullin soil is shallow and well-drained. It formed in colluvium derived dominantly from andesite, tuff, and breccia. Typically, the surface layer is a gravelly loam about 7 inches thick. The subsoil is a gravelly clay loam about 10 inches thick. The depth to bedrock ranges from 12 to 20 inches. In some areas the surface layer is stony. Permeability is moderate in the McMullin soil. Available water capacity is about 2 inches. The effective rooting depth is 12 to 20 inches. Runoff is slow, and the hazard of water erosion is slight. Slopes range from 1 to 75 percent. The Rock Outcrop consists of areas of exposed bedrock. Runoff is very rapid in these areas.

Offenbacher Series

The Offenbacher soil series is well-drained, has potential for rapid runoff and moderate permeability. It is formed in Colluvium weathered from altered sedimentary and extrusive igneous rocks. Typically, there is a 0- to 1-inch depth of partially decomposed leaves, needles and twigs. The surface layer is a gravelly loam about 4 inches thick. The subsoil is approximately 30 inches thick, ranging from a gravelly loam in the upper horizon to a loam. Bedrock is at a depth of approximately 34 inches and consists of fractured metamorphosed volcanic bedrock. Slopes range from 50 to 80 percent in the project area, but are lower than 65 percent in the project units. Rooting depth is 20 to 40 inches. The hazard of water erosion is high.

Ruch Series

The Ruch series consists of very deep, well drained soils on foot slopes and alluvial fans. These soils formed in mixed alluvium derived from altered sedimentary and volcanic rock. Slopes are 2 to 20 percent. The mean annual precipitation is about 30 inches, and the mean annual temperature is about 52 degrees F. The topsoil is a gravelly silt loam (from 0-7 inches), from 7 inches depth the soil texture is a loam down to bedrock (70 inches). Permeability is moderately slow in the Ruch soil. Available water capacity is about 8 inches. The effective rooting depth is 60 inches or more. Runoff is slow or medium, and the hazard of water erosion is slight or moderate.

Vannoy Series

The Vannoy soil is moderately deep and well drained. It is formed in colluvium weathered from metamorphic and sedimentary rocks. It has an organic horizon ranging from 0 to 0.75 inches thick comprised of partially decomposed litter of needles, leaves and twigs. The surface layer, approximately 11 inches, is a silt loam. The subsoil, approximately 29 inches thick has a notable increase in clay with depth. Bedrock is at a depth of 38 inches and consists of weathered and highly fractured metamorphosed bedrock. Slopes range from 2 to 60 percent. Permeability is moderately slow and has the potential for medium to rapid runoff. Available water capacity is about 5 inches. The effective rooting depth is 20 to 40 inches. The hazard of water erosion is moderate.

Voorhies Series

The Voorhies soil is moderately deep and well drained. It formed in colluvium weathered from altered sedimentary and extrusive igneous rocks. It has an organic horizon ranging from 0 to 1 inches. The surface layer, approximately 8 inches thick, is a very gravelly loam. The subsoil, approximately 28 inches, is a very gravelly loam, very gravelly clay loam, or very cobbly clay loam changing with depth. Bedrock is at a depth of 36 inches and consists of partially consolidated and weathered metamorphic bedrock. Slopes range from 35 to 55 percent. Permeability is moderately slow and has the potential of medium to rapid runoff. The available water capacity is about 3 inches. The effective rooting depth is 20 to 40 inches.

Xerorthents-Dumps complex

This map units is on flood plains, stream terraces, and alluvial fans where excavated material was deposited during mining operations. The material in this unit commonly is referered to as mine tailings. Slopes range from nearly level to hummocky. Vegetation on Xerorthents is mainly scattered conifers and hardwoods and a sparse understory of grasses, shrubs and forbs. The Dumps soil supports very little, if any, vegetation. There is less than 5 acres of this soil in the proposed units. Permeability, available water capacity, and the effective rooting depth vary considerably in areas of this unit. There is a seasonal high water table in winter and spring, particularly in areas on flood plains.

It is estimated that the natural erosion rates for soils in the Klamath Mountain Range to be about 0.13 yd^3/ac/year and erosion rates increased in harvest areas to 0.89 yd^3/ac/yr (in Amaranthus, 1985: 233). Erosion rates are highly dependent on the intensity and amount of rainfall that a particular site receives in a given time period. Other factors that affect erosion rates are steepness of slope, ground cover, soil particle cohesion and amount/degree of disturbance. The analysis area consists of slopes ranging from around 20 percent to 75 percent with a very slight potential for landslides. For this reason it is anticipated that erosion rates in the project area to be much less than those reported by Swanson and should not be of concern.

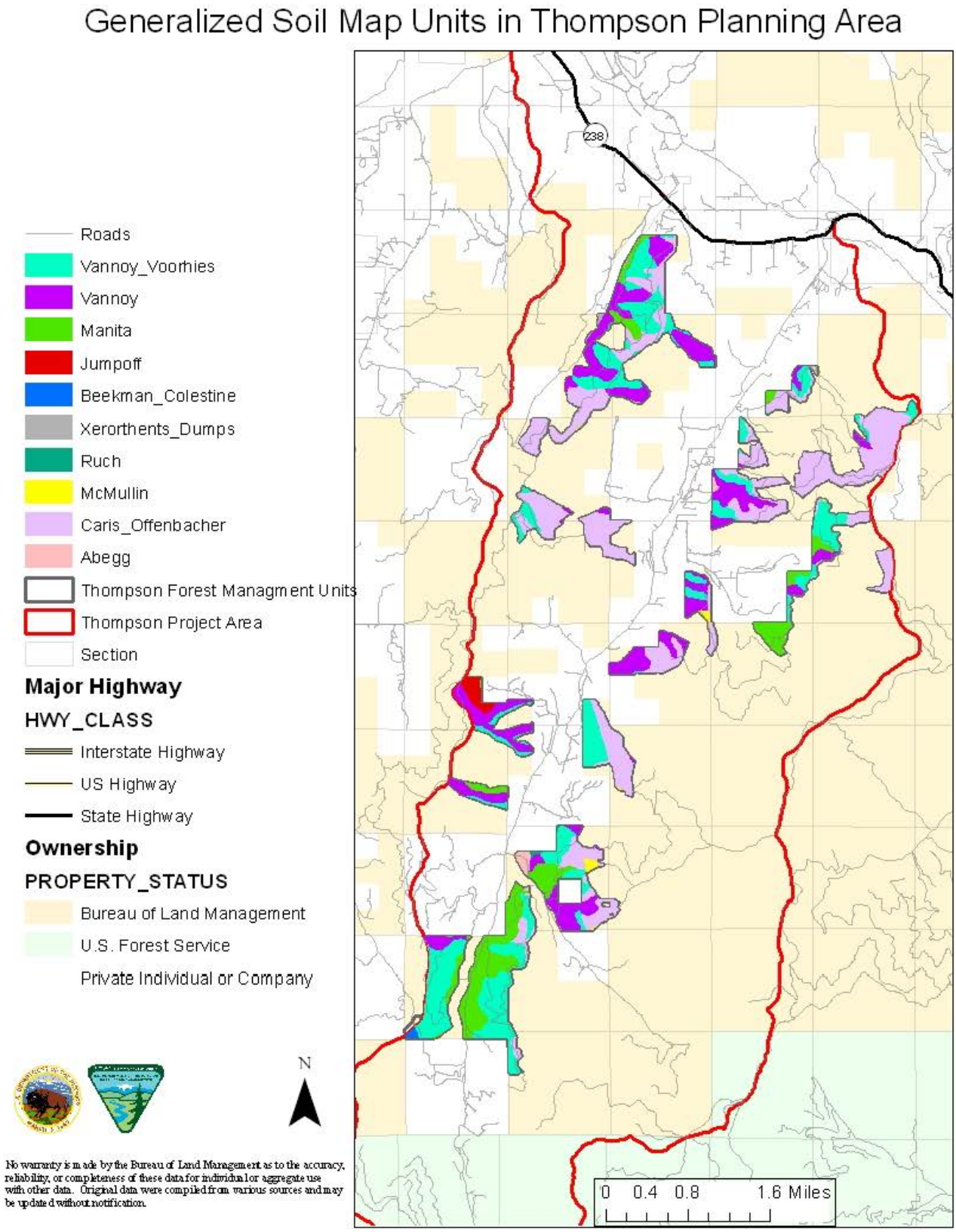
b. Roads

There are approximately 130 total miles of road in the 23,268 acre analysis area. Approximately 50 miles of the existing roads are confirmed paved (17 miles) or adequately surfaced with rock (33 miles). The remaining roads are either natural surface (19 miles), or information on the surface type is unknown (61 miles) (un-inventoried roads on private land). A study by Swift determined that soil loss from a lightly graveled roadbed is approximately equivalent to loss from an ungraveled one. In contrast, soil loss from fully-graveled roadbeds in the central Appalachian Mountains (6 to 8 inches thick) was found to be only 3 to 8 percent of that from the bare soil roadbed of otherwise similar construction (Swift 1988).

It is estimated that every 1 mile of road occupies 4 acres. Therefore, approximately 520 acres in the analysis area are roaded and removed from vegetative productivity. In the Swift study, erosion rates from the natural surfaced and minimal surfaced roads were about 1.4 tons/acre/inch rain while the adequately rocked roads yielded less than 0.1 ton/acre/inch rain. Although erosion rates vary depending on site hydrology, soil type, topography, climate, and engineering treatments, these figures provide an example of the relative amount of erosion that may occur.

In the analysis area there are approximately 20.2 miles of known OHV trails. These trails have the highest concentrations around the Ninemile road, primarily in sections 19 and 29 (39S-4W) Hinkle Gulch and Ferris Ridge. Off road damage caused by OHV is apparent in these areas with deep tracks imprinted on the ground. In most of these tracks, soil is compacted and the top soil and organic horizon has been physically displaced from vehicles resulting in bare, compacted soil. Where this occurs on a slope, soil particles are also displaced by water. The soil series may influence the amount and distance these particles are displaced. Single-grained soils, such as those developed from pumice and Granodiorite (which are not present in this analysis area), often are seriously eroded when bared. In contrast, finer textured soils, such as may develop from basalt and sedimentary rock, are especially susceptible to puddling, compaction, and subsequent rilling. Heavy loam soils are usually the most resistant to erosion (Rice, Rothacher, and W.F. 1972: 323). In the project area, most soils are a loam, silt loam, clay loam or have some amount of gravels as well.

Map 3-1. Pilot Thompson Project Area Soil Types



c. Soil Productivity

Soil is a fundamental resource that controls the quantity and quality of such renewable forest resources as timber, wildlife habitat, forage, and water yield. Soil productivity is the inherent capacity or potential of a soil to produce vegetation, and the fundamental measure of soil productivity is the site's carrying capacity for plant growth. The key properties directly affected by management are site organic matter (OM) and soil porosity. These two properties regulate critical site processes through their roles in microbial activity, soil aggregate stability, water and gas exchange, physical restrictions on rooting, and resource availability (Powers et al. 2004, p. 194). Site organic matter and soil porosity are most important when measuring the effects of management, although other factors such as water regimes, soil biological types and populations, and soil loss can also affect long-term soil productivity.

A sustained flow of organic matter from primary producers to the forest floor and into the soil is vital to sustained site productivity through its influence on soil protection, the activity of beneficial soil organisms, soil water holding capacity, soil structure and aggregate stability, and nutrient supply. Organic matter influences the interception and retention of solar heat by the soil. It dissipates the energy of falling water (rain). Organic matter is the ultimate source of substances that bind soil particles together into stable aggregates that resist erosion. Through its carbon compounds, organic matter constitutes the energy source for soil fauna and microbes and is a concentrated reservoir of plant nutrients supplied to the soil.

In the project area, organic matter is present on all sites that are planned for treatment. Most of the organic matter is in the form of down wood, leaf litter and needle cast, and was produced from trees, shrubs, grasses, and moss. Soil organic matter appears typical for the region with most of the sites having about ½ inch or less of litter (leaf and needles). Except for areas disturbed by roads and trails, and sites with gravels and cobbles surfaces, most of the soil in the proposed project area has at least a thin ground cover of organic material. On most sites, soil organic matter consumption appears normal with a very thin layer of decomposing matter at the soil and litter layer interface.

The reduction in soil porosity (compaction) results in the loss of soil aeration, moisture availability and increases the resistance of soil particles to root growth. Reduced soil porosity also can reduce water infiltration rates, thereby accelerating surface runoff and soil erosion. The size distribution of soil pores is also important for maintaining a productive site. Large pores and cracks are important for soil drainage, aeration, and root access; smaller pores store soil water and are the sites of nutrient retention and microbial activity. Both kinds of pores are required for productive soils.

Rapid gas exchange in soils is required for optimum microbial activity and growth of plant roots. Adequate supply of oxygen for root growth can be assured if there is a network of continuous, air-filled pores present in a soil. Soil water storage is very important because total site water use is generally positively correlated with growth: factors that decrease soil water storage are detrimental to productivity and those that increase it are beneficial (Childs et al. 1989).

In the analysis area there are soils that are classified as fragile for slope gradient (FG). Approximately 121 acres are withdrawn in the analysis area. No forest management is proposed in withdrawn areas. Approximately 2,839 acres in the analysis area are classified as fragile gradient but suitable (FG) for forest management with additional Project Design Features. In the action alternatives, there is proposed forest management in FG soils.

d. Past Actions

The relevant part of analyzing past actions is determining what events or actions previously occurred, whether current proposals repeat those actions or events, and whether current proposals have similar or different anticipated effects. In addition, past events are manifested in current conditions, the starting point for the addition of cumulative effects. The lessons learned from past actions are that roads were historically poorly designed and located without regard to erosion and stream sedimentation impacts. Many of the roads have been

poorly maintained and have been degraded as a result of use during the wet season. Clearcutting and broadcast burning in the 1980s created highly erosive conditions, especially when ground-based yarding systems were used without much regard for the location and number of skid trails, and/or tractor-piling of slash was incorporated. These sites have been re-established with vegetation and, except for roads, erosion rates are near natural levels.

Past timber harvest on BLM-administered lands in the project area has been sporadic. Since 1995 approximately 3,859 acres of harvest has occurred on BLM administered lands within the planning area. Of that total, 81 percent or 3,126 acres were thinning or select harvest treatments where canopy cover was not appreciably reduced. The most recent commercial treatment occurred in 1999, thus allowing vegetative recovery to offset any potential detrimental impacts associated with reduced canopy cover on the remaining 733 acres.

It is estimated that most of past tractor harvest occurred before 1980 and was not on designated skid trails. Timber harvest after 1980 required the use of designated skid trails in order to reduce the amount of unit area compacted. It is assumed that tractor units harvested after 1980 on BLM-administered land are below the 12 percent areal compaction threshold.

It is difficult to predict compaction's effects on soil productivity because of all the variables, but McNabb and Froehlich (1983) estimate that stand growth losses can range from 5 to 13 percent and compaction's effects can last 30 years. Lucklow and Guldin, in a 2004 compaction study of Arkansas forest, found evidence that old disturbance areas have partially self-mitigated since the previous harvest entry. The old disturbance compaction observed in this study was caused from harvest equipment activities that occurred at least 15-20 years earlier. Old disturbance areas are composed of secondary or primary skid trails and areas that received 1-2 equipment passes. They estimate it would take from 50-80 years for skid trail soil density levels to recover to near-natural density levels (Lucklow and Guldin 2004). This estimated recovery period is in line with other findings. Perry (1964) estimated a 40-year recovery period for reduced infiltration rates on old compacted woods roads to approach natural rates on a southern Arkansas soil. For this reason, it is assumed that compaction in areas harvested by tractor prior to 1970 are considered recovered.

2. Environmental Effects

Because no new management is proposed under Alternative 1, the effects described reflect current conditions and trends that are shaped by ongoing management and events unrelated to the Pilot Thompson Project.

Discussions for Alternative 2 and Alternative 3 reflect the direct and indirect impacts of these alternatives. Effects discussion also includes cumulative impacts of those direct/indirect actions when added incrementally to actions past, present, and reasonably foreseeable. The environmental consequences on the soil resource are be described in terms of the effect that a particular action would have on the soil characteristics or soil erosion processes.

It would be futile to try to predict specific quantitative values for erosion as there are too many variables to consider, such as rainfall amount, duration and intensity during storm events. The effects of the proposed activities would be compared to natural rates.

The appropriate scale for measuring soil productivity criteria (compaction, erosion, etc.) is site-specific or on a unit-by-unit basis. The appropriate scale for measuring erosion or compaction that may affect water resources would be the designated analysis area (see Water Resources section C.1.a). Short-term impacts (or effects) are those anticipated within ten years or less, and those impacts anticipated more than ten years in the future are considered long-term. Although studies (Rice et al. 1972) and local observations by BLM soil scientists reveal that vegetation recovery and erosion rates return to near-normal levels within approximately 5 years, short-term effects of 10 years were used because broadcast burning within 5 years after harvest could occur.

a. Alternative 1 – No Action

The effect of the No-Action Alternative on the soil resource would be the continuance of existing erosion rates resulting from the current conditions throughout the analysis area. Erosion rates are near natural levels throughout the project area, except in areas where roads and trails exist. The units that were harvested in the past have stabilized, with vegetation and erosion rates back to near natural levels. There is no way to be certain that possible future actions would occur on private land, but it is presumed that all private lands having timber of commercial value would be harvested in the near future (10 years). These actions would increase the amount of disturbed soil. A discussion of the effects that future harvest, compacted acres, and roads have on sedimentation in local waterways is included in the Water Resources section.

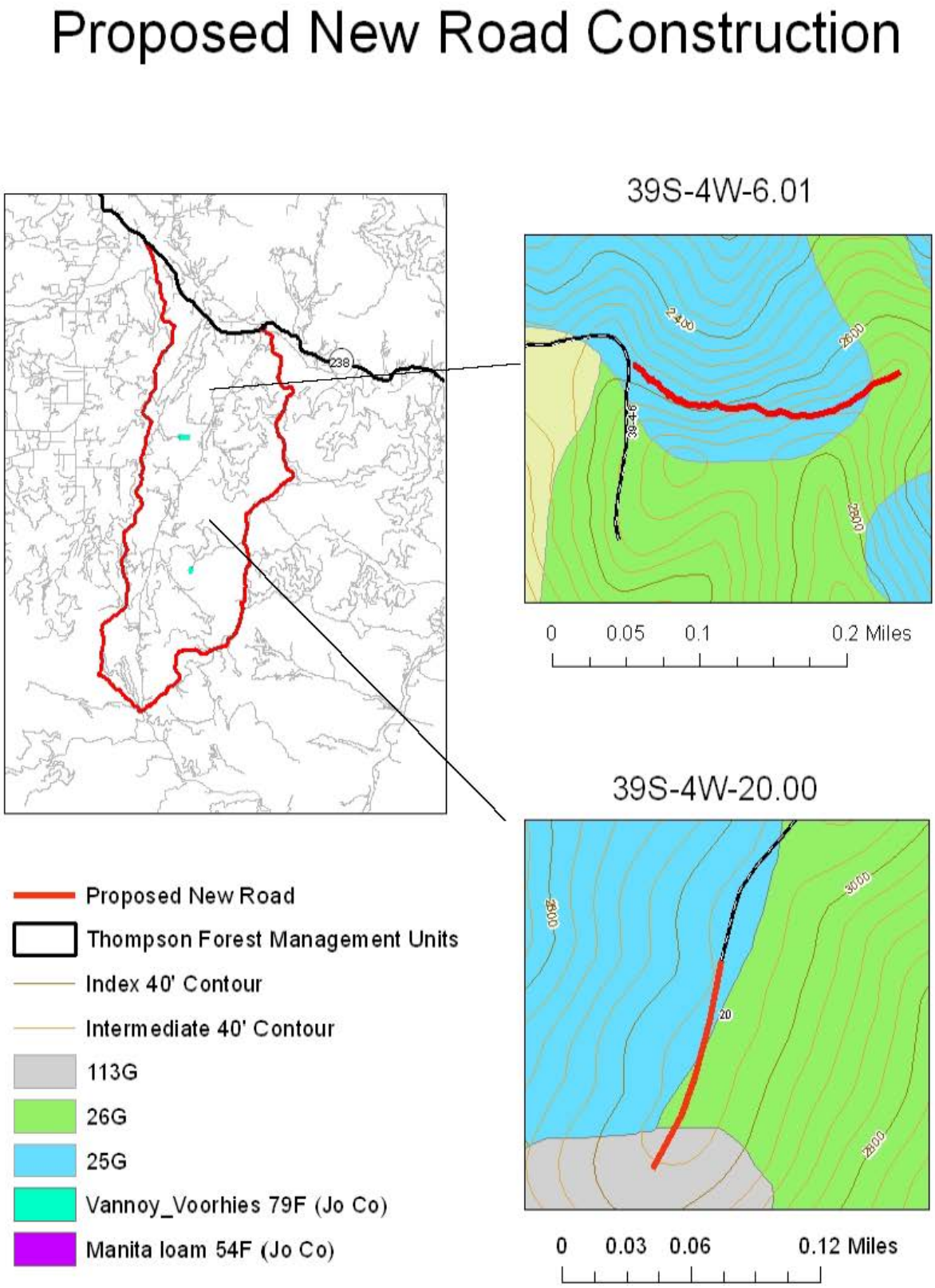
b. Alternative 2

Alternative 2 includes new road construction, temporary road construction, skid and swing trails, road renovation and maintenance, road decommissioning, and forest management.

New Road Construction

Two roads are proposed for construction in this project: proposed road 39-4-06.1 in T39S-R4W-S6 (0.25 miles) and proposed road 39-4-20 in T39S-R4W-S20 (0.12 miles) (Map 3-2).

Map 3-2. Soils within Areas Proposed for New Road Construction



Proposed road 39-4-06.1 sidehills just below a ridgetop (generally less than 200 feet from the ridgetop) and continues to a saddle and ends with approximately 300 feet (about 0.06 percent of the length) on ridgetop. The total proposed length is 0.25 miles. Assuming that approximately 4 acres are taken out of vegetative production for every mile of road, approximately 1 acre would be removed from the construction of this road. This road is on the Caris-Offenbacher map unit with the majority on north-facing slopes ranging from 50-80 percent with the end on the nose of a ridge. This proposed new road is in FG soils.

This soil is rated as having good to fair shear strength by the unified soil classification system. This classification depends on different soil characteristics such as soil depth and soil texture. The length of road that transverses the highest gradient (between 65 and 75 percent) is approximately 0.044 miles (230 feet) of the road length. The rest of the road is located on hillslopes between 35 and 65 percent.

Based on field review, the portions of road that are on the 65 to 75 percent slopes have the potential to be easily detached. A well designed road is necessary to prevent excessive soil movement (both mass and surface). Sidecast of road construction material would be prohibited in this location due to the slope and soil characteristics. According to the operational guide in the TPCC, road locations should seek areas of high stability and avoid side casting material in headwall and slide prone areas or on very steep side slopes (+80 percent) (TPCC p. 9-1). This proposed road is not in a headwall or slide prone area, but a portion is on high gradient side slopes (between 65 and 75 percent) and precautionary design would occur.

Prohibiting sidecast of excess material is expected to increase the stability of the road. Soil particles that are displaced from the road prism are expected to be intercepted by surrounding vegetation or organic material on the soil surface. The amount of soil particles displaced is expected to be minimal due to the Project Design Features described in Chapter 2 (p. 2-31 to 2-42). This road would be blocked after use which would protect from further soil displacement that potentially would have occurred from vehicle traffic, mainly in the wet season.

The area near road 39-4-06.1 has off road use (OHV trails). A road leads directly uphill to the ridge. There are large gullies in the road. This road is proposed to be decommissioned. Refer to pages 2-9 and 2-20 for discussion of proposed road decommissioning. The main difference in the current road that has developed ruts and the proposed road is the location on the landscape. The rutted road is a continuous surface that goes straight uphill with no vegetative growth or organic matter to intercept soil particles. When wetted, these soil particles move downslope and there is nothing (not even waterbars) to intercept the particles so they continue to be displaced from their current location. The soil particles settle at a landing further down the ridge. The proposed road also begins close to that same landing but the road is located at a slightly inclined contour to the hillside. Displaced soil particles would not move down the length of the road, but would instead move off of the road due to the PDF which requires newly constructed roads to be outsloped where possible (p. 2-38).

Proposed road 39-4-20 would be on a ridgetop for the total length (0.12). The road begins on Caris-Offenbacher and ends on the McMullin-Rock outcrop complex. Due to the location of the road, minimal soil movement would occur for the construction of the road. The proposed road is located primarily on rock outcrop. The road would be stable and very little fine sediment is expected to be displaced. This area would be removed from vegetative productivity (approximately 0.48 acres). However, due to the presence of rock outcrops, the area proposed for the road currently has low productivity. Based on the Unified Soil Classification, the shear strength in the soil ranges from good to fair among the different soil series involved. The Caris Offenbacher has good to fair shear strength depending on depth and which series it is within the map unit. Shear strength ranges from good to fair in the McMullin-Rock outcrop complex.

Very little soil would be cleared for construction due to the road location. The workability as construction material ranges between good to fair.

Newly constructed roads would be outsloped where possible. This and other PDFs (surfacing, slope protection, dips) would be required to ensure the road is not hydrologically connected to streamcourses.

Following use, all newly constructed permanent roads would be effectively blocked to preclude use. Blockage would consist of placing logs, slash, boulders, berms, and other material both at the entrance so that it is camouflaged, and at sufficient intervals along the roads length. This is expected to reduce the amount of displaced soil particles from the road prism.

There would be a noticeable increase in soil erosion the first few significant rain events after construction.

Erosion rates from roads and landings on the Klamath Mountains geomorphological unit (similar to that of the analysis area) were reported to be 14.51 $yd^3/ac/yr$ (Amaranthus et al. 1985). This total includes mass slope failures from roads and landings on unstable slopes in calculating the number.

Because most of the newly proposed road construction would be located on stable slopes it is anticipated that, under average rainfall conditions, the erosion rates would be less than one-half of those reported by Swanson and Dyrness (1975) (<7.25 $yd^3/ac/yr$) in the first few substantial storm events after construction, and decrease down to about 3 times natural rates after 3 years.

Typically, newly constructed roads lose the most soil primarily during the short period before grass becomes established and the roadbed is graveled or compacted. Soil loss from fully graveled roadbeds was only 3 to 8 percent of that from the bare soil roadbed of otherwise similar construction (Swift Jr, 1988, p. 321).

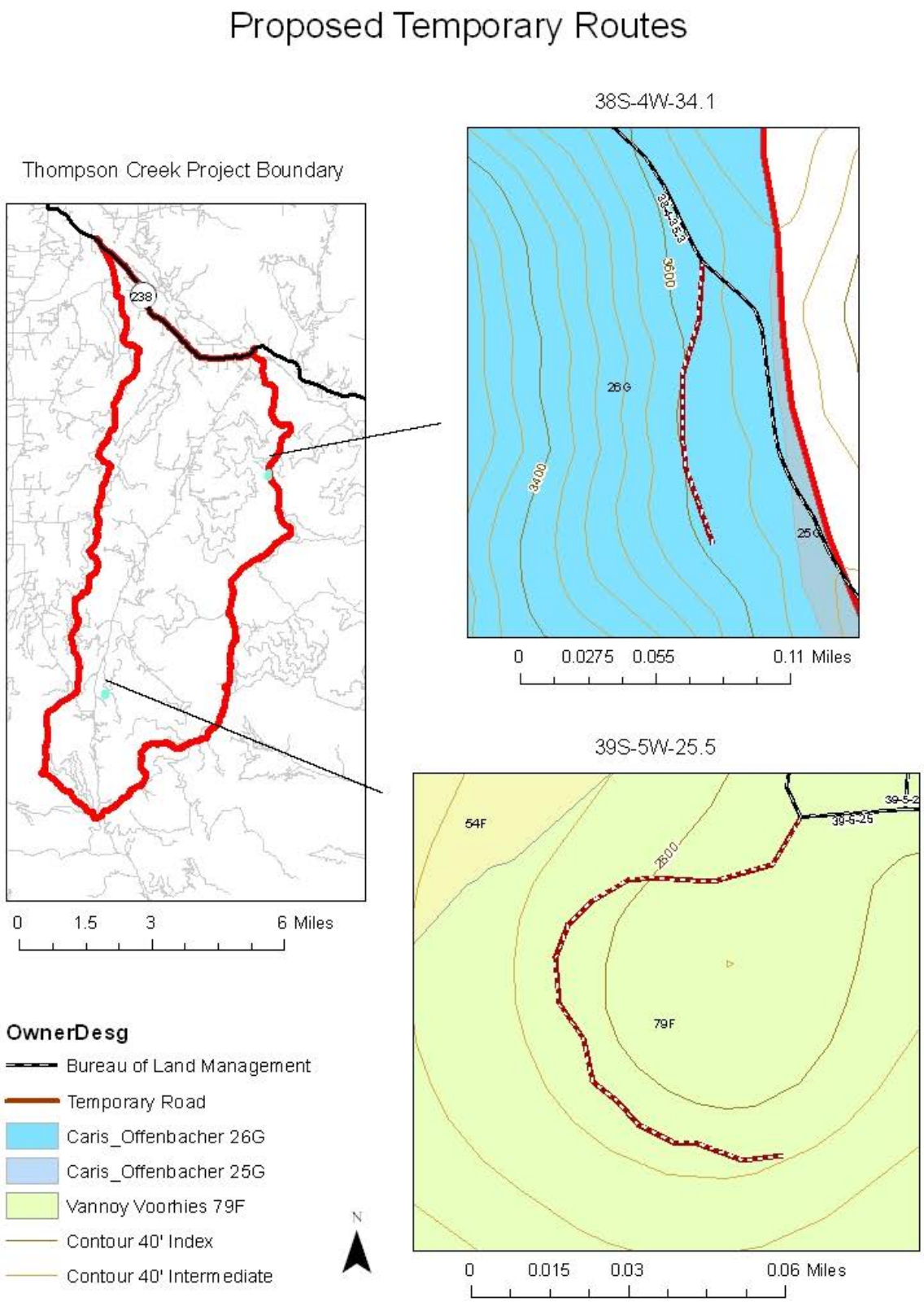
Any amount of soil particles displaced from the road is expected to move only a short distance from the road. This is due to the position of the road, soils, and surrounding vegetation. The entire herbaceous understory, down woody debris, trees, leaf litter and other live or decaying vegetation is expected to intercept possible eroded material.

Temporary Road Construction

There are two temporary roads proposed under Alternative 2: proposed road 38-4-34.1, T38S-R4W-S 34.1 (0.12 miles) and proposed road 39-5-25.5, T39S-R5W-S.25.5 (0.13 miles) (Map 3-3).

Temporary roads used or constructed would be fully decommissioned or obliterated at the completion of log haul and site preparation. Treatment would include decompacting the surface to a depth of 12 inches or to bedrock (whichever is shallower) and where fill occurs, recontouring outsloping the travelway to disperse runoff. Slash and other debris would be placed along the roads length to provide ground cover and discourage OHV use. Blockage at the entrance would consist of placing logs, slash, boulders, and other material so the entrance is camouflaged and vehicle use is precluded.

Map 3-3. Soils within Areas Proposed for Temporary Road Construction



Proposed road 39-5-25.5 would be 0.13 miles. It is located in the Vannoy-Voorhies complex. The road contours just below a peak. Slopes range from 35 to 45 percent where the road is designed. Approximately 0.52 acres would be taken out of vegetative productivity. The slope is uniform and does not show indications of instability. The Vannoy soil is rated as having fair shear strength and the Voorhies soil series is rated as having good to fair shear strength. Although this soil has a low resistance to compaction, which is based on different soil characteristics such as percentages of different soil particle sizes, soil structure, organic material amount, and percentage of coarse fragments, it has a high potential for recovery. Therefore, when the road is ripped, the affected soil is expected to return to its former productive state both functionally and structurally.

The restoration potential is based on rainfall, soil depth, and other indicators that tend to have impacts on the time and ability for a soil to be restored. "This interpretation rates each soil for its inherent ability to recover from degradation, which is often referred to as soil resilience. The ability to recover from degradation means the ability to restore functional and structural integrity after a disturbance (NRCS 1993)."

Proposed road in 38-4-34.1 (0.12 miles) is located in Caris-Offenbacher soils. Approximately 0.48 acres would be taken out of vegetative productivity. This road is on or at the edge of a saddle. The soils in this area are classified as Fragile for steep gradient. However, due to the scale of mapping, the slope on the ground is gentle and the proposed road is located just above the steep slope break. The hill slope ranges between 30 and 45 percent and is on the edge of the saddle and right before the slope break where slopes are greater than 60 percent. The location of the road is on stable soils. Based on a rating from the NRCS, these soil series have a low resistance to compaction. Although this soil has a low resistance to compaction, it has a high potential for recovery. Therefore, when the road is ripped, the soils are expected to return to its former productive state both functionally and structurally.

The effects of road construction are the same with temporary roads during construction and the time period of the project when the road would be in use. The differences are the effects after the project is completed. The road would be fully decommissioned or obliterated when the project is completed. Fully decommissioning would include decompacting the surface to a depth of 12 inches, and slash and other debris would be placed along the road's length to provide ground cover and discourage OHV use. Blockage at the entrance would consist of placing earthen berms, logs, slash, boulders, and other material so the entrance is camouflaged and vehicle use is precluded. Obliterated roads would be treated similar to fully decommissioning; however, where fill occurs, recontouring and outsloping the travelway to disperse runoff would occur. Both methods would include the removal of all drainage structures.

Soil erosion from the construction and decommissioning of the temporary routes is expected to be avoided or minimized due to the implementation of Project Design Features. For example, seasonal restrictions during all road construction activities would reduce the potential for runoff and erosion from intensive winter storms and saturated soil conditions. All new temporary roads are on an upland ridge or stable slopes which also decrease the potential for soil erosion.

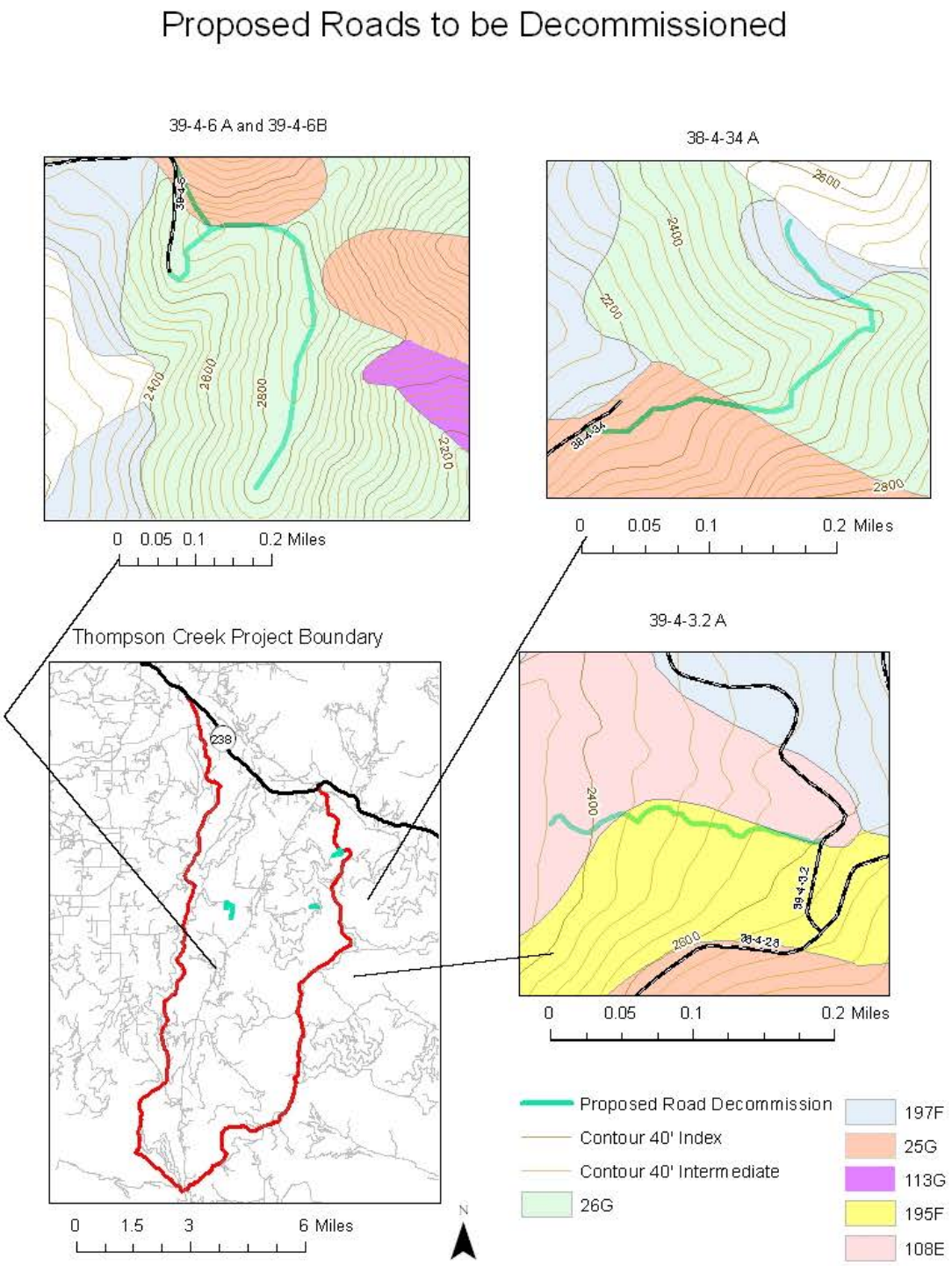
Decommissioning would likely not return the soil to the original bulk density in the short term. However, through seeding and mulching it would discourage soil displacement, reintroduce organic material and rooting systems into the soil and facilitate the vegetative recovery of the soil. Soil productivity is expected to be returned in the long term.

Road Decommissioning

Approximately 2.55 miles of road would be fully decommissioned. Approximately 1.3 miles of road will require actions, such as pulling back the slope to recontour the area to the original hillside shape, to fully decommission the road. All roads proposed for decommissioning are currently natural surfaced roads. Refer to Map 3-4 for road locations. An additional 1.2 miles of road (Roads 38-4-28.2, 39-4-19, and 39-4-3.1) are currently closed and are decommissioning naturally. Under this action they will be changed to the fully decommissioned

category and removed from the system road network. No action is required for these three roads so they will not be considered further.

Map 3-4. Roads Proposed to be Decommissioned



Proposed decommissioned road, 38-4-34.00 Spur A (0.46 miles, the last 0.15 miles of that are in FG soils). The fill slope would be pulled back on top of the road to restore the natural hillslope. This is a mostly overgrown road that has off road vehicle and horse tracks on it. Portions of the length of the road are slumping (primarily in the cut slope). Portions are steep. The tracks are about 5 feet wide. The road is located on Caris-Offenbacher soils and Vannoy-Voorhies. These complexes are moderately deep, well drained soils that have a surface layer of silt loam or gravelly loam. The portion of the road in FG soils is in the Vannoy-Voorhies. The soil does not show indicators of instability in this area although the slope is steep. The last portion of the road is overgrown with shrubs. According to the NRCS, these soils have a "high potential" for restoration. "This interpretation rates each soil for its inherent ability to recover from degradation, which is often referred to as soil resilience. The ability to recover from degradation means the ability to restore functional and structural integrity after a disturbance" (Natural Resources Conservation Service).

The 39-4-03.02 Spur A is approximately 0.2 miles. Currently it is a narrow jeep-like road. The beginning of the road (and majority) is on Vannoy silt loam and it ends on the Manita loam. The Vannoy silt loam is moderately deep, well drained soils, the top 18 inches ranges from a silt loam at the surface to a clay loam. Ripping would be completed to an 18 inch depth. Bedrock is at a depth of 20 to 40 inches. The Manita loam is deep and well drained. The top 18 inches ranges from a loam at the surface to a clay loam. Depth to bedrock is 40 to 60 inches. Ripping is not expected to come in contact with bedrock or boulders. It is a pretty steep grade (for a road). The road continues after it crossed private. The portion of this road on BLM administered lands would be decommissioned after harvest. According to the NRCS, these soils have a "high potential" for restoration.

Road 39-4-6 Spur A is 0.57 miles and Spur B is 0.11 miles. Both are natural surfaced. The steep pitch in the beginning of Spur A has deep ruts in the road. The beginning of road 39-4-6 Spur A is on Caris-Offenbacher gravelly loams, 50-80 percent north slopes (25G) and the rest of road and Spur B are on south slopes (26G). It is well drained and 20 to 40 inches to bedrock. The top 18 inches ranges from gravelly loam or gravelly to very gravelly clay loam. Ripping is not expected to come in contact with bedrock or boulders. The poor location of the road (the steep incline) causes soil loss from the road and accumulation of soil further downslope. According to the NRCS, these soils have a "high potential" for restoration.

In total, approximately 1.3 miles of road are proposed to be decommissioned which is approximately 5.2 acres. Therefore, approximately 5.2 acres of soil that currently has no or very little vegetative productivity would be restored to productive land. Also, the amount of soil particles being displaced from the exposed cut bank and road surface would decrease due to these actions.

Road construction and decommissioning activities would follow the applicable Best Management Practices from the 1995 Medford District ROD/RMP (USDI 1995, p. 165).

Road Renovation and Improvement

An estimated 45 miles of road would be used as haul routes and improved as needed. Road improvements could include such items as spot rocking, cleaning road drainage ditches and culvert basins, repairing and installing water dips, grading and shaping roads.

The effects of road improvements to the soil resource are that some of the work (water dips, grading, shaping roads and cleaning ditches) would displace soil from the current location. This soil, however, is already disturbed due to the road. Work involved with improvement would result in minimal disturbance and would ultimately improve the road due to improved drainage and spot rock surfacing, which would reduce future soil erosion.

Renovation of approximately 3.30 miles of road would occur on existing BLM roads to access commercial harvest units. Renovation of roads would include reshaping the road with a blade, brushing, and restoring water drainage. Refer to Chapter 2 for the list of roads proposed for improvement. Renovation may result in more disturbance to the road prism than improvements due to reshaping the road with a blade. This is a disturbance

within an already disturbed road prism. The associated project design features are included to minimize the amount of soil erosion from activities and minimize or prevent the movement of the soil particles from the road. Refer to the Project Design Features that prevent off-site erosion during road renovation (p. 2-35 to 2-37).

One of the roads proposed for improvement is currently blocked but is being used by OHVs. Implementation of the following Project Design Feature is designed to discourage future use of the road bed by OHVs:

- Following use, all newly constructed and renovated permanent roads would be effectively blocked to preclude use. Blockage would consist of placing logs, slash, boulders, berms, and other material both at the entrance so that it is camouflaged, and at sufficient intervals along the roads length.

Summary of Effects - Temporary and Permanent Road Construction, Road Decommissioning, and Road Renovation and Improvement

Road construction would have the greatest impact on the soil resource as approximately 4 acres of land are disturbed and taken out of vegetation production for every one mile of road construction proposed. Approximately 1.48 acres would be taken out of vegetation production through the construction of the two roads (39-4-6.01 is 0.25 miles and proposed road 39-4-20 is 0.12 miles). Approximately 1.00 acre would be temporarily removed from vegetative production from the two proposed temporary roads (39-5-25.5 is 0.13 miles and 38-4-34.1 is 0.12 miles). Currently there are 130 miles of road in the analysis area. During the project, road miles would increase to 130.62 miles. After project completion the road miles would be reduced to 130.37 from the decommissioning of the temporary roads and ultimately, 129.07 miles after the additional road decommissioning occurs. The 1.25 miles of road that are currently closed would reduce this number to 127.82 miles.

Soil disturbance due to road renovation and improvements would be minimal as actions would be confined to the existing road prism, which has already been disturbed, and associated Project Design Features would help to minimize soil erosion, prevent movement of soil particles from the road, and discourage future use of the road bed by OHVs.

So, although some soil disturbance would occur under Alternative 2, in the end, a small net decrease in total road miles would occur and implementation of associated Project Design Features would minimize the potential for impacts to soils from construction, renovation, and decommissioning to occur.

Designated Skid Trails, Tractor Swing Trails and Landings

Under Alternative 2, a total of 1.17 miles of designated skid trails (DST) and swing trails are proposed (Map 3-5).

Map 3-5. Soils in Areas Where Skid and Swing Trails are Proposed

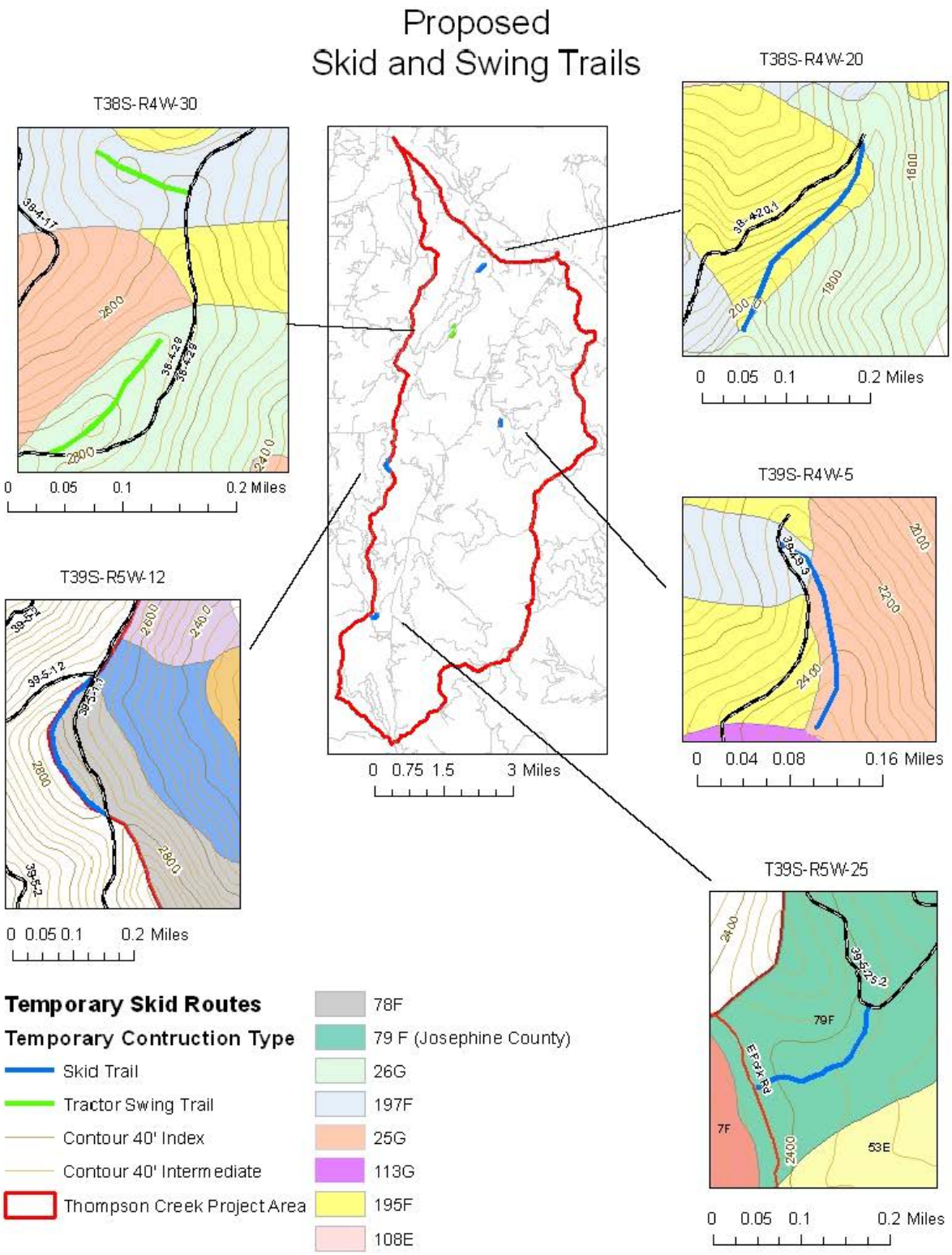


Table 3-9. Designated Skid Trails and Tractor Swing Trails in the Project Area (Alternative 2)

Township Range Section	Trail Type	Miles	Soil Map Unit	Location on Topography	Current condition	Projected Acres (approx. 2 acres per mile)
T38S-R4W-S20	Skid Trail	0.28	195F	Ridge *	Not existing.	0.56
T39S-R5W-S12	Skid Trail	0.29	78F (JO CO)	Ridge	Existing footprint. Broad and gentle gradient. Portion over 35 percent is excluded.	0.58
T39S-R4W-S5	Skid Trail	0.18	25G 197F (at end)	Ridge	Existing footprint	0.36
T38S-R4W-S30 North	Swing Trail	0.09	197F	Broad ridge	Existing footprint	0.18
T38S-R4W-S30 South	Swing Trail	0.15	26G	Ridge.	Old existing. Grown over with brush but has a trail.	0.3
T39S-R5W-S25	Skid Trail	0.18	79F	Gentle slope	Not existing	0.36

*This has short portions where slope is greater than 35 percent. The trail was reviewed and it is appropriate for the site, the slope is a short pitch of around 40 percent and is still on ridge top. This pitch gives access to gentle slope above.

As described in the Table 3-9, other than the skid trail in unit 25-3, all skid and swing trails are on ridge tops. The designated skid trail in unit 25-3, which is needed to access the western portion of the unit, would cross a short duration intermittent stream. Prior to harvest, bump logs would be placed in the channel to minimize disturbance. Following harvest any berms or ruts would be leveled to match the existing topography and slash and other debris scattered so that 80 percent ground cover is achieved. The bump logs would be removed and any loose soil removed from within the channel. Straw bales would be positioned downstream of the skid trail to arrest downstream sediment movement (p.2-35). All skid trails would be water barred according to BLM standards. Skid trails would be blocked with an approved barricade and camoflauged with slash and other debris where they intersect haul roads (p.2-34). On tractor swing trails, where determined necessary, any berms or ruts would be leveled to match the existing topography and slash and other debris scattered to discourage use and protect the surface from erosion (p. 2-35).

The amount of area compacted in trails with existing footprints would remain the same, although the degree of compaction may increase. Within a timber sale area, the amount of area compacted must be less than 12 percent. Due to the slope of the unit, the yarding system would be cable and the designated skid trail is the only additional compaction to the unit. Cable yarding may slightly increase compaction in corridors where extensive dragging occurs but it would not be greater than 12 percent of the unit.

Landings would be constructed or renovated in Alternative 2. Landing construction and renovation would not occur during the winter months (October 15 to May 15) when the potential for soil erosion exists. An extension (earlier or later) of these dates may be considered under dry conditions and a specific erosion control plan is prepared and accepted (e.g. rocking, water barring, seeding, mulching, barricading). All construction activities would be stopped during a rain event of 0.2 inches or more within a 24-hour period or if determined by the administrative officer that resource damage would occur if construction is not halted. If on-site information is inadequate, measurements from the nearest Remote Automated Weather Station (RAWS) would be used.

Construction activities would not occur for at least 48 hours after rainfall has stopped and on approval by the Contract Administrator. Landings would be located on existing footprints.

OHV Trails

There are 18.0 total miles of mapped OHV trails on BLM-administered lands in the analysis area. OHV trails are found throughout the analysis area but tend to be most dense in the Hinkle Gulch area, Ferris Gulch and along the beginning of Ninemile. This affects the condition of the soils in proposed treatment acres where these trails are within.

Table 3-10. The Area and Length of OHV Trails in the Analysis Area.

Trail width (m)	Trail Width (ft)	Total length of OHV trail (miles)	Total length of OHV trail (feet)	Area of OHV trail (square feet)
4 meter wide	13.12	0.07	364.3	4,780
3 meter wide	9.84	3.26	17,210	169,300
2 meter wide	6.56	4.55	24,020	157,600
1 meter wide	3.28	2.50	13,200	43,300
0.5 meter wide	1.64	1.51	7,973	13,080
Unknown width	-	6.12	32,310	-

The total area of known widths of OHV routes is approximately 391,060 square feet (8.98 acres) total, excluding routes of unknown. In the 23,268 acre watershed, 8.98 acres (0.03.9 percent) are OHV routes. In combination with road mileage (130 miles) which is approximately 520 acres and the 8.98 acres of OHV route (excluding unknown widths) this is a total of 528.98 acres that is road or OHV route in the analysis area (2.27 percent). A total of 148 miles of land in the analysis area are roads or OHV routes.

Of the total length of OHV trails, 1.9 miles are located on Fragile Gradient soils and 5 miles are located in proposed units in Alternative 2. OHV trails within units would be blocked, where applicable, upon completion of the project. Blockage would consist of placing logs, slash, and other material both at the entrance, so that it is camouflaged, and at sufficient intervals along the routes length. This is expected to reduce soil displacement and compaction in units where it is possible to effectively block the trail.

An additional 0.7 miles of OHV routes are on roads that are included in the current road mileage but are either gated, decommissioned or blocked roads. The soils in this area were disturbed prior to OHV use from the road construction. However, due to the OHV use on these areas, surface disturbance is still occurring and soil productivity is not returning to natural levels as it would if OHV use was not occurring. An increase in the amount of soil displacement from the road surface is occurring in these areas.

Due to OHV use in the watershed, the following project design features would be implemented in order to reduce or minimize off-site soil erosion occurring from OHV use.

- Old skid trails would not be opened or driven on without the approval of the authorized officer. When this is permitted, slash and other material would be scattered along the segment where use occurred to camouflage the feature and preclude use by OHVs.
- Old skid trails would not be treated near the intersections with system roads in order to provide a visual screen and discourage vehicular access
- Following use, all newly constructed and renovated permanent roads would be effectively blocked to preclude use. Blockage would consist of placing logs, slash, boulders, berms, and other material both at the entrance so that it is camouflaged, and at sufficient intervals along the roads length.

Forest Management

Of the proposed units in Alternative 2, 465 acres are in fragile gradient (FG) soils. The FG soils are classified as fragile due to the potential for surface ravel.

About 19 acres of the units proposed in FG soils would be tractor yarded. From field observations, the slope in the area proposed for tractor is gentle (35 percent or less) and the slope break to the steep ground is just below. Helicopter yarding is proposed for 39 acres of FG soils. 281 acres of FG soils in units would be cable yarded. In cable yarded units, the yarding corridors would be the only area where soil disturbance would occur. The remaining acres of the treated FG soil would not be yarded (126 acres).

The main concern with FG soils is disturbance from yarding and the need to locate roads on stable locations. The operational guide in the 1995 TPCC included that, "cable systems that provide partial or complete log suspension are necessary to minimize disturbance to soil surface and loosening of existing ravel" (TPCC p. 9-1).

Approximately 3,442 acres of BLM-administered land is proposed for management activities. Soil disturbance from timber harvesting is not avoidable, but can be minimized. Preventative measures are more effective in minimizing impacts on soils than remedial mitigation because of the remedial expenses, loss of productivity until mitigation occurs, and the possibility that the original soil conditions may never be restored (Miller et al. 2004). The commercial timber harvest activities planned in Alternative 2 would disturb, on average, about 15 percent of the ground in the proposed harvest units. As a result of implementing designated skid trails, the units tractor logged (174 acres) would result in approximately 12 percent or less of the area compacted (USDI 1995). Designating skid trails would minimize the area that would be deeply disturbed during tractor logging operations.

The rest of the acres would be cable yarded (1,052 acres), or not yarded (2,216 acres).

In an Oregon State University study on partially cutting (using designated skid trails), designated skid trails occupied only 4 percent of the area, compared to 22 percent for conventional logging (Bradshaw 1979). In a study of thinnings and partial-cutting by yarding systems, skidding logs caused soil disturbance on about 21 percent of the site, resulting in 13 percent displacement and 8 percent compaction (Landsberg et al. 2003). Observations of the units proposed for harvest reveal very few old skid trails still apparent across the landscape. Tree and brush vegetation has re-established in most of the skid trails that were previously compacted from past harvesting.

Most of the eroded particles would not reach waterways as a result of riparian reserve buffers, waterbars and the dispersal of yarding skid trails. The decrease in soil pore space as a result of the compacted skid trails causes a slower infiltration rate. Although erosion rates would increase initially in the harvested units, most soil particles would not reach local waterways under normal rainfall conditions; erosion rates would be expected to return to near normal rates within 5 years as vegetative cover is re-established. In most operations, a major portion of the harvest area would remain essentially undisturbed. Even logging systems that cause the most disturbances seldom bare more than 30 percent of the soil surface. Since surface erosion depends primarily on extent and continuity of bare areas, soil loss is usually slight (Rice et al. 1972).

The natural erosion rate in the Klamath Mountains is estimated to be 0.13 $yd^3/ac/yr$ (Aramanthus et al. 1985). Harvested areas are estimated to be 0.89 $yd^3/ac/yr$ (Aramanthus et al. 1985). A major difference in these estimates and what is likely to occur from this project is that unstable areas are not avoided as they are in this project. So, the erosion rate is expected to be less than the estimated amount due to slope restrictions, seasonal restrictions, and the prescription.

Variable Density Thinning is prescribed. This would result in gaps, or openings of one half to 2 acres in size, on +/-15 percent of the treatment area. These openings would not have continuity with each other as stated above. These openings are dispersed throughout the unit so any displaced soil from one opening is expected to be

intercepted by vegetation and organic material before it reaches another opening. Best Management Practices (BMPs), as required by the Federal Clean Water Act, and Project Design Features (PDFs) outlined in Chapter 2 would be followed, and creation of the gaps would not result in soil productivity loss or detrimental soil displacement. Skips would be in +/-15 percent of the treatment area. A skipped area may be a seep or rock outcrop which would be beneficial in both maintaining soil productivity and reducing soil displacement.

The rate of surface erosion is closely correlated with vegetative cover, especially litter on the soil surface. Litter protects the soil surface from raindrop impact and promotes infiltration. Litter and the stems of vegetation also bar the downslope movement of surface soils, which might be started by gravity, flowing water, or animals (Rice et al.1972, p. 322).

Riparian Reserve Thinning

Vegetation would be treated in designated Riparian Reserves outside of a no treatment buffer (50 ft.) under Alternative 2. This no treatment buffer is expected to intercept any possible displaced soil particles due to vegetation and organic matter present in the no treatment buffer. Machinery would be prohibited in the Riparian Reserves, so there would be no compaction and minimal to no ground disturbance in the Riparian Reserves.

Fuels Reduction

Prescribed burning planned under Alternative 2 would be in the form of handpile burning or broadcast burning. Broadcast burning would not occur within skips. As the broadcast burning planned in this project would be an underburn conducted only during spring-like conditions, the intensity of the burn would be light-to-moderate and have slight direct short-term effect on soil properties. A light surface fire would generally only char the litter, leaving most of the mineral soil at least partially covered. A moderate burn would result in the partial consumption of duff, rotten wood or other woody debris; mineral soil under the ash would not appreciably change in color. Most soil and ash movement occurs during the first rainy season after the slash is burned and quickly diminishes as vegetation cover re-establishes. A recent study concluded that prescribed restoration fires did not have a significant effect on soil solution and stream chemistry or stream sediment concentrations, and that low-intensity, low-severity fires could be used effectively as a tool to restore vegetation structure and composition (Elliot and Vose 2005).

The increase in erosion rates over present levels would be less than 15 percent as a result of burning handpiles because the piles would be spaced throughout and occupy approximately 3 to 5 percent of the total area. The increased potential of soil particles reaching the local waterways as a result of the prescribed burning would be low because of prescribed riparian buffers, and handpiling of slash would not occur near waterways. High soil temperatures generated by burning piles would severely and negatively affect soil properties in 3 to 5 percent of the unit by physically changing soil structure and reducing nutrient content. In most pile burning operations, the duff and woody debris associated with the piles is completely consumed.

Duff and woody debris represent a storehouse of minerals and protection for the soil surface. Since nitrogen losses are roughly proportional to the amount of duff consumed, burn prescriptions that allow greater retention of woody debris benefit long-term site productivity. Burning volatizes organic nitrogen, or changes it into a readily available form (for plant use). Large proportions of the total nitrogen budget can be lost through volatilization in the sites where pile burning occurs. Total foliar nitrogen content is also reduced (14 percent in moderate burns, 33 percent in intense burns), and the effects last at least 4 years (Atzet et al. 1987). Overall, soil productivity would experience a slight (less than 15 percent), decrease through short-term effects, but potential long-term positive effects would be realized from the proposed actions as the risk of catastrophic fire is diminished.

Summary of Effects -Forest Management

In summary, there would be a net increase in compacted area in the tractor harvest units, averaging about 12 percent, which would slightly decrease soil productivity long-term. Based on research and past monitoring of

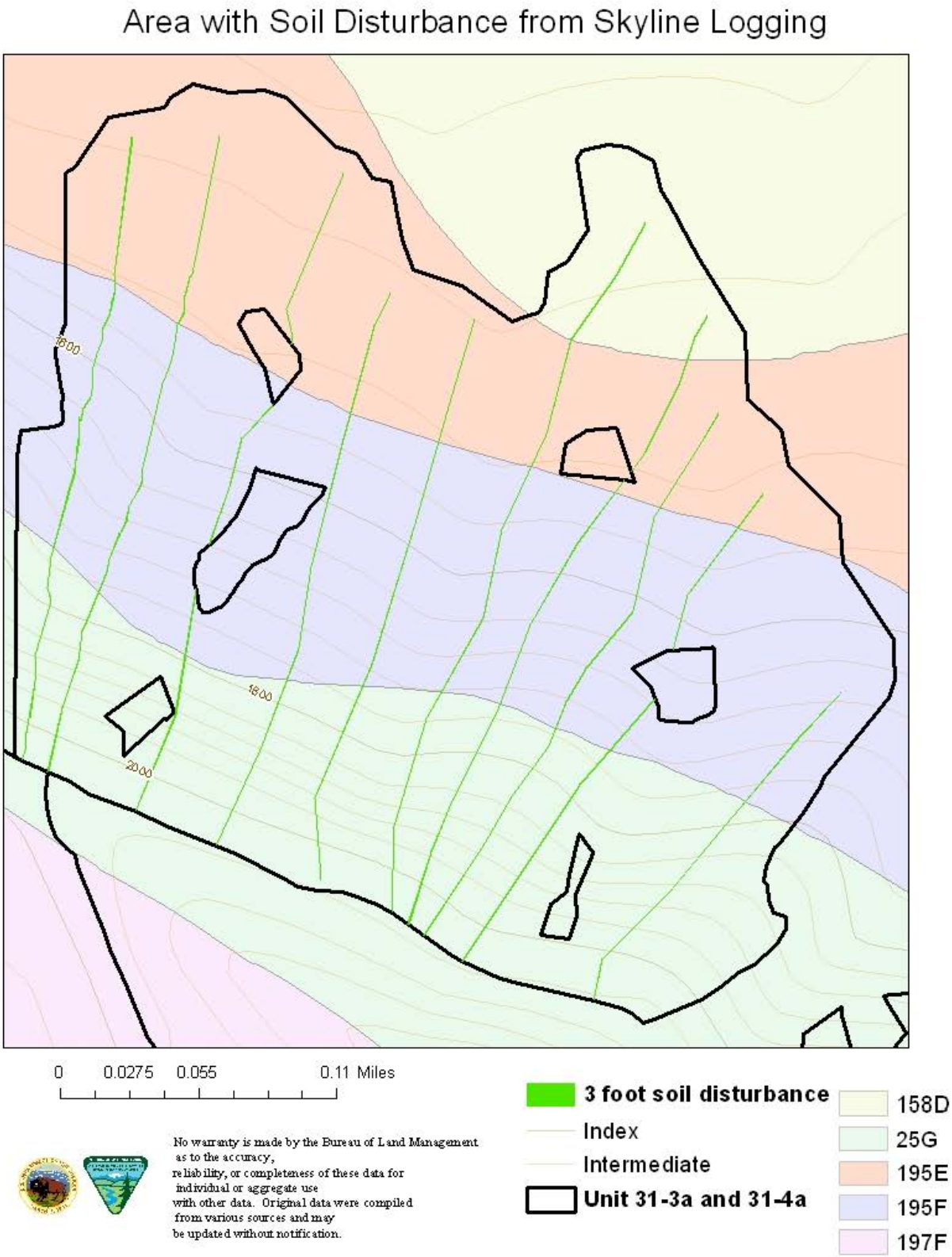
operational activities, it is assumed there would be a 5 percent loss of productivity on all lands that would be tractor harvested using designated skid trails. The loss is accounted for in the (Medford District) non-declining timber harvest calculations (USDI 1994). Soil productivity would experience a slight (less than15 percent), negative decrease short-term, but potential long-term positive effects would be realized by thinning and prescribed fire of density management units. There would be a slight to moderate (15-50 percent) increase in erosion rates as a result of the combination of harvesting timber and fuel reduction activities (i.e. slashing, prescribed burning) which would last approximately three to five years. A slight cumulative long-term increase in erosion rates would occur as a result of harvesting activities.

The recent forest management activities in the adjacent watershed (Pilot Joe) may be used as an opportunity to predict effects to the units in the Pilot Thompson project area due to the similar soil types, climate and terrain. Through monitoring past actions, negative impacts, if they exist, may be avoided for future projects and actions that have positive results may continue in future projects. Soil disturbance in the cable unit (31-3A and 31-4A) was assessed. The main soil disturbance occurred inside the yarding corridors. From a distance, the soil disturbance in the yarding corridors looked much wider than on the ground. On average, the width of soil disturbance (where the topsoil and some cases mineral soil were displaced) was about 3 feet wide. The widest being about 5 feet. The slope was very steep. Although the slope was steep there was a mixture of waterbars, slope breaks and down vegetation to slow down soil particle movement and displace off of the disturbed area. Most of the disturbed soil still had some surface roughness (generally in concave areas) which helps to intercept soil particles. Surface roughness, even in mineral soil, indicates that water is still intercepted by soil and moves downward through the profile.

In the units, 31-3A and 31-4A, the steep corridors are intercepted at the base by a large berm and then the ground flattens out. This large berm and change in topography would stop all soil particle movement and no soil particles are displaced outside of the unit. Within the disturbed area there were portions of the length that were more impacted than others. There was some evidence of sheet erosion (the indicator is a smoothed exposed mineral soil). This was mostly after a slope break where the slope is slightly convex. The soil particles were then displaced downslope to a more concave slope or where there was a waterbar or down log. There were visible areas of where the logs were dragged across the soil surface and physically displaced soil sideways and compacted downward. Away from the inside of the yarding corridor disturbed area, the soil still has residual organic horizon on the surface, with only small areas where a tree was felled and small areas were slightly displaced. There were no rills or gullies. There are still areas of intact organic soil surface horizon within the yarding corridor length.

The location and extent of yarding corridors were collected (Map 3-6). In many portions of the corridors' length, there was little to no soil disturbance (duff was still intact). Areas where the soil was disturbed, (mineral soil exposed, and duff as well as soil particles displaced) the width of disturbance averaged approximately three feet. Based on that average, the amount of area where soil is disturbed was estimated. If all the yarding corridors had three foot wide soil disturbance, then, the amount of area disturbed is 0.89 acres. This is approximately 1.6 percent of the unit. The total area of corridor (with both disturbed and undisturbed soil) is approximately 8.0 percent. This number may be higher than the actual amount due to the areas along the corridor that are not disturbed; however, it is a general idea.

Map 3-6. Soil Disturbance From Cable Yarding in Pilot Joe



Cumulative Effects

Geppert (1984) concluded that cumulative surface erosion should result from the construction and existence of road networks, but that forest harvest and site preparation should not result in cumulative erosion, except when poorly applied on poor or harsh sites (Beschta n.d.). There are no harsh or poor sites being treated in Alternative 2, as such sites were screened through the Timber Productivity Capability Classification process and taken out of the timber harvest base. It is estimated that there are approximately 130 miles of road that exist in the 23,268-acre project analysis area, as well as 18 miles of OHV routes on BLM-administered lands. This results in an average road density of 3.6 miles of road per square mile, which is approximately 520 acres of compacted area from roads, in addition to the area compacted from the 18 miles of OHV routes (area not calculated due to the variability of widths of these routes).

Currently there are 130 miles of road in the project area. New road construction would increase the number to approximately 130.37 miles over 23,268 acres. This does not take into account the 0.25 miles of temporary road as those roads would be decommissioned immediately post project. Additionally, 1.3 miles of road total would be decommissioned. Taking into consideration the additional 1.25 miles of closed roads that have decommissioned naturally, the total road mileage would be reduced to 127.82 miles. Natural surfaced roads would be blocked at close of activity.

Additionally, in the reasonably foreseeable future, 1.2 miles of road is also proposed for decommissioning under a separate project not funded by the timber sale. This would add 4.8 acres into vegetative production.

Cumulatively, there is currently little direct evidence to indicate that harvest removals in themselves lead to soil depletion over several succeeding rotations (Beschta n.d.). A crucial aspect that affects soil productivity is cutting intensity, or the proportion of standing trees harvested (i.e. clearcutting vs. shelterwood vs. selection cutting). As cutting intensity decreases, so, too, do the effects on the soil.

Another critical aspect of a silvicultural regime is the rotation, or cycle length. Rotation length determines the intervals at which the site is entered and disturbed and the rate at which nutrients are removed, redistributed or lost. Rotation length is especially important from the point of view of cumulative effects because it determines the time periods allowed for recovery between harvests. Soil productivity decline should be least likely when low silvicultural intensity is combined with high inherent productivity and favorable conditions. Soil erosion may prove cumulative through time if periodic disturbances occur (that result in soil leaving the site) at intervals too short for the site to stabilize to bring about recovery. This should not be the case as a result of the Pilot Thompson Project, as soil disturbance would only slightly increase the amount of soil leaving the site and erosion rates would return to near normal within approximately five years.

c. Alternative 3

Alternative 3 is similar to Alternative 2 with respect to the soils resource except:

- No new road construction (temporary or permanent) would occur;
- An additional 0.10 miles of swing trails are proposed;
- A slight increase (0.07 miles) in road renovations are proposed;
- An additional 1.7 miles of road would be used as haul routes;
- An additional 106 acres of non-commercial treatments are proposed;
- Helicopter yarding would be used for 437 acres;
- 9 existing helipads would be used; and
- There would be a reduction in cable yarded acres (71 acres).

Roads

Under Alternative 3, no new road construction is proposed, either temporary or permanent. Therefore, Alternative 3 would not displace any soil due to road construction, leaving 2.48 acres not compacted and remaining in vegetative productivity. Compared to Alternative 2, an additional 0.07 miles (totaling 3.37 miles) of road renovation is proposed under Alternative 3. An additional 1.7 miles (totaling 46.7 miles) of road would be used as haul routes and improved as necessary. The difference in miles of renovation and improvement would increase the amount of ground disturbed and the potential for soil displacement; however, on the larger scale of the project area, the amount of change is minimal.

As with Alternative 2, approximately 2.55 miles of road would be fully decommissioned under Alternative 3. Approximately 1.3 miles of road will require actions, such as decompacting the surface and pulling back the slope to re-contour the area to the original hillside shape, to fully decommission the road. After road decommissioning, the total miles of road in the analysis area would be reduced from 130 to 128.7 miles. Taking into account the 1.25 miles of road that are currently closed and have decommissioned naturally reduces this number to 127.45 miles.

Designated Skid Trails and Swing Trails

In addition to the 1.17 miles of DST and swing trails proposed under Alternative 2, a third swing trail is proposed to access Unit 19-4 (T39S-R4W-S20), instead of constructing a new road (refer to Map 2-6, p. 2-20). The proposed swing trail would be 0.10 miles long and would be placed in the same location as the proposed road (under Alternative 2), which is along the ridge top. Therefore, under Alternative 3, a total of 1.27 miles of DST and swing trails are proposed (refer to Table 3-9, p.3-52). While the amount of swing trails would increase from Alternative 2, the amount of ground disturbance and potential for soil displacement would be less than if you were to build a new road.

Forest Management

Alternative 3 proposes 2,322 acres of non-commercial treatment; this is an increase of 106 acres from Alternative 2. Soil productivity on these additional 106 acres is expected to be the same as described under Alternative 2. Alternative 3 proposes to treat 960 acres of forest land using a cable yarder; this is 71 acres less than what is proposed under Alternative 2. The reduction in cable yarding acres is due to the lack of road construction and resulting elimination of access to select. A reduction (71 acres) of proposed cable yarding would result in fewer acres of soil disturbance.

Under Alternative 3, 437 acres of helicopter yarding would occur. In-unit soil disturbance from helicopter yarding is expected to be less than both cable and tractor yarding. Nine existing helipads would be used under Alternative 3. No new compaction is expected to occur from the use of helicopter landings.

Riparian Reserve Thinning

Vegetation would be treated in designated Riparian Reserves outside of a no treatment buffer (50 ft.) under Alternative 3. The effects to the soils resource are expected to be the same except trees 14 inches and greater would be left on-site for down wood recruitment. Trees would be felled toward the creek and soil productivity would increase where the trees remain. Additionally, leaving the trees would further protect the soil surface from soil mineral displacement.

Cumulative Effects

Alternative 3 would result in a slightly larger net decrease of road miles than Alternative 2 (127.45 miles in comparison to 127.82 miles). The amount of short term soil disturbance would be greater in Alternative 2 than Alternative 3, primarily due to the differences in road construction. The difference in Riparian Reserve Thinning units between the action alternatives is not expected to be significant at the scale of the analysis area.

E. WATER RESOURCES

1. Characterization

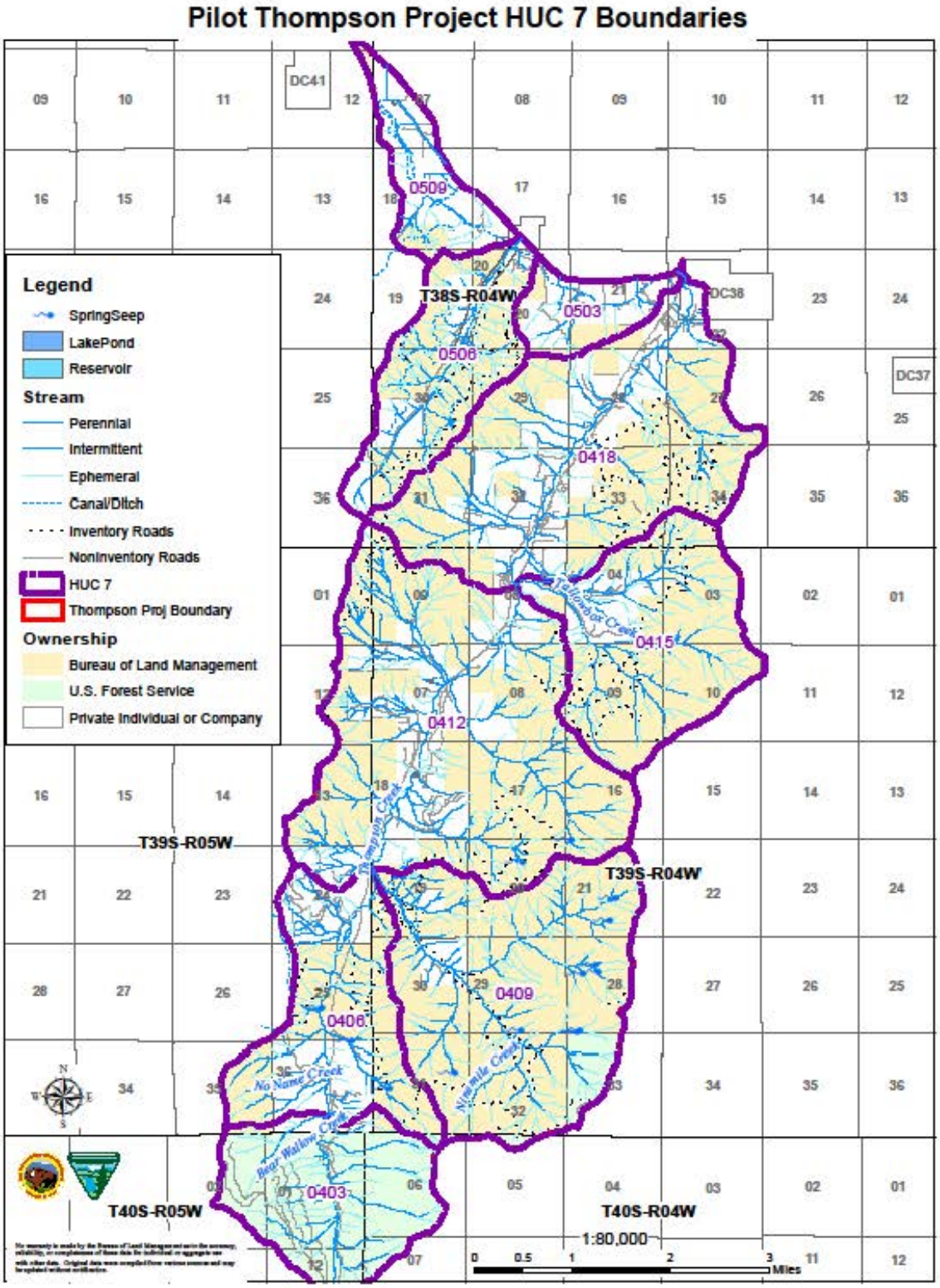
The proposed Pilot Thompson project area is within the western portion of the Middle Applegate River Watershed. All of the land within the project area drains into the portion of the lower Applegate River near the small community of Applegate. The project area is smaller than the analysis area and for purposes of analyzing the affected environment and the proposed project, specifically cumulative effects, the analysis area for water resources will consider those portions of Thompson Creek and a portion of Slagle Creek (Ferris Gulch) where treatments are proposed. Thompson and Slagle Creeks are referred to as sub-watersheds and represent 6th field hydrologic unit codes or HUCs. Thompson Creek is subdivided into 7th field HUC's called drainages while Ferris Gulch is a 7th field HUC within the larger 6th field Slagle Creek. The analysis area for water resources is those 7th field drainages where activities are proposed. The drainages range in size from 1,727 to 5,331 acres and the total size of the analysis area is 19,820 acres or 31 square miles (Table 3-11, Map 3-7). This size of drainage is large enough to assess the cumulative effect of actions that, taken individually (site scale) may not be significant, but when combined with effects from everything else going on in the drainage, may have a potential impact ("cumulative effect"). The drainage areas are small enough to avoid "drowning out" evidence of adverse effects. As the size of the analysis area increases, there is an increasing possibility of the analysis indicating that there is "no problem" when in fact individual drainages may have issues of concern.

The major drainages where actions are proposed consist of Ninemile, Tallowbox, and Jamison Creeks, along with Hinkle and Ferris Gulches. There is one drainage outside of the analysis area where portions of two harvest units (25-3, 25-7) cross sub-watershed boundaries. There is approximately 7 acres proposed within the Williams Creek sub-watershed, which is part of the Grants Pass Resource Area. The affected drainage is East Fork Williams Creek below Pipe Fork Gaging Station above Rock Creek. Williams Creek is a tributary of the Applegate River and eventually the Rogue River. Approximately 5 acres would be commercially harvested and the remaining 2 acres would be pre-commercially thinned, both using tractors. Harvest within this drainage is on relatively flat ridgetop topography, does not include Riparian Reserves, and will not reduce canopy cover below 30 percent. Also, no new road construction or reconstruction is proposed. Since there would be no changes to the indicator thresholds used to assess effects, including cumulative, this analysis does not include this drainage. Most of the BLM-administered land is located in the upper elevations of the drainage areas while the private lands dominate the lower valley along the Applegate River. Some of the private lands are owned by timber companies and their management is guided in part by the Oregon Forest Practices Act. Most of the private land use along the river is either residential or agricultural.

Table 3-11. Analysis Areas and Ownership Associated with the Pilot Thompson Project Area

Drainage	HUC 7 #	HUC Acres	BLM (Percent)	Private (Percent)	USFS (Percent)
Upper Thompson	0406	2,149	58	41	1
Ninemile Creek	0409	3,876	88	5	7
Middle Thompson	0412	5,331	68	32	
Tallowbox Creek	0415	2,443	82	18	
Lower Thompson	0418	4,294	59	41	
Ferris Gulch	0506	1,727	72	28	
	Total	19,820			

Map 3-7. Pilot Thompson Area and Associated Drainages.



2. Affected Environment

Moderate to high streamflows usually occur between mid-November and April, with runoff peaking in February and March. Significant flows can also be produced by local high intensity summer storms, though these events are relatively rare and their effect is limited to the immediate area. The lowest streamflows generally occur in August and September. Use of water through valid water rights and other water withdrawals increase the likelihood that the streams and wells will go dry in late summer, especially in drought years. Streamflows in the Applegate River are partially regulated by Applegate Dam which controls the flow from 223 square miles of the river basin and thus regulates approximately 44 percent of the flow to the project area. The dam has moderated the extreme values of both high and low flows in the mainstem Applegate River resulting in reduced peak flows and less extreme low flow conditions.

The transient snow zone is defined as the elevation range between 3,500 and 5,000 feet where there is a higher probability of rain-on-snow precipitation events. This zone is of interest to land managers since greater snow accumulation can occur in clearings, producing the potential for higher peak flows during rain-on-snow events. The Oregon Watershed Assessment Manual (OWAM) that was developed by Watershed Professionals Network (WPN 1999, pp. IV-9-11) for the Governor's Watershed Enhancement Board provides a method for assessing the potential risk for peak flow increases from runoff originating in the transient snow zone. This risk assessment method indicates that drainages with more than 25 percent of the area in the transient snow zone may be at risk for possible peak flow increases.

Table 3-12. 7th Field HUCs Percent within Transient Snow Zone (TSZ), Percent Canopy Cover, Percent Canopy Cover within the TSZ

Drainage	HUC 7	Percent of Drainage within the TSZ	Percent CC Less Than 30 Percent within the TSZ	Percent Canopy Cover (CC) Less Than 30 Percent [1]
Upper Thompson	0406	9.0	0.0	2.5
Ninemile Creek	0409	27.1	0.5	3.8
Middle Thompson	0412	4.0	0.0	6.0
Tallowbox Creek	0415	22.3	0.0	2.9
Lower Thompson	0418	0.3	0.0	8.4
Ferris Gulch	0506	0.0	0.0	9.8

[1] Includes existing disturbance features such as roads and landings

Ninemile Creek (0409) is the only drainage in the project area with more than 25 percent of the area within the transient snow zone (Table 3-12). The OWAM risk assessment chart (Figure 3-4) indicates that more than 89 percent of the area in the transient zone would have to have less than 30 percent crown cover to potentially cause a detectable increase in peak flows (based on Figure 3, Page IV-11 of the OWAM). Consequently, the risk of increased peak flows in all drainages is low under current conditions.

It should be noted that, for this eco-region, the historic crown closure is listed as greater than 30 percent (WPN 1999, Appendix A) and current closure in this transient zone is estimated to be well above the 30 percent minimum value. Consequently, under current conditions, snow accumulation in the transient zone of all the drainages may be less than what may have occurred historically.

Surface water in the proposed Pilot Thompson project area includes streams, springs, wetlands, reservoirs, and ditches. 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 on federal lands are required to have Riparian Reserves as

defined in the Northwest Forest Plan (USDA and USDI 1994). For the Pilot Thompson project, Riparian Reserves have been established based on a site potential tree height of 155 feet for the Middle Applegate Watershed. Dry draws do not meet the Northwest Forest Plan definition for streams needing Riparian Reserves. Streams on private forest lands are managed according to the Oregon Forest Practices Act. Stream types on federal lands were identified through site visits; non-federal land stream types were estimated using aerial photo interpretation and extrapolation from information on adjacent federal lands.

Springs, wetlands, and reservoirs on BLM-administered lands within the project area have been identified and mapped in GIS. All of these features are less than one acre and are contained within a Riparian Reserve protection area.

a. Water Quality

The Oregon Environmental Quality Commission has adopted numeric and narrative water quality standards to protect designated beneficial uses. In practice, water quality standards have been set at a level to protect the most sensitive uses. Cold-water aquatic life such as salmon and trout are the most sensitive beneficial uses in the Applegate Subbasin (ODEQ 2003b, p.9). The Oregon Department of Environmental Quality (DEQ) is required by the federal Clean Water Act (CWA) to maintain a list of stream segments that do not meet water quality standards for one or more beneficial uses. This list is called the 303(d) list because of the section of the CWA that makes the requirement. DEQ's 2002 303(d) list is the most recent listing of these streams (ODEQ 2003a).

The BLM in cooperation with the Forest Service, DEQ, and the Environmental Protection Agency (EPA) is implementing the *Forest Service and Bureau of Land Management Protocol for Addressing Clean Water Act Section 303(d) Listed Waters* (USDA and USDI 1999). Under the Protocol, the BLM will protect and maintain water quality where standards are met or surpassed, and restore water quality limited waterbodies within their jurisdiction to conditions that meet or surpass standards for designated beneficial uses. The BLM will also adhere to the State Antidegradation Policy (OAR 2005; 340-041-0004) under any proposed actions. The BLM will continue to work with DEQ to implement the Applegate Subbasin Total Maximum Daily Load (TMDL) and Water Quality Management Plan (WQMP) completed in 2003 (ODEQ 2003b) and the Water Quality Restoration Plan (WQRP) for BLM and U. S. Forest Service-administered lands in the Applegate Subbasin (USDA and USDI 2005). Recovery goals focus on protecting areas where water quality meets standards and avoiding future impairments of these areas, and restoring areas that do not currently meet water quality standards.

The Applegate River is the only waterbody in the project area that is on the 2004 Oregon DEQ 303(d) water quality limited list. It is listed for dissolved oxygen from the mouth upstream for 32.5 miles for the period of October 15 to May 15. Alternately, the Applegate River was delisted in 2004 for summer temperature following approval of the TMDL (USDA and USDI 2005b).

Past human-caused actions that have affected stream temperature in the project area include stream shade removal for conversion to agricultural fields and home sites, mining activities, timber harvest, road building; and water withdrawals for irrigation, mining, and domestic use (ODEQ 2003b). Large scale hydraulic mining conducted in the 1850s dramatically increased sediment in the Applegate River and some of its tributaries (USDI 1995b). Agricultural and residential development in the valley bottoms have contributed to sedimentation through channel modification, grazing, and land clearing. Logging activities started in the late nineteenth and early twentieth centuries, but were limited in scale until the late 1940s (USDI 1995b). During the second half of the twentieth century, large scale timber harvest and road building resulted in increased sedimentation (USDI 1995b). Until the Oregon Forest Practices Act was passed in 1972, yarding was typically accomplished using tractors, even on steep slopes, with little regard for protecting stream crossings. Riparian areas received little protection and ground disturbing activities such as yarding resulted in sediment reaching the streams. Trees were harvested from streambanks leaving little vegetation to prevent the banks from eroding into

the streams during high flows. Early forest roads were often poorly designed and located in unstable areas, and road failures provided a major source of sediment.

Stream temperatures in smaller streams that are closer to their respective source areas are typically cooler than large rivers such as the Applegate River. BLM stream temperature monitoring was conducted between 1994 to1997, and again in 2000 on lower Ninemile Creek and Thompson Creek immediately above Ninemile Creek. Results indicate that the two sites on BLM-administered land met the 64.4°F maximum criterion at that time. In 2000, eight other sites were monitored for stream temperature for one year. Of those sites, two exceeded the 64.4 degree criteria and both were located in mainstem Thompson Creek. Although recent data is lacking, in general channel stability and stream temperatures are expected to improve as Riparian Reserves mature and additional structural material is added to the channel area on smaller tributary streams where BLM-managed land occurs.

The interaction of roads with streams is considered an indicator of potential for sediment impacts to the stream or altered flow regimes. Roads located in riparian areas can adversely affect stream temperature, flow and sediment. Road densities may be considered high and may result in altered hydrology when they exceed 4 miles per miles^2 (King and Tennyson 1984). Overall road densities within the analysis area range from 2.1 to 5.8 miles/mile^2 (Table 3-13), with 0406 (Upper Thompson), 0418 (Lower Thompson), and 0506 (Ferris Gulch) representing the highest. Within Riparian Reserves, all drainages with the exception of (0409) Ninemile have relatively high road densities. Drainage areas 0418 (Lower Thompson Creek) and 0506 (Ferris Gulch) have the highest road densities, with 6.7 and 7.2 miles per mile^2 respectively. These high numbers are largely attributed to private lands and county maintained roads in the valley bottoms. Roads on BLM-administered lands in the analysis area are relatively stable with no large failures present**.** Road sediment sources are primarily surface erosion from natural surfaced roads and road ditches that connect to streams. Road-stream crossings were observed during BLM stream surveys as a potential source of road-generated sediment in all drainage areas. In addition, many culverts have been identified as undersized and/or aquatic barriers. Undersized culverts represent a high risk of failure and subsequent sedimentation during large storm events. Currently, the BLM has plans for removing five undersized culverts and restoring crossings as a result of decommissioning 1.2 miles of BLM road 39-4-32 in the Ninemile drainage. Funds have been obligated and a contract is in place for this to occur in 2013. Specifically, this project is designed to restore hillslope hydrology; reduce road density and sources of sediment; and improve aquatic passage.

The BLM implemented a land management plan in 1979 (USDI 1979) that provided 100 foot no-cut riparian buffers for anadromous fish-bearing streams, retained shade from hardwoods and non-commercial conifers on resident fish-bearing streams, and minimal to no protection of nonfish-bearing streams. Road design and construction practices improved during the 1980s; however, extensive road building occurred.

The advent of the Northwest Forest Plan in 1994 (USDA and USDI 1994) followed by the Medford District Record of Decision and Resource Management Plan in 1995 (USDI 1995) resulted in major improvements for stream and watershed protection and restoration on federal lands. Riparian Reserves establish protection for all fish-bearing streams as well as nonfish-bearing perennial and intermittent streams, wetlands, lakes, ponds, and unstable areas. Riparian Reserves are adequate to maintain riparian conditions necessary to protect stream shade and restore water temperature over time (USDA and USDI 2005). Over the past 10 years, road construction has declined and road decommissioning and upgrading has slightly increased. Implementation of Best Management Practices (BMPs) during road and logging operations has reduced impacts to water quality. Water quality on federal lands is on an upward trend with reductions in summer stream temperatures and sediment input.

Past timber harvest on BLM-administered lands in the project area has been sporadic. Since 1995, approximately 3,859 acres of harvest has occurred on BLM administered lands within the planning area. Of that total, 81 percent or 3,126 acres were thinning or select harvest treatments where canopy cover was not appreciably reduced. The most recent commercial treatment occurred in 1999, thus allowing vegetative

recovery to offset any potential detrimental impacts associated with reduced canopy cover on the remaining 733 acres.

Off Highway Vehicle (OHV) routes are a more recent development affecting water quality, particularly within Ferris Gulch. This use is especially damaging in wet weather when ruts are formed that direct the surface water away from the natural drainage. Since these areas are often in remote locations, the erosion may progress unabated for an extended period of time, resulting in extensive damage. If a route becomes impassible due to rutting, frequently a new, adjacent trail is established. Currently OHV use is sporadic and not particularly acute within the Thompson Creek sub-watershed. This is largely because of the steep forested topography and restricted access due to private lands in the valley floor. The BLM has conducted inventories of off-highway vehicle (OHV) routes on BLM managed land within the analysis area; however, no such inventory exists for private lands. Approximately 18.7 miles of OHV routes were identified, with the majority occurring within Ninemile Creek (4.4 miles), Lower Thompson Creek (6.6 miles), and Ferris Gulch (4.7 miles).

Table 3-13. 7th Field Road Densities and Road Densities within Riparian Reserves by Ownership

Drainage	HUC 7	Road Density (miles/square mile) [1]			Road Density within Riparian Reserves (miles/square mile) [1]		
		BLM	PVT/ Other	Total	BLM	PVT/ Other	Total
Upper Thompson	0406	1.8	2.9	4.6	1.2	4.8	5.8
Ninemile Creek	0409	1.9	0.2	2.1	3.3	0.3	3.8
Middle Thompson	0412	1.1	1.9	3.0	0.6	3.8	4.3
Tallowbox Creek	0415	2.3	1.1	3.4	2.2	3.8	5.8
Lower Thompson	0418	1.5	2.7	4.2	0.7	5.9	6.7
Ferris Gulch	0506	3.4	2.4	5.8	2.6	4.3	7.2

[1] Road densities were calculated using BLM corporate GIS data and includes all roads representing numerous jurisdictions, including urban or otherwise developed areas within the HUCs.

Groundwater supplies in the project area are limited and primarily found in valley bottom alluvium of the Applegate River corridor (USDI 1995b, p. 47). Well water quality problems are prevalent throughout the Rogue basin, arising from natural sources such as arsenic, boron, and fluoride. Surface contaminants such as nitrate and fecal matter may enter ground water through improperly constructed wells. Increasing demand from rural population density increases and years with below-normal precipitation have been identified as factors affecting ground water supplies in Jackson County (USDI 1994, p. 3-13). The Medford District RMP/EIS identified that an increase in rural population density has been accompanied by an increase in ground water diversion, and this trend is expected to continue (USDI 1994, p. 3-13).

b. Water Quantity

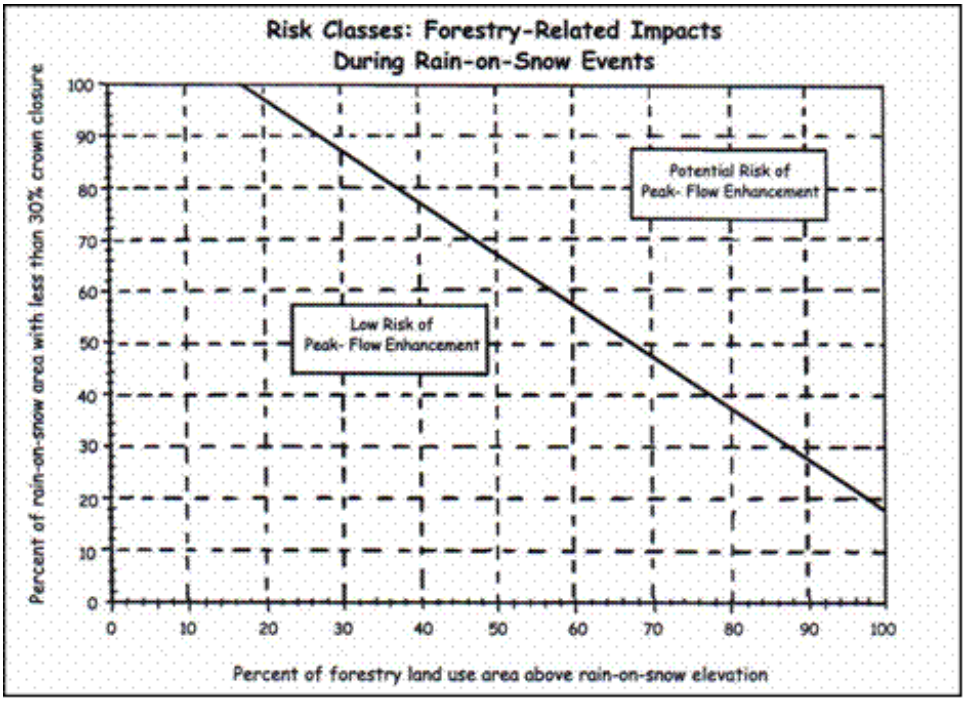
Roads, trails, and ditches can intercept both surface and subsurface flow thereby changing the local drainage pattern (Wemple 1994). This is of particular concern if they force the natural drainage system that has developed over millennia to adjust to a new regime. For example, a road might intercept storm flow and transport it into a different drainage. The channel in the drainage receiving the additional flow must start an adjustment process to accommodate this flow increase while the original channel responds to a reduction in water. Well-designed roads and trails with a properly functioning drainage system attempt to mimic the local natural drainage pattern by keeping the local downslope movement of water similar to the pre-road condition. However, during extreme events (drought or peak flow) any hydrologic differences between the artificial

drainage associated with the road system and the natural system become more critical and can cause noticeable effects on the local environment.

Soil compaction (due to ground-based logging equipment, ground-based fuels treatment machinery, and the existence of forest roads and trails) and removal or alteration of vegetation (from timber harvest, roads, fuels reduction, prescribed fire and wildfire) may increase the frequency and magnitude of peak streamflows (Harr 1976). Compaction can reduce the infiltration properties of the soil, resulting in increased runoff. Soil compaction can also impede the subsurface movement of water as it moves downslope in shallow aquifers. Peak flows for small, headwater streams appear to be increased where at least 12 percent of a watershed was seriously compacted by road building, tractor skidding, or tractor windrowing of slash (Harr 1976). Severe fire can also reduce the infiltration properties of the soil, resulting in increased surface runoff.

Reduction in vegetation canopy has the potential to cause the following hydrologic process changes: reduced interception and transpiration; increased snow accumulation in transient snow zone; increased snow melt rate; decreased snow melt time in transient snow zone; and increased soil water content (Chamberlin et al. 1991). Possible effects on the streamflow regime from these hydrologic process changes include reduced time to hydrograph peak, increased frequency of peak flow, and increased magnitude of peak flows. Altered peak flows may affect stream channel condition by eroding streambanks, scouring streambeds, and transporting and depositing sediments.

Figure 3-4. Graph for estimation of the risk of peak-flow enhancement from forestry-related impacts during rain-on-snow events (WPN 1999: IV-11)



Road miles were determined from the BLM GIS data base and from an aerial photo survey. It is likely that some roads such those hidden by tree canopy, jeep and OHV trails and recently new private roads are not included in the analysis.

Road density provides a general index of relative extent of the amount of road in the project drainages (Table 3). Areas with higher road densities will generally experience more road-related effects; however, many other

factors such as design, location, maintenance, use, surface type, and geology can influence the effect of any particular road. Although not extreme, relatively high road densities are found in three of the drainages associated with the project area. Overall road density within the analysis area is 3.6 miles/mile^2.

Increased openings in the forest canopy from harvest activity may increase the magnitude and frequency of peak streamflows, especially openings in the transient snow zone where greater snow accumulation may increase the amount of streamflow during rain-on-snow events. The BLM-managed land in the upland portion of the project area tends to be well forested while the private land in the lower valley is more open due to agricultural and residential use.

Canopy cover for the analysis area was estimated based on an aerial photo survey using BLM aerial photos and is displayed in Table 3-12. The historic crown closure for this eco-region is listed as greater than 30 percent (WPN 1999, Appendix A). The crown cover across all the drainage areas is within established ranges and increases in peak flows are not expected to occur.

3. Environmental Effects

Because no new management is proposed under Alternative 1, the effects described reflect current conditions and trends that are shaped by ongoing management and events unrelated to the Pilot Thompson Project. Discussion for Alternative 2 and 3 reflect the direct and indirect impacts of the proposed actions. Effects discussion also includes cumulative impacts of those direct/indirect actions when added incrementally to actions past, present, and reasonably foreseeable. Short-term effects are defined as those lasting ten years or less and long-term effects last more than ten years (USDI 1994, p. 4-4).

As part of an assessment of cumulative effects, a discussion of reasonably foreseeable future activities combined with those of the action alternatives is included. Below is a summary of those actions that may occur with reasonable certainty. The affected environment section summarizes present conditions and effects.

Future harvest on commercial private timber lands would likely occur within the planning area and we assume that it will continue at a similar rate as has occurred in the past. Private lands are governed under state forestry regulations, and as such receive a different level of protection than federal lands. Analysis of effects from private timber harvest generally considers the worst case scenario (i.e. all suitable forested lands would be logged at ~ 60 year tree-growing rotations) with regeneration harvest and road building as the predominate effects. As derived from aerial photo interpretation, currently approximately 1,933 acres of private timberland within the analysis area is predominantly 60 years old or older and may be available for harvest. The drainages with the highest percentage of those acres are 0406, 0415 and 0418 which contain 443 (21 percent of drainage), 305 (12 percent of drainage), and 624 (15 percent of drainage) acres respectively. These values, along with those summarized in Table 3-12 are considered low, and as a result increased harvest on private land could be accommodated without approaching the 30 percent threshold that may increase risk. However, although road densities are low on BLM managed land (Table 3-13), in the unlikely event that extensive road construction is initiated, particularly within Riparian Reserves, this could elevate road densities where they are currently high and result in an increased risk of adverse effects.

a. Alternative 1 – No Action

Direct and Indirect Effects

There are no actions proposed under Alternative 1 (No Action Alternative). Therefore direct and indirect effects are the current conditions in the analysis area which are the result of past actions not related to the Pilot Thompson Project. All current conditions and trends will continue as specified in the affected environment. Namely roads and OHV routes with poor drainage and lack of maintenance, or improper maintenance, would continue to deliver water and sediment to streams and may increase over time. Likewise, in certain stream reaches, channel processes would maintain poor habitat conditions due to a localized lack of large instream wood.

On BLM managed lands, over time, vegetation recovery within Riparian Reserves would moderate steam temperatures 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 snowpack 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. Changes in average annual streamflows are also expected to decrease. Flood severity is expected to increase because increased interannual precipitation variability will cause increased runoff in wet years and increased rain-on-snow probability in low elevation snowpacks.

Given these impacts, effective climate change adaptation strategies will need to focus on maintaining watershed resiliency. Under this alternative, although much of the BLM-administered lands have been treated to reduce fuel amounts and continuity, given the right conditions, a high intensity wildfire over part or all of the area may occur. Should this happen, 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 low summer flows would likely increase. However, the absence of vegetation may also result in an increased risk of higher peak flows and increased erosion.

b. Alternative 2

Direct and Indirect Effects

This alternative proposes treatment using a variety of commercial and non-commercial prescriptions, including commercial thinning in Riparian Reserves. Commercial prescriptions would be implemented using cable and tractor yarding systems. Proposed transportation activities include temporary and permanent road construction, road maintenance, renovation, and decommissioning. In addition, depending on post-harvest conditions, activities would be followed up by fuels treatments that would entail hand thinning, piling, and burning.

A total of 0.62 miles of road construction and 3.30 miles of road renovation are proposed. No road construction would occur within Riparian Reserves. Of the 0.62 miles of road constructed, 0.37 would be added to the transportation system while the remaining 0.25 miles would be fully decommissioned or obliterated as described in Chapter 2 following use. In addition, another 2.55 miles would be fully decommissioned. This would either entail mechanically treating the road, or if there is currently an effective closure in place and the drainage is stabilized, the road would not be physically treated but decommissioned by removing it from the transportation system. Also, road maintenance including spot rocking and drainage improvements would be implemented as necessary prior to and during harvest operations. Two new landings less than 0.50 acre each would be constructed.

All vegetation treatments would maintain an overstory and mosaic of understory vegetation where at least 30-50 percent canopy cover would be maintained except where localized thinning around desired pine species occurs. This would not result in appreciable reductions in canopy cover at the drainage scale. Thinning within Riparian Reserves would occur along intermittent streams on approximately 83 acres. A prescription specific to Riparian Reserves that is consistent with Aquatic Conservation Strategy (ACS) objectives would be applied that reduces stand density and increases species diversity and tree vigor. There would be a 50 foot no-cut buffer along each side of the channel and no mechanized equipment would be permitted within Riparian Reserves with the exception of a proposed skid trail that crosses an intermittent stream channel within unit 25-3. This skid trail is necessary to facilitate treatments both within and outside of the Riparian Reserve without having to construct a landing adjacent to, and a road through, the Riparian Reserve. A project design feature (PDF) specific to this

skid trail (p. 2-35) would minimize sediment delivery to the channel and discourage OHV use. Overall, with minimal disturbance utilizing cable logging systems and an effective filter strip, sediment delivery attributable to harvest is unlikely within Riparian Reserves. Where full "no harvest" Riparian Reserve buffers will be maintained, sediment delivery to streams would be unlikely as well. Baseflows would remain unaffected as the magnitude of vegetation removal would not significantly reduce transpiration. Since harvest proposed within Riparian Reserves would occur adjacent to intermittent streams only, combined with a no-cut buffer and limited tree removal, stream temperatures would not be affected by the proposal and the project is in compliance with both the Applegate Sub-basin TMDL (ODEQ 2003b) and Water Quality Restoration Plan (USDA and USDI 2005).

Where fuel treatments occur, tree thinning and low intensity underburning and pile burning would retain a mix of hardwoods and conifers, organic duff layer, leaf litter, and coarse wood debris. Collectively these forest components provide nutrients, bacteria and fungi decomposers, and mycorrhizae to maintain long term site productivity. Additionally, fuel treatments would likely occur over a period of 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. In addition to road construction, renovation, and decommissioning this proposal includes log hauling and associated road maintenance. This would entail ditch cleaning, 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 channels. 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 percent decrease in erosion and sediment transport from roads in years one and two following road maintenance activities. With this proposal, hauling and road maintenance activities are expected to result in short term increases in sediment and turbidity. As a result of BMP implementation, maintenance activities would be properly conducted and these increases are expected to be minor. When transport occurs during high flows, the introduced sediment will become an immeasurable fraction of the total sediment load and would not be detectable at downstream locations.

Road construction has the potential to increase sediment production as well. Compared to the existing road system, the amount of permanent new construction (0.37 miles) proposed is minor in extent and would not measurably increase road density and the compacted area attributed to roads within the affected drainages (0409, 0418), and more importantly within Riparian Reserves. An indirect effect that is difficult to quantify is OHV use following harvest. In areas not already closed by gates or other measures, OHV use of skid trails and other features such as previously closed roads has been observed, particularly within Ferris Gulch. The result is a potential increase of unmanaged OHV trails leading to elevated sediment rates and adverse impacts to soils and other resources. These effects may persist over time. Within the analysis area, generally light use is occurring within the Thompson Creek drainages with more widespread use, consisting of primarily motorcycles, occurring within Ferris Gulch. The probability that OHV use will increase as a result of this alternative is low primarily because PDFs designed to discourage this type of use are included in this proposal. They include blocking and camouflaging main skid trails at intersections with roads and placing slash and other debris on cable yarding corridors within Ferris Gulch where motorcycles may be inclined to seek the fall line.

Actions included in this alternative that have a higher probability of sediment delivery include road use and maintenance and road construction/renovation. None of the proposed new road construction occurs within Riparian Reserves; however, one new road located in units 6-1 and 6-2 is proposed on a relatively steep slope. This will necessitate full bench construction in places. This type of disturbance can elevate the potential for altering sub-surface flow and increases the probability of slope failure. Based on the area's stable geology and lack of vegetative indicators of high groundwater, the likelihood of this occurring is low and, if it were to occur, sediment transport to stream channels is unlikely due to slope position and lack of connectivity to streams. This alternative also includes two tractor swing trails. These are proposed to avoid constructing additional temporary

or permanent roads. A yarder would be "walked" to a transfer site and the logs skidded to a landing on what's referred to as a swing route. Both these features are located on ridgetops and since they are within Ferris Gulch, if necessary, would be treated according to the PDFs to discourage OHV use and minimize the potential for erosion as described in Chapter 2.

Project Design Features and BMPs are designed to protect water quality and are integral in ensuring compliance with applicable State and Federal statutes, such as the Clean Water Act (CWA). BMPs required for this project are contained in the Medford District Resource Management Plans (USDI 1995), and include newly revised road BMPs that were incorporated as part of an RMP update (USDI 2011). The implementation of Project Design Features (PDFs) and BMPs would result in minor increases of sediment routed to stream channels, largely the result of road use and haul. Not considering temporary road construction, which would be fully decommissioned following use, this alternative provides for a net reduction of 2.18 miles of system road within the analysis area. The elimination of these sources of both chronic and episodic sediment would result in a likely minor but long-term reduction of sediment delivery to channels within the analysis area. Also, since no appreciable reduction in canopy cover less than 30 percent will occur, there is little probability the proposal would modify the magnitude or timing of peak or base flows.

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. Changes in average annual streamflows are also expected to decrease. Flood severity is expected to increase because increased interannual precipitation variability will cause increased runoff in wet years and increased rain-on-snow probability in low elevation snowpacks.

Given these impacts, effective climate change adaptation strategies will need to focus on maintaining watershed resiliency. Under this alternative, although much of the BLM-administered lands have been treated to reduce fuel amounts and continuity, additional vegetation and fuels treatments may decrease the likelihood a high intensity wildfire over part or all of the area may occur. This would maintain or slightly improve watershed resiliency as would a reduction in road densities. However, given the uncertainty in climate models and predicted effects on a site specific scale, it is difficult to make accurate statements pertaining to this project's effect on climate change and resultant impacts.

Cumulative Effects

As described in the affected environment, impacts from roads, recreation, and past logging has altered watershed processes in the upper drainages. In the lower stream reaches of the drainages and sub-watershed grazing, roads, residential development, channel alteration, and water diversions are responsible for degraded aquatic processes and conditions. This mix of impacts is typical of many of the drainages that are tributary to Thompson Creek and the Applegate River.

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. Activities on BLM-administered 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 Riparian Reserves improve shade and large wood recruitment. Grazing impacts on private lands will likely continue to occur at near present levels.

Increased road density, particularly with Riparian Reserves, can increase the potential for sediment delivery to stream channels. Although road densities are considered moderate to high in all drainages, particularly within Riparian Reserves, this alternative reduces road densities within all drainages with the exception of Ferris Gulch (0506), which would remain unchanged. This is consistent with recommendations specified in the Middle

Applegate Watershed Analysis (USDI 1995, p. 84) regarding decommissioning roads to meet ACS and Riparian Reserve objectives. This alternative includes decommissioning portions of roads located within Riparian Reserves. Under this alternative, all new road construction occurs high up in the drainages outside of Riparian Reserves and would be outsloped to eliminate concentrating runoff. There would be no direct connection to stream channels. It is expected that sediment production from new road construction would be short term and is not likely to reach surface water. Alternative 2 includes decommissioning portions of roads located within Riparian Reserves and would result in a net road reduction of 2.18 miles within the analysis area.

Overall, Alternative 2 does not reduce canopy cover below critical thresholds or result in increases in road density. These would be the primary catalysts that may trigger synergistic responses. The proposal does not appreciably decrease canopy cover within the TSZ that may result in peak flow increases. Drainages that may be at an elevated risk of experiencing adverse cumulative effects typically have both high road densities and large percentages of canopy cover less than 30 percent. Drainages with large percentages of private land with forested stands greater than 60 years old were also included in this analysis. Although unlikely, if all those acres were reduced below 30 percent canopy cover all drainages would still be below levels where potential cumulative impacts would be magnified. This alternative does not elevate the potential for cumulative effects beyond those that may be currently occurring. Sediment production resulting from road use and construction may increase in the short term. In many cases riparian vegetation vigor would improve over time, thus potentially decreasing stream temperatures. Although there are both natural and human induced risk factors for cumulative effects, this alternative is not expected to increase these within the project area drainages, or the larger sub-watersheds.

c. Alternative 3

Direct and Indirect Effects

This alternative proposes treatment using a variety of commercial and non-commercial prescriptions, including commercial thinning in Riparian Reserves. Commercial prescriptions would be implemented using cable, tractor, and helicopter yarding systems. Proposed transportation activities include road renovation, maintenance and decommissioning; however, there would be no new temporary or permanent road construction. In addition, depending on post-harvest conditions, activities would be followed up by fuels treatments that would entail hand thinning, piling and burning.

A total of 3.37 miles of road renovation are proposed. In addition, another 2.55 miles would be fully decommissioned. This would either entail mechanically treating the road, or if there is currently an effective closure in place and the drainage is stabilized, the road would not be physically treated but decommissioned by removing it from the transportation system. Also, road maintenance including spot rocking and drainage improvements would be implemented as necessary prior to and during harvest operations. Two new landings, each smaller than 0.5 acre, would be constructed.

The effects of implementing vegetation treatments under Alternative 3 would the same as described for Alternative 2, except for the following differences. Thinning within Riparian Reserves would occur along intermittent streams on approximately 83 acres; however, under Alternative 3 the conifer trees identified (marked) for harvest that are 14 inches and greater would be directionally felled toward the channel and left on-site for down wood recruitment. Due to the limited number of trees that would be felled and left, fuel loading within the Riparian Reserves is not expected to approach levels of concern.

The effects of implementing transportation management activities under Alternative 3 would the same as described for Alternative 2, except for the following differences. Under Alternative 3, there are no new roads proposed; therefore, there would not be any short- or long-term increases in sediment attributable to road construction as described in Alternative 2. This alternative provides for a net reduction of 2.55 miles of system road within the analysis area, an increase of 0.37 miles from Alternative 2.

Cumulative Effects

As described in the affected environment, impacts from roads, recreation, and past logging has altered watershed processes in the upper drainages. In the lower stream reaches of the drainages and sub-watersheds, grazing, roads, residential development, channel alteration, and water diversions are responsible for degraded aquatic processes and conditions. This mix of impacts is typical of many of the drainages that are tributary to Thompson Creek and the Applegate River.

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. Activities on BLM-administered 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 Riparian Reserves improve shade and large wood recruitment. Grazing impacts on private lands will likely continue to occur at near present levels.

Increased road density, particularly with Riparian Reserves, can increase the potential for sediment delivery to stream channels. Although road densities are considered moderate to high in all drainages, particularly within Riparian Reserves this alternative reduces road densities within all drainages with the exception of Ferris Gulch (0506), which would remain unchanged. This is consistent with recommendations specified in the Middle Applegate Watershed Analysis (USDI 1995, p. 84) regarding decommissioning of roads to meet ACS and Riparian Reserve objectives. Alternative 3 includes decommissioning portions of roads located within Riparian Reserves and would result in a 2.55 mile net road reduction within the analysis area as opposed to 2.18 miles for Alternative 2.

Overall, Alternative 3 does not reduce canopy cover below critical thresholds or result in increases in road density. These would be the primary catalysts that may trigger synergistic responses. The proposal does not appreciably decrease canopy cover within the TSZ that may result in peak flow increases. Drainages that may be at an elevated risk of experiencing adverse cumulative effects typically have both high road densities and large percentages of canopy cover less than 30 percent. Drainages with large percentages of private land with forested stands greater than 60 years old were also included in this analysis. Although unlikely, if all those acres were reduced below 30 percent canopy cover all drainages would still be below levels where potential cumulative impacts would be magnified. This alternative does not elevate the potential for cumulative effects beyond those that may be currently occurring. Sediment production resulting from road use may increase in the short term. In many cases riparian vegetation vigor would improve over time, thus potentially decreasing stream temperatures. Although there are both natural and human induced risk factors for cumulative effects, this alternative is not expected to increase these within the project area drainages, or the larger sub-watersheds.

F. FISH AND AQUATIC HABITAT

The Pilot Thompson Project is located in the Thompson Creek and Ferris Gulch catchments, both of which are tributaries to the Applegate River and occur within the Middle Applegate River Watershed. These two catchments will make up the analysis area for the Fish and Aquatic portion of the Pilot Thompson Project (Map 3-8).

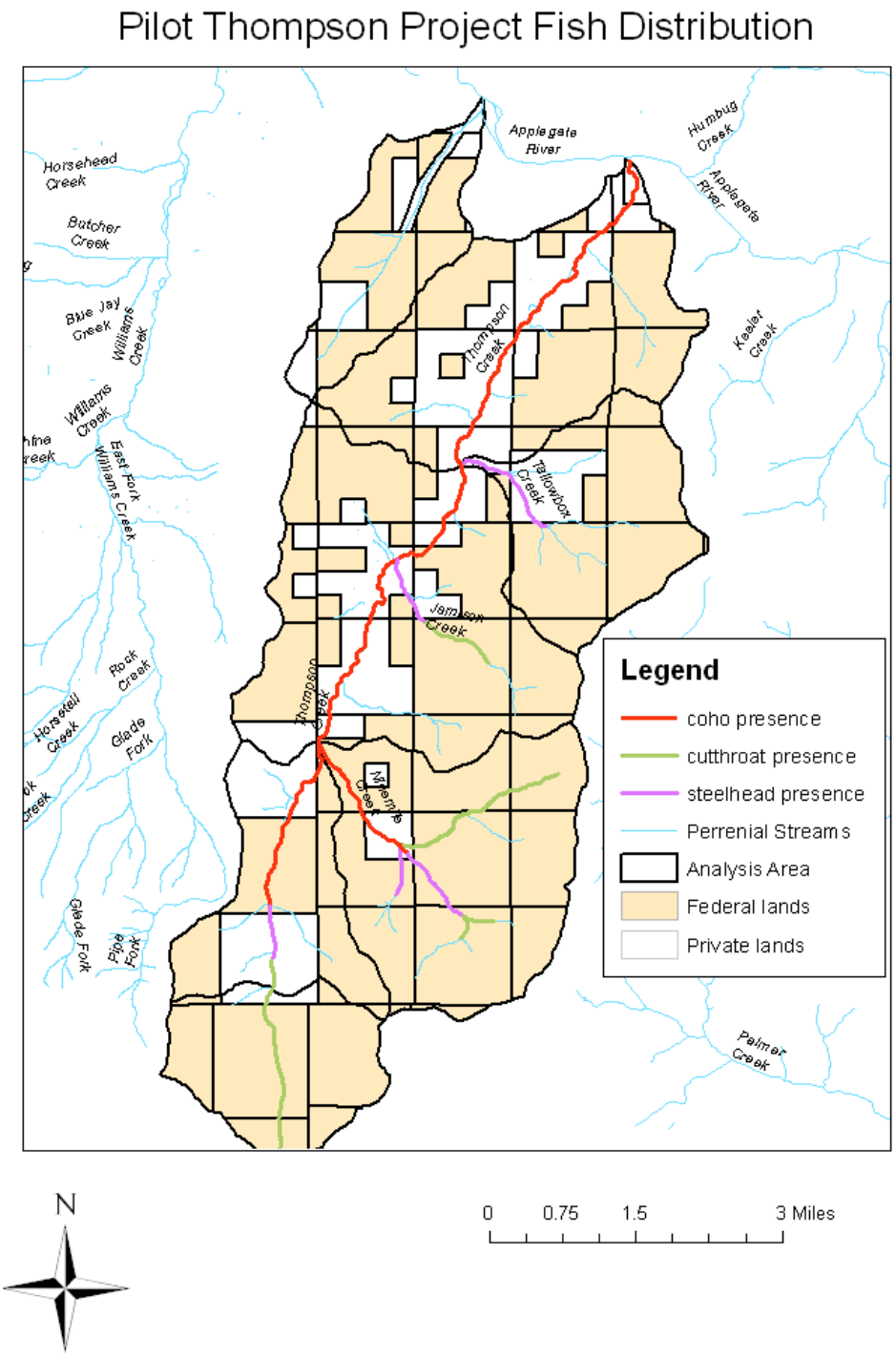
Approximately 7.0 acres of ridgetop units (25-3, 25-7) are proposed for treatment between the Thompson Creek and Williams Creek catchments. Williams Creek is part of the Grants Pass Resource Area. Activities proposed in the Williams Creek drainage would occur on or near the ridgetop and would not be hydrologically connected to the stream network and will therefore not be analyzed further.

1. Key Fisheries and Aquatic Resources Issues

Scoping (external and internal) generated the following issues/concerns and anticipated effects related to implementing the Proposed Action.

- Road densities increase the potential for fine sediment input to aquatic habitat.
- Unauthorized OHV access and use causes erosion and sedimentation. New roads and yarding corridors could attract more unauthorized use.
- Road building and using equipment in riparian zones could impact threatened and sensitive fish species and their critical habitat near and downstream of the project.

Map 3-8. Pilot Thompson Area Drainages and Fish Distribution



a. Threatened and Endangered Aquatic Species and Essential Fish Habitat

In 1997 the Southern Oregon/Northern California Coasts (SONCC) Evolutionary Significant Unit (ESU) of coho salmon (*Oncorhynchus kisutch)* was listed as "threatened" with the possibility of extinction under the Endangered Species Act (ESA) by the National Marine Fisheries Service (NMFS). SONCC coho are known to occur in the mainstem of the Applegate River and several of its larger tributaries, including Thompson Creek and Ninemile Creek.

b. Coho Critical and Essential Fish Habitat

On May 5, 1999, NMFS designated Coho Critical Habitat (CCH) for SONCC coho salmon. Critical habitat includes "all waterways, substrate, and adjacent riparian zones below longstanding, naturally impassable barriers." It further includes "those physical or biological features essential to the conservation of the species and which may require special management considerations or protection...", including all historically accessible waters (F.R. vol. 64, no. 86, 24049). CCH is broken into occupied CCH, habitat known to support coho based on observation or historical records, and unoccupied CCH, which is habitat that is assumed to be capable of supporting populations of coho should the species be recovered. The upper distribution of unoccupied CCH is often determined by fisheries biologists, who use available information and professional judgment to make an educated estimate of where coho could have historically been present. Determinations are usually based on stream conditions (such as stream size, gradient, presence and nature of natural barriers such as waterfalls, etc.). Lacking information regarding historical distribution of coho salmon, and in the absence of natural fish migration barriers, fisheries managers often consider unoccupied CCH to include stream reaches known to be accessible to other migratory fish, particularly to steelhead.

Essential Fish Habitat (EFH) has been defined by NMFS as "those waters and substrate necessary to fish for spawning, breeding, feeding, or growth to maturity." This definition includes all waters historically used by anadromous salmonids of commercial value (in this instance, coho salmon). EFH within the analysis area is identical to CCH. More information regarding EFH may be found at: http://www.nmfs.noaa.gov/ess_fish_habitat.htm.

c. Riparian Reserves

Under the Northwest Forest Plan, Riparian Reserves (RRs) have been established on all stream channels displaying annual scour located on federal lands. Areas of unstable/potentially unstable ground are also managed as RRs. Riparian Reserve widths have been identified as 310 feet or twice the length of a site potential tree (whichever is greater) for fish bearing streams, 155 feet or the length of one site potential tree for non-fish bearing perennial streams, and 155 feet or the length of one site potential tree for intermittent streams. Widths are measured as slope distance from the edge of the stream, and are applied to both sides of the channel. Site potential tree heights average 155 feet on BLM-administered lands in the analysis area catchments. These Riparian Reserve widths are in accordance with the Northwest Forest Plan, as incorporated by the Medford District RMP (USDA and USDI 1994:C30-C31). The primary function of Riparian Reserves is to provide shade and a source of large wood inputs to stream channels. Additionally, they are a source of nutrient inputs to the aquatic ecosystem, they provide bank stability, maintain undercut banks that offer prime salmonid habitat, and provide habitat for a diverse range of other aquatic and terrestrial organisms (Meehan 1991).

d. Aquatic Conservation Strategy

The Aquatic Conservation Strategy (ACS) was developed to restore and maintain ecological health of watersheds and aquatic ecosystems on public lands. It includes 9 objectives, which guide BLM's management of Riparian Reserves. These objectives are examined at the site (e.g. a single pool or stream reach), HUC 7 (drainage) and HUC 5 (large watershed) scale. The 9 objectives and effects from implementation of the alternatives are presented below.

2. Foreseeable Future Actions

This section will present projects proposed in the foreseeable future that may add cumulative impacts to fisheries resources on top of anticipated impacts resulting from the Pilot Thompson Project, within the analysis area. Anticipated direct and indirect effects to fisheries resources will be described from each action. For any foreseeable future action determined to have any anticipated effects to aquatic habitat, the cumulative effect of the action coupled with effects from the Pilot Thompson Project will be discussed at the end of this analysis.

Private Timber Harvest: Future timber harvest on private lands would occur within the analysis area. Private lands are governed under state forestry regulations, and as such receive a different level of protection than federal lands. Analysis of effects from private timber harvest generally considers the worst case scenario (i.e. all suitable forested lands would be logged at ~ 60 year tree-growing rotations). At this time, it is not known when or where private timber harvest will occur in the area. This analysis will assume that all suitable private lands will continue to be subject to timber harvest, and that the amount of disturbance to aquatic systems as a result of this harvest will continue similar to present rates, helping to maintain degraded aquatic habitats.

Road Maintenance: Road maintenance including spot rocking and drainage improvements are anticipated to occur prior to the Pilot Thompson Project initiation. Maintenance activities are generally undertaken to improve drainage issues associated with roads, such as installing additional cross drains or water dips to help reduce the length of road with hydrological connectivity to the aquatic system and addition of surfacing to reduce erosion of the running surface along the road. Maintenance activities in general increase short term risk of sediment transport to aquatic systems, coupled with long term reductions in the same risk. The actions of adding additional rock surfacing and adding water dips or cross drains would not be expected to generate sediment because, for the most part, these actions are not hydrologically connected, and, where they are connected, PDFs would minimize the amount of sediment available for transport.

Future Fuels Treatments: Fuels treatments are tentatively planned in the analysis area. Fuels treatments would leave riparian buffers, require minimal ground disturbance, and would not treat large trees. All check lines would be waterbarred and rehabilitated after ignition operations were completed. Because stream side shade producing vegetation would be buffered, treatments would not lead to increases in water temperature or sediment inputs to channels. Canopy levels would not be reduced by treatments, nor would ground compaction increase; hence peak flows would not be affected. The only effect fuels treatments may have to fisheries resources is a possible increase in ground water storage and subsequent release to streams throughout the dry season. However, any extra water available is likely to be utilized by remaining vegetation before entering stream channels. For these reasons, fuels treatments are not expected to impact fisheries resources, and would therefore not contribute to cumulative impacts.

Off-highway Vehicle (OHV) Use: OHV use is currently creating disturbance throughout much of the Ferris Gulch drainage. Unauthorized trails located on steep slopes are distributed throughout the drainage and most of them are erosive in nature. Some trails have hydrological connectivity with channels, and as a result this activity is contributing sediment to stream systems in the drainage. OHV use will continue as unauthorized trails are used, maintained, and created. From a fisheries perspective, this sediment is filtered out by the quarry on private land where stream flow is interrupted both by sections of subsurface flow and by small dug out ponds in the main stream channel left over from previous quarry activity. For this reason, sediment input into the Ferris Gulch drainage by OHV use does not affect CCH or fish habitat downstream of the quarry. It is anticipated that these activities would continue to occur and would contribute sediment to stream channels.

Road Decommissioning: Several road segments in the project area have been identified for future decommissioning. This work would occur when funding becomes available and would be analyzed separately.

3. Affected Environment – Fish and Designated Habitat

This section will present baseline conditions in the Middle Applegate River Watershed and within the analysis area drainages specifically, as well as anticipated effects resulting from this project. The effects of past actions manifest themselves in the current conditions. Effects added on top of these past actions as a result of the Pilot Thompson Project, coupled with foreseeable effects from future projects as described above, are the cumulative effects of this project to fisheries resources in the watershed and specific analysis catchments.

a. Fish and Designated Habitat

The Applegate River flows along the northern edge of the project area. Several native fishes spawn and rear in the Applegate: coho salmon (*Oncorhynchus kisutch*), chinook salmon (*O. tshawytscha*), steelhead (*O. mykiss*), rainbow trout (*O. mykiss*), cutthroat trout (*O. clarkii*), Pacific lamprey (*Entosphenus tridentatus*), sculpin (*Cottus spp*.), and Klamath smallscale suckers (*Catostomus rimiculus*) (USDI 1995). Several non-native species have also invaded or been introduced to the river, among them smallmouth bass (*Micropterus dolomieu*) and golden shiners (*Notemigonus crysoleucas*).

SONCC coho salmon, fall chinook salmon, summer and winter steelhead, and Pacific lamprey are native migratory fish species present in the Thompson Creek Subwatershed (http://www.streamnet.org/). Thompson Creek is considered occupied CCH and steelhead trout habitat to river mile 11.9. In Ninemile Creek, occupied CCH and steelhead trout habitat has been confirmed to river mile 2.4. Steelhead trout have been confirmed in Jamison Creek to river mile 0.35, so this is considered unoccupied CCH. In Tallowbox Creek, steelhead distribution extends past the forks, approximately 1.25 miles from the confluence, so this is considered unoccupied CCH. In the Ferris Gulch drainage, steelhead are confirmed to river mile 0.18 where a culvert blocks upstream migration at the Highway 238 crossing. Ferris Gulch is considered unoccupied CCH; however, it currently does not support any fish populations upstream of the Highway 238 crossing.

These same streams also support populations of resident rainbow and/or cutthroat trout (ODFW 2002) and these species are typically found the farthest upstream. In Thompson Creek, cutthroat trout have been confirmed to river mile 12.8. Cutthroat trout were confirmed up to river mile 2.9 in Ninemile Creek. In Tallowbox Creek, fish (rainbow trout) distribution ends at river mile 1.25. Jamison Creek supports populations of cutthroat trout to river mile 1.7. Hinkle Gulch is also in the project area; however, surveys conducted by ODFW in 2002 found Hinkle Gulch dammed approximately 200 feet upstream of Thompson Creek. This dam is a complete block to fish passage. Cutthroat trout were observed in Darniell Gulch up to river mile 0.2 where a 9.0 foot concrete dam blocks upstream fish passage.

Historically, fish were probably abundant in Thompson and Ninemile Creeks, and opportunistically used the lower reaches of smaller intermittent streams for flood refugia or possibly even spawning. Currently, fish numbers in Thompson and Ninemile Creeks are low relative to historic.

4. Affected Environment - Aquatic Habitat

This project is located on the west side of the Middle Applegate River Watershed (5th Level) and includes the Thompson Creek and Ferris Gulch catchments.

Middle Applegate River Watershed

The Applegate River borders the project area to the north. The project area is comprised of two north-flowing stream systems that flow into the Applegate River, from west to east, Ferris Gulch and Thompson Creek. The Applegate River has a long history of gold mining, agricultural and residential development, beaver trapping, water withdrawals, dam construction, water diversion, road development, logging, wildfire, and fire suppression. It is 303(d) listed for temperature by Oregon Department of Environmental Quality (ODEQ) (http:///www.deq.state.or.us/wq/standards/WQStdsTemp.htm). The riparian area has been confined to a narrow river-side strip of large trees. The river has been straightened, channelized, and isolated from its floodplain,

with the following related effects to fish habitat: fewer pools, a wider channel, little refugia from floods or predators, fewer spawning areas, and decreased food supply. For detailed information on river condition, please see the Middle Applegate Watershed Analysis (USDI 1995).

Thompson Creek

Thompson Creek is approximately 14 miles long. Its floodplain is almost entirely in private ownership and the entire subwatershed is within the Pilot Thompson project area. The BLM manages approximately 1.0 mile of stream at river mile 10 and the USFS manages a two mile segment at the very upper reaches of the stream. Aquatic inventory data conducted by ODFW is limited to a 0.6 mile stretch of private and BLM-managed stream reach in sections 24 and 25, upstream of Ninemile Creek (2003 and 2006). BLM stream surveys were conducted on Thompson Creek from Tallowbox Creek to the USFS boundary in 1997.

Agricultural development of private lands along the main stem of Thompson Creek has had negative effects to most of the small Thompson Creek tributaries, as these streams at their mouths are now characterized as narrowed stream channels choked by blackberries or have been obliterated all together, eliminating surface connection between Thompson Creek and many of its smaller tributaries.

The ODFW Aquatic Inventory (2003) described the 0.6 mile reach as rural residential with light grazing pressure. The channel was constrained by hillslopes and terraces and gradient averaged 2.0 percent. Fast water units of rapids (53 percent) and riffles (19 percent) dominated this reach with scour pools comprising 22 percent. The reported pool frequency of 5.4 channel widths between pools is considered desirable by ODFW Habitat Benchmarks. Stream substrate was comprised of gravel (33 percent), cobble (26 percent), and sand (24 percent). Gravel percentages greater than 35 percent are considered desirable by the ODFW benchmarks; however, greater than 20 percent fines (sand, silt, and clay) is considered not properly functioning by NOAA in the Klamath Province/Siskiyou Mountains Matrix of Factors and Indicators. Wood volume was low by all standards, at 8.4 m^3/100m.

The remaining portions of Thompson Creek, as observed from Thompson Creek Road, have varied habitat quality, ranging from from blackberry infested channelized and oversimplified sections, to nicely shaded stream segments with a large wood component and high quality spawning gravels. Water withdrawals severely limit summer flows and are the single largest limiting factor in this system.

Ninemile Creek

A majority of the Ninemile Creek drainage is in BLM ownership (89 percent). ODFW conducted aquatic habitat inventories on the mainstem of Ninemile Creek from the mouth to river mile 3.0 (ODFW 2009 and 2002) and the data from these surveys is summarized below.

Historic land uses in Ninemile Creek include second growth timber and private agricultural. The lower section of Ninemile Creek is confined by terraces within a broad valley and the topography becomes more confined higher up in the drainage. Average gradient increases from 2.4 percent in the lower reaches to 13.4 percent in the upper reach. Fast water habitats dominate Ninemile Creek with riffles and rapids constituting 50-70 percent of the stream segments surveyed. Stream substrate was mostly comprised of gravel (33 percent) and cobble (32 percent) in the lower reach with increasing boulder substrate in the middle reach and finally bedrock (27 percent), boulder (20 percent) and gravel (19 percent) in the upper reach. Overall the surveyed section was dominated by gravel (29 percent) cobble (28 percent) and boulder (19 percent) stream substrate. In 2008 and 2011, large wood habitat projects improved large wood density in Ninemile Creek by introducing 75 pieces of wood to 0.75 mile of the main stem. This wood is currently providing cover and creating complexity. Additionally there are multiple log weirs installed in the lower 1000 feet during the late 1980s to early 90s that have created small pool habitats in the main stem channel. Ninemile Creek is in relatively good condition and provides valuable low gradient habitat for coho salmon and steelhead.

Notable Perennial Tributaries to Thompson Creek: Hinkle Gulch, Tallowbox Creek, Darniell Gulch, Jamison Creek

The lower reaches of these four perennial streams are privately owned while the headwaters are in BLM ownership. There is very little information on the aquatic conditions of these drainages.

Hinkle Gulch is the northernmost perennial tributary in the Thompson Creek drainage. A large portion of the Hinkle Gulch drainage is owned by BLM with the lower 0.5 mile in private ownership. Many of the frontal tributaries to Thompson Gulch are impacted by private agricultural uses, flowing subsurface between the stream mouth and Thompson Creek proper. Other tributaries appear channelized and vegetated with blackberries. No instream habitat data for the fish bearing portion of Hinkle Gulch is available.

The lower mile of Tallowbox Creek is privately owned with the headwaters in BLM ownership. ODFW fish presence surveys (2002) found steelhead up to river mile 1.25. Fish were observed in the forks in Section 9. No instream habitat data for the fish bearing portion of the stream is available.

Darniell Gulch is in private ownership on the lower 0.75 miles of stream with BLM land in the headwaters. A dam blocks all fish passage approximately 1000 feet upstream of the confluence with Thompson Creek and this is also the end of fish presence. No instream habitat data for the fish bearing portion of the stream is available.

The lower section of Jamison Creek is privately owned with BLM land higher up in the drainage. ODFW fish presence surveys (2002) found steelhead to river mile 0.35 and cutthroat trout to river mile 1.7. BLM Stream Surveys conducted in 1995 found a concrete diversion dam approximately 0.5 mile upstream of Thompson Creek at river mile 0.5 that is a complete block to upstream fish migration. Stream habitat below this diversion dam appears to be in relatively good condition on BLM land.

Ferris Gulch

Ferris Gulch is located to the west of Thompson Creek and is a narrow drainage that flows into the Applegate River. Steelhead have been confirmed to river mile 0.18 where Highway 238 crosses Ferris Gulch (www.streamnet.net), this culvert is a barrier to fish migration in most flows. Ferris Gulch does not support fish populations above the Highway 238 crossing. Two ditches cross Ferris Gulch in the lower 0.5 mile: the Bridgepoint Ditch diverts water from the Applegate River and crosses Ferris Gulch in an inverted siphon. The Berryman Ditch also diverts water from the Applegate River and crosses Ferris Gulch in a concrete flume with a perched culvert underneath it. This drainage is mostly (70 percent) in BLM ownership.

There is a private quarry in the main stem of Ferris Gulch, approximately 0.5 miles upstream of the Applegate confluence, upstream of the Highway 238 crossing. This riparian area is characterized by past mining activities with a couple of small dug out pools connected by narrow channels and sections of subsurface flow. Overstory riparian vegetation is lacking along this stretch of stream. Historic and ongoing land uses in Ferris Gulch include a quarry in the Ferris Gulch main stem, timber harvest, OHV use, private residences and agriculture. Stream surveys conducted by the BLM in 1997 found several low water stream crossings and multiple riparian roads on Ferris Gulch and its tributaries. These crossings and roads were contributing sediment to the stream channel and causing continued degradation of the habitat. Stream substrate was comprised of mostly fines and some cobble with actively eroding banks ranging from 20-35 percent of the stream length. A portion of this reach was characterized by areas of severe downcutting.

5. Environmental Effects - Aquatic Habitat

a. Alternative 1 - No Action

The No Action Alternative would have no direct or indirect effects, and hence would not add a cumulative effect to aquatic habitats, as no ground disturbing activities would occur. Aquatic habitats within the watershed would continue to exist in their current state. Road densities would remain at the current level within the planning

area. Fish habitat would continue to be impacted as a result of past and ongoing activities, as described in the current condition section.

Urban and agricultural lands would likely remain in their current state, impacting fish habitat in the drainages and in the Middle Applegate Watershed as described. It is unknown at this time what additional development may occur on private lands, but increased development of the area would place greater stresses on aquatic habitats.

b. Alternative 2

This alternative proposes various prescriptions of commercial harvest, pre-commercial thinning, fuels treatments, integrated vegetation management, small amounts of riparian thinning along intermittent channels, new road construction, road decommissioning, a temporary crossing, and log haul.

Ground disturbing activities in or near stream channels and roads have the greatest potential to impact fish habitat; it is these activities that could increase erosion and sediment transport to, and storage in, stream channels. The temporary crossing and log haul are the project elements proposed under this alternative that have been identified as having the greatest potential to contribute sediment to streams.

Commercial Timber Harvest

There are no commercial sale units proposed inside perennial Riparian Reserves. Several units (83 acres) within intermittent Riparian Reserves are proposed for commercial harvest and are analyzed below. Because existing large wood densities and shade would be maintained within the perennial Riparian Reserves, harvest and yarding operations would have no impact on stream temperatures or future large wood recruitment potential. The Water Resources analysis (Section E) documented that harvest operations would not reduce canopy cover within any of the planning area catchments enough to measurably affect or alter the timing of peak or base flows. No hydrological connectivity would exist between harvest units and stream channels because harvest and yarding operations would not take place within Riparian Reserves surrounding perennial streams. Fine sediment mobilized from units or skid trails would be filtered by vegetation within the Riparian Reserves and deposited on the forest floor before reaching aquatic habitat. In sum, no connectivity, and hence no causal mechanism, would exist for commercial timber harvest to input sediment through the Riparian Reserve buffers and into perennial stream channels.

Because harvest and yarding operations would not decrease stream shade, reduce future wood inputs, increase peak flows, negatively modify summer base flows, or input sediment into aquatic habitats, they would not directly or indirectly affect the perennial aquatic environment, and hence would not impact fisheries resources, and would not add a cumulative effect.

Riparian Reserve Harvest/Temporary Crossing

Approximately eighty three (83) acres are proposed for harvest within intermittent Riparian Reserves as part of this project. The units would retain a 50 foot no-treatment buffer established on both sides of the stream channel. Trees would be directionally felled away from the stream channel and end lined from outside the Riparian Reserve. The treatment objectives are to restore dry forest stand densities and improve species diversity while maintaining aquatic conditions. These vegetation treatments would increase species diversity within dry Douglas-fir stands that exhibit uncharacteristic stand structure and species composition. Stands would be thinned to a canopy cover range of 30-50 percent. This would remove fuel accumulations in patches while thinning lower and middle tree layers to accelerate development of a mature multi-layered stand structure. Trees outside the 50’ buffer that could naturally fall and land within any portion in the stream channel would be directionally felled toward the channel and left on site.

Use of ground based equipment is only proposed in one of the riparian units. In unit 25-3, a designated skid trail would cross a short duration intermittent channel to access the western portion of this unit approximately 0.25

miles upstream of coho critical habitat. Approximately 100 logs would be skidded out across this channel. The channel depth is shallow, 3 to 4 inches and the width is approximately 18 inches. Prior to harvest, bump logs would be placed in the channel to provide some protection to the stream bank. Equipment would cross the channel only at this location. Following harvest bump logs would be removed and berms or ruts would be leveled to match the existing topography and the disturbed area would be mulched and seeded. Loose soil generated by the activity would be removed from within the channel and staggered straw bales would be placed and secured in the channel to arrest any downstream sediment movement. These straw bales would be left in place for one winter after harvest is completed. The proposed PDFs would maintain channel integrity while also eliminating any loose sediment resulting from the crossing. Removing all loose material from the stream channel and using straw bales to filter downstream flow would arrest any downstream effects to CCH approximately 0.5 mile downstream.

Fine sediment mobilized from units or skid trails would be filtered by vegetation within the no treatment buffers retained within the Riparian Reserves and deposited on the forest floor before reaching aquatic habitat. Apart from the one skid trail crossing, the proposed harvest activities would not be hydrologically connected to the aquatic network.

The Water Quality Restoration Plan (WQRP) for the Applegate Sub-basin calculated shade targets for perennial and fish-bearing streams only. Intermittent stream channels were not included in the Applegate WQRP shade targets; however, the 50 foot no cut buffer would provide for shade in the primary shade zone. Thinning along intermittent channels outside the 50 foot no cut buffer would not be expected to affect water temperatures. Providing for future large wood recruitment is an important riparian objective that would be accomplished by maintaining a 50 foot no treatment buffer and by leaving (not marking) trees outside of the 50 foot no treatment buffer that would naturally fall into the stream channel.

Harvest and yarding operations would not affect stream temperature, reduce future wood inputs, increase peak flows, negatively modify summer base flows or input sediment into aquatic habitats, they would not directly or indirectly affect the aquatic environment, and hence would not impact fisheries resources, and would not add a cumulative effect. In sum, the skid trail crossing is the only activity proposed under commercial harvest that would have any hydrologic connectivity and PDFs would ensure that sediment generated from this action would be arrested on site. All other activities would occur outside the Riparian Reserve, or outside a no cut riparian buffer and would not be hydrologically connected to the stream network and would therefore have no effect.

Roads

Of all forest management activities, roads typically have the greatest potential to influence aquatic habitat in forested watersheds. Impacts include both near term and ongoing (chronic) impacts. Near term impacts stem from activities which include new ground disturbance, such as construction or maintenance of road segments. These activities lead to increased potential for erosion and transport of sediment to channels. Sediment contribution to channels stemming from these activities generally diminishes after 1 – 3 years (Luce and Black 2001, Megahan 1974).

Long term and indirect effects are more pervasive, and may persist even beyond the life of the road. For example, new road construction requires clearing along the road right of way. Where a road crosses a stream, this means the removal of shade producing riparian vegetation, which would not fully recover until long after the road is decommissioned or abandoned. Road segments located away from stream channels can also greatly influence aquatic habitat. Numerous studies have shown how roads may increase the length of the drainage network by intercepting ground or surface flow and precipitation, resulting in disruption of natural flow paths. This in turn may lead to increases in peak flow and/or timing to peak flows (Wemple et al. 1996; Jones et al. 1999). Increased peak flows, if great enough, can cause channel adjustments that physically alter aquatic habitat. Additionally, roads cut through steep side slopes or in unstable areas are at risk to failure, which can trigger mass wasting events such as debris torrents, capable of scouring out channels and transporting and depositing tons of material, including large wood and sediment of all size classes in large episodic pulses.

Weathering of road surfaces can lead to chronic sediment and turbidity contributions to aquatic habitats, and maintenance and use of roads (such as for haul) can accelerate rates of erosion, particularly during the wet season (Luce and Black 1999; Reid and Dunne 1984). Intercepted runoff which becomes concentrated over erodible road surfaces mobilizes and transports sediment with it. Surfaces armored by pavement do not experience this type of chronic weathering, while rocked roads are more resistant than natural surfaced ones. For these reasons, natural surfaced (or broken down rocked surfaced) roads with a high degree of hydrological connectivity are particularly problematic to aquatic habitat.

It is important to note that not all roads or road segments contribute deleterious effects to aquatic habitat. Many variables interact to determine the potential for any given stretch of road to influence aquatic habitat, with the most important being the degree to which the road is hydrologically connected with the aquatic system (Furniss et al. 2000; Jones et al. 1999; MacDonald and Coe 2008). Hydrological connectivity is present at any point where roads and streams interface. Midslope and valley bottom roads constructed in areas of high drainage density (which necessitates many crossings) have a high degree of connectivity, while ridge top segments which do not cross channels have no connectivity. Segments with high connectivity have high potential to affect aquatic habitat, while those with no connectivity have no potential. Note that none of the proposed new roads in the Pilot Thompson Project would be hydrologically connected to the aquatic system.

In addition to channel crossings, the design of the road also plays into the degree of hydrological connectivity. Roads which are designed to shed intercepted water quickly off their surface and back to the forest floor have connectivity only from the point of the last turn out device to where the road crosses the stream. Examples of such designs include outsloped road surfaces, rolling dips, and waterbars, which when constructed and maintained properly are effective and common designs used to reduce connectivity between roads and the aquatic system (Luce and Black 2001; MacDonald and Coe 2008). Contrast this with an insloped road drained by an inboard ditch with few cross drains; such a road would have a greater portion of its length directly connected to the stream, and hence a greater potential to impact aquatic habitat. Connectivity also changes in response to climactic conditions, with the greatest road-stream hydrological connectivity occurring during the wettest period of the year, when soil moisture contents are high, ground water tables elevated, and runoff more likely (Furniss et al. 2000). For this reason, wet season use of a given road system would have a higher potential to contribute impacts to aquatic habitat then dry season use. In the Pilot Thompson Project, road construction and log haul are proposed and these activities would be restricted to the dry season.

Road Construction and Renovation

In the Pilot Thompson Project, two new permanent road segments are proposed to facilitate access to commercial harvest units, totaling 0.37 miles in length. Two temporary road segments are also proposed, totaling 0.25 miles. The proposed road segments are located away from streams and Riparian Reserves. Road construction would occur during the dry season. The permanent new construction would occur in the Ninemile Creek drainage and the west side of the Hinkle Gulch drainage. In Ninemile Creek, the road segment would be a short extension of an existing ridgetop road. In Hinkle Gulch, the road would be an upper midslope reroute to avoid excessive slopes of the existing road. The existing road would be decommissioned and is discussed in a later section. Two temporary roads are proposed under this alternative; one in the Thompson Creek drainage and the other in the Tallowbox drainage. The first temporary road segment proposed for construction is located in the Thompson Creek drainage and would be a short midslope spur (0.13 miles) proposed off of an existing road. The second temporary road segment (0.12 miles) would be located along a ridgetop in the Tallowbox drainage. These temporary roads would be fully decommissioned after use in the Pilot Thompson Project.

As the proposed road work would be located on or near ridge tops, there is little probability that they would intercept ground water. The roads would be able to intercept precipitation directly, which could potentially become concentrated flow capable of rutting the road surface and transporting eroded material downslope. However, drainage relief would be incorporated into the new construction and renovation, which would ensure the road surfaces would shed intercepted water and any mobilized sediment off of their prisms and into

downslope vegetation, minimizing the potential for rutting and disruption of natural flow paths. This, coupled with the absence of hydrological connectivity minimizes the potential for new road construction proposed in the Pilot Thompson Project to affect aquatic habitat.

Although the construction of the new roads would increase road densities in catchments and watersheds that already have high road densities, given that the proposed new roads would lack hydrological connectivity, there is no chance that construction of these roads would impact fisheries or aquatic resources and would not add a cumulative effect.

Approximately 3.3 miles of road renovation is proposed under this alternative. Renovation would include blading, brush removal, and improving drainage features on existing old roads that have not been used for 10+ years. All but one of these old roads are located on or near a ridgetop, do not cross drainage features, and are not hydrologically connected. One road crosses an intermittent channel approximately 0.3 miles from CCH. This segment would be hydrologically connected with aquatic habitat, but as the stream would be dry during renovation and straw bales would be placed on the downstream edge to stop sediment and turbidity from moving off site, no direct effect to aquatic habitat would occur as a result of renovation.

Road Decommissioning

Approximately 2.55 miles of native surface road are proposed for full decommissioning under the Pilot Thompson Project. This includes 7 road segments distributed throughout the project area. Fully decommissioning would include decompacting the surface to a depth of 12 inches and slash and other debris would be placed along the roads length to provide ground cover and discourage OHV use.

Three of these road segments (Roads 38-4-28.2, 39-4-19, and 39-4-3.1) totaling 1.2 miles, are currently closed and decommissioning naturally. Under this action they will be changed to the fully decommissioned category and removed from the system road network. No action is required for these three roads so they will not be considered further.

Two road segments (Road #s 39-4-06 Spur A and B) located on a ridgeline between Darnielle Creek (a tributary to Thompson Creek, located within the Jamison Creek drainage)and a frontal tributary to Thompson Creek would be decommissioned after the Thompson Pilot Project is complete. These two segments, totaling 0.7 miles, are rutted and have active areas of erosion from OHV pressure. These roads are not near Riparian Reserves, they do not have any cross drains or culverts to remove, and they are not connected hydrologically to any stream system.

Two additional sections of road (Road #s 39-4-34 Spur A and 39-4-3.2 Spur A), totaling 0.7 miles, would be decommissioned after being used to access units in the Pilot Thompson Project. One of these segments is located near the top of the Hinkle Gulch drainage and the other one is located near a tributary to Tallowbox Creek. The road segment in Hinkle crosses a dry draw but there is not a culvert at that location. This area would be ripped and mulched and seeded to reestablish natural vegetation in the draw crossing. The road segment in Tallowbox Creek is located within a Riparian Reserve but does not cross any draws or channels and is not hydrologically connected to any stream system.

Road decommissioning would reduce the overall road densities in these drainages and would reduce the amount of compacted ground. Decreased compaction and improved terrestrial connectivity would improve at the site level; however, since these road segments are not hydrologically connected to any stream systems the benefit to aquatic systems would be negligible and immeasurable.

Haul Routes

The main line haul routes include the paved road along Thompson Creek and a well rocked and partially paved road along Ferris Gulch. Log hauling would occur on 46 miles of road located throughout the entire Thompson Creek and Ferris Gulch systems (23,268 acres): 3.6 miles on bituminous (BST) surface road, 32.6 miles on

rocked roads, and 9.7 miles on natural surfaced roads. Haul routes are distributed throughout the entire project area and would be located on BLM and private timber land roads. Haul routes are largely confined to upslope areas and only include 11 perennial crossings. Approximately 6.4 miles of unpaved haul roads exist within a Riparian Reserve width distance of stream channels (includes riparian areas on private lands) most of which (5.7 miles) are rocked. No unpaved routes would parallel fish habitat, and only a short road segment (0.25 mile) parallels an intermittent stream channel. Therefore the primary mechanism by which road derived sediment is most likely to enter streams as a result of log haul is from storm runoff, not directly through airborne contributions. The following table (Table 3-14) describes haul related channel crossings in the project area.

Table 3-14. Haul route stream crossings by road surfacing and stream type

Stream Type	Road surfacing		
	BST	Rocked	Native surface
Perennial	1	10	0
Intermittent	3	31	4
Dry Draw	25	106	15

Of the perennial crossings, two occur on the mainstem of Thompson Creek in CCH, one is a bottomless arch culvert on a well rocked road and the other is a concrete bridge. There is a crossing over the mainstem of Ferris Gulch, approximately 0.25 miles upstream of CCH. In the Tallowbox and Hinkle Gulch drainages there are 8 perennial crossings, one of which is located on a fishless tributary to Thompson Creek approximately 0.25 mile from CCH. The other 7 are located greater than 0.5 mile from fish presence on well rocked roads high in the drainages. None of the rocked roads parallel the perennial stream channels so dust abatement and roadside vegetation would adequately reduce and filter dust from getting to the stream channel.

Crossings on intermittent stream channels are scattered throughout the drainages. There are 38 intermittent crossings identified within the haul route for this project. Intermittent channels only flow seasonally and would likely not be flowing when haul is occurring. In the rare circumstances that the road network has dried enough to reinitiate haul and the intermittent channels are still running, there would not be a mechanism for sediment from the road to be transported into the stream channel because the roads would be dry. However, fine sediment generated from haul could be transported off site during high flow events when intermittent channels are flowing.

Most of the haul proposed under this project would occur in the Ferris Gulch drainage. The western portion of the Jamison Creek drainage would be accessed from the Ferris Gulch road system and this would be the main haul route for trucks leaving units on the west side of the Jamison Creek drainage. Within the Ferris Gulch/Jamison haul area, approximately 14 miles of road system would be used for haul including 1.5 miles in Riparian Reserves. Only one perennial crossing is proposed in the Ferris Gulch drainage. The road at this location is paved and it crosses the mainstem of Ferris Gulch below the quarry approximately 0.25 mile upstream of fish habitat. A paved crossing is not considered a potential sediment source. Eight intermittent crossings are distributed throughout the Ferris Gulch drainage. This road system in the Jamison catchment is mostly ridge top but does include 6 intermittent stream crossings high in the catchment. Very little haul is proposed within Riparian Reserves of the Jamison Creek catchment and most of this occurs as the roads cross tributaries in the headwaters of these drainages. Approximately 460 truckloads of material would be hauled out through the Ferris Gulch/Jamison haul area. The haul routes are well distributed throughout the two catchments, minimizing concentrated effects. The roads used for haul are well rocked and all but one of the crossings (the perennial crossing on Ferris Gulch) are at least 1.0 miles upstream of CCH. The quarry serves as a sediment trap in most flow conditions by either slowing and backing up stream flow or by providing segments of subsurface flow conditions. The main road is partially paved, further minimizing haul related sediment.The route through Hinkle Gulch will be used to haul logs from units in the Tallowbox and Hinkle Gulch catchments.

In these two catchments, approximately 16.7 miles of road are proposed for haul with 2.1 miles within Riparian Reserves. The haul route does not parallel stream channels for any substantial distance but does cross multiple channels as it traverses the catchments, following the contour around the middle and upper portions of the drainage. In the Hinkle Gulch drainage, there are five perennial crossings on tributaries to Thompson Creek, all of which are greater than 0.25 mile from fish presence and CCH in Thompson Creek. In Tallowbox Creek there are 3 perennial crossings and they too are greater than 0.25 mile from fish habitat and CCH in Thompson Creek. Approximately 300 truckloads of timber would be hauled out through Hinkle Gulch. Roads in these catchments are well rocked and in good condition. All of the crossings are more than ½ mile from CCH in Thompson Creek. Approximately 2.0 miles of the Ninemile Creek road system would be used for haul with approximately 1.2 miles in the Riparian Reserve. Routes in Ninemile Creek cross one perennial stream and four intermittent channels. The perennial crossing is a concrete bridge low in the drainage that actually crosses Thompson Creek. This crossing is not considered a potential sediment source. The main Ninemile Creek Road is either paved or well rocked and in good condition as it crosses 4 intermittent tributaries to Ninemile Creek. Approximately 117 truckloads of logs would be hauled out through Ninemile Creek. Most of the logs would come down the 39-4-19.1 Road and out the lower segment of the Ninemile Creek Road, which is within the Riparian Reserve but only parallels the stream channel for a short distance and there is adequate vegetation to filter dust. This route would only cross one intermittent tributary located about 0.5 mile upstream of CCH in Ninemile Creek.

The Jamison Creek drainage spans both sides of Thompson Creek. There is one unit on the west side and material from this unit would be hauled down the Ferris Gulch Road (see discussion of Ferris Gulch/Jamison haul area above). There are several units on the west side of the drainage, two on the north end and one on the south end. Approximately 9.2 miles of road would be used for haul in this catchment with 0.75 miles in Riparian Reserves. Material removed from units on the east side of the drainage would be either hauled north through the Tallowbox and Hinkle Gulch drainages or south into the Ninemile Creek drainage. Approximately 44 truckloads of logs would be hauled out of Jamison Creek; half to the north and half to the south. There is one perennial crossing on a frontal tributary to Thompson Creek approximately 1.5 miles from CCH. There are five intermittent crossings; all greater than 0.25 mile from CCH in Thompson Creek. The roads proposed for haul are rocked and in good condition.

The southernmost units in the project area are in a drainage area that spans both sides of Thompson Creek above the confluence with Ninemile Creek. Approximately 5.9 miles of road would be used for haul including 1.7 miles in Riparian Reserves. There is one perennial crossing (rocked surface) where the haul route crosses Thompson Creek and it is located within CCH. This perennial crossing is a bottomless arch, in good condition. Approximately 131 truckloads of material would be hauled out over this crossing and onto the paved Thompson Creek road. The road at this crossing is in an area of low topography so there is only a short distance (200 feet) of road that would be served by the adjacent ditch. In addition the ditch turn out empties onto vegetated banks of Thompson Creek and there is no sediment deposition observed within the ditch or at the ditch turn out. Based on the condition of the ditch and the ditch turn out (vegetated with no captured fine sediment suggesting flow), it is a ditch section that very rarely flows water. In addition, a PDF requires that hay bales and/or filter cloth be added to the ditch to filter any road related sediment from entering Thompson Creek. The site specific PDFs for this crossing would stop any haul related sediment from entering CCH on Thompson Creek.

Direct and indirect sediment inputs to aquatic habitat may result from dry season haul. Direct sediment inputs occur as haul related dust drifts into stream channels. Dust abatement is a proposed PDF that would reduce any direct sediment inputs from haul. In addition, the haul routes do not generally parallel stream channels and where they do there is adequate vegetation to filter any haul related dust. Similarly, where the haul route crosses stream channels adequate vegetation would filter fine dust from entering the stream channel. Indirect sediment inputs result from haul related surface erosion. Surface erosion would be minimized because PDFs would allow log hauling during dry conditions and it would be restricted whenever soil moisture conditions or rainstorms could result in the transport of sediment to ditch lines and nearby stream channels. Most of the haul roads are rocked (36 of 46 miles) or paved, rather than native or natural surfaced. This reduces the probability of road

surface erosion and subsequent sedimentation of aquatic habitat, as the hardened surfaces can withstand more wear and tear.

After the dry season, during the fall and winter rains, sediment from the road prism could be transported into the ditch system. However, this would occur at a time when stream levels are elevated and transporting sediment naturally. Under these conditions the small amount of sediment indirectly contributed from haul would not be measureable or detectable above background levels. Seasonal restrictions on haul, the location of most haul being high in the watershed, crossing intermittent channels, and well maintained roads (mostly rocked) would greatly reduce the amount of sediment entering stream channels from log haul as part of this project. Any haul dust or sediment from wear and tear on rocked roads would only be moved during intense rain events when it would not be measurable or detectable above background levels.

It is not possible to accurately quantify how much dry season haul may increase erosion rates or sediment input into aquatic habitat; there are too many interacting variables (MacDonald and Coe 2008), and what studies have been done have largely focused on wet season haul. Because dry season haul would yield both substantially less initial erosion of the road surface and less subsequent transport of eroded sediment, amounts contributed to aquatic habitat are anticipated to be minimal. Given that these inputs would occur only during a precipitation event following a season of haul, would be spatially spread over many input locations, and that they would occur in the nature of increased turbidity, it is extremely unlikely that sediment input by haul would be detectable beyond background levels at the site level. .

In summary, although haul would likely result in some sediment entering aquatic habitats, the magnitude of the inputs would be small because of dry season haul restrictions, the large spatial scale of activity, proposed PDFs, and because most of the crossings are on intermittent channels. The amount of sediment to reach and settle out in any one pool would be insufficient to adversely modify aquatic habitats or meaningfully affect aquatic organisms. Additionally, in most cases there is at least 0.25 mile between the hydrologically connected action and CCH allowing adequate stream length to filter, sort, and store sediment. Suspended sediment inputs would only occur during a precipitation event following a season of haul and would be spatially spread over many input locations at a time when stream levels are elevated and naturally turbid and would not be detectable above background levels. No effects to CCH are anticipated.

Aquatic Habitat Effects Summary and Cumulative Effects

Several proposed activities would be hydrologically connected to the stream network, including one segment of road renovation, one skid trail across an intermittent channel, and haul. The road renovation and skid trial crossing are not expected to contribute any sediment as PDFs are in place to minimize disturbance and arrest any downstream sediment movement. Short term (one to three years) there would likely be small inputs of sediment to channel crossings in the Ferris Gulch and Thompson Creek catchments resulting from haul. Given the dry season haul restriction, inputs would occur only during a precipitation event following a season of haul and would be spatially spread over many input locations so it is extremely unlikely that sediment input from these activities would be detectable above background levels and would not have an effect on aquatic habitat. Sediment increases would be minor and undetectable relative to existing sediment levels and would not contribute measurable or detectable effects above already elevated background levels.

Upland work, including timber harvest and follow up fuels treatments would have no effect on fine sediment levels, due to the filtering action of Riparian Reserve buffers, extensive PDFs designed to prevent overland sediment movement, and normal BMPs. Stream temperatures would not be affected, as no riparian vegetation adjacent to perennial streams would be removed.

Future private harvest, mining, and private land development are expected to continue existing trends in fine sediment potential and health of riparian areas currently present in the planning area. The Pilot Thompson Project would, in the short term, contribute a small amount of sediment to channels within the project area, on top of the large amounts contributed annually from all other sources. Direct inputs of fine sediment resulting

from haul would be of insufficient magnitude to meaningfully affect fish or fish habitat and would not be detectable above background levels. In sum, no measurable changes in the aquatic habitat conditions are anticipated to result from implementation of this alternative and, as such, there would not be a cumulative effect to aquatic habitats.

c. Alternative 3

The effects of Alternative 3 on fish and fish habitat would be similar to those outlined in Alternative 2 except that Alternative 3 proposes additional log hauling to accommodate the proposed helicopter units. In Ferris Gulch, an additional 310 truckloads of logs would be required to transport trees harvested from helicopter logging units. The helicopter units are spread throughout the drainage as are the effects. Increases in sediment would be expected although not in measurable quantities. The roads used for haul are well rocked and the main road is partially paved. PDFs including seasonal restrictions would greatly reduce sediment created from log haul and any sediment generated from this action would not be measurable or detectable above background levels and would not impact CCH approximately 0.5 mile downstream.

In Jamison Creek, an additional 243 truckloads would be required to transport trees harvested from helicopter logging units. Most of this material would be hauled out down a tributary to Ninemile Creek. This haul route crosses through the head waters of an unnamed tributary to Thompson Creek before crossing over into Ninemile Creek. Stream crossings in the unnamed tributary drainage are intermittent and > 1 mile from CCH. In the Ninemile drainage there is one intermittent crossing located approximately 0.3 miles upstream of CCH. PDFs including seasonal restrictions would greatly reduce sediment created from log haul and any sediment generated from this action would not be measurable or detectable above background levels and would not impact CCH in Ninemile Creek. In sum, no measurable changes in the aquatic habitat conditions are anticipated to result from implementation of this alternative and as such, there would not be a cumulative effect to aquatic habitats.

6. Environmental Effects - Fish and Designated Habitat

a. Alternative 1 - No Action

The No Action Alternative will have "*No Effect*" to fish populations or distribution, SONC coho salmon, CCH, or EFH, as no ground disturbing activities would occur under this alternative.

b. Alternative 2

Alternative 2 has been determined to have "*No Effect*" to SONC coho salmon, CCH, or EFH. This determination was made based on analysis to fish and aquatic habitat in this REA. There is no expectation that actions described in this REA would affect survival or production of fish, nor would they meaningfully impact aquatic habitats in fish bearing channels and hence implementation of the action alternative would not affect fish populations or fish habitat (including listed SONC coho salmon, CCH, and EFH) in the analysis area streams or in the Middle Applegate River Watershed.

c. Alternative 3

Alternative 3 has been determined to have "*No Effect*" to SONC coho salmon, CCH, or EFH. This determination was made based on analysis to fish and aquatic habitat in this EA. There is no expectation that actions described in this REA would affect survival or production of fish, nor would they meaningfully impact aquatic habitats in fish bearing channels and hence implementation of the action alternative would not affect fish populations or fish habitat (including listed SONC coho salmon, CCH, and EFH) in the analysis area streams or in the Middle Applegate River Watershed.

7. Affected Environment - Riparian Reserves

Riparian corridors along fish bearing stream reaches in the Middle Applegate River Watershed have been reduced from historic levels as agriculture and urban development of valley lands, road construction, and historic timber harvest practices have cleared vegetation adjacent to stream channels. Many of the Riparian Reserves on federal land in this project area are recovering nicely from past timber harvest. ODFW considers greater than 70 percent shade desirable, and less than 60 percent shade undesirable to aquatic organisms in small (less than 12 meters wide) forested streams. The Applegate River is listed as water quality limited for exceeding several parameters identified by the Oregon Dept. of Environmental Quality (DEQ), including dissolved oxygen.

Within the planning area catchments, there are an estimated 2,916 acres of Riparian Reserves (calculated from GIS) on BLM land within the project area. There are more riparian acres located on private lands that do not receive the same level of protection as federal Riparian Reserves. Overlaying the vegetation condition (GIS) layer with Riparian Reserve boundary layer is a useful way to display current vegetative states of the reserves over the large area encompassed within the project boundary. Note, however, that the vegetative condition layer was generated primarily to reflect upland conditions, and only estimates the conditions in riparian areas, especially those areas adjacent to stream channels (the primary shade and large wood producing zone). A summary of existing vegetative states in RRs on BLM-managed lands within the Pilot Thompson Project analysis area is presented by catchment in Table 3-15 below.

Table 3-15. Seral State of Riparian Reserves in the Pilot Thompson Project Analysis Area

Catchment	Riparian Reserve Acres by Vegetation Type						
	Grass and shrubs	Hardwoods	Early Seral (seedlings/ saplings)	Poles (5-11" DBH)	Mid Seral (11-21" DBH)	Mature (>21" DBH)	Total Acres of R.R.'s
Upper Thompson	0	0	9	159	83	76	327
Ninemile	26	102	25	144	398	175	870
Jamison	47	44	62	133	378	127	791
Tallowbox	4	13	1	40	216	55	329
Hinkle	17	81	17	15	148	51	329
Ferris	4	41	18	23	103	37	226
Project Total	98	281	132	514	1326	521	2872

The seral stage of vegetation surrounding the reserves can provide insight to how well the reserves are capable of functioning, in terms of providing shade and as a source of large wood inputs. For the purpose of this analysis, it was assumed that trees in a mid seral stage (minimum 11inches in diameter at breast height (DBH)) or older will function to provide sufficient shade to stream channels, and that pole size trees (less than 11 inches DBH) and younger may not provide sufficient shade to stream channels to prevent solar penetration to the stream channel. It was also assumed that only stands in a mature stage (greater than 21 inches DBH) are capable of providing a source of large wood of sufficient size to encourage channel modification and habitat improvements. Hardwoods were not included in this comparison as they do not conform well to DBH measurements, and do not provide large wood of the same quality that conifers do (Beechie et al. 1999). Excluding hardwoods (a common component of riparian areas) and pole size trees may tend to underestimate

the percent of reserves that are currently providing sufficient levels of shade to stream channels. Table 3-16 below displays the percent of all reserves that are in mid seral or greater stage (capable of providing high levels of shade), and in a mature stage (capable of providing large wood to channels).

Table 3-16. Percent of all Reserves in Mid Seral or Greater, and Mature Seral Stages in the Planning Area

Catchment in Planning area	Percent of Reserves in Mid Seral Stage or Greater (Trees >11" DBH)[1]	Percent of Reserves in Mature Stage (Trees >21" DBH)[1]
Upper Thompson	25	23
Ninemile Creek	46	20
Jamison Creek	48	16
Tallowbox Ck.	66	17
Hinkle Gulch	45	16
Ferris Gulch	46	16
Project Average	46%	18%

[1] Does not include acres of hardwoods, which likely underestimates actual shade provided to stream channels.

Data obtained through this analysis suggests that within the Pilot Thompson Project analysis area, Riparian Reserves are in a mid-seral stand condition, effectively providing shade but somewhat limited in large wood inputs. Nineteen percent (19 percent) of Riparian Reserves are comprised of pole sized (5-11 inches DBH) trees, often overstocked with limited vigor. RRs in forested areas which have been altered by past human caused disturbances will continue to mature over time, and it is expected that both the amount of shade and the potential for large wood inputs will increase, barring a catastrophic wildfire or major flood event.

8. Environmental Effects - Riparian Reserves

a. Alternative 1 - No Action

The No Action Alternative would not have any direct or indirect effects to Riparian Reserves within the Middle Applegate Watershed. The reserves would remain as they are currently, slowly recovering as stands mature. It is anticipated that levels of shade and large wood input will slowly increase over time. Benefits will be limited in RR's impacted by roads, as barring major road decommissioning, the existing road system will likely remain in use, perpetuating canopy openings adjacent to the fish bearing stream reaches. As this alternative would not contribute any direct or indirect affects to the reserves, no cumulative effects would result from implementation of the no action alternative.

b. Alternative 2

Activities proposed in RRs include thinning, road decommissioning, a skid trail, and log haul. Thinning would improve the condition of the Riparian Reserves by thinning mid-seral aged stands creating structural and species diversity. The riparian silvicultural prescription would not affect stream temperatures as the treatment areas are within intermittent stream reserves only.

Road decommissioning would improve a small stretch of Riparian Reserve in the Hinkle Gulch and Tallowbox Creek drainages by ripping the existing road segments, seeding and mulching. This proposed decommissioning would slightly improve Riparian Reserves at the site level by decreasing road densities. Over the long term, trees would grow in the road prism, eventually providing shade and large wood.

A skid trail is proposed within a Riparian Reserve of a Thompson Creek tributary. The skid trail would be approximately 150 feet long and would cross an intermittent stream channel. Prior to harvest, bump logs would

be placed in the channel to minimize disturbance. Following harvest any berms or ruts would be leveled to match the existing topography and slash and other debris scattered so that 80 percent ground cover is achieved. After the unit is treated, the bump logs would be removed and any loose soil removed from within the channel.

The proposed haul routes for the Pilot Thompson Project would occur on existing roads and mainly outside Riparian Reserves. PDFs would limit use to dry season haul and also requires dust abatement to minimize local impacts. Log haul would not change the existing condition of the RRs.

As the recovery of RRs on federal lands continues, it is anticipated that both shade levels and inputs of large wood will eventually increase over stream channels on BLM-administered lands within the planning area. However, it will take many years for the RRs to achieve their full potential, and benefits would be limited in areas already impacted by permanent roads. Because the majority of riparian areas over the fish bearing channels are on private lands, it is unlikely that the recovery of Riparian Reserves on federal lands would translate to lower stream temperatures in the fish bearing reaches, which are anticipated to remain in their current state (i.e. narrow corridors, impacted by roads, residences, and pasture land).

c. Alternative 3

The effects to Riparian Reserves would be similar between Alternative 2 and 3. One notable difference would occur in Alternative 3 as greater than 14 inches DBH trees marked under the Riparian Reserve prescription would be cut, felled, and left on site. Leaving this downed large wood component would improve connectivity for riparian associated species and would add complexity to the upland portion of the Riparian Reserve. See the wildlife section for more information.

G. CONSISTENCY WITH AQUATIC CONSERVATION STRATEGY

1. Introduction

The Northwest Forest Plan's (NWFP) Aquatic Conservation Strategy (ACS) has four components: Riparian Reserves, Key Watersheds, Watershed Analysis, and Watershed Restoration. It is guided by nine objectives which are meant to focus agency actions to protect ecological processes at the 5th-field hydrologic scale, or watershed, at the 6th and or 7th fields (subwatershed and or drainage), and at the site level. In this case, the Pilot Thompson Project is comprised of ten 7th field drainages, located in the Humbug and Thompson Creek 6th field subwatersheds. The Pilot Project is located entirely within the Middle Applegate River 5th field watershed. How the four components of ACS relate to the Pilot Thompson Project is explained below:

1. Riparian Reserves: Riparian Reserve widths for streams, springs, wetlands, and unstable soils have been determined according to the protocol outlined in the NWFPs Aquatic Conservation Strategy and are listed in the PDFs for the Pilot Project.

2. Key Watersheds: Tier 1 Key Watersheds contribute directly to conservation of at-risk anadromous salmonids, bull trout, and resident fish species. They also have a high potential of being restored as part of a watershed restoration program. The Middle Applegate Fifth Field Watershed is not a Key Watershed.

3. Watershed Analysis: BLM completed the Middle Applegate Watershed Analysis in 1995. The Watershed Analysis covers the project and analysis areas.

4. Watershed Restoration: Most of the restoration activities in the watershed have focused on restoring fish passage to provide better access to habitat on upstream private and federal lands. Projects by the local watershed council, ODFW and/or BLM include culvert removal and replacement, road decommissioning, and irrigation ditch fish screens and siphoning.

2. Evaluation of This Action's Consistency with Northwest Forest Plan Aquatic Conservation Strategy Objectives

1. *Maintain and restore the distribution, diversity, and complexity of watershed and* ***landscape-scale features*** *to ensure protection of the aquatic systems to which species, populations and communities are uniquely adapted.*

   This objective would be the same for both Alternatives 2 and 3. Topography, slope, forest fire regime, climate, and the distribution of soil types and plant communities are some of the landscape-scale features affecting aquatic systems in the Middle Applegate Watershed. One of the treatment objectives of the timber sale is to compensate for an altered fire regime and restore certain plant communities. The intent of this objective is to restore the function of landscape-scale processes like wildfire in order to protect the complexity and distribution of plant communities (including riparian areas) across the landscape. This would be noticeable at the site level, but would have only a minor benefit at the watershed scale, as less than 1 percent of the watershed would be treated.

2. *Maintain and restore* ***spatial and temporal connectivity*** *within and between watersheds. Lateral, longitudinal, and drainage network connections include floodplains, wetlands, upslope areas, headwater tributaries, and intact refugia. These network connections must provide chemically and physically unobstructed routes to areas critical for fulfilling life history requirements of aquatic and riparian-dependent species.*

   In the Middle Applegate River Watershed, much of the floodplain is in private ownership and used for agricultural purposes. BLM-managed land is concentrated in the steeper slopes of the tributary streams. Here, longitudinal connectivity and road densities are the primary issues for aquatic species. No activities planned under the Pilot Thompson Project would affect spatial and/or temporal aquatic connectivity, as no culverts are proposed for addition, replacement, or removal on perennial channels under this project.

   Terrestrial connectivity for riparian-dependent species with limited home ranges would be improved at the site level in Alternative 3 as trees greater than 14 inches DBH would be felled and left on site thus providing cover and habitat complexity for riparian dependent species in riparian areas that are currently devoid of downed wood.

3. *Maintain and restore the* ***physical integrity*** *of the aquatic system, including shorelines, banks, and bottom configurations.*

   There is only one activity proposed in the Pilot Thompson Project that would impact the physical integrity of the aquatic system. The skid trail proposed in Alternative 2 and 3 would cross an intermittent channel and has the potential to impact the physical integrity of the channel at the site level. PDFs would provide a measure of protection by requiring bump logs be placed inside the channel to protect the stream bank. Following harvest, bump logs would be removed and berms or ruts would be leveled to match the existing topography and the disturbed area would be mulched and seeded. Loose soil generated by the activity would be removed from within the channel. This action would have short term slightly negative impacts at the site level but the effects of this action would not be transmitted downstream. Approximately 30 linear feet of stream would be impacted but this action would not be relevant beyond that immediate location.

4. *Maintain and restore* ***water quality*** *necessary to support healthy riparian, aquatic and wetland ecosystems. Water quality must remain within the range that maintains the biological, physical, and chemical integrity of the system and benefits survival, growth, reproduction, and migration of individuals composing aquatic and riparian communities.*

There would be no effect on water temperature, because shade would not be reduced along any perennial stream channels. Short term (one to three years) there would likely be a small amount of fine sediment entering stream channels in the drainages where haul would occur. Sediment increases resulting from this activity would be minor relative to existing sediment levels, and would not be detectable at the site level. Upland work would have no effect on fine sediment levels, due to the filtering action of Riparian Reserve buffers, extensive PDFs designed to prevent overland sediment movement, and normal BMPs.

5. *Maintain and restore the **sediment regime** under which aquatic ecosystems evolved. Elements of the sediment regime include the timing, volume, rate, and character of sediment input, storage, and transport.*

   The only element of this project that could affect the sediment regime is log haul. Haul is expected to contribute some sediment to aquatic habitats but it is expected to be immeasurable and undetectable at the site level. For the most part the haul routes are not adjacent to streams but include discrete locations at road stream crossings. Fine dust from haul on rocked or native surface roads would be minimized by dust abatement and filtered by riparian vegetation. Many of the road segments in the haul route are outsloped which greatly reduces the amount of fine sediment entering the stream systems. If, during rain events after the haul season, fine sediment is mobilized and transported into the stream channel it would be during a time of elevated flows and would not be measurable or detectable above background levels. Also see ACS Objective #4. In general, high road densities and OHV use in the analysis area catchments will continue to impact the sediment regime.

6. *Maintain and restore **instream flows** sufficient to create and sustain riparian, aquatic, and wetland habitats and to retain patterns of sediment, nutrient, and wood routing. The timing, magnitude, duration, and spatial distribution of peak, high, and low flows must be protected.*

   Peak flows and summer low flows are unlikely to be affected by the Pilot Thompson Project. Please see Section E, Water Resources in the Environmental Assessment for details. Any effects on ground water availability from the project would be too small to be noticeable at the site, much less the drainage or watershed scale. Storage dams, water transfers and withdrawals for agriculture and residential use, and the high amount of non-porous surfaces (roads, buildings, etc.) have the most significant impacts to instream flows in the watershed.

7. *Maintain and restore the timing, variability, and duration of floodplain inundation and water table elevation in **meadows and wetlands**.*

   Only harvest would have any mechanism to affect the timing, variability, and duration of floodplain inundation and water table elevation. However, harvest would not occur in perennial Riparian Reserves, and, across the project area, would leave canopy cover within the range of natural variability. Because of this, any extra water input intercepted by the ground as a result of harvest would likely be utilized by remaining vegetation before it reached the floodplain. Therefore, this objective would not be measurably affected at any spatial scale.

8. *Maintain and restore the species composition and structural diversity of **plant communities in riparian areas** and wetlands to provide adequate summer and winter thermal regulation, nutrient filtering, appropriate rates of surface erosion, bank erosion, and channel migration and to supply amounts and distributions of **coarse woody debris** sufficient to sustain physical complexity and stability.*

   The Riparian Reserve Thinning silvicultural prescriptions would improve species composition and structural diversity along several intermittent channels. While this prescription is meaningful at the site level it is unlikely that any effects would be detectable beyond the actual harvest unit boundary.

   Fuels treatments are proposed within the Riparian Reserves although are not proposed immediately adjacent to streams. The prescription does not call for thinning of shade trees, only the dense understory

so shade would not be reduced by this action. This treatment may improve large wood inputs as the remaining trees will have improved growing conditions and would grow larger and faster, thus enhancing the large wood component adjacent to stream channels. These effects would not be meaningful to the larger aquatic system.

9. *Maintain and restore **habitat** to support well-distributed populations of native plant, invertebrate, and vertebrate riparian-dependent species.*

   See objectives # 3, 4, 5, and 8. Site level effects to aquatic and riparian habitat would not be of sufficient magnitude to compromise this objective. The amount of habitat affected would be insignificant and immeasurable at the drainage, subwatershed, and watershed scales compared to the past and ongoing degradation that has impacted habitat in these catchments.

H. TERRESTRIAL WILDLIFE

1. Affected Environment

a. Vegetation Conditions and Terrestrial Wildlife Habitats (General)

The Pilot Thompson project area is located in the Middle Applegate River watershed, which is a tributary to the Rogue River. The analysis area, used to assess the impacts on all wildlife species, was designed to encompass the provincial home range circles of 10 known northern spotted owl sites. These sites were selected due to the fact that proposed treatment units fall within their home range radii. The total size of the wildlife analysis area is 38,963 acres (approximately 61 square miles). BLM-administered lands comprise approximately 63 percent of this area.

The present-day composition and distribution of vegetation in the project area is influenced by site characteristics (soil types, aspect, and topography), natural disturbance (wildfires, insects, disease, etc.) historic mining, rural residential development, agricultural activities, timber harvest, fuels reduction projects, fire suppression, and road building. Common forest types include Douglas-fir, ponderosa pine, and white oak forest series.

The vegetation condition classes presented in Table 3-17 provide habitat for the terrestrial wildlife species found in the proposed Pilot Thompson analysis area. Acreage of each vegetation condition class and several wildlife species that are representative of the various habitats are also displayed. Approximately 235 vertebrate terrestrial wildlife species are known or suspected to occur in the analysis area based on known range and habitat associations, including species that migrate through the area.

Table 3-17. Vegetation Condition Classes on BLM-Administered Lands within the Pilot Thompson Analysis Area

Vegetation Condition Class	Acres	Representative Species (from Brown 1985)
Grassland/Shrubland	580	gopher snake, California ground squirrel, western meadowlark, wrentit, dusky-footed woodrat
Hardwood/Woodland	3,142	acorn woodpecker, western gray squirrel, ringneck snake
Seedling/Sapling	1,383	northwestern garter snake, mountain quail, pocket gopher
Small Conifer	2,652	golden-crowned kinglet, porcupine, Southern alligator lizard
Large Conifer	9,665	ensatina, Stellar's jay, mountain lion
Mature Conifer	6,952	northern spotted owl, northern flying squirrel, pileated woodpecker,

b. Special Status Wildlife Species

Special Status Species are those species that are Federally-listed as Threatened or Endangered; proposed or candidates for Federal listing as Threatened or Endangered; or are BLM-designated Sensitive species. Survey and Manage species are listed for protection under the Northwest Forest Plan. Table 3-18 lists the Special Status and Survey and Manage species that are known, suspected or have habitat in the project area. Species determined to have a very low likelihood of occurring in the project area, or whose presence would be considered accidental, were not included in this analysis.

Table 3-18. Wildlife Species Known, Suspected or Habitat Occurs in the Analysis Area

Scientific Name	Common Name	Status	Occurrence
Strix occidentalis caurina	northern spotted owl	FT	Known
Strix nebulosa	great gray owl	SM	Known
Haliaeetus leucocephalus	bald eagle	SEN/EPA	Suspected
Aquila chrysaetos	golden eagle	EPA	Known
Falco peregrinus anatum	American peregrine falcon	SEN	Suspected
Martes pennanti	fisher	SEN/FC	Known
Antrozous pallidus	pallid bat	SEN	Suspected
Myotis thysanodes	fringed myotis	SEN	Suspected
Actinemys marmorata	Pacific pond turtle	SEN	Known
Plethodon stormi	Siskiyou Mountains Salamander	SEN/SM	Known
Helminthoglypta hertleini	Oregon shoulderband	SEN/SM	Suspected
Monadenia chaceana	Chase sideband	SEN/SM	Suspected
Monadenia fidelis celeuthia	travelling sideband	SEN	Suspected
Vespericola sierranus	Siskiyou hesperian	SEN	Known
Chloealtis aspasma	Siskiyou short-horned grasshopper	SEN	Suspected
Bombus occidentalis	Western bumblebee	SEN	Suspected
Bombus franklini	Franklin's bumblebee	SEN	Suspected

Status:

FT – Federally Threatened SEN – Bureau Sensitive Species EPA – Bald and Golden Eagle Protection Act

FC – Federal Candidate SM – Survey and Manage Species

Occurrence:

Known – Species is known to occur in the project area

Suspected – Species not known to occur but reasonable potential to exist in the project area

c. Federally Listed Species

Northern Spotted Owls (NSOs)

The northern spotted owl, a Federally-listed Threatened species, is associated with existing habitat within and adjacent to the Pilot Thompson project area. Spotted owls prefer coniferous forest with multiple layers of vegetation and a variety of tree species and age classes with the presence of large logs and large diameter live and dead trees (snags), for nesting, roosting, and foraging habitat. They may also be found in younger stands with multilayered, closed canopies, large diameter trees, and abundance of dead and down woody material. Based on studies of owl habitat selection (including habitat structure and use and prey preference throughout the range of the owl), spotted owl habitat consists of four components: nesting, roosting, foraging, and dispersal (Thomas et al. 1990).

The Bureau of Land Management (BLM), Forest Service (FS), and US Fish and Wildlife Service (USFWS)

have conducted a coordinated review of four reports containing information on the northern spotted owl. The reviewed reports include the following:

- Scientific Evaluation of the Status of the Northern Spotted Owl (Sustainable Ecosystems Institute, Courtney et al. 2004);
- Status and Trends in Demography of Northern Spotted Owls, 1985-2003 (Anthony et al. 2004);
- Northern Spotted Owl Five Year Review: Summary and Evaluation (USFWS 2004); and
- Northwest Forest Plan – The First Ten Years (1994-2003): Status and trend of northern spotted owl populations and habitat, PNW Station Edit Draft (Lint 2005).

Anthony et al. (2004) published meta-analysis of owl demographic data collected in 14 demographic study areas across the range of the northern spotted owl. Four of the study areas are in western Washington, six are in western Oregon, and four are in northwestern California. Although the agencies anticipated a decline of NSO populations under land and resource management plans during the past decade, Anthony et al. identified greater than expected NSO population declines in Washington and northern portions of Oregon, and more stationary populations in southern Oregon and northern California. However, Anthony (2010) stated that that there is now an apparent decline in spotted owl occupancy in the Southern Cascades Study Area, while the presence of barred owls is increasing.

The reports listed above did not find a direct correlation between habitat conditions and changes in NSO populations, and they were inconclusive as to the cause of the declines. Even though some risk factors had declined (such as habitat loss due to harvesting), other factors had continued, such as habitat loss due to wildfire, potential competition with the barred owl, West Nile virus, and sudden oak death (USFWS 2004; Lint 2005). The barred owl is present throughout the range of the spotted owl, so the likelihood of competitive interactions between the species raises concerns as to the future of the spotted owl (Lint 2005).

This analysis considered new information presented in the 2011 Revised Recovery Plan for the Northern Spotted Owl (USDI 2011). Specifically, the recovery plan identified barred owls as one of the primary threats to the recovery of the spotted owl. Barred owls reportedly have reduced spotted owl site occupancy, reproduction, and survival (USDI 2011). There is a perceived threat because barred owls use habitats typical of spotted owl habitat. They may be able to coexist through habitat segregation; however, whether this would occur is unclear (Courtney et al. 2004). Barred owls may be more of a habitat generalist and occupy a wider diversity of habitat types than spotted owls. Displacement of spotted owls by barred owls is likely occurring, but the rate and extent of this are unknown; further, whether this effect is exacerbated by other confounding issues is uncertain (Courtney et al. 2004).

The cause of the barred owl invasion is not clear and the BLM has no control over barred owls or their encroachment into NSO habitat. To what extent the barred owl range expansion is a result of humans altering the environment is unknown (Monahan and Hijmans 2007; Livezey et al. 2008). Currently, it is unclear whether forest management influences the outcome of interactions between barred and spotted owls (Courtney et al. 2004). The barred owl issue is being addressed at the range level by the Regional Barred Owl Working Group through research efforts, management strategies, and protocol revisions.

No coordinated surveys for barred owls have occurred in the Ashland Resource Area, nor are any planned at this time. All barred owl observations on the Resource Area are from incidental observations. Barred owls have been detected in the Pilot Thompson project area in both 2011 and 2012. One pair was located each of these years in the same general location. A possible barred owl juvenile was detected in 2011.

In more recent reports (Davis et al. 2010, 2011; Forsman et al. 2011), it has become more evident that the barred owl population is increasing across the range of the northern spotted owl. Forsman (2011) indicates that the spotted owl populations have declined across most of the range, with the most significant declines occurring in

Washington where the barred owl has been present the longest. Although analysis within the nearest NSO demography study (Klamath Study Area, or KSA) to the Project Area indicates a stable spotted owl population during the study period, the recent data shows the beginning of a trend towards a declining population (Davis et al. 2010). Davis et al. (2010) states that:

> [t]here is mounting evidence that barred owls are negatively impacting spotted owl population within the KSA. This is illustrated by several population trends beginning about 2003, which is when barred owl detections within the KSA exceed 10 percent of the sites. Spotted owl detections have been steadily decreasing since 2002 and reached the lowest point in 2010, the same year barred owl detections reached their highest level. Fecundity rates appear to be declining during the past 8 years and in only 1 of those 8 years was the rate above average. Fecundity rates for sites with known barred owl presence were lower than at other sites. If these trends continue a combination of lower occupancy and reduced fecundity, there may be cause for concern regarding the spotted owl population.

On June 30, 2011, the United States Fish and Wildlife Service released the *Revised Recovery Plan for the Northern Spotted Owl* for public comment (USFWS 2011). This Revised Recovery Plan recommends achieving recovery of the spotted owl through 1) the retention of more occupied and high-quality habitat, 2) active management using ecological forestry techniques, both inside and outside of reserves, 3) increased conservation of spotted owls on State and private lands, and 4) the removal of barred owls in areas with spotted owls. The plan recommends retaining the Northwest Forest Plan reserve network while the Service utilizes a habitat modeling framework to develop and propose a new critical habitat network for the spotted owl. This new critical habitat for NSOs was finalized on November 21, 2012 and published in the Federal Register on December 4, 2012. The effective date for the Final Critical Habitat was on January 3, 2013 (30 days after the date of publication in the Federal Register).

The original foundation for spotted owl recovery was the 1994 Northwest Forest Plan (NWFP). Management direction and land allocations in the standards and guidelines of the NWFP are intended to constitute the Forest Service and BLM contributions to the recovery of the northern spotted owl (USDA and USDI 1994). The NWFP provides a network of late-successional reserves, 100-acre Known Spotted Owl Activity Centers (KSOACs), connecting riparian corridors, and connectivity blocks across the lands within the Plan area.

The NWFP-designated KSOACs were the best habitat on Federal lands as close as possible to the spotted owl nest site, or owl activity center, for all sites known as of January 1, 1994 (USDA and USDI 1994a). These KSOACs are to be protected to preserve an intensively used portion of the breeding season home range close to a nest site or center of activity (USDI 1995). There are no KSOACs in the Project Area.

The Pilot Thompson project area is located within the provincial home ranges (1.3-mile radius from the site center) of ten historic spotted owl sites. No known nests are located within the proposed treatment units. The survey history for each NSO site within the planning area has varied over the years. Reproduction has been confirmed at 3 sites in the last 10 years. For purposes of this analysis, all sites are assumed to be occupied. While there is no requirement to survey for spotted owls prior to implementing forest management actions, the BLM conducted six survey visits to seven of these sites in 2012. The surveys resulted in the visual detection of one pair of NSOs at one of the sites on multiple occasions. This NSO pair has been observed nesting in 2013.

Northern Spotted Owl Habitat

For the purposes of this analysis, the vegetation within the Pilot Thompson project area was typed into habitat categories pertinent to the northern spotted owl. These categories are distinct and not over-lapping. These habitat types are used throughout this document to describe and quantify habitat conditions across the landscape (Table 3-19).

Table 3-19. Northern Spotted Owl Habitat Types and Area in the Pilot Thompson Analysis Area

Habitat Type	Description	Areas (Acres)
Suitable Habitat (NRF)	Meets all spotted owl life requirements. Stands are generally older than 80 years, have a high canopy cover (greater than 60 percent), a multilayered structure, and large overstory trees. Deformed, diseased, and broken-top trees, as well as large snags and down logs, are also present. Suitable habitat also includes areas with more uniform structure that may not have nesting structures, but provides roosting and foraging habitat with flying space for owls in the understory.	16,990
Dispersal Only Habitat	Not suitable for spotted owl nesting/roosting/foraging, but has sufficient patchy cover to be used for travel between suitable stands, a minimum 40 percent canopy cover, and an average tree diameter greater than 11 inches with flying space for owls in the understory.	5,939
Capable Habitat	Forest that is currently not spotted owl habit, but can become NRF or dispersal in the future as trees mature and canopy fills in.	3,669
Non-Suitable Habitat	Lands that do not provide habitat for spotted owl and would not develop into NRF or dispersal in the future (open prairies, meadows, shrub lands, etc.)	1,734
	Total	28,332

Highly suitable, or **RA32** (Recovery Action 32) **habitat**, is a sub-set of NRF habitat. Under the NSO Recovery Plan, the US Fish and Wildlife Service recommends agencies maintain substantially all of the older and more structurally complex, multilayered conifer forests on Federal lands (USFWS 2008c). These forests are characterized as having large diameter trees; high amounts of canopy; and decadence components such as broken-topped live trees, mistletoe, cavities, large snags and large coarse wood. Stands proposed for harvest in the Pilot Thompson project area were evaluated using interagency draft methodology. Stands evaluated and meeting the definitions in the methodology are referred to as RA32 stands. Through field evaluations, 2 acres of one treatment unit were determined to meet RA32 stand conditions (Unit 25-7). No treatment will occur in these 2 acres (see also Chapter 2, Section D: Actions and Alternatives Considered but Eliminated from Detailed Analysis).

Spotted Owl Prey Base

Dusky-footed woodrats, the primary prey species for spotted owls in southwest Oregon, are found in high densities in early-seral or edge habitat (Sakai and Noon 1993). Down wood is an important habitat feature for this major prey species in southwest Oregon. Dusky-footed woodrats build stick nests, sometimes incorporating logs as part of the structure. Northern flying squirrels are another major source of owl prey in southwest Oregon. (Forsman et al. 2004).

Northern Spotted Owl Critical Habitat

Critical habitat is designated under the auspices of the Endangered Species Act of 1973 and was first designated for the northern spotted owl in 1992. Critical habitat includes the primary constituent elements (PCE) that support nesting, roosting, foraging, and dispersal. It also includes forest land that is currently unsuitable, but has the capability of becoming NRF habitat in the future (57 Federal Register 10:1796-1837). On February 28, 2012, the U.S. Fish and Wildlife Service (USFWS) released the proposed revised critical habitat in the form of maps and the draft form of the federal register publication. The proposed rule was published in the Federal

Register on March 8, 2012 (77 Federal Register 46:14062-14165). On November 21, 2012, in compliance with an order from the U.S. District Court of Columbia, the USFWS finalized the proposed rule. The rule becomes effective 30 days after the date of Federal Register publication. Federal Register publication took place on December 4, 2012, thus the rule became effective on January 3, 2013. There are approximately 16,508 acres of critical habitat in the analysis area.

The Pilot Thompson Project is located in the Klamath West (KLW) critical habitat unit (also referred to as Unit 10) and specifically, it is within the subunit KLW 4. The KLW–4 subunit consists of approximately 158,299 ac (64,061 ha) in Josephine and Jackson Counties, Oregon, and Del Norte and Siskiyou Counties, California, and comprises lands managed by the USFS and the BLM that are managed as directed by the NWFP (USDA and USDI 1994). Special management considerations or protection are required in this subunit to address threats to the essential physical or biological features from current and past timber harvest, losses due to wildfire and the effects on vegetation from fire exclusion, and competition with barred owls. This subunit is expected to function for demographic support to the overall population and for north-south and east-west connectivity between subunits and critical habitat units. The USFWS evaluation of sites known to be occupied at the time of listing indicates that approximately 95 percent of the area of KLW 4 was covered by verified spotted owl home ranges at the time of listing (USFWS 2012).

Based on current research on the life history, biology, and ecology of the northern spotted owl and the requirements of the habitat to sustain its essential life history functions, the Service has identified the following PCEs for the spotted owl (USFWS 2012):

1) Forest types that may be in early, mid, or late-seral states and support the spotted owl across its geographical range
2) Habitat that provides for nesting and roosting (NR). This habitat must provide:
    a) Sufficient foraging habitat to meet the home range needs of territorial pairs of northern spotted owls throughout the year.
    b) Stands for nesting and roosting that are generally characterized by:
        - Moderate to high canopy closure (60 to over 80 percent),
        - Multilayered, multispecies canopies with large (20- 30 inches (51-76 cm) or greater DBH) overstory trees,
        - High basal area (greater than 240 ft^2/acre (55 $meters^2$/hectare),
        - High diversity of different diameters of trees,
        - High incidence of large live trees with various deformities (e.g., large cavities, broken tops, mistletoe infections, and other evidence of decadence)
        - Large snags and large accumulations of fallen trees and other woody debris on the ground, and
        - Sufficient open space below the canopy for northern spotted owls to fly.
3) Habitat that provides for foraging (F), which varies widely across the northern spotted owl's range, in accordance with ecological conditions and disturbance regimes that influence vegetation structure and prey species distributions (see specific description for the Klamath province below).
4) Habitat to support the transience and colonization phases of dispersal (D), which in all cases would optimally be composed of nesting, roosting, or foraging habitat (PCEs (2) or (3)), but which may also be composed of other forest types that occur between larger blocks of nesting, roosting, and foraging habitat. In cases where nesting, roosting, or foraging habitats are insufficient to provide for dispersing or nonbreeding owls, the specific dispersal habitat PCEs for the northern spotted owl may be provided by the following:
    a) Habitat supporting the transience phase of dispersal, which includes:

- Stands with adequate tree size and canopy closure to provide protection from avian predators and minimal foraging opportunities. In general this may include, but is not limited to, trees with at least 11 inches (28 cm) DBH and a minimum 40 percent canopy closure; and
- Younger and less diverse forest stands than foraging habitat, such as even-aged, pole-sized stands, if such stands contain some roosting structures and foraging habitat to allow for temporary resting and feeding during the transience phase.

b) Habitat supporting the colonization phase of dispersal, which is generally equivalent to nesting, roosting, and foraging habitat as described in PCEs (2) and (3), but may be smaller in area than that needed to support nesting pairs.

d. Survey and Manage Species

Great Gray Owls

Great gray owls nest in a varied array of open forests associated with grassy areas suitable for their preferred prey species (e.g., voles, moles, gophers). Broken top trees, abandoned raptor nests, mistletoe clumps, and other platforms provide suitable nest structures (USDA and USDI 2004). All of the great gray owl (GGO) nests documented in the western half of the Ashland Resource Area (including the Applegate River Basin and surrounding areas) have been platform nests, whereas nests located in the higher elevation eastern portion of the Ashland Resource Area have been predominately in broken top snags. Suitable nesting habitat is defined in the "Survey Protocol For The Great Gray Owl " (USDI and USDA 2004) as large diameter trees with roosting cover within 200 meters (656 feet) of suitable foraging habitat. Foraging habitat is described as relatively open, grassy habitats, such as bogs, natural meadows, open forests and recent selective/regeneration harvest areas. Great gray owls have been observed foraging up to 2 miles from the nest (Bull and Henjum 1990). In the Ashland Resource Area, nests are often located in forest stands which are relatively open and possess substantial herbaceous understory. In these cases, nesting habitat is also used for foraging.

There are 5 recorded historic nest locations of great gray owls within the analysis area. The forested stands present within the analysis area are of mixed suitability as habitat for great gray owls. Some stands are dense, steep and/or do not provide an open, grassy understory condition typical of GGO habitat. Other stands offer habitat components more typically utilized by great gray owls (e.g. broken-topped trees, grass and forb communities to support prey species). Protocol surveys were conducted for GGOs. Some portions of the project area were surveyed as early as 1997. The most recent surveys took place in 2011 and 2012 in previously unsurveyed portions of the project area. Survey and Manage guidelines dictate that there is no expiration date for GGO surveys.

A new GGO reproductive site was located by BLM employees during the course of their field work in Unit 30-2. A protection buffer of approximately 100 acres has been designated for this site. Unit 30-2 will be reduced in area by the size of this buffer. The proposed action, as described in Chapter 2, has not been adjusted to reflect this change.

Mollusks

The proposed action is located within the suspected ranges of four terrestrial mollusk species for which surveys are required and which are granted protection through buffering of known locations. All four of these snails appear on the Bureau Sensitive Species list. One of these four, the Chase sideband, also appears on the list of Survey and Manage species. Although very little is known regarding the ecology of these species, they are generally associated with moist areas and use rock substrate, large woody debris and logs as refugia during the dry months (Duncan et al. 2003). Protocol surveys (USDA and USDI 2003) for terrestrial mollusks were conducted in the project area during the spring and fall of 2012. Voucher specimens collected from surveys have been classified by genus and/or species and have been identified to species/sub-species by a malacologist. Six (6) verified locations for *Vespericola sierranus* (Siskiyou Hesperian) have been identified and will be

protected with no treatment buffers of approximately 150 feet (dependent upon habitat and topography).

The **Chase sideband** is commonly found within 30 meters (98 feet) of rocky areas, talus deposits and in associated riparian areas. Areas of herbaceous vegetation in these rocky landscapes adjacent to forested habitats are preferred.

The **Oregon shoulderband** utilizes habitat similar to that used by the Chase sideband, but is generally associated with shrublands or rocky inclusions in forested habitat with substantial grass and subsurface water sources.

Habitat attributes for the **travelling sideband** include dry basal talus and rock outcrops, with oak and maple overstory components. Also, they have been found along spring run-off in rocks and moist silty alluvial benches adjacent to creeks with moist vegetation and detritus in mixed conifer-hardwood forest.

The **Siskiyou hesperian** is primarily a riparian associate found in perennially moist habitat, including spring seeps and deep leaf litter along stream banks and under debris and rocks.

e. BLM Bureau Sensitive Species

Bureau Special Status Species (SSS) are species proposed for listing under the ESA or species requiring special management consideration to promote their conservation and reduce the likelihood and need for future listing under the ESA. The SSS list was most recently updated in January 2012 (USDI 2011b). This list has two categories: Sensitive and Strategic. Per BLM Manual 6840 (Section .06) (USDI 2008), Bureau sensitive species will be managed consistent with species and habitat management objectives in land use and implementation plans to promote their conservation and to minimize the likelihood and need for listing under the ESA. Project implementation will adhere to the requirements set forth in Section 6840.2.C. All Sensitive species were considered and evaluated for this project, and only those that could be impacted by the proposed actions are discussed in more detail.

Fishers

Fishers (a mammal in the weasel family) are found in forested landscape mosaics that include conifer-dominated stands. Their occurrence is closely associated with low- to mid-elevation forests (generally less than 4,100 feet) with a coniferous component, large snags or decadent live trees, and fallen logs for denning and resting, and complex physical structure near the forest floor (Aubry and Lewis 2003). Forest type is probably not as important to fishers as the vegetative and structural complexity that lead to abundant prey populations and potential den sites (Lofroth et al. 2010). Fishers do not appear to occur as frequently in early-successional forests as they do in late-successional forests in the Pacific Northwest (Powell and Zielinski 1994), but they will use harvested areas if patches of habitat with residual components (i.e., logs, hardwoods) and areas where larger trees are left in the landscape (Lofroth et al. 2010). In addition, Buskirk and Powell (1994) hypothesized that the physical structure of the forest and prey associated with forest structures are the critical features that explain fisher habitat use, not specific forest types. Prey and scavenged remains recovered from den and rest sites in southwest Oregon include rabbit, ground squirrel, flying squirrel, woodrat, opossum, skunk, porcupine, bobcat, deer and elk carrion, jay, woodpecker, grouse, berries, and yellow jackets (Lofroth et al. 2011 ; Aubry and Raley 2006).

Females usually give birth in cavities (natal den) in large live or dead trees. These cavities are in trees with openings that access hollows created by heartwood decay (Aubry and Raley 2002). After the kits become more active, the females move them to a larger den (maternal den) on or near the forest floor. These dens are primarily cavities in the lower bole or butt of live or dead large trees. Fishers also use snags, mistletoe brooms, rodent nests, logs, and cull piles for rest sites (Lofroth et al. 2010).

Currently, there are two populations of Pacific fisher in Oregon which appear to be genetically isolated from each other: a small population in the Southern Cascades near Prospect and Butte Falls, and a second population

in southwestern Oregon in the Klamath and Siskiyou Mountains (Lofroth et al. 2010; Aubrey et al. 2004). This is considered to be the result of the presence of potentially strong ecological and anthropogenic barriers including the white oak savanna habitat of the Rogue Valley. Based on DNA analyses, individuals in the southern Oregon Cascades appear to be descendants of animals reintroduced from British Columbia and Minnesota during the late 1970s and early 1980s by the Oregon Department of Fish and Wildlife (Drew et al. 2003). Animals in the eastern Siskiyou Mountains of Oregon are genetically related to individuals in the northwestern California population, which is indigenous (Wisely et al. 2004 ; Farber and Franklin 2005). Recent DNA evidence collected from fishers in the southern Oregon Cascades found that these individuals were genetically related to the fisher population in the Siskiyou Mountains. This evidence shows that fishers are able to cross interstate highways (Stephens 2012).

Fishers are highly mobile and have large home ranges, and travel over large areas. In the Southern Cascades population, the average home range for females was approximately 6,200 acres (25 km^2). Male home ranges varied from approximately 36,300 acres (147 km^2) during breeding season to 15,300 acres (62 km^2) during the nonbreeding season (Aubry and Raley 2006). Other fisher research studies on the West Coast have shown that fisher mean home range size vary considerably. Females' mean home ranges vary from 420 to 14,579 acres (1.7 km^2 to 59 km^2) and males' from 1,829 to 43,861 acres (7.4 km^2 to 177.5 km^2).

The northern spotted owl NRF habitat-type described above adequately describes suitable fisher denning and resting habitat because there is a direct correlation of key habitat features used to assess NSO habitat and fisher habitat (high canopy cover, multi-storied stands, large snags, and large down trees on the forest floor). Using northern spotted owl habitat as a surrogate for fisher habitat has been accepted by the courts as a reasonable practice (*KS Wild v. US BLM*, Case No. 06-3076-PA, Order and Judgment 9/10/2007).

Based on the NSO habitat analysis, approximately 16,990 acres of suitable fisher denning and resting habitat exist on BLM-administered lands within the analysis area. However, all of these acres may not provide optimal fisher habitat because past harvest practices and land ownership patterns have resulted in fragmented habitat. BLM "checkerboard" ownership may be one of the primary factors limiting the ability of BLM-administered lands to provide optimal habitat for fishers (USDA and USDI 1994). This checkerboard ownership pattern was created by the Congressional acts that provided land grants, and is beyond the scope of the BLM's authority.

Fisher presence and absence surveys using baited camera stations and hair snares have been conducted in portions of the Applegate River watershed and in the analysis area. Fishers were detected at camera stations in the analysis area. The habitat within the Pilot Thompson project area and analysis area is likely used for all stages of fishers' life history (i.e.: foraging, resting, dispersing, reproduction).

USFWS published a finding in April 2004 that a petition to list fishers as a "Federally Threatened" species was warranted but precluded by higher priority listing actions (USDI 2004). The species remains a USFWS candidate species (69 FR 68:18770). An interagency team of Federal agency and State biologists from British Columbia, Washington, Oregon, and California completed a draft Conservation Strategy (September 2011) which is currently being reviewed by Regional Supervisors. Fishers remain a BLM Bureau Sensitive Species and are managed consistent with BLM Manual 6840 (USDI 2008).

Bald Eagle

The bald eagle is a Bureau Sensitive Species and is also protected under the Bald and Golden Eagle Protection Act and the Migratory Bird Treaty Act. The US Fish and Wildlife (USFWS 2007) Bald Eagle Management Guidelines state:

> Bald eagles generally nest near coastlines, rivers, large lakes or streams that support an adequate food supply, usually fish and waterfowl. They often nest in mature or old-growth trees; snags (dead trees); cliffs; rock promontories; rarely on the ground; and with increasing frequency on human made structures such as power poles and communication towers. In forested areas, bald eagles often select the

tallest trees with limbs strong enough to support a nest that can weigh more than 1,000 pounds. Nest sites typically include at least one perch with a clear view of the water where the eagles usually forage. Shoreline trees or snags located in reservoirs provide the visibility and accessibility needed to locate aquatic prey. Eagle nests are constructed with large sticks, and may be lined with moss, grass, plant stalks, lichens, seaweed, or sod. Nests are usually about 4-6 feet in diameter and 3 feet deep, although larger nests exist.

There are no known bald eagle nests in or adjacent to the Project Area, but the stands do have large enough trees to support nesting. Thompson Creek, the Applegate River, and scattered large ponds provide foraging opportunities for this species.

Bats

The three Bureau Sensitive bat species (Townsend's big-eared, Pallid, Fringed Myotis) utilize mines, caves, manmade structures, snags and rock outcroppings for roosting and hibernacula sites.

Pallid bats west of the Cascade Range are restricted to the drier interior valleys of the southern portion of the state. They are usually found in brushy, rocky terrain, but have been observed at edges of coniferous and deciduous woods and open farmland (Verts and Carraway 1998). Roost habitat includes buildings, bridges, large decadent snags, and rock outcrops. Pallid bats have not been confirmed in the Analysis Area, but they are likely to be present.

Fringed myotis bats appear adapted to live in areas with diverse vegetative substrates. They are associated with a variety of habitats including conifer forests and oak woodlands. They roost in buildings, caves, and mines, and in crevices and cavities in large trees. No fringed myotis bats have been documented in the Analysis Area.

Townsends Big-eared bat are associated with caves and mining adits which they use for roosting, hibernating, and maternity colonies. There are a number of mining adits within the Pilot Thompson planning area that should be protected with a 250 foot buffer if conditions are adequate for use by Townsend's big-eared bat (USDI 1995, p. 57). Approximately 50 mining features (adits and shafts) occur across the Pilot Thompson planning area. A review of the condition and habitat for each adit was conducted using the Abandoned Mine Lands (AML) dataset, and only one adit was located within proximity of treatment areas which provides habitat suitable for Townsend's big-eared bat (Fellers et al. 2002). That adit is known as Maid of the Mist Mine and would be protected with a 250 foot no treatment area buffer (ROD/RMP) to protect the mine's microclimate.

All known mining adits in the project area have been assessed for suitability as bat habitat. Any mining adits located prior to harvest that can provide suitable bat habitat will be protected with a 250-foot no-cut buffer (USDI 1995).

Scattered large remnant trees and snags that could provide roosting opportunities during foraging are present in and adjacent to the proposed units. Such trees and snags within the units are not the subject of treatment and would be protected to the greatest extent possible, unless they present a safety hazard.

Siskiyou Mountains Salamander

The Siskiyou Mountains Salamander (*Plethodon stormi*) is a member of the family Plethodontidae, the lungless salamanders. Members of the genus *Plethodon* respire primarily through their skin and are completely terrestrial. The Siskiyou Mountains salamander (SMS) is considered a talus or rock substrate obligate, and has rarely been found far from talus deposits or fissured rock outcrops (Stebbins 1966; Nussbaum 1974). Nussbaum (1974) characterized optimum habitat for the SMS as stabilized talus in old-growth stands with high canopy closure and a northern aspect. There are several known detections of the SMS across the Pilot Thompson planning area, but none of these locations occur within any of the treatment areas proposed under the Pilot Thompson project.

Current management direction for the Siskiyou Mountains Salamander is described in detail in the Conservation Agreement for the Siskiyou Mountains Salamander (*Plethodon stormi*) in Jackson and Josephine Counties of Southwest Oregon; and within Siskiyou County in northern California (USDI 2007). This Agreement adopts the Conservation Strategy (Olson et al. 2007) developed for this species (USDA USDI 2007) and utilized the following strategy.

Sites identified for Siskiyou Mountains Salamander conservation were selected by a panel of scientists and natural resource managers from records in the GeoBOB databases. These sites are referred to as "high-priority" sites. The potential role of a site was reviewed at the Applegate River 4th field watershed, 6th field watershed and individual site scales. At the Applegate River 4th field watershed scale, each site was evaluated based on the distribution of known sites, federal land allocations, the predictions of a habitat model, and the predicted risk to persistence from natural (fire) and anthropogenic disturbances. Within each 6th field watershed, sites were selected for protection to reduce extinction likelihood within the watershed and to contribute to well-distributed, interacting sub-populations. When possible, we selected localities that occurred in or near existing federal reserve land allocations as defined in the Medford District Resource Management Plan and the Rogue River National Forest Plan. Land allocations include large Late-Successional Reserve owl cores, botanical set-asides, and Riparian Reserves.

As described within the Conservation Strategy, management discretion of high-priority salamander sites is expected. Although specific sites have been selected and delineated as high-priority salamander management areas, there is considerable flexibility to fine tune these recommendations during project planning. As projects are proposed within watersheds, there is an opportunity to field verify assumptions used for site selection.

There are 13 high-priority sites located within the Pilot Thompson planning area; two of these sites are within treatment units. Ground-truthing of the high-priority site polygons within the Pilot Thompson planning area revealed significant differences between modeled habitat areas and the on-the-ground physical habitat. Each site was ground-truthed to more accurately match the on the ground habitat (talus). These areas have been flagged on the ground in areas where management activities are proposed.

Siskiyou Short-horned Grasshopper

This species is often associated with blue elderberry for the egg-laying phase of its life cycle. Siskiyou short-horned grasshoppers are actively feeding and reproducing from July through September.

This species has not been documented within the Analysis Area. It has been found approximately 15 miles to the southeast of the Analysis Area.

Western Bumblebee

This species was until recently common across much of the western United States. The species has experienced a precipitous population decline in the last decade, likely due to introduction of non-native pathogens. This species is associated with open grassland/ shrubland where abundant flowering plants occur and serve as a food source.

Franklin's Bumblebee

This species has a very limited known range, one of the smallest known of any bumblebee. Known sightings are restricted to southern Oregon and extreme northern California. This species is associated with open grassland/ shrubland where abundant flowering plants occur and serve as a food source. This species has experienced a precipitous population decline in the last decade, likely due to introduction of non-native pathogens. The last recorded observation of this species occurred in 2006 on Mount Ashland.

Pond Turtle

The pond turtle is associated with streams and ponds throughout southwestern Oregon. Egg laying sites are terrestrial and located near water sources. Over-wintering sites may be aquatic or terrestrial, sometimes several hundred yards from water. Pond turtles have been documented in and near streams and ponds within the Analysis Area.

Peregrine Falcon

The peregrine falcon is a Bureau Sensitive species. This species nests on rock cliffs and outcrops and feeds on a variety of birds including pigeons and waterfowl. Peregrine falcons have not been documented nesting within the Analysis Area. Few if any suitable rock formations exist within the Analysis Area, thus this species is unlikely to reproduce within its boundary. No further analysis will take place for this species.

f. Other Wildlife Species of Concern

USFWS Birds of Conservation Concern and Game Birds below Desired Condition

Resident (found year-round) and Neotropical bird species are addressed here due to widespread concern regarding downward population trends and habitat declines. BLM has interim guidance for meeting Federal responsibilities under the Migratory Bird Treaty Act (USDI 2008b) and Executive Order (EO)13186. Both the Act and the EO promote the conservation of migratory bird populations. The interim guidance was transmitted through Instruction Memorandum No. 2008-050. The Instruction Memorandum relies on two lists prepared by the US Fish and Wildlife Service in determining which species are to receive special attention in land management activities; the lists are *Bird Species of Conservation Concern* (BCC) found in various Bird Conservation Regions (Project Area is in BCR 5) and *Game Birds Below Desired Condition* (GBBDC) (USDI 2008b). Table 3-20 displays those species that are known or likely to be present in the Analysis Area.

Table 3-20. BCC and GBBDC Species Known or Likely to be Present in the Project Area

Scientific Name	Common Name	Status
Patagioenas fasciata	band-tailed pigeon	GBBDC
Zenaida macroura	mourning dove	GBBDC
Contopus cooperi	olive-sided flycatcher	BCC
Selasphorus rufus	rufous hummingbird	BCC
Carpodacus purpureus	purple finch	BCC
Aix sponsa	wood duck	BCC

GBBDC – Game Birds Below Desired Condition

BCC – Birds of Conservation Concern

Current research indicates the most appropriate scale to study impacts to migratory birds is at the eco-regional scale (California Partners in Flight 2002). Breeding bird surveys in the Southern Pacific Rainforest Physiographic Region (which includes western Oregon) indicate that songbirds are declining. The exact cause of these declines is still unclear, but issues associated with their winter grounds (Central and South America) are suspected to be an important factor.

Band-tailed pigeons are generally found in temperate and mountain coniferous and mixed forests and woodlands, especially pine-oak woodland. They will often forage in diverse habitats not used for nesting, including cultivated areas, suburban gardens and parks (Braun 1994). Mineral springs and mineral graveling sites are important for mineral intake by adults, especially during the nesting season. Pigeons show strong

fidelity to mineral sites and have been documented traveling 32 miles from a nesting site to a mineral spring (Jarvis and Passmore 1992).

Mourning doves breed in variety of open habitats, including agricultural areas, open woods, deserts, forest edges, cities and suburbs. A dove may have up to five or six clutches in a single year. Human alteration of original vegetation in North America is generally beneficial for this species, with creation of openings in extensive forests and plowing of grasslands for cereal-grain production of particular importance. Mourning doves are one of the most widespread avian species in North America.

Olive-sided flycatchers are most often associated with forest openings, forest edges near natural openings (e.g., meadows, canyons, rivers) or human-made openings (e.g., harvest units), or open to semi-open forest stands. In Douglas-fir forests of northwest California, Olive-sided Flycatcher is the only common species detected more often at forest edges than in forest interior (Rosenberg and Raphael 1986). Olive-sided flycatchers occur primarily in harvest units where at least a few large snags and live trees are retained.

Rufous hummingbirds' breeding habitat includes coniferous forest, second growth, thickets and brushy hillsides, foraging in adjacent scrubby areas and meadows with abundant nectaring flowers. They are associated with secondary succession communities and forest openings (Healy and Calder 2006). Nest sites are located in a variety of plants and sites including shrubs and drooping lower branches of conifers and oaks. There are reports of colonies of up to 20 nests only a few yards from each other in timber or second growth (Bent 1940).

The **purple finch** is likely to be found in the proposed project. In summer, purple finch mainly breed in moderately moist, open conifer forests, and edge habitat at low-to-mid elevations. They use a variety of habitats including deciduous woodlands, riparian corridors and edge habitat (Marshall et al. 2003). In winter they are more widespread, using forests, shrubby areas, weedy fields, hedgerows, and backyards.

Wood ducks are also considered a Game Bird Below Desired Condition. They prefer sites close to or over water and near good brood-rearing areas; depending on availability of cavities, they will use nest sites within 2 kilometers of water (Hepp and Bellrose 1995). Most cavities suitable for wood ducks develop when branches break and permit subsequent heart rot of the trunk. Abandoned woodpecker cavities (e.g., Pileated Woodpecker) are used infrequently and therefore, wood ducks seldom utilize mixed conifer stands unless a hardwood component is present.

Currently, the **golden eagle** is not recognized as a federally listed (under the Endangered Species Act) or state listed species, or managed under the Bureau's Special Status Species program. However, protection is afforded under the Bald and Golden Eagle Protection Act and under the 1995 Medford District RMP.

In Oregon, golden eagles inhabit a wide range of habitats, including shrub steppe, grasslands, juniper, open ponderosa pine, and mixed conifer/deciduous habitats. The preferred foraging habitat is generally open areas with a shrub component that provides food and cover for prey (primarily black-tailed jackrabbit). Nests are typically large (3 to 10 feet tall and 3 feet wide), and often built in large live ponderosa pines (greater than 30 inches DBH) or on ledges along rims and cliffs (Marshall et al. 2003). There are no known golden eagles nests in the project area, but they are often seen soaring in the Thompson Creek watershed and there are trees in the analysis area large enough to support a golden eagle nest.

g. Elk Management Area

On BLM-managed lands, approximately 11,752 acres of the Pilot Thompson analysis area are in an Elk Management Area as identified in the Medford District RMP.

On BLM-managed lands within the analysis area, approximately 1,187 acres serve as foraging areas (grass, brush, woodland, and early seral vegetation condition classes). Approximately 5,001 acres serve as thermal cover (mid-seral and mature forest with a high degree of canopy closure). Thus, approximately 42 percent of

the analysis area on BLM-managed lands is currently providing thermal cover. Generally, brushland/shrubland and mature conifer forest vegetation condition classes also provide hiding cover.

Management for elk in these areas is focused on improving forage and cover conditions and decreasing the density of roads that are open to vehicular traffic.

2. Environmental Effects

Impacts to wildlife from the proposed actions are best measured by the predicted potential changes in stand structure within different habitat types that would result from the activities proposed under each Alternative. Quantifying the predicted changes in wildlife habitat is the best method to evaluate the potential affects to wildlife species because they reflect the modification to and the resulting functionality of the residual stand after treatment. Each wildlife species will respond differently to these stand structure changes; some may be negatively affected, others may benefit, while still others may remain unaffected. The effects to key species associated with these habitats are linked to these changes in stand structures, as well as the magnitude (total treatment acres), intensity, and timing of the treatments. Only Federally listed, Bureau Sensitive, and Survey and Manage species known or suspected to occur within the planning area and with the potential to be impacted by the proposed actions are addressed further in this EA.

a. Alternative 1—No Action

Under Alternative 1, no vegetation management would be implemented and there would be no direct effects to wildlife species on BLM-administered lands. Without treatment, the current stand conditions would likely develop into less complex stand structures and species compositions than that of late-successional stands (Sensenig 2002), or at the very least, would require a much longer time scale to develop into more complex, late successional habitat (Tappeiner et al. 1997). Habitat conditions would remain generally unchanged at the unit scale in the short term unless a major disturbance such as fire, wind, ice, insects, or disease occurred.

Conditions in the proposed treatment units would be most affected in the long term by this competition of overstory trees. Overstocked stand conditions would result in relatively slow growth rates that would prolong crown differentiation. Eventually, some trees would become dominant and shade out suppressed trees. These trees would stand as small-diameter snags and ultimately fall, but would not create openings as occur in late-seral stands because of their small size. The remaining dominant trees would soon expand their crowns into the newly-available growing space, increasing the effects of mortality on understory vegetation. Multiple waves of such competition mortality would occur before dominant tree density would be low enough for understory re-initiation. This growth trajectory would be unfavorable to the development of mature and late-successional forest attributes. These processes are discussed in further detail in the Silviculture portion of this REA (Section B).

Private lands surrounding and interspersed with the project area are made up of early, mid, and late seral forests, agricultural fields, urban areas, and barren land. Most private forest lands are managed as tree farms for production of wood fiber on short rotations. It is expected that any remaining late-seral forests on private timber lands will be converted to early seral forest over the next one or two decades. For those species dependent on early-seral habitat, private forest lands are not expected to provide quality habitat as competing vegetation that includes flowering plants, shrubs and hardwood trees are often treated with herbicides to reduce competition with future harvestable trees.

b. Alternative 2

All of the prescriptions included under the Pilot Thompson Project were designed to achieve the following over-arching objectives:

- Conserve and improve survivability of older trees (trees >150 years of age) by reducing nearby fuels and competing vegetation.

- Increase resistance/resilience of forest stands and landscape to wildfire, drought, insects, etc. by reducing stand densities, ladder fuels, and shifting tree species diversity.
- Restore more sustainable structure and composition by reducing stand densities and enhancing tree diversity, including retention of hardwoods and desirable understory species.
- Accelerate development of structural complexity such as larger tree structures and decadence.
- Develop spatial heterogeneity within stands (e.g. fine-scale structural mosaic).
- Create conditions that are favorable for the initiation, creation, and retention of snags, down wood, large vigorous hardwoods, and understory vegetation diversity in areas where these are lacking
- Contribute to fulfilling the intent of the Endangered Species Act by conserving ecosystems upon which species depend and incorporating elements of active management proposed by the US Fish and Wildlife Service in the Revised Recovery Plan for the Northern Spotted Owl.

Riparian Reserve Thinning

Vegetation treatments would be limited to thinning in young to mid seral stands to reduce stand density and acquire desired vegetation characteristics. These vegetation treatments will increase species diversity and tree vigor within dry Douglas-fir stands that exhibit uncharacteristic stand structure and species composition. Treatment consists of cutting small diameter conifers (generally less than 12 inches), non-riparian hardwoods, and shrubs. For the purpose of considering effects to wildlife species, riparian thinnings are included with adjacent commercial treatment units as effects will not be measurably different from effects in those commercial units.

Federally Threatened Species—Northern Spotted Owl

Effects on Northern Spotted Owl Habitat

All action alternatives may affect northern spotted owls to some degree (*Likely to Adversely Affect* or *Not Likely to Adversely Affect*), and therefore require consultation under Section 7 of the Endangered Species Act. Consultation with the USFWS has been completed for the activities proposed under this project in BLM's Biological Assessment (Thompson_Bean FY13 Formal BA), and USFWS's Biological Opinion (Tails #: 01EOFW00-2013-F-0091). The Service concluded in its Biological Opinion that the District's proposed activities are *likely to adversely affect* northern spotted owls, but is *not likely to jeopardize* the continued existence of the spotted owl (USFWS 2013, p. 67). Both the final BA and the final BO are available for review on the Medford District BLM website.

Alternative 2 proposes to treat up to 371 acres of NRF habitat, 1366 acres of dispersal habitat, and 611 acres of capable habitat.

When discussing changes to spotted owl habitat, the following definitions are used to describe the anticipated effects of the activities associated with the proposed action to the NSO habitat types within the Pilot Thompson project area. Canopy closure is used as one of the critical habitat thresholds because it is highly important to NSO nest site selection and general habitat use, because increased levels of canopy afford protection from predators, and regulate temperature extremes (Courtney et al. 2004). The proposed treatments can be assigned into the following general effect types:

1) A **Treat and Maintain** of NRF or dispersal habitat means an action or activity will occur within NRF or dispersal habitat but will not change the habitat classification post treatment. The NRF stand will retain an average of 60 percent canopy cover post-treatment, large trees, multistoried canopy, standing and down dead wood, diverse understory adequate to support prey, and may have some mistletoe or other decay. Dispersal habitat will continue to provide at least 40 percent canopy, flying space, and trees 11 inches

diameter at breast height (DBH) or greater, on average. The habitat classification of the stand following treatment will be the same as the pretreatment habitat classification.

2) A **Downgrade of NRF** alters the condition of spotted owl NRF habitat so that the habitat no longer supports nesting, roosting, and foraging behaviors. Downgraded NRF habitat has enough tree cover to support spotted owl dispersal. Downgrade is defined as occurring when the canopy cover in a NRF stand drops to 40-60 percent at the stand level, and when conditions are altered such that an owl would be unlikely to continue to use that stand for the purpose of nesting, roosting or foraging. Downgraded NRF continues to provide habitat for dispersal.

3) Treatments that **Remove NRF** or **Remove Dispersal** alter known spotted owl NRF so that the habitat no longer functions as nesting, roosting, foraging or dispersal. Removal generally reduces the canopy cover to less than 40 percent, alters the structural diversity and dead wood in the stand, or otherwise changes the stand so that it no longer supports owls for nesting, roosting, foraging, or dispersal.

Table 3-21. Alternative 2: Effects of Proposed Treatments to NSO Habitat in the Analysis Area

Habitat Type	Pre-Project Acres	Treat and Maintain	Downgrade	Removal	Post-Project Acres	Percent Change
NRF	16,990	219	152	0	16,676	-0.1.8
Dispersal-only	5,939	1,366	0	0	6,091	+2.5

When analyzing the impacts to spotted owls from timber harvest, the amount, intensity and duration of the harvest are not the only factors to consider. A critical factor to consider is the spatial distribution of the habitat found across the landscape and where the proposed treatments would occur in relation to known NSO nest sites. These areas of use are defined as follows:

- **Nest Patch** is the 300-meter (984-foot) radius area around a known or likely nest site; it is included in the core area (USFWS 2008c).
- **Core Area** is a 0.5-mile radius circle (approximately 500 acres) from the nest or center of activity to delineate the area most heavily used by spotted owls during the nesting season; it is included in the provincial home range circle. Core areas represent the areas which are defended by territorial owls and generally do not overlap the core areas of other owl pairs (USFWS 2008c).
- **Provincial Home Range** is defined by a circle located around an NSO activity center and represents the area owls are assumed to use for nesting and foraging in any given year. For the Western Cascade Province the home range is a 1.3 mile radius circle (approximately 2894 acres (USFWS 2008c). The home ranges of several owl sites may overlap.

These three areas represent how NSOs utilize the forest environment around their nest sites, and the importance of the habitat located within each spatial scale to a given NSO pair. They also provide a better understanding of how habitat altering treatments may affect NSOs life functions depending on where the treatment would occur in relation to known NSO nest sites. A more detailed description of the scientific rationale for the development of these three (3) scales is provided in the Methodology for Estimating the Number of Northern Spotted Owls Affected by Proposed Federal Actions (USFWS 2008c). Research has shown that the habitat quality within 300 meters (984 feet) of a nest site (known as the nest patch) is critically important to determining nest site positioning across the landscape (Perkins et al. 2000).

Under Alternative 2, there are approximately four (4) acres of treatment proposed in a spotted owl nest patch (Unit 8-1). Proposed treatments on these four acres of NRF habitat are designed to maintain the current condition of the stand within the nest patch. This nest site is a generated site based on computer simulation that may not reflect an actual spotted owl location. Even if this was a known site nest patch, the small amount of

treatment within the nest patch is not expected to disrupt the normal use of the nest patch for breeding, feeding and shelter by spotted owls. Additionally, these treatments would occur outside of the critical breeding periods, which would further reduce potential impacts (USDI 2013, p.35-36).

There are approximately 158 acres of proposed treat and maintain of dispersal habitat and approximately 80 acres of proposed treat and maintain of NRF habitat and approximately 4 acres of proposed downgrade of NRF habitat in the two spotted owl Core Areas combined. Where downgrading will occur, the amount of NRF habitat will still be above thresholds after treatment (USDI 2013, p.36).

The proposed action would take place within the Provincial Home Range of ten (10) historic northern spotted owl sites. Under Alternative 2, there are 1,741 acres of proposed treatments within these owl home ranges. About 144 acres of NRF and 1,022 acres of dispersal would be treated, but would be maintained and still function the same following treatment; 137 acres of NRF would be downgraded to dispersal and 442 acres of capable would be treated. Across the analysis area, more than 98 percent of existing suitable (NRF) northern spotted owl habitat would remain untreated.

While the implementation of this project under Alternative 2 would result in the downgrade of 152 acres of NRF habitat to dispersal-only habitat, the treatments would have long term beneficial effects to the forest structure and overall forest "health." Treatments under Alternative 2 would reduce competition and increase the vigor of the residual trees left in the stand, while simultaneously reducing ladder fuels and decreasing the fire hazard rating of the stand. A specific goal of the prescription is to leave the largest and oldest trees in the stand, and retain all large hardwoods and snags. The majority of the physical structure of the habitat in the treatment areas would still be present after implementation. Therefore, the treatment effects to habitat are mostly related to changes in canopy cover and the understory composition.

During the development of the Pilot Thompson Project, a landscape level plan was developed that would delineate a proportion of the landscape that would serve as areas of dense, closed-canopy contiguous forests, within which minimal to no treatments would be proposed. These areas, which are called Late-Successional Emphasis Areas (LSEAs) are designed to provide larger blocks (300-500 acres) of dense forest conditions where succession continues uninterrupted by active management, and provide fairly contiguous blocks of mature and late-successional habitat. The treatments under Alternative 2 were then designed around the LSEAs, with a goal of strategically locating treatments around the LSEAs in order to meet the restoration goals at the stand level outside of these important LSEAs. This strategy provides a measure of protection to the LSEAs by reducing the chance of high severity fire activity reaching the LSEAs.

The Middle Applegate Watershed Analysis recommends the use of "appropriate silvicultural prescriptions to maintain forested timber stands within and between adjacent watersheds" in the wildlife corridor represented by sections 9, 10, 11, 12 and 16 in Township 39 South, Range 4 West near Tallowbox Lookout (p. 97). Units 9-1, 9-2 and 9-3 (38 acres) are located in the northern portion of section 9 in that recommended wildlife corridor. Applying the silvicultural prescriptions proposed for these units would result in sufficient stand densities to maintain and enhance forested timber stands. No other treatments are proposed in the recommended wildlife corridor. The majority of sections 9 and 10 are comprised of a 523 acre Late Successional Emphasis Area (LSEA),

The long-term (greater than10 years) effects of the actions proposed under Alternative 2 are anticipated to increase the health and vigor of the residual stands post treatment. It is likely that the treated stands will develop into more complex, structurally diverse forests in the long term in comparison to the No Action Alternative. In fact, thinning dense stands may be necessary in order to achieve old-growth forest characteristics in the absence of natural disturbance events (Tappeiner et al. 1997). Thinning younger forest stands may provide growing conditions that more closely approximate those historically found in developing old-growth stands (Hayes et al. 1997). Many of the treatments as proposed under Alternative 2, especially those that would occur in dispersal quality habitat, would have long-term beneficial effects to NSOs by increasing growth rates of the residual stand

and accelerating the development of late-successional structural complexity within the treated areas than would occur if left untreated.

Effects on Northern Spotted Owl Prey

Treatments associated with Alternative 2 that would remove, downgrade, or maintain spotted owl habitat may impact foraging by changing habitat for spotted owl prey species (USFWS 2006). Residual trees, snags, and down wood retained in the thinned stands would provide some cover for prey species over time, and would help minimize harvest impacts to some prey species. Treatment implementation would be spread out temporally and spatially within the project area, which would provide areas for spotted owl foraging during project implementation and reduce the impact of these short-term effects at the project level.

Timber harvest and associated activity fuels reduction projects could impact foraging by changing habitat conditions for prey. Some disturbance of habitat can improve forage conditions, provided some ground cover is retained or created. Removal of tree canopy would bring more light and resources into the stand, stimulating forbs, shrubs and other prey food. Once the initial impact of disturbance recovers (6 months to 2 years), the understory habitat conditions for prey forage would improve over the years, until shrubs and residual trees again close in the forest floor.

While some reports suggest negative impacts of thinning on flying squirrels (Wilson 2010; Holloway and Smith 2011), there exists counter information regarding effects. (Gomez et al. 2005; Ransome et al. 2004; Waters and Zabel 1995). Flying squirrel densities are correlated with high cavity density, large amounts of hypogeous fungi, and crown-class differentiation (Carey et al. 1999, Carey et al. 2000). Gomez et al. (2005) noted that commercial thinning in young stands of Coastal Oregon Douglas-fir (35-45 years in age) did not have a measurable short-term effect on density, survival, or body mass of northern flying squirrels. Similarly, Waters and Zabel (1995) compared squirrel densities and body mass in shelterwoods, old, and young stands in the northern Sierras and found no difference in body mass or recapture rates between young and old stands in northern, more mesic forest habitats. However, they did conclude that heavy logging site preparation (burning) in the shelterwoods negatively affected flying squirrels. Ritchie et al. (2009) found negative landscape effects on flying squirrels when harvesting stands resulted in open conditions.

Woodrats (both bushy-tailed and dusky-footed) are important components of the spotted owls' diet in in the Project Area (Forsman et al. 2004). Some beneficial effects to dusky-footed woodrats due to shrub development in thinned stands will be possible (Sakai and Noon 1993; Suzuki and Hayes 2003). Also, bushy-tailed woodrat presence is more dependent on cover and food availability than on a stand's seral stage.

Edges created from harvest can be areas of good prey availability and potentially increased prey vulnerability (i.e., better hunting for owls) (Zabel et al.1995). Prey animals may be more exposed in the disturbed area or could move away from the disturbed area for the short-term (Carey 1991; Suzuki and Hayes 2003). Changes in prey availability occur as cover is disturbed and prey species move around in the understory. As a result, they can become more vulnerable and exposed. The disturbance could attract other predators such as hawks, other owls, and mammalian predators. This may increase foraging competition for owls in the treatment area, but the exposure of prey will also improve prey availability for northern spotted owls.

Bingham and Noon (1997) reported that a spotted owl core area (closest to the nest) is the area that provides the important habitat elements of nest sites, roost sites, and access to prey, benefiting spotted owl survival and reproduction. Rosenberg and McKelvey (1999) reported that spotted owls are "central place" animals with the core area being the focal area. Several studies (Wagner and Anthony 1998; Dugger et al. 2005; Zabel et al. 2003; Bingham and Noon 1997) indicate the core area size for the Klamath province is 0.5 miles from the nest site (or 500 acres). Therefore, effects to prey species for each alternative would be assessed by the amount of habitat treated within the core area. Due to the spatial distribution of the proposed treatments, adequate and sufficient prey habitat would remain within the core areas and would continue to provide suitable foraging opportunities within the home range. Therefore, effects to prey species are most critical at the nest patch and

core areas. Under Alternative 2, there would be no treatment within known nest patches and all treatment within core areas would be "treat and maintain."

Implementation of Project Design Features that would retain and/or place large down wood while also retaining snags in the treatment units will provide cover for prey species, and will help minimize harvest impacts to prey habitat.

Effects of Noise Disturbance on Northern Spotted Owls

Mandatory PDFs would be incorporated into all action activities. Nesting owls are confined to an area close to the nest, but, once the young fledge, they can move away from noise and activities that might cause them harm. Since all projects would follow mandatory PDFs that restrict activities to outside of the breeding season and beyond recommended disturbance distance thresholds, as established by the US Fish and Wildlife Service, no harm to nesting owls, or their young, is expected from project related noise or activities.

Effects of Fuels Reduction Treatments on Northern Spotted Owls

Alternative 2 proposes to treat slash created from harvest treatments. The fuels reduction treatments as proposed in Chapter 2 would not alter the overstory forest structure or remove additional key habitat components related to spotted owl habitat. In the thinning units, these treatments reduce understory density and improve flight paths within stands, in turn increasing the accessibility of the forest floor to owls and prey abundance or availability (Sakai and Noon 1993 and 1997).

Large down woody debris, patches of unburned vegetation in draws and cooler aspects, and some unburned slash piles would continue to provide ground cover habitat during and after treatments. These untreated areas and residual habitat features, along with the spatial and temporal staggering of treatments across the landscape should ameliorate the potential negative effects (e.g., removal of cover; disruption of normal feeding, breeding, and sheltering activities) of these fuels treatments on prey species at the landscape level.

Fuels treatments do have potential to impact the spotted owl prey base because some snags or coarse woody debris habitat that prey species utilize can be consumed during underburn operations (where underburn operations are foreseeable). However, these effects are expected to be limited and localized because not all the existing snags or CWM within a unit is lost during firing operations and every reasonable precaution is taken to prevent loss of wildlife habitat (Mason 2012). In addition, while some prey species may be adversely affected from fuels treatments, a proportion of the prey is primarily arboreal in habit, and would remain largely unaffected by these treatments. Coarse woody debris (CWD) would be retained and protected from disturbance to the greatest extent possible during burning. In the NRF treatments, no broadcast burning would occur post-harvest to insure the CWD is maintained. Approximately 10 percent of the hand-piles created from hazardous fuels reduction treatments would be left unburned across the treatment areas to provide refugia for small mammals and other species.

Effects of Road Construction on Northern Spotted Owls

Trombulak and Frissel (2000) conducted a literature review on the ecological effects of roads. These effects range from direct mortality to alteration of the chemical environment. They stressed the need to retain remaining roadless areas, remove or restore existing roads, and to consider the full range of ecological process when designing a new road. The fact that there is an array of possible negative effects associated from building roads is not debatable. The magnitude of these effects from implementing the proposed project is discussed in the analysis. From a terrestrial wildlife standpoint, BLM Specialists have selected mitigation measures to limit some of the described negative effects, which include (but are not limited to) wildlife surveys, seasonal restrictions, and placement of the road to miss large trees and retaining large woody material.

There are a number of ways roads affect wildlife (in addition to habitat removal), including vehicular noise disturbance (which affects behavior patterns), increased potential for poaching, increased potential for over-hunting along roads due to easy access, and microclimatic changes to the habitat adjacent to roads.

Under Alternative 2, the BLM proposes to utilize and maintain (as needed) about 45 miles of existing roads (i.e., road grading, rock surfacing, and water drainage improvements). Road maintenance has the potential to impact wildlife species through noise and displacement, but would be of short duration and subject to wildlife seasonal PDFs.

Approximately 0.62 miles of new road would be constructed under Alternative 2. The new road construction will be located in dispersal northern spotted owl habitat. Seasonal restrictions listed as PDFs would avoid adverse disturbance to adjacent nesting spotted owls during road construction. Roads would be blocked after use.

Approximately 2.55 miles of roads would be decommissioned under Alternative 2. The decommissioning of roads is anticipated to have a positive effect on the usefulness of areas adjacent to these roads for northern spotted owls. Decommissioning will remove disturbance caused by vehicles, and allow the former road beds to grow vegetation and blend into adjacent timber stands thus eliminating habitat fragmentation in these specific areas. These combined positive effects may provide more disturbance free areas in which NSOs can nest, forage, or disperse and provide for more unimpeded movement across the landscape.

Effects on Northern Spotted Owl Proposed Critical Habitat

Alternative 2 is located within critical habitat sub-unit KLW-4 and proposes treatment on approximately 850 acres within 2012 critical habitat. Of these treatment acres there are 638 acres of treatment in dispersal habitat and 150 acres in nesting, roosting and foraging (NRF) habitat. The remaining acres of proposed treatment are found in capable habitat, which currently does not function as suitable spotted owl habitat.

The proposed action is not expected to affect the intended conservation function of this unit (north-south connectivity between subunits and demographic support) because the remaining combination of acres of NRF and dispersal habitat will continue to allow spotted owls to effectively disperse within and beyond this critical habitat sub-unit.

Table 3-22. Alternative 2 - Effects to Northern Spotted Owl Critical Habitat and PCEs in KLW-4

Primary Constituent Elements	KLW-4 Acres	Treat and Maintain	Downgrade	Removal	Post-Project Acres	Percent Change
NRF	90,134	138	12	0	90,126	-0.01
Dispersal only	51,276	638	0	0	51,288	+0.02

In the consultation process with the USFWS, effects were quantified using Section 7 Watershed data due to the lack of a habitat layer which covered the entire CHU subunit. The acres in this table were calculated from a more recent and comprehensive dataset, the Northwest Forest Plan 15-year monitoring Spotted Owl Habitat layer (Davis 2011).

Effects of Barred Owls on Northern Spotted Owls

Barred owls are known to use a wide variety of forest types, including early successional habitats. While a suggestion has been made that timber harvest activities may favor barred owls, an alternative hypothesis is that barred owls have a wider range of habitat use in the northern part of the spotted owl's range, and the spotted owl has a narrower one. But in the more southerly part of the spotted owl's range, the spotted owl seems to have a broader range of habitat use than does the barred owl (Courtney et al. 2004). Therefore, timber harvest may have the effect of reducing spotted owl habitat in some areas (Dugger et al. 2011), leading to a competitive advantage for barred owls, but perhaps not in others (Courtney et al. 2004).

The studies above suggest that the two species compete for resources. However, the Revised Recovery Plan recommends conserving and restoring older, multi-layered forests across the range of the spotted owl in order to reduce or not increase this potential competitive pressure while the threat from barred owls is being addressed. Protecting these forests should provide spotted owls high-quality refugia habitat from the negative competitive interactions with barred owls that are likely occurring where the two species' home ranges overlap. Maintaining or restoring these forests should allow time to determine both the competitive effects of barred owls on spotted owls and the effectiveness of barred owl removal measures. (USDI 2011) As mentioned in the Affected Environment Section, stands proposed for harvest in the Pilot Thompson project area were evaluated using interagency draft methodology (2010) to identify structurally complex stands (RA 32 habitat).

Field evaluations located a total of two acres of RA32 habitat and all occurred in one treatment unit. No treatment will occur in these two acres. In order to determine if the Pilot Thompson Project could potentially exacerbate competitive interactions between barred owls and spotted owls, in the Biological Opinion, the USFWS analyzed the amount of available high-quality habitat (RA32) that would be reduced as a result of the proposed action. While NRF habitat will be impacted, no treatments are proposed for high-quality NRF habitat (RA32) and, therefore, the USFWS did not anticipate the project would increase the competitive interactions between the two species. Additionally, although available evidence suggests that the presence and distribution of barred owls may affect habitat quality for spotted owls (Wiens 2012), there is currently no indication that silvicultural management influences barred owl habitat selection (E. Forsman, pers. comm., cited in USDI FWS 2011 p. B-11). In addition, the LSEAs would provide refugia from the intrusion of barred owls.

The Pilot Thompson Project defers proposed treatment in RA 32 stands identified by interagency survey guidance (USDA and USDI 2010) and is consistent with consultation completed with the U.S. Fish and Wildlife Service (USFWS), (USFWS 2011b and USFWS 2012b). Therefore, indirect effects to spotted owls from increased competition from barred owls are not expected from this project.

Summary of Effects on Northern Spotted Owl

The long-term (greater than10 years) effects of the actions proposed under Alternative 2 are anticipated to increase the health and vigor of the residual stands post treatment. It is likely that the treated stands will develop into more complex, structurally diverse forests in the long term in comparison to the No Action Alternative. In fact, thinning dense stands may be necessary in order to achieve old-growth forest characteristics in the absence of natural disturbance events (Tappeiner et al. 1997). Thinning younger forest stands may provide growing conditions that more closely approximate those historically found in developing old-growth stands (Hayes et al. 1997). Many of the treatments as proposed under Alternative 2, especially those that would occur in dispersal quality habitat, would have long-term beneficial effects to NSOs by increasing growth rates of the residual stand and accelerating the development of late-successional structural complexity within the treated areas than would occur if left untreated.

Spotted owl habitat in the project area is already below a threshold point, at which any habitat effects in a home range would trigger a required consultation with the U.S. Fish and Wildlife Service. The proposed action would treat and maintain 1,366 acres of dispersal and 219 acres of NRF habitat. 152 acres of NRF habitat would be downgraded to dispersal habitat. Consultation with the USFWS has been completed for the activities proposed under this project in BLM's Biological Assessment (Thompson_Bean FY13 Formal BA), and the USFWS Biological Opinion (Tails #: 01EOFW00-2013-F-0091). Both the final BA and the final BO are available for review.

Conservation Measures implemented that will reduce impacts to spotted owls or key habitat areas:

- Spotted owl habitat assessments were used to reduce impacts to NRF and eliminate treatments in RA-32 habitat
- Protection and buffering of Special Status Species sites found during protocol surveys

- Protection of sensitive plants that occur in the treatment areas
- Placement of riparian area buffers
- Protection and buffering of all known mining adit locations
- Project design that incorporated historic owl survey data assessments
- None of the projects occur within known NSO nest patches

In summary, Alterative 2 would have minimal impacts to the NSOs found within the planning area given that:

- No treatments would occur within any known NSO nest patches (only within the nest patch of a generated site).
- The majority of the physical structure of the habitat in the treatment areas would still be present after implementation;
- Treatments would increase growth rates of the residual stand and accelerate the development of late-successional structural complexity within the treated areas in the long-term;
- Treatments would reduce competition and increase the vigor of the residual trees left in the stand, while simultaneously reducing ladder fuels and decreasing the fire hazard rating of the stand;
- LSEAs would provide a large amount of contiguous dense, closed-canopy, mature and late-successional forest habitat;
- Negative impacts to NSO prey are anticipated to only occur in the short term (less than 5 years) and would be spatially separated and well distributed across the analysis area; and
- Seasonal restrictions will reduce the likelihood of noise disturbance to nesting owls and would avoid adverse disturbance during road construction, road decommissioning, and road maintenance.

Survey and Manage Species

Great Gray Owls

BLM conducted surveys for great gray owl (GGO) in the project area in 2011 and 2012 and detected no owls. However, in 2013, a new GGO reproductive site was located by BLM employees during the course of their field work in Unit 30-2.

Alternative 2 proposes treatment in approximately 321 acres of suitable GGO nesting habitat. Thinning treatments are proposed for these stands. The reduction of canopy closure from these treatments will not impact owl nesting opportunities, as the majority of existing nest sites in the analysis area will remain in place, post-harvest. Nests constructed by other species, usually of sticks and other materials, are the preferred nesting substrate in the Applegate River drainage in Southwestern Oregon (Godwin 2012).

Long term beneficial effects include accelerated development of late-successional forest habitat suitable for nesting and improved potential foraging habitat as understories respond from increased light penetrating to the forest floor. In addition, implementing the required PDFs (seasonal restrictions, retaining snags, cull material, and down woody debris retention) will be beneficial to this species prey base. Less than 0.25 miles of the proposed new road construction associated with Alternative 2 would occur in suitable great gray owl habitat.

Some trees, including snags, will be removed in the process of this road building. The majority of potential nest trees in the stand through which this new road will pass will remain post-construction.

Known great gray owl reproductive sites will be protected 0.25 mile radius circle area equivalent (approximately 100-120 acres) no harvest protection zone (USDA and USDI 2001). Meadows and natural openings throughout the project area will be protected with a 300 foot no harvest buffer.

Road construction and timber harvest, as proposed, are expected to have a minimal effect on great gray owls, where present, and minimal effect on the potential for great gray owls to use this habitat for breeding, foraging, and dispersing in the future. These effects are not expected to be significant, as the majority of habitat used by GGO will remain intact, post-treatment. The proposed treatments will not cause this species to trend towards listing as either a Bureau Sensitive species, or a Federally Threatened or Endangered species. No significant cumulative effects are anticipated to this species due to the limited and dispersed nature of the proposed treatments.

Terrestrial Mollusks

Surveys conducted in 2011 and 2012 resulted in confirmed Special Status Species mollusks locations within the Pilot Thompson project area; these known sites have received protection buffers with a radius equal to approximately one average site tree. Buffers have been installed according to professional judgment, with the goal to preserve microclimate environmental conditions (e.g. canopy, ground cover, woody debris, rocky substrate) around known species' locations to provide for the persistence of the species at these sites.

In the short term, thinning of the canopies could desiccate fine scale habitats, but the canopy would eventually fill back in when shrubs and saplings reestablish on the forest floor. Impacts from implementing treatments in Alternative 2 are likely to have minimal effects and will not trend these species towards listing because:

- The dispersed impact of the proposed treatments in relation to the project area and the proximate undisturbed habitat for species to recolonize the impacted areas;
- Perennial riparian areas and water sources are buffered;
- Large course woody debris will be retained and protected from disturbance to the greatest extent possible during logging, burning, and other project activities.
- Any known locations will receive protection buffers or management recommendations.
- No significant cumulative effects are anticipated to these species as a result of imposed protection buffers.

Bureau Sensitive Species

Fishers

Fisher occurrence is closely associated with low to mid-elevation (generally less than 4,100 feet) forests with a coniferous component, large snags or decadent live trees and logs for denning and resting, and complex physical structure near the forest floor (Aubry and Lewis 2003). Forest type is probably not as important to fishers as the vegetative and structural complexity that lead to abundant prey populations and potential den sites (Lofroth et al. 2010). Currently, there is a minimal amount of research regarding fisher habitat use and preferences in the Oregon Cascade Mountains. The most applicable data available to the BLM regarding the location of these key structural habitat components on the landscape are the northern spotted owl nesting, roosting and foraging (NRF) habitat models.

There is considerable information on the importance of structural elements (e.g., large trees and snags with cavities) for fisher. The strongest and most consistent habitat association observed across all fisher studies in the West Coast Distinct Population Segment was the use of cavities in live trees and snags by reproductive females with kits. Natal dens are typically found in the largest trees available in a stand and there is a preference towards hardwood cavities when present on the landscape. These large trees with cavities and platforms are also used

extensively by both sexes for resting sites. Naney et al. (2012) stated that the reduction in structural elements used for denning and resting distributed across the landscape was the highest ranked and geographically most consistent threat to fishers. Currently, there are no defined empirical thresholds at which the reduction of structural elements may begin to negatively affect fishers (Naney et al. 2012).

Other threats to fishers in SW Oregon include overstory reduction, roads, fragmentation, uncharacteristically severe wildfires, and the reduction of structural elements mentioned above (Naney et al. 2012). These changes in habitat have the greatest effect on fisher new home range establishment. Fishers typically have large home ranges, use habitat at multiple spatial scales, and typically avoid areas with little or no contiguous canopy cover (Lofroth et al. 2010). Fragmentation is primarily influenced by land ownership patterns, management practices, and is a higher threat on commercial timber lands (Naney et al. 2012). These effects likely have the strongest influence on females because males have been known to disperse great distances to settle new home ranges. Although not always successful, dispersing juveniles have been documented moving long distances-- navigating across or around landscape features including rivers, highways, and rural communities (Lofroth et al. 2010). In a study in the southern Oregon Cascades, juvenile males averaged a dispersal distance of 18 miles (Aubry and Raley 2006). Roads also fragment habitat. However, fishers are deterred more by vehicular traffic than by the linear opening of the road itself. If roads are closed or decommissioned after use they do not serve as an impediment to fisher movement.

According to a fisher study nearest the project area (Aubry and Raley 2006), fisher male non-breeding home ranges average 24 square miles (15,320 acres) and females average 9.6 square miles (6,177 acres). Fisher homeranges that overlap portions of the project area contain a wide variety of vegetation classes. Fishers utilize many of these vegetation classes for various portions of their life history. While fishers tend to select older, more structurally complex forests for denning and resting sites, they use a much wider variety of vegetation types for foraging and dispersing across the landscape including hardwood forest, pine oak savannah, and chaparral. Fishers also use riparian areas, many of which are protected within this project and across the landscape, as foraging areas and movement corridors. Thus, fisher habitat within a given home range resembles a mosaic of various vegetation types which provide for all phases of fisher life history. Since female home ranges frequently overlap, the analysis area has the potential to contain up to six female home ranges and up to two male home ranges, and possibly more, depending on their home range juxtaposition on the landscape. Baited camera station surveys conducted in the analysis area detected several fishers.

A considerable amount of research exists describing denning and resting habitat use and landscape-level selection (Lofroth et al. 2010), but very little is known regarding how forestry practices affect fishers' continued use of previously untreated areas. Historically, a change in habitat is used as a surrogate to determine the effects of habitat modification in lieu of published research. As previously mentioned, the best tool for determining suitable fisher habitat, while not implying a level of fitness, is to use spotted owl habitat models. Field surveys have shown that spotted owl NRF habitat can contain similar decadent attributes or structural elements that fisher use for denning and rest sites. The proposed treatments in Alternative 2 would treat and maintain 219 acres and downgrade 152 acres out of 16,990 acres (total) of NRF habitat in the analysis area.

The commercial treatments under Alternative 2 would have short term negative effects to habitat for some fisher prey species due to the reduced vegetation which they use as forage and/or hiding cover. These effects are relatively short term, as understory vegetation typically returns within 5 years and some of the fishers' prey species take advantage of early-seral stages. The immediate effects to fisher foraging opportunities should be minimal, because the large number of untreated areas within the analysis area would continue to provide hunting habitat while canopy cover in the treated stands increases. Additionally, treatments would retain key habitat characteristics such as large snags and coarse woody debris (CWD) to provide existing and future habitat for fishers.

Disturbance from treatment activities would likely be the principal effect to fisher within the project area. However, fishers are highly mobile and with large home ranges, they would likely move to another part of their

home range while the activity is ongoing. Unrelated to disturbance, ongoing radio telemetry work in the nearby Ashland watershed has shown that fishers are quick to respond to environmental changes (e.g. heavy snowfall) and move to other parts of their home ranges (Clayton 2012).

Under Alternative 2, there are Project Design Features that will minimize impacts to fishers. These include the retention of key structural elements such as mature and decadent trees, snags, CWD, mistletoe, and large hardwoods for denning. While two (2) percent of NRF habitat within the analysis area is proposed for treatments, areas such as Riparian Reserves, NSO RA-32 habitat, 100-acre KSOAC owl cores, LSEAs, and other designated reserves will continue to provide undisturbed habitat for fishers. Because of the retention of these habitat features in the analysis area, effects to fishers from implementation of this project are expected to be minimal and will not trend this species towards further listing. The proposed road decommissioning and the preservation of functional elements of NRF habitat in conjunction with the anticipated benefits to forest health from proposed treatments have the potential to contribute to the persistence and recovery of the fisher population in this area. No significant cumulative effects are anticipated to this species.

Bald Eagle

No known bald eagle nest trees are located within the planning area. Therefore, no direct effects are anticipated. Bald eagles in Oregon primarily nest within 1 mile of water sources such as lakes, rivers, reservoirs, or oceans (Marshall et al. 2003). If a nest is located prior to (or while) implementing the project, it would be protected under the 1995 RMP guidelines and the National Bald Eagle Management Guidelines. Even though Alternative 2 could remove some potential nest/roost trees, bald eagles would not be precluded from nesting due to retention of larger suitable nest trees in treatment units and the number of suitable nest trees located within the project area; therefore, effects to bald eagles are expected to be minimal. Because of the retention of these habitat features, no significant cumulative effects are anticipated to this species. Additionally, there are no ongoing or foreseeable management actions occurring on Federal lands within the Pilot Thompson analysis area that would contribute to cumulative effects.

Bats

The three Bureau Sensitive bat species (Townsend's big-eared, Pallid, Fringed Myotis) utilize mines, caves, manmade structures, snags and rock outcroppings for roosting and hibernacula sites. No surveys have been conducted for these species. Even though the proposed action may potentially disrupt local bat populations, and may cause the loss of habitat in some cases, this project is not expected to affect long-term population viability of any bat species in the project area. Project Design Features and marking guidelines requiring the retention of snags, decadent wildlife trees, buffering of mines, Riparian Reserves, 100-acre spotted owl KSOAC cores, LSEAs, and other reserves, would continue to provide undisturbed habitat for these sensitive bat species. With implementation of this project, effects to bats are expected to be minimal. The proposed actions would not cause bat species occurring in the project area to trend towards further listing. No significant cumulative effects are anticipated to these species.

Siskiyou Mountains Salamander

There are several known detections of the Siskiyou Mountains Salamander (SMS) across the Pilot Thompson planning area, but none of these locations occur within any of the treatment areas proposed under the Pilot Thompson Project. There are thirteen high-priority sites located within the Pilot Thompson planning area; two of these sites are within treatment units. Verification of the high-priority site polygons within the Pilot Thompson planning area revealed significant differences between modeled habitat areas and the on-the-ground physical habitat. Each site was verified to more accurately match the on the ground habitat (talus).

There is very little habitat (talus) present in any of the treatment areas; these areas have been flagged on the ground or incorporated into "skips" in areas where management activities are proposed. Therefore, there are no anticipated impacts to the SMS from the activities proposed under Alternative 2.

Siskiyou short-horned grasshopper

This species has not been documented in grassland/shrubland within the analysis area. The nearest known location is approximately 15 miles to the southeast. There will be no effect to this species with implementation of proposed actions.

Western Bumblebee

The grassland/shrubland habitat of this species will not be treated under the Pilot Thompson Project, and consequently, there will be no effect to this species with implementation of Pilot Thompson Project proposed actions.

Franklin's Bumblebee

The grassland/shrubland habitat of this species will not be treated under the Pilot Thompson Project, and consequently, there will be no effect to this species with implementation of Pilot Thompson Forest Management Project proposed actions.

Pond Turtle

The aquatic habitat of this species will not be treated under the Pilot Thompson Project. The upland areas immediately adjacent to this aquatic habitat will be protected by riparian buffers. It is possible that individuals of this species overwintering in forested areas may be disturbed or harmed by the activities planned under the Pilot Thompson Project. This sort of impact to individuals would not be expected to contribute to the need to list this species as Federally Threatened or Endangered. No significant cumulative effects are anticipated with project implementation.

Other Wildlife Species of Concern

USFWS Birds of Conservation Concern and Game Birds Below Desired Condition

Some migratory bird individuals other than USFWS species of concern may be disturbed or displaced during project activities. Some nests may be destroyed from timber harvest occurring during active nesting periods. However, there would be no perceptible shift in species composition the following breeding season because of the small scale habitat modifications in relation to the project area. Adequate undisturbed areas adjacent to the Project Area would maintain habitat for displaced individuals. Overall, populations in the region would be unaffected due to this small amount of loss that would not be measurable at the regional scale. Analyzing bird populations at this scale is supported by Partners in Flight (California Partners in Flight 2002).

As described in the Affected Environment, the five USFWS species of concern (band-tailed pigeon, mourning dove, olive-sided flycatcher, rufous hummingbird, and purple finch) known or suspected to occur in the project area prefer open to semi-open forests, stand edges, woodlands, brush, and agriculture land to nest and forage. Indirect effects from habitat changes in Alternative 2 will be beneficial to these species while the forest matures into a mid- to late-successional seral stage (Janes 2003). Direct effects to these bird species are expected to be minimal as a result of implementing this project, No significant cumulative effects are anticipated to these species.

Golden Eagles

There are no known golden eagle nest sites in the analysis area but they are regularly observed in the Thompson Creek drainage. Due to the suitable habitat available to golden eagles within these watersheds, any impact to the species from the Pilot Thompson Project is expected to be minimal because of the retention of over 97 percent of older forested habitat types within the analysis area. These older forests are the most likely to support nesting by golden eagles. Most large suitable nest trees would be retained post-harvest. There are grasslands suitable for foraging in the area (which would not be treated) and will remain usable by golden eagles to their present

extent. The most suitable foraging habitat for golden eagles is found in the valleys outside the analysis area. With implementation of this project, direct effects to golden eagles are expected to be minimal and will not trend this species towards further listing. No significant cumulative effects are anticipated for this species.

Elk Management Area

Under Alternative 2 approximately 464 acres would be treated within the Elk Management Area. No new road construction would take place within the Elk Management Area. Current road density on BLM ownership within this Elk Management Area is 2.19 miles per square mile. This exceeds the RMP target of 1.5 miles per square mile. Approximately 1.5 miles of existing road within the Elk Management Area would be decommissioned.

Under Alternative 2, the BLM proposes to maintain about 45 miles of roads (i.e., road grading, rock surfacing, and water drainage improvements). Approximately 0.62 miles of new road would be constructed under Alternative 2, of which 0.25 miles would be temporarily constructed and decommissioned at the completion of the project. Additionally, 2.55 miles of road would be decommissioned under Alternative 2. There are a number of ways roads affect wildlife in addition to habitat removal during the construction process. Some of the more common ones are vehicular noise disturbance which affects behavior patterns, increased potential for poaching, increased potential for over hunting along roads due to easy access, and microclimatic changes to the habitat adjacent to roads. Road maintenance has the potential to influence wildlife species through noise, but would be of short duration and subject to wildlife seasonal PDFs. Effects to big game as a result of project implementation are expected to be minimal and no significant cumulative effects are anticipated to these species.

c. Alternative 3

The effects to terrestrial wildlife from implementing Alternative 3 would be very similar to Alternative 2, except the overall effects would be increased. Under Alternative 3 there would be no new road construction; however, an additional 366 acres of forest land is proposed for treatment. These increases in actual acres of potential impacts would result in a proportionate increase in effects. For many species, however, this increase in effects is not quantifiable. Species for which a measurable increase in effects can be calculated are analyzed in detail below.

Riparian Reserve Thinning

Under Alternative 3, trees would be harvested in Riparian Reserve Thinning (RRT) units using the silvicultural prescription described in Section C (Components Common to the Action Alternatives) of Chapter 2. All commercial sized conifer trees less than 14 inches DBH would be harvested and sold under a timber sale or stewardship contract. Conifer trees that are 14 inches and greater would be directionally felled toward the channel and left on-site for down wood recruitment. The retention of these large trees as down wood would be an important contribution to small mammal and invertebrate habitat which support the large vertebrate community as prey.

Northern Spotted Owl

Effects to spotted owls, spotted owl habitat, and spotted owl prey species under Alternative 3 would be similar to the effects of Alternative 2, but increased quantitatively. The discussion in Alternative 2 is reasonably applicable under this alternative. Alternative 3 proposes to treat approximately 611 acres of NRF habitat, of which 244 acres would be downgraded to dispersal. Therefore, an additional 92 acres NRF habitat would be downgraded to dispersal habitat than under Alternative 2 (Table 3-23).

Table 3-23. Effects of Alternative 3 Proposed Treatments to NSO Habitat in the Analysis Area

Habitat Type	Pre-Project Acres	Treat and Maintain	Downgrade	Removal	Post-Project Acres	Percent Change
NRF	16,990	367	244	0	16,746	-1.4
Dispersal-only	5,939	1,490	0	0	6,183	+4.1

The following table summarizes effects of Alternative 3 by acres and habitat type to NSO Critical Habitat.

Table 3-24. Effects to PCEs in KLW-4 resulting from implementation of the Pilot Thompson Project (Alternative 3)

Primary Constituent Elements	KLW-4 Acres	Treat and Maintain	Downgrade	Removal	Post-Project Acres	Percent Change
NRF	90,134	138	12	0	90,126	-0.01
Dispersal only	51,276	701	0	0	51,284	+0.02

In the consultation process with the USFWS, effects were quantified using Section 7 Watershed data due to the lack of a habitat layer which covered the entire CHU subunit. The acres in this table were calculated from a more recent and comprehensive dataset, the Northwest Forest Plan 15-year monitoring Spotted Owl Habitat layer (Davis 2011).

All Other Special Status Wildlife Species

The difference in effects to wildlife species between Alternative 3 and Alternative 2 would be negligible or difficult to quantify, and the analysis and discussion in Alternative 2 is reasonably applicable under Alternative 3, as well.

3. Cumulative Effects

Cumulative effects are the impacts on the environment which results from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions. Cumulative effects may include beneficial changes. Cumulative effects for wildlife species and habitat are reviewed at the watershed level to capture the varying habitats, species home ranges, and varying degrees of species mobility. Technical issues that complicate analysis of cumulative effects include the large spatial and temporal scales involved, the wide variety of processes and interactions that influence cumulative effects, and the lengthy lag-times that often separate a land-use activity and the landscape's response to that activity. Fire suppression, road building, and timber harvest throughout the project area have resulted in habitat modification and fragmentation, and have changed the distribution and abundance of wildlife species surrounding the project area. Timber harvest has occurred on BLM-administered lands in the analysis area for decades. The associated habitat modification has negatively affected late-successional forest habitat-dependent species by reducing stand seral stage and changing habitat structure. However, species associated with younger forested conditions have benefited from these changes due to the increased acres of young stands within the watershed.

Private lands surrounding the project area are made up of early-, mid-, and late-seral forests, agriculture, urban areas, and barren land. Most private forest lands are managed as tree farms for production of wood fiber on forest rotations. It is expected that any remaining late-seral forests on private timber lands will be converted to early seral forest over the next one or two decades. For those species dependent on early-seral habitat, private forest lands do not always provide quality habitat as competing vegetation that includes flowering plants, shrubs and hardwood trees are regularly sprayed to reduce competition with future harvestable trees. The majority of state and private forests in Washington, Oregon, and Northern California are managed for timber production. Non-Federal lands are not expected to provide demographic support for spotted owls across and between physiographic provinces (Thomas et al. 1990; USDA and USDI 1994a). Historically, non-Federal landowners practiced even-aged management (clear-cutting) of timber over extensive acreages. Private industrial forest

lands are managed for timber production and will typically be harvested between 40 and 60 years of age, in accordance with State Forest Practices Act standards. In 2008, during the development of the District Analysis and 2008 Biological Assessment of Forest Habitat (DA 08 BAFH), data was requested from Oregon Department of Forestry and the Pacific Northwest Inventory and Analysis team to help determine harvest rates in the past decade on private lands within the Medford district. These records indicated private harvest rates in Jackson and Josephine Counties have never exceeded 1.08 percent of the total private lands per year since 1998. These records did not provide information of pre-treatment habitat conditions. We anticipate some loss of owl habitat on private lands, but cannot predict the rate of loss, or the specific location of harvest.

The proposed Pilot Thompson Project treatment acres represent approximately 8 percent of the total BLM-administered acres in the analysis area. The only foreseeable management action on federal lands in close proximity to the Pilot Thompson analysis area is the Williams IVM Project in the adjacent Williams Creek 5th field watershed. Forest management activities are proposed on 6,625 acres of forest land. Of these acres, the following is proposed: 4,198 acres of Hazardous Fuels Reduction, 824 acres of Pre-commercial Thin, 827 acres of Density Management, 338 acres of Variable Density Thinning, 194 acres of Commercial Thin, and 244 acres of Oak Restoration or Pine Restoration. The Williams IVM Project EA states (p.131) that the project would have minimal negative impacts to the NSOs found within the planning area given that:

- No treatments would occur within the nest patch area of any known NSO site within the planning area;
- All treatments are designed to treat amd maintain the functionality of the habitat where the treatment occurs and these treatments would not reduce the overall amount of NRF habitat found within the planning area'
- A relatively small amount (15 percent) of the total NRF habitat located within the planning area would be treated; and
- The anticipated negative effects to NSOs are expected to be limited to short-term effects to NSO prey and prey habitat.

Because of the relatively light impact of the Williams IVM Project, it is not expected to significantly contribute to cumulative impacts to any Federally Listed, Bureau Sensitive, or Survey and Manage wildlife species in the Pilot Thompson analysis area.

a. Northern Spotted Owl

The Pilot Thompson Project proposes commercial treatments on up to 611 acres of NRF, 1490 acres of dispersal-only, and 611 acres of capable NSO habitat (Alternative 3). Under Alternative 2, treatment acres would be slightly reduced. These treatments, coupled with the other recent and reasonably foreseeable projects described above, would increase fragmentation within the watersheds. Up to 244 acres of NRF habitat would be downgraded as a result of implementing Alternative 3 and 152 acres of NRF habitat would be downgraded under Alternative 2. This amount of removal at the watershed level would not preclude spotted owls or other late-successional forest species from dispersing within or through the watersheds. Additionally, even when the Pilot Thompson Project is combined with current and foreseeable actions, it is unlikely the actions proposed in this project would appreciably reduce or diminish the chances of survival or recovery of the northern spotted owl. This is because of the small percentage of suitable habitat affected at the provincial and the regional population levels. The level of harvest associated with this project would not preclude owls occupying historic home ranges and continuing to reproduce in the project area and watersheds, including the LSEAs. Barred owls have been documented in the project area. It is anticipated that the protection of RA-32 habitat and the delineation of LSEAs would provide refugia from the intrusion of barred owls.

Non-Federal lands are not expected to provide demographic support for spotted owls across and between physiographic provinces (Thomas et al., 1990; USDA and USDI 1994). The Medford BLM assumes these past

management practices will continue and reduce the amount of NRF habitat for spotted owl on non-Federal lands over time.

b. Other Wildlife Species

This section addresses wildlife species (other than northern spotted owl) listed as Survey and Manage or Bureau Sensitive discussed in the Affected Environment portion of this analysis. There is no evidence that current forest practices on Federal land immediately threaten any terrestrial vertebrate species in Oregon. Even though the proposed actions may potentially adversely disrupt local individuals of sensitive wildlife species and may cause the loss of habitat in some cases, this project is not expected to affect long-term population viability of any Bureau Sensitive or Survey and Manage wildlife species known to be in the area. Additionally, this project combined with other actions in the watershed would not contribute to the need to Federally list any Bureau Sensitive or Survey and Manage wildlife species, because of the small scope of the proposed action compared to the available habitat within the analysis area. Implementation of all potential treatments proposed under Alternatives 2, and 3 would treat only 7 percent or less of the analysis area. The Williams IVM project is the only reasonably foreseeable action planned in close proximity to the Pilot Thompson Project. All treatments in the Williams IVM project will retain current functional condition (NRF or Dispersal) of NSO habitat. Because of the relatively light impact of the Williams IVM project it is not expected to significantly contribute to cumulative impacts to any Bureau Sensitive or Survey and Manage wildlife species wildlife species in the Pilot Thompson analysis area.

I. BOTANY

1. Introduction

This section discloses the impacts to threatened, endangered, Special Status, Survey and Manage (including fungi) and invasive plant species.

Scoping (external and internal) generated the following issues/concerns and anticipated effects related to implementing the Proposed Action. These effects may or may not occur as a result of the proposed action but were of concern to members of the public or ID team specialists.

- Degrading habitat for threatened, endangered, Special Status or Survey and Manage species may result in further population declines and/or trends away from recovery of the species.
- Habitat alteration including reduced canopy cover and soil compaction associated with harvest activities degrades habitat for native plant (including Special Status and Survey and Manage plant and fungi species) populations.
- Ground disturbance associated with harvest activities may impact stems and propagules of native plant species (including Special Status and Survey and Manage plant and fungi species).
- Ground disturbance and road building provide vectors for expansion of invasive plant populations.
- Invasive plant species may become established or become more widespread as a result of habitat manipulation.

Bureau Special Status Plants, Lichens, and Fungi (SSP) include species that are listed as threatened or endangered under the Endangered Species Act (ESA), proposed or candidates for listing, State listed, and Bureau designated Sensitive species. Per BLM Manual 6840 (Section .06), Bureau Sensitive Species will be managed consistent with species and habitat management objectives in land use and implementation plans to promote their conservation and to minimize the likelihood and need for listing under the ESA. Project implementation will adhere to the requirements set forth in Section 6840.2.C.

Special Status species are officially designated by the State director. The most recent Special Status Species list went into effect on December 21, 2011 (IM OR 2012-018). This new list has two categories, Sensitive and Strategic. Bureau Strategic species do not require protection or effects analysis and therefore will not be addressed further in this document. The BLM collects population and habitat data on these species to ascertain if a status upgrade to Sensitive or removal as a common species is warranted.

The Pilot Thompson Project meets the provisions of the 2001 *Record of Decision and Standards and Guidelines for Amendments to the Survey and Manage, Protection Buffer, and other Mitigation Measures Standards and Guidelines*.

2. Affected Environment

The proposed harvest and treatment areas are located within the 6th field Ferris/Slagle and Thompson Creek sub-watersheds of the Middle Applegate 5th field watershed. The planning area is 23,268 acres of mixed BLM, private and Forest Service lands extending from highway 238 near the town of Applegate south to the upper reaches of the Thompson Creek sub-watershed. The analysis area consists of the 14,419 acres of BLM-administered lands within the planning area. The forested areas in the planning area consist primarily of three plant series: Douglas-fir, Ponderosa Pine and White Oak. These three plant series provide habitat for several Special Status and Survey and Manage plant species (Table 3-25).

a. Survey Methods and Completion

All of the proposed treatment areas have been surveyed for Bureau Special Status and Survey and Manage vascular and nonvascular (lichens and bryophytes) plants. Surveys are conducted to conform to the *FY 2009-2013 Programmatic Assessment for Activities that May Affect the Listed Endangered Plant Species Gentner's Fritillary, Cook's Lomatium, McDonald's Rockcress, and Large-Flowered Woolly Meadowfoam*, and are valid for 10 years. Survey of unsuitable habitat for Federally-listed plants is not required, and 2-year surveys in all suitable habitat are required for larger scale projects. For those surveys for *Fritillaria gentneri*, two surveys must occur within a 10-year interval, and are recommended to be within 5 years of each other (USDI 2008c).

Of the 2,723 acres proposed for various treatments, 596 acres of suitable *Fritillaria gentneri* habitat have received only one year of surveys. These acres are solely in non-commercial treatment units. Therefore, this project requires consultation with the USFWS to obtain clearance via a Biological Opinion and Letter of Concurrence before any treatment activities occur in those units.

Surveys are conducted using the intuitive controlled survey method. This method includes a complete survey in habitats with the highest potential for locating Special Status species. Surveys are completed by walking routes that cover a representative cross section (approximately 80 percent) of all major topographic (slopes, draws, benches ridges) and special features (wet areas, rock outcrops, riparian areas, serpentine areas, etc.) of each unit. In areas of high potential habitat, a more thorough and intensive survey is made. Field work is conducted during the stage of plant phenological development that assures visibility of characteristics necessary for accurate identification of special status plant species. Multiple survey visits may be required in some habitats for certain species to ensure that the phenological development is such that accurate identification is possible. Timing of fieldwork takes into consideration seasonal climate, elevation, aspect, target species, and suitable habitat.

Surveys for all species on the Medford SSP list (current at the time of survey) were completed in all units proposed for ground-disturbing activity and proposed new road locations. Surveys for prior projects occurred from 1998 to 2009. Surveys specifically for the Pilot Thompson Project occurred from 2010 to 2012.

b. Vascular and Non-Vascular Plants

Botanical surveys documented 29 occurrences of Bureau Sensitive and/or Survey and Manage plant species within the project area. No other occurrences of Federally-listed, Bureau Special Status or S&M plant species

have been detected within the project area. No known occurrences of *Fritillaria gentneri* occur in the project area. However, *Fritillaria spp*. leaves were found in non-commercial fuel reduction units in T39S-R5W-Section 25 that have received only one year of surveys (Table 3-25).

Table 3-25. Bureau Special Status and Survey and Manage Plant Species in the Pilot Thompson Project Area

Lifeform	Species name (followed by number of occurrences in proposed treatments)	Common Name	Status	Occurrences in analysis area[1]
Vascular	*Cypripedium fasciculatum* (6)	Clustered Lady's-slipper	BSO	80*
Vascular	*Cypripedium montanum* (3)	Mountain Lady's-slipper	S&M C	10
Vascular	*Eucephalis vialis* (2)	Wayside Aster	BSO, S&M A	2
Vascular	*Zigadenus fontanus* (1)	Giant Death Camas	BSO	9
Vascular	*Fritillaria* leaves** (2)	Gentner's Fritillary	See ** below	2
Lichen	*Chaenotheca ferruginea* (1)	Black Pin Lichen	S&M B	2
Lichen	*Chaenotheca subroscida* (1)	Lemondrop Pin Lichen	S&M E	3
Lichen	*Leptogium teretiusculum* (1)	Olive-thorn lichen	S&M B	17
Lichen	*Bryoria tortuosa*	Horsehair Lichen	S&M D	25

Status definitions:

BSO=Bureau Sensitive Oregon – manage so treatments do not trend species towards listing under ESA (BLM Manual 6840);

S&M A: Rare, and all know sites are managed. Current and future known sites will be managed according to the Management Recommendations for the specieis. Minimize inadvertent loss of undiscovered sites. Pre-disturbance surveys are practical.

S&M B: Rare, pre-disturbance surveys not practical - manage all known sites and minimize inadvertent loss of undiscovered species;

S&M C: Uncommon, pre-disturbance surveys practical – manage all known sites to provide for reasonable assurance of taxon's persistence at the site level (FS, BLM, 2001).

S&M D: Uncommon, pre-disturbance surveys not practical or not necessary – until high-priority sites can be determined, manage all known sites.

S&M E: Rare, status undetermined – manage all known sites while determining if the species meets the basic criteria for Survey and Manage and , if so, to which category (A,B, C, or D) it should be assigned[1]BLM Database: Geographic Biological Observations (GeoBOB).

*Many sites detected over 15 years ago – see Environmental Effects section.

**Detected during "one year survey only" units – assumed to be *Fritillaria gentneri* for protection purposes.

Detected Special Status and Survey and Manage species descriptions are as follows:

Cypripedium fasciculatum: Clustered lady's slipper occurs in a variety of coniferous habitats all of which seem to have a filtered light condition in common and most frequently occurs on moderately steep slopes at mid elevations. It is most often associated with Douglas fir and is usually tucked under some type of hardwood tree in areas with relatively little competition from other understory plants. This species has a scattered range in Washington, Oregon, Idaho, Montana, Wyoming, Colorado, Utah, and California.

Cypripedium montanum: Mountain lady's slipper is found in later seral conifer and mixed hardwood-conifer stands, on mostly northerly aspects, 25-50 percent slopes, with 60-80 percent canopy cover. This species is found in California, Oregon, Washington, Idaho, Montana, and Wyoming.

Eucephalis vialis: Wayside Aster is a native perennial that is found in dry coniferous forests typically dominated by Douglas-fir. The species' preferred habitat is thought to have been historically sustained by

frequent fire return intervals that create open forest conditions with widely spaced conifers. It is known from Southern Oregon/Northern California and the Willamette Valley.

Zigadenus exaltatus: Giant death-camas is known from western California and southwestern Oregon. There are taxonomic questions related to the plants in the Applegate Valley of southern Oregon and they may represent a new species to science. In the project area this species occurs in a wide variety of open to semi-open habitats on south facing slopes. Habitats include meadow, chaparral, Oregon white oak, Douglas fir and mixed hardwood-conifer stands.

Chaenotheca ferruginea: is a black stubble or pin lichen. The typical substrate is the sheltered bark or wood of large old trees. In the project area, it is found in late seral Douglas-fir forests on the trunks and bases of Incense cedar and Douglas-fir. *Chaenotheca ferruginea* is globally widespread in cool to temperate areas.

Chaenotheca subroscida: is a yellowish stubble or pin lichen. The typical substrate is the sheltered bark or wood of large old trees. In the project area, it is found in late seral Douglas-fir forests on the trunks and bases of Incense cedar and Douglas-fir. *Chaenotheca subroscida* is globally widespread in cool to temperate areas.

Leptogium teretiusculum: is a fruticose lichen that is widespread in North America and Europe, but rarely collected due to its small size and high variability in appearance. It grows mostly on the bark of hardwood trees – primarily *Quercus* and *Acer* spp. in or near riparian areas.

Bryoria tortuosa: Horsehair lichen grows on trees and shrubs in well-lit, open stands, most frequently on Oaks and pines, although, it has been collected on a variety of trees and shrubs. In Oregon and Washington, it is most common east of the Cascade crest in the Douglas-fir Zone and Ponderosa Pine Zone.

c. Fungi

The 2001 Survey and Manage Record of Decision (ROD) Standards and Guidelines established timelines for the completion of Strategic Surveys for Category B fungi species (Standards and Guidelines, p. 9). If timelines for Strategic Survey completion are not met, the species will require "equivalent-effort" pre-disturbance surveys for projects in old-growth forests (in this case, defined as stands 180 years or older in age). For the Category B fungal species, the deadline for completion of Strategic Surveys was the beginning of fiscal year 2011. Since an evaluation of Strategic Survey results for Category B fungi has not been completed, equivalent-effort pre-disturbance surveys are required in those stands that meet the criteria for being considered "old-growth". The BLM assumes that surveying for fungi in stands 180-plus years old, protecting known and future found sites, and the existence of late-successional forest stands in reserves (i.e. Riparian Reserves, owl cores, etc.) across the landscape will ensure that Sensitive fungi species will not trend toward listing, and Survey and Manage fungi species will persist (OSO IB-OR-2004-145).

Prior to the removal of pre-disturbance survey requirements for fungi, approximately 700 acres in or adjacent to proposed treatment areas were surveyed – three visits during fall and spring 2000-2001 during peak sporocarp fruiting time. One S&M B fungi, *Balsamia nigrans*, occurs outside the project area. Within one of the treatment units inT38S-R4W-Section 30, a small portion of the forest stand (2 acres) is 180+ years or older. Fungi surveys have occurred in this small piece for four seasons – Spring 2011/2012 and Fall 2011/2012. No Bureau Sensitive or Survey and Manage fungi were found in this unit.

Fourteen Bureau Sensitive fungi are documented or suspected of occurring on the Medford District BLM administered lands (Table 3-26). Most Sensitive and S&M fungi grow in late successional forested stands. Some are associated with moister conifer stands while others grow in the drier hardwood-conifer plant associations. The nearest Bureau Sensitive fungus, *Helvella crassitunicata*, occurs near Powell Creek 0.5 miles west of the project area in a riparian zone.

Table 3-26. Medford District Sensitive Fungi Species

Scientific Name	Status	ORBIC List[1]	NWFP Sites[2]	Miles to nearest site
Arcangeliella camphorata	SEN, S&M B	1	6	65
Boletus pulcherrimus	SEN, S&M B	1	23	30
Chamonixia caespitosa	SEN	2	3	62
Dermocybe humboldtensis	SEN, S&M B	1	4	58
Gastroboletus vividus	SEN, S&M B	1	5	66
Gymnomyces fragrans	SEN, S&M B	3	2	~10
Helvella crassitunicata	SEN, S&M B	1	29	0.5
Phaeocollybia californica	SEN, S&M B	3	50	14.5
Phaeocollybia oregonensis	SEN, S&M B	1	15	36
Pseudorhizina californica	SEN, S&M B	3	42	~15
Ramaria spinulosa var. *diminutiva*	SEN, S&M B	3	1	55
Rhizopogon chamalelotinus	SEN, S&M B	1	1	27
Rhizopogon ellipsosporus	SEN, S&M B	2	5	3
Rhizopogon exiguus	SEN, S&M B	2	3	15

Status definitions:
SEN=Bureau Sensitive Oregon – manage so treatments do not trend species towards listing under ESA (BLM Manual 6840);
S&M B: Survey and Manage Category B – manage all known sites and minimize inadvertent loss of undiscovered species (USDA/USDI, 2001).
[1]ORBIC List: Oregon Biodiversity Information Center maintains extensive databases of Oregon biodiversity, concentrating on rare and endangered plants, animals, and ecosystems.
1 = taxa which are threatened or endangered throughout their range or which are presumed extinct.
2 = taxa which are threatened, endangered, or possibly extirpated from Oregon but are stable or more common elsewhere.
3 = taxa for which more information is needed before status can be determined, but which may be threatened or endangered in Oregon or throughout their range.
4 = taxa which are very rare but are currently secure, as well as taxa which are declining in numbers or habitat but are still too common to be proposed as threatened or endangered.
[2]BLM Database: Geographic Biological Observations (GeoBOB).

d. Noxious Weeds

Noxious weeds are generally nonnative plants that cause or are likely to cause economic or environmental harm or harm to human health. Introduced plants are species that are nonnative to the ecosystem under consideration. Introduced plants may adversely affect the proper functioning condition of the ecosystem. "Noxious Weed" describes any plant classified by the Oregon State Weed Board that is injurious to public health, agriculture, recreation, wildlife, or any public or private property (ODA 2012, p.4).

The Medford District ROD/RMP states the objectives for noxious weeds are to continue to survey for, avoid introducing or spreading, and contain or reduce infestations on BLM-administered land (USDI 1995, p. 92-93).

The Oregon Department of Agriculture designates and classifies noxious weeds according to their detrimental effects, reproductive strategies, distribution, and difficulty of control (Table 3-27).

Table 3-27. ODA Noxious Weed Control Rating System (ODA, 2012, p.6)

Category	Criteria	Recommended Action
A	Weeds that occur in the state in small enough infestations to make eradication or	Infestations subject to eradication or intensive control when and where found.

Category	Criteria	Recommended Action
	containment possible; or are not known to occur, but their presence in neighboring states makes future occurrence in Oregon seem imminent.	
B	Regionally abundant weed, but which may have limited distribution in some counties.	Limited to intensive control at the state, county, or regional level as determined on a case-by-case basis. Where implementation of a fully integrated statewide management plan is not feasible, biological control (when available) shall be the main control approach.
T	A select group of A or B designated weeds.	Identified by the Oregon State Weed Board as a priority target on which the Oregon Department of Agriculture will develop and implement a statewide management plan.

All of the proposed treatment areas were surveyed for noxious weeds by qualified botanists over a time period extending from 1998 through 2012. Surveys have documented nine species of ODA listed noxious weeds occurring primarily along roads in the project area (Table 3-28).

Table 3-28. Noxious Weeds in the Pilot Thompson Project Area

Species	Common Name	Status	Number of Sites in Project Area	Ecology and Habitat*	Ashland Resource Area Management Strategy
Centaurea solstitialis	Yellow star-thistle	B/T	Over 20	Annual, occasional biennial. Reproduces from seeds; one plant can produce more than 10,000 seeds. Root system consumes more water than native vegetation. Extensive infestations in degraded grasslands and along disturbed areas.	Focus treatments on populations along roads, in quarries, near Special Status plant sites or other special areas, and in fuels reduction units.
Centaurea stoebe	Spotted Knapweed	B/T	3	Biennial or short-lived perennial. Reproduces by seed. Displaces native vegetation via competition and allelopathy.	Relatively uncommon on Medford BLM. Eradicate small sites, control larger ones.
Chondrilla juncea	Rush Skeletonweed	B/T	2	Perennial, reproduces by seed and vegetatively. Roots can reach 8 feet depth. Root parts can form new shoots from 4 foot depth.	Relatively uncommon on Medford BLM. Eradicate small sites, control larger ones.
Cirsium arvense	Canada thistle	B/T	2	Perennial herbaceous plant. Reproduces from seeds. Common along roadsides and disturbed moist areas, where soil is disturbed and canopy cover	Treat specific populations in high risk areas (Special Status plant sites, special areas)

Species	Common Name	Status	Number of Sites in Project Area	Ecology and Habitat*	Ashland Resource Area Management Strategy
				removed.	
Dipsacus laciniatus	Cutleaf Teasel	B	1	Biennial. Reproduces by seed. Common in grasslands, savannahs and waste areas.	Relatively uncommon on Medford BLM. Eradicate all known sites, Early Detection and Rapid Response (EDRR).
Isatis tinctoria	Dyer's Woad	B	1	Biennial, winter annual or short-lived perennial. Reproduces by seed. Taproots to 5 ft depth. Disturbed and undisturbed sites. Displaces native vegetation, allelopathic.	Treat sites via herbicides early, digging and pulling later. Target small outlier sites, control larger ones.
Lathyrus latifolia	Perennial Peavine	B	2	Perennial. Reproduces by seeds and vegetatively. Displaces low-growing native vegetation. Occupies wide range of climatic conditions.	Often overlooked as invasive, increasingly a problem in W Oregon. Treat sites near activity areas and outliers.
Rubus armeniacus	Himalayan blackberry	B	Abundant along roads - < 1 percent of BLM land in planning area	Perennial shrub. Reproduces both by seed and vegetatively. Canes can grow more than 20 feet per season with rootstocks more than 30 feet long. Seeds dispersed by birds and animals. In Jackson County, grows in riparian areas, pastures, and meadows, and along roads.	Treat specific populations in high risk areas (Special Status plant sites, special areas). Trial treatments on mowed/cut roadsides in Pilot Thompson project area.
Taeniatherum caput-medusae	Medusahead Rye	B	3	Winter annual. Reproduces by seed. Displaces desirable vegetation on grasslands. Thatch changes soil temperature/moisture dynamics.	No effective treatment method available at this time. Properly timed Rx burn would help, but timing usually off.

Oregon Department of Agriculture (ODA) Noxious Weed Control Program: provides a statewide leadership role for coordination and management of state listed noxious weeds.

A= a weed of known economic importance which occurs in the state in small enough infestations to make eradication or containment possible; or is not known to occur, but its presence in neighboring states make future occurrence in Oregon seem imminent.

B= a weed of economic importance which is regionally abundant, but which may have limited distribution in some counties.

T= a priority noxious weed designated by the Oregon State Weed Board as a target for which the ODA will develop and implement a statewide management plan. "T" designated noxious weeds are species selected from either the "A" or "B" list.

* (Oregon State University Extension Service 2003; DiTomaso and Healy, 2007)

Weeds spread via seeds, which are carried from one location to another by air, water, animals, humans, or vehicles. Some weeds also spread when roots or other plant parts break off and re-sprout to create new plants. Most weeds have reproductive and life cycle characteristics that give them an advantage over native plants in establishing quickly. These characteristics include high seed production, good dispersal mechanisms, fall germination and rosette development, production of long taproots that capture water at different levels in the soil profile, and early or late season growth and bloom times to avoid competition with native species. Noxious weeds also have an advantage over natives because they occupy hostile sites with exposed, bare ground; tolerate drought; and form persistent seed banks that lie dormant until the next disturbance event provides new openings in which to become established. Because they originated from other countries, noxious weeds lack the predators that keep them under control in their native habitats and ecological areas.

Newly disturbed areas are most vulnerable to noxious weed establishment. Soil disturbance creates favorable conditions for the establishment of noxious weeds by removing competing vegetation. Weed seeds that have been suppressed in the soil have an opportunity to germinate and develop before native species are able to become reestablished. The disturbed soil is also a ready seed bed if weed seeds or other plant parts are transported or blow into the area by natural processes.

Roads are common avenues of invasion, as seeds lodge in tire treads or undercarriages and can be carried from infested areas into newly disturbed unoccupied areas. Activities that introduce or spread noxious weeds include road construction, timber harvest, farming, over-grazing, recreation, and residential development. Natural processes, such as wind, seasonal flooding, and migration patterns of birds or animals also contribute to the spread of noxious weeds (Table 3-29).

Table 3-29. Factors Affecting Noxious Weed Spread

Activity	Role in Dispersing Noxious Weed Seed
Private Lands	Private lands host a perpetual source for noxious weed seed, which can be dispersed when seeds attach to tires, feet, fur, feathers, or feces, or when natural processes such as wind and/or flooding events transport the seed from its source to other geographical vicinities.
Farming and Grazing	Farming creates soil disturbance and openings that noxious weeds can occupy. Farming equipment may move noxious weed seed from one area to another. Agricultural seed may be contaminated with noxious weed seed and spread during farming activities. Overgrazing of pastures or rangelands removes vegetation leaving bare, open spaces that noxious weeds may invade. If livestock are fed grain or hay containing noxious weed seed or parts, or consume noxious weeds, they may disperse them when they move to non-infested pastures or range.
Logging on Private Lands	Logging activity presents a key dispersal opportunity for noxious weed seeds. They may attach to tires or tracks of mechanized logging equipment, tires of log trucks, and various other logging-related substrates and be subsequently transported from their source to another geographic vicinity. Logging creates openings during ground disturbance and canopy removal which noxious weeds may colonize. Not using Project Design Features, such as equipment/vehicle washing, etc., also increases the risk of introducing or spreading noxious weed seed during logging operations.
Motor Vehicle Traffic (including Log Trucks)	Roads on public land are for public use, which results in a plethora of seed-dispersal activities occurring on a daily basis. Private landowners use public roads to haul logs, undertake recreational pursuits, and/or access their

Activity	Role in Dispersing Noxious Weed Seed
	properties. This transportation often occurs along BLM-administered roads, which are situated within a checkerboard ownership arrangement. How or when seed detachment occurs is a random event and could take place within feet or miles from the work site/seed source, presenting a high likelihood of detachment on public lands.
Recreational Use	The public often recreates on BLM-managed lands and can spread seed from their residences or other areas to public lands in a variety of ways, including attachment to vehicle tires; recreational equipment; hikers' socks, shoes, or other clothing; fur of domestic animals, etc.
Rural and Urban Development	Because of BLM's checkerboard land ownership, BLM parcels are generally interspersed with private lands, many of which are used for homesites, businesses, or agricultural endeavors. Rural and Urban Development often involves ground disturbance during building or road construction which creates openings for noxious weeds to occupy. See "Motor Vehicle Traffic" and "Private Land" for additional information about how this affects the spread of noxious weeds from private to public lands.
Natural Processes	Wind, seasonal flooding, fire, and migration patterns of birds or animals are a few of the natural processes that contribute to the spread of noxious weeds. Wind, water, or wildlife carry seeds or other plant parts and deposit them at new locations at random intervals. Wildfire removes ground cover and leaves areas open to invasion by noxious weeds if a seed source is nearby.

Noxious weed populations are treated on BLM-administered lands under the *Medford District Integrated Weed Management Plan and Environmental Assessment* (EA #OR-110-98-14) (BLM 1998). The Medford District BLM Noxious Weed list is a subset of the state list. It contains category A, B and T species that occur in the District and are targeted for detection and control (USDI 1998: 1-2). The BLM also treats all categories of weed species at high priority sites such as Special Status plant sites, special areas (Area of Critical Environmental Concern [ACEC]), contiguous blocks of BLM-administered land and within project areas that pose a risk of spreading weeds during project implementation. Depending on the species and what has been determined to be effective eradication or treatment method, the BLM treats weeds by manual, chemical, mechanical or biological means.

Adjacent private lands in the Applegate drainage are also known to harbor many populations of various noxious weeds. The BLM is not authorized to survey private lands and as a consequence, the extent of these populations and infestations is currently unknown.

3. Environmental Effects

This section discusses the direct and indirect effects of implementing each of the alternatives and the impacts it would have on botanical resources. This section also discusses any cumulative effects, which considers the range of alternatives plus the effects of other actions that are currently happening or will be happening in the foreseeable future.

a. Alternative 1 – No Action

Direct and Indirect Effects

Special Status and S&M Vascular and Non-vascular plants and fungi

Under Alternative 1, the No Action Alternative, the BLM would not implement any new management actions. Because no ground disturbance or changes in canopy cover or environmental conditions would occur, implementing Alternative 1 would not result in negative direct or indirect impacts to Special Status or S&M vascular or nonvascular plants or fungi. There would be **"no effect"** to T&E plants, Sensitive plants would not trend toward listing, and S&M species persistence would not be affected.

Forest stands with diverse species composition that are structurally complex and resilient to extreme fire behavior or insect or disease outbreaks provide the most favorable habitat for rare forest-associated plants and fungi. Different species have different habitat requirements, but the presence of large conifers, large and small woody debris, and an intact layer of organic duff are common requirements for many rare species, especially fungi. These conditions are declining in the project area. Under Alternative 1 overstocked forested stands would not be thinned. Trees in these stands have reduced vigor; higher mortality of suppressed trees; and higher susceptibility to insects, disease, and severe fire behavior than untreated stands. Forest structure and species diversity would continue to decline in a negative trend. Pine and hardwoods would decline and Douglas-fir would increase. As a result, there would be a loss of varied habitat types which provide for a diversity of herbaceous and fungi associates.

Noxious Weeds

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 project area. Implementing Alternative 1 would result in no direct or indirect impacts to noxious weeds. The project area would be a relatively lower priority for weed control other than rare plant sites, contiguous blocks of BLM-administered land, or special areas. When the BLM decides to implement a project in a specific area, it raises the priority level for treating local infestations.

Without treatment, roadside Blackberry infestations will continue to increase over time to create impenetrable thickets. All other infestations would slowly increase along and directionally away from roads. All infestations would likely increase due to natural processes, inherent competitiveness against native vegetation and other potential disturbances (see Table 3-29).

Cumulative Effects

Added to past, present, and foreseeable future actions, implementing Alternative 1 would not contribute additional cumulative effects to noxious weeds in the Pilot Thompson project area beyond existing conditions because no new activities would occur that create risks of introducing or spreading them.

b. Alternative 2

Direct and Indirect Effects

Under Alternative 2, tractor yarding would occur on 174 acres and cable yarding on 1,052 acres in mature to mid-seral forest, leaving 7,928 acres of mature and mid-seral BLM forest land untreated at this time in the analysis area.

Special Status and S&M Vascular, Non-vascular plants and fungi

Potential impacts to rare vascular or nonvascular plants from the proposed thinning, road construction, silvicultural and fuels reduction activities include:

- damage to or mortality of plants from logging equipment during timber harvest activities or road construction or creation of landings

- mortality of plants or reduced plant vigor or reproductive success from changes in environmental conditions when overstory trees are removed, resulting in increased light or temperature and reduced relative humidity
- mortality of plants or reduced plant vigor or reproductive success as a result of disturbing mycorrhizal connections and food cycling between conifers or hardwoods and rare plants when overstory trees are removed
- damage to or mortality of plants from heat or flames during post-harvest slash pile burning
- reduced plant vigor as a result of damaging associated mycorrhizal fungi during timber harvest or handpile burning
- removal of late successional forest that provides habitat for expansion of existing Special Status or S&M vascular plant populations or occupation by new populations
- competition to Special Status or S&M vascular plants from noxious weeds introduced or spread during timber harvest, road work, or post-harvest slash pile burning

Protection measures are designed to prevent or reduce these direct or indirect effects that could occur during forest management activities. No-treatment buffers would protect rare plant populations from timber harvest, road construction, silvicultural or fuels treatments, and post-harvest slash treatments. Buffer sizes would vary depending on the type of treatment proposed, the species being protected, and current environmental and ecological conditions at the site.

Fifteen occurrences of seven Bureau Special Status and S&M plant species are present within units proposed for treatment under the Action alternatives (*Fritillaria spp.* leaves are not counted here). There are no known *Fritillaria gentneri* populations within the project area. The specific identification of the two *Fritillaria spp.* leaves found in non-commercial fuel reduction units in T39S-R5W-Section 25 is unknown at this time, so they will be protected as if they are *Fritillaria gentneri* per the Programmatic BA/BO (USDI 2008c). For these reasons, there will be no effect on *Fritillaria gentneri*.

It is expected that the protection measures described in Table 3-30 will protect Special Status plants and populations by not trending them towards listing, and will assure local persistence of Survey and Manage species and their habitat. There will be no effect on Bureau Special Status or Survey and Manage plant species as a result of implementing Alternative 2.

Table 3-30. Special Status and S&M Plant Species Protection

Species name (followed by number of occurrences in proposed treatments)	Status	Protection
Chaenotheca ferruginea (1)	S&M B	25 foot buffer and large conifer retention prescription
Chaenotheca subroscida (1)	S&M E	25 foot buffer and large conifer retention prescription
Cypripedium fasciculatum (6)	BSO, S&M C	25-100 foot no treatment buffer depending on site conditions – fuels treatments that reduce dense understory while retaining canopy can be beneficial – no mechanical disturbance
Cypripedium montanum (3)	S&M C	25-100 foot no treatment buffer depending on site conditions – fuels treatments that reduce dense understory while retaining canopy can be beneficial – no mechanical disturbance
Eucephalis vialis (2)	BSO, S&M A	25 foot buffers around plant clumps allows beneficial treatments while avoiding mechanical damage

Species name (followed by number of occurrences in proposed treatments)	Status	Protection
Fritillaria leaves - 1 year only survey units (2)	FE, BSO	100 foot no treatment buffer
Leptogium teretiusculum (1)	S&M E	25 foot buffer and large hardwood retention prescription
Zigadenus exaltatus (1)	BSO	25 foot no burn piles buffer – seasonal restriction April 1- July 15 to remove excess vegetation
Bryoria tortuosa (10)	S&M D	25 foot buffer and substrate retention

Fungi

Timber harvest can have varying degrees of adverse effects on fungi, depending on the level of tree removal and ground disturbance. Activities that remove, disturb, or compact the top layer of organic material and mineral soil negatively impact fungi. The main and most extensive part of a fungus consists of a mycelial network that resides in the top few inches of mineral soil. In one study, mycelial networks ranged in size from 1.5 to 27 square meters (16 to 291 square feet) (Dahlberg and Stenlid 1995). During timber harvest, tractors and yarding equipment disturb and compact soil, which could damage fungal mycelia.

Removing conifers during timber harvest could indirectly affect fungi over the short term because it could break mycorrhizal connections between the trees and fungal mycelia. Removing host trees halts the transfer of nutrients produced during photosynthesis to the fungi. Mycorrhizal associations could reestablish as new conifers grow if the fungal hyphae persists through the period of stress caused from disruption of the mycorrhizal connections and changes in environmental conditions and if large enough conifers remain in the vicinity for mycelia to form connections with their root systems.

Removal of the overstory canopy during timber harvest changes environmental conditions which indirectly affects fungi. Relative humidity drops, light exposure increases, and air and soil temperatures rise. Hotter, drier conditions inhibit sporocarp production, reproductive success, and fungal persistence.

Construction of 0.62 miles of new roads would impact an estimated 3-4 acres, or less than 0.03 percent of the analysis area. It is expected that this small of an area would not affect fungi in the project or analysis area. Decommissioning old roads would not impact fungi as compacted old roads do not provide suitable habitat for Special Status or S&M fungi.

Burning post-treatment slash piles also poses potential impacts to rare fungi. After timber harvest and non-commercial understory treatments, the remaining slash is often piled and burned, or scattered and broadcast burned in lighter fuel accumulations. If rare fungi are present beneath the slash piles, the mycelia and spores would be damaged or destroyed by the intense heat generated during burning. Other detrimental effects to fungi from slash burning include loss of litter and organic matter, resulting in reduced moisture retention capability and a loss of nutrient sources. The effect of these activities on fungi is a loss of species diversity and abundance (Amaranthus et al. 1996). Under Alternative 2, the BLM would pile and burn or underburn post-treatment slash on up to 2,216 acres. The total area potentially impacted by burn piles would be 3-5 percent (see Soil Resources section) of the units for a total of 66-110 acres impacted within the project area.

Underburning could also negatively impact fungi. Mycelia could be damaged or destroyed if the fire burned hot. Burning the duff layer or understory vegetation could also change environmental conditions and leave mycelia exposed and vulnerable to dessication and mortality. Understory vegetation provides shade for terrestrial species, retains moisture that contributes to relative humidity, and cools air temperatures.

Thinning forested stands presents some risks of impacting Sensitive and S&M species as described above, but it would also create more open conditions that a fire could burn through without causing a high intensity burn or

stand-replacing wildfire. Late-successional forest lands not proposed for harvest or treatments, and skips and gaps as described in Chapter 2 would provide refugia and sources for mycelia and mycorrhizal fungi that could spread to treated areas after harvest and burning activities thus restoring fungal communities.

Furthermore, the BLM assumes that conducting surveys for S&M fungi in 180-plus year old stands, protecting known and future found populations, and the presence of late-successional forest stands in reserves (Riparian, Late-successional, RA32, NSO nest patches and other special management areas) across the landscape would prevent Sensitive species from trending toward listing or threaten S&M species' persistence (USDI 2004, p. 5-2).

Noxious Weeds

Historic and recent inventories detected nine species of Oregon State designated noxious weeds within the project area: Yellow starthistle, Armenian (Himalayan) blackberry, Medusahead rye, Spotted knapweed, Canada thistle, Rush skeletonweed, Cutleaf teasel, Perennial peavine, and Dyers woad. Currently, treatments and monitoring of weed infestations show that Yellow starthistle has decreased due to weed control efforts during the past two years. It is expected that the treatments that have occurred on all weeds in the project area will contribute to their control and/or local eradication.

Timber harvest and the associated road work and fuels treatments could introduce or spread noxious weeds within the project area unless Project Design Features (Ch. 2) in conjunction with active weed control are applied. Management activities which disturb the soil and remove existing vegetation leave areas open for possible invasion by noxious weeds. Burning post-harvest slash and non-commercial excess vegetation in handpiles would also remove ground cover under the piles leaving those areas open to occupation by weeds. Underburning creates a different type of risk for weed spread because it is often less intense than pile-burning and burns in a patchy pattern. However, it removes ground vegetation over larger areas potentially leaving them vulnerable to invasion by noxious weeds if populations are present nearby. A combination of these two methods of burning fuels could occur on up to 2,216 acres in the project area.

Noxious weed seeds or plant parts could be transported from infested areas outside the project area to non-infested areas within the project area along the 46 miles of haul routes on equipment or vehicles used for timber harvest or road work. Implementing vehicle washing prior to deployment of equipment would mitigate this risk (see Chapter 2, PDFs).

In the short term (approximately 1-5 years), proposed timber harvest activities within the project area could result in a moderate probability of introducing or spreading noxious weeds. However, the rate at which weeds could potentially spread as a result of these activities cannot be predicted due to the indistinguishable causal effect of other activities and factors listed in Table 3-29. Implementing PDFs and continuing weed treatments would mitigate the risk of overall spread, as well as likely improve habitat in the watershed by eliminating small infestations and decreasing larger ones.

c. Alternative 3

Although the acreages of harvest and other silvicultural treatments, fuels reduction, road construction, haul routes, and road decommissioning are increased in this alternative (see Chapter 2), the impacts to Special Status and S&M plants and fungi, and noxious weeds, are not sufficiently different to warrant separate analysis in this section. There is a slightly increased risk for weed spread under Alternative 3 due to proposed harvest of Unit 8-2, which is adjacent to a treated patch of Yellow Starthistle. Continued treatments would mitigate this risk. Otherwise, the effects remain the same as described in Alternative 2.

d. Cumulative Effects

Past, present, and reasonably foreseeable future activities in the Ferris/Slagle and Thompson Creek sub-watersheds would be similar to those described in the No Action Alternative, except that the BLM would implement actions proposed under Alternatives 2 and 3.

Because the BLM has surveyed harvest units, landings, and areas proposed for road construction for Special Status and S&M vascular and nonvascular plants and for Sensitive and S&M fungi in the highest likely habitat and in 180-plus year old stands, and will protect any sites discovered, project activities proposed under Alternatives 2 and 3 would not result in any cumulative impact to these species.

The proposed timber management activities would occur within the Applegate Adaptive Management Area (AMA). Lands in the Applegate AMA are intended to be used for the development and testing of forest management practices including partial cutting, prescribed burning, and low impact approaches to forest harvest that provide for a broad range of forest values, including late-successional forest and high quality riparian habitat (USDI 1995, p. 36). Across the Northwest Forest Plan area, approximately 14 percent of the 8 million acres of late-successional forest are designated as Matrix or AMAs and are available for harvest, while 86 percent are designated as Late-Successional Reserves, congressionally reserved areas, or Riparian Reserves. This reserve system across the landscape is intended to provide protection and development of mature and old-growth forests for the protection and expansion of late-successional associated rare plants, animals, and other organisms. Under the Northwest Forest Plan, at least 15 percent of late-successional (80 years or more) conifer forest must be maintained on federal lands in each fifth field watershed (USDI 1994, C-44).

In the analysis area, substantial forested BLM-administered lands are unavailable for timber harvest due to inaccessibility or other restrictions (NSO habitat, Riparian Reserves, etc.). These stands contain old-growth characteristics suitable for special status and S&M plants and fungi. Therefore, Alternatives 2 and 3 would not add cumulative effects to these species.

Past, present, and reasonably foreseeable future activities in Alternatives 2 and 3 would be similar to those described in the No Action Alternative. These human caused activities and natural processes will continue to present a risk of introducing new noxious weeds and spreading existing populations. However, the BLM has an on-going program of inventory and treatment of noxious weeds in the Pilot Thompson project area. Treatments in the past few years have focused on quarries and road systems, with populations treated by herbicide spraying and manual removal.

Added to past, current, and reasonably foreseeable future activities, the proposed timber harvest and related road and fuels treatment work could add cumulative effects to noxious weeds in the project area without the use of the proposed mitigation measures and PDFs. The risk of introducing or spreading noxious weeds as a result of activities proposed in Alternative 2 is moderate if weed treatments continue to be funded and remain moderate if not funded. The proper implementation of PDFs would reduce the risks that activities in Alternatives 2 and 3 would add cumulative effects to noxious weeds in the planning area.

It is anticipated that ongoing activities on private lands and activities over which the BLM does not have control will continue facilitate the introduction and spread of noxious weeds. On-going treatments and monitoring by the BLM and continued collaboration with outside groups, such as the Forest Capital Partners, the Jackson County Cooperative Weed Management Area, and The Nature Conservancy's Early Detection and Rapid Response (EDRR) program, increase the chances of containing or reducing noxious weed populations in the watershed and the project area.

J. RECREATION

1. Affected Environment

Recreational resources in the Pilot Thompson planning area are managed under the Medford District BLM's 1995 Resource Management Plan (RMP). Recreation use across the Medford District BLM is described in the 1994 Medford District Proposed Resource Management Plan/Environmental Impact Statement (USDI 1994). BLM-administered lands fall into two recreation management categories; Special Recreation Management Areas and Extensive Recreation Management Areas. Extensive recreation use areas are all BLM-administered lands not included in Special Recreation Management Areas (SRMAs) identified in the RMP (USDI 1994, p. 3-71) that provide for dispersed recreation opportunities across the Medford District BLM. SRMAs are those areas identified with high concentrations of recreation use and developed facilities.

An estimated 799,243 acres provide for dispersed recreation use across the Medford District (USDI 1995). The entire Pilot Thompson project area, approx. 2,356 to 2,723 acres, is allocated as extensive recreation use areas that provide for dispersed recreation. This represents less than 0.1 percent of the Medford District's extensive recreation use areas. These areas are characterized as low use recreational areas where no developed or designated recreational sites or activities exist.

Dispersed recreation in the project area includes hiking, horseback riding, hunting, Off-Highway Vehicles (OHV) activities, fishing, driving for pleasure, target practice, dispersed camping, and vegetative gathering. An extensive network of trails exists in the planning area. The vast majority of the trails in the Thompson Creek drainage were formed through non-motorized uses such as horseback riding and hiking. Trails in the Ferris Gulch drainage are mixed use with the majority of use being OHV. Ferris Gulch was designated under the Medford District RMP as an OHV Management Area (USDI 1995, p. 67). Within this area, OHVs are restricted to existing roads and designated trails. Existing trails within the Ferris Gulch drainage are of mixed use with the majority of use being OHV. No designated trails exist within the Ferris Gulch Area.

2. Environmental Effects

a. Alternative 1 - No Action

In the No Action Alternative, recreation opportunities would remain unchanged. Dispersed recreational activities including hiking, horseback riding, sightseeing, OHV activities, fishing, driving for pleasure, hunting, target practice, dispersed camping, and vegetative gathering would continue.

b. Alternatives 2 and 3

Dispersed types of recreation within the Pilot Thompson project area would receive some negative short-term intermittent impacts as a result of implementing Alternative 2 or Alternative 3. During the spring and summer operational period when outdoor use is highest, recreational users may encounter log trucks, equipment, noise from machinery and chainsaws, and some traffic congestion, and closed or blocked roads and trails. Signs would be posted along roadways, and other appropriate locations, to minimize safety risks associated with project activities. It is anticipated that only short term negative impacts to the dispersed recreational user within the Pilot Thompson planning area would occur during actual harvest or fuels management operations, when certain roads or trails may be blocked by logging equipment or active falling operations. Sounds from helicopter logging operations may also have short-term negative impact on the experience of recreational users. Project activities would be restricted to between May 15 and November 15, although some variation in those dates is possible depending on weather and soil moisture, so the short term impacts described above would happen during that time period.

Non-commercial and fuel treatments may occur before and after those dates, but the expected impact to the dispersed recreational user is minimal. There may be short periods of time when burning may preclude some

recreational use due to safety concerns. Additionally, smoke from prescribed burning may adversely affect recreational use of the Thompson Creek and Middle Applegate watersheds, but the effects would be short term, and typically overnight, when residual smoke may subside into the valleys. Underburning is usually accomplished in early spring and late fall, before and after the peak recreational period. Pile burning is typically accomplished November through February when atmospheric conditions are favorable, and when recreational use is also in the off season.

Main tractor skid trails would be blocked with an approved barricade and camouflaged with slash and other debris where they intersect haul roads. All cable yarding corridors located in units 20-1, 29-1, and 30-2 within Ferris Gulch would have slash and other debris scattered along their length sufficient to preclude OHV use, specifically motorcycles. As dense forested areas are thinned and become more open, an opportunity for increased OHV travel in the project area is possible; however, the probability that OHV use will increase as a result of this project is low primarily because PDFs designed to discourage this type of use are included in this proposal. They include blocking and camouflaging main skid trails at intersections with roads and placing slash and other debris on cable yarding corridors within Ferris Gulch where motorcycles may be inclined to seek the fall line. In addition, OHV access is limited in much of the project area because of the area's steep forested topography and restricted access due to private lands in the valley floor. In some cases OHV use may inadvertently be reduced through trail obliteration during the course of logging operations. For these reasons, forest management activities in the Pilot Thompson Project units, such as the creation of skid trails and corridors for cable logging, as well as the loss of vegetation caused by the cutting of timber, are not likely to significantly contribute to an increase in off-road OHV use in project units, nor would they affect any authorized trail use within the Ferris Gulch Area or within the greater project planning area.

The types of prescriptions proposed in each of the project units would not change the overall character of the landscape for the average recreationist, and therefore, would not impact the desirability of the area for dispersed recreation in the long-term. It is expected that any decline in recreational visitation would be short-term and that these levels would return to the pre-project levels.

K. VISUAL RESOURCES MANAGEMENT (VRM)

1. Affected Environment

"Visual Resources are the land, water, vegetation, structures, and cultural modifications that make up the scenery of BLM-administered land." Medford District BLM-administered lands have been classified under a Visual Resource Management (VRM) Class system established by the BLM. The criteria used to determine VRM classes were scenery quality ratings, public sensitivity ratings and distance zone-seen area mapping criteria. Approximately 60 percent of the viewsheds in the Medford District Resource Management Plan (RMP) planning area have fragmented land ownership patterns with private lands dominating the viewed landscape (USDI 1995). The characteristic landscape in the area of the Pilot Thompson Project is that of an uneven aged canopied forest environment with meadow openings in steep to moderately steep mountainous terrain. The proposed Pilot Thompson Project is within an area to be managed as VRM Class III and Class IV under BLM's 1995 RMP.

Class III Objective: The objective of this class is to partially retain the existing character of the landscape. The level of change to the characteristic landscape should be moderate. Management activities may attract attention but should not dominate the view of the casual observer. Changes should repeat the basic elements found in the predominant natural features of the characteristic landscape.

Class IV Objective: Manage for moderate levels of change to the characteristic landscape. Management activities may dominate the view and be the major focus of viewer attention. However, attempts should be made to minimize the effects of activities through careful location and minimizing disturbance so as to repeat the basic elements of form, line, and color.

As with all proposed projects, it must be determined whether the potential visual impacts from a proposed ground-disturbing activity will meet the management objectives established for the area, or whether design adjustments would be required. A visual contrast rating process is used for this analysis, which involves comparing the project features with the major features in the existing landscape using the basic design elements of form, line, color, and texture. This process is described in BLM Handbook H-8431-1, Visual Resource Contrast Rating.

It is important to note, that the system is based on observations of a casual observer and not local residents who are very sensitive to minor changes that may take place in the local neighborhood and landscape. For this analysis the casual observer would be identified as recreationists including hunters, horseback riders, hikers, OHV users and by drivers along area roads.

The characteristic landscape within the zone is typical of a highly managed and altered forest scene. Past activities such as extensive road building, complete conifer harvest and ranching on adjacent private lands, and extensive hardwood stands, meadows, and ranch land scattered throughout create a highly modified forest and valley landscape. The intermingled private lands with their associated developments and past harvest treatments provide a variety of visual contrast.

2. Environmental Effects

a. Alternative 1- No Action

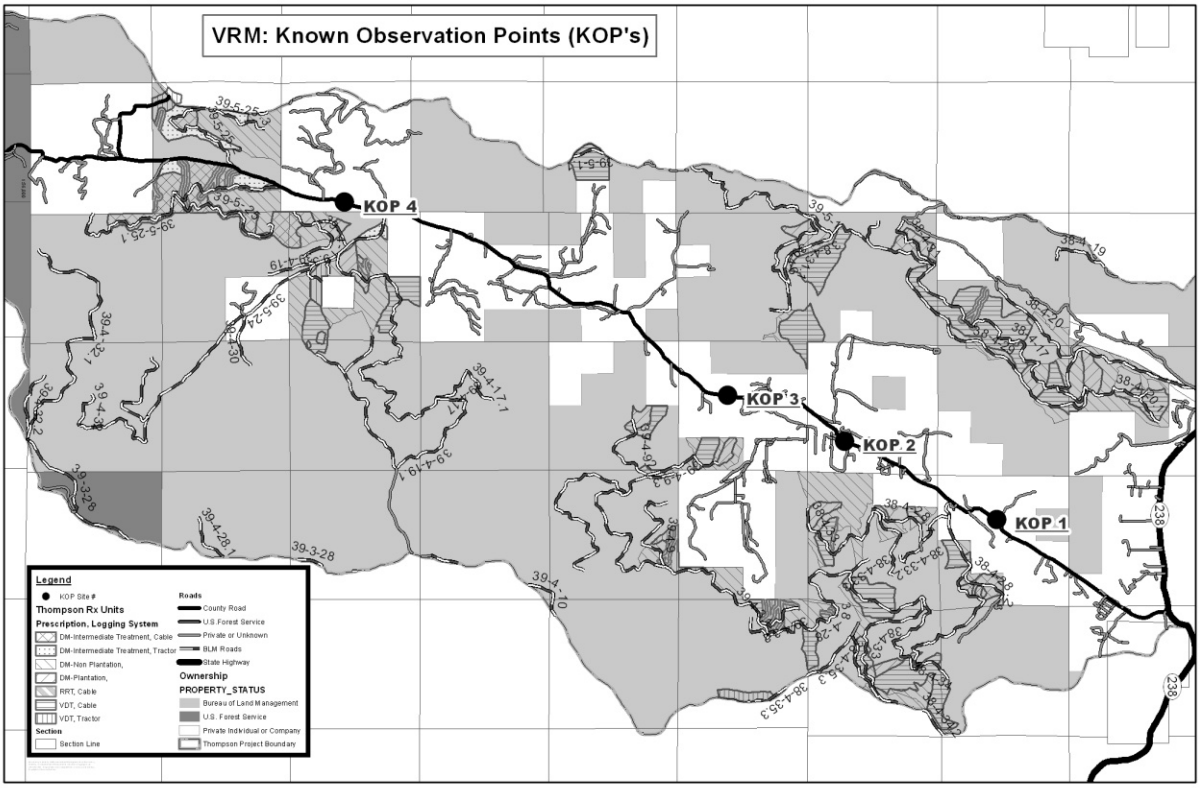
Under the Alternative 1, there would be no immediate change to the visual resources on BLM-administered lands as viewed from various locations throughout the planning area. Changes to the characteristic landscape over time may occur as a result of tree mortality or wildfire. Changes may be gradual, in the case of individual or small groups of tree mortality, or changes may be more noticeable if a large-scale stand replacement wildfire occurred.

b. Alternatives 2 and 3

Resource development patterns that disrupt the land surface (road construction) and alterations to vegetative patterns can have adverse effects on visual resources (USDI 1994, p. 4-86). The proposed Pilot Thompson Project is located on land classified as VRM Class III (2311 to 2693 acres) and VRM IV (22 to 39 acres) under the 1995 Medford District RMP.

A visual resources contrast rating system analysis (on file at the Medford District BLM Office) was completed for Alternatives 2 and 3 of Pilot Thompson Project. Alternative 3 differs from Alternative 2 in that Alternative 3 was designed to address the desire for no road building and provides a comparison of the environmental effects of building roads versus not building roads. It also provides a comparison of the differences in the cost for completing forest thinning, including helicopter logging opportunities. Alternative 3 added Units 29-7, 29-2, 8-2, 12-2, 12-3, 13-1, and 17-1 adding approximately 366 acres. Two units; 6-1 and 34-3, were converted from cable yarding to helicopter logging units.

Map 3-9. Location of Known Observation Points within the Pilot Thompson Project Area



From these roads (Thompson Creek and Ferris Gulch), not all project units will be visible due to the topography of the landscape and the units' location on the hillside slope. Project units that may be visible or partially visible will be noticeable to the casual observer; however, because of the overall character of the surrounding landscape, the expected speed of travel, and the nature of the proposed project, the units will not be the primary focus of the observer.

Four Known Observation Points (KOPs) were used to view the landscape in areas where the project in both Alternative 2 and Alternative 3 would occur. These KOPs were chosen for their proximity to the project units and the site's ability to provide the maximum viewing area from roads traveled in the area of the project (Map 3-9). The same KOPs were used for each alternative in analyzing potential visual changes to the landscape and were used to complete the visual resource rating system analysis.

KOP #1 is located on Thompson Creek Road near county mile post 1.0. KOP #1 was chosen for its close proximity to the Units 28-1 to 28-6. Unit 28-1 is prescribed under a Density Management Intermediate (DMI) treatment that involves the management of small trees (less than 20 inches DBH) in young and mid seral stands. Density management within this stand would remove fuel accumulations in patches while thinning lower and middle tree layers to accelerate development of a mature multi-layered stand structure. Materials generated from this activity would be piled and burned. The piles created may be visible in the short term; however, once the piles are burned, no remnants of the hand-piles would be visible. Unit 28-2 would be treated under a Variable Density Thinning (VDT) prescription, which is designed to move stands from their current condition of crowded, uniform forest stands to site conditions that are more open and spatially heterogeneous (clumpy) in nature. Harvest corridors would be created to allow removal of commercial logs from the unit. In the short term, harvest corridors may be visible to observers; however, these corridor openings would result in hardwood and shrub growth response which would quickly "green up" these corridors obscuring them in the long term. Units 28-3, 28-4, 28-5, and 28-6 would be treated under a Density Management (DM) treatment, which is used to accomplish forest health thinning and fuels reduction treatments in conifer forests, hardwood woodlands, and

shrublands. Density management consists of cutting small trees (generally less than 8 inches diameter) and vegetation with chainsaws and disposing of the material by hand-piling and burning or use of a lop and scatter method in lighter fuels. The treatments, as viewed, would partially retain the existing character of the landscape and would not dominate the view of the casual observer. These treatments would result in a weak degree in contrast as compared to the current vegetation landscape components of form, line, and texture due to the unaffected over-story. Both of the action alternatives, Alternative 2 and Alternative 3, of the Pilot Thompson Project meet VRM Class III management objectives in the observed from KOP #1.

KOP #2 is located on Thompson Creek Road near county mile post 2.8. KOP #2 is within 0.25 miles of Unit 33-5 and less than 0.5 miles from Units 33-6 and 33-4. Unit 33-5 is the closest and the largest of the units visible from this KOP and has a prescribed treatment of Density Management (DM), which consists of cutting small trees (generally less than 8 inches diameter) and vegetation with chainsaws and disposing of the material by hand-piling and burning or use of a lop and scatter method in lighter fuels. This treatment would result in a weak degree in contrast as compared to the current vegetation landscape components of form, line, and texture due to the unaffected over-story. The piles created may be visible in the short term; however, once the piles are burned, no remnants of the hand-piles would be visible. Views of harvest treatments in Units 33-4 and 33-6 would be obscured by topography and would not dominate the landscape. Alternative 2 and Alternative 3, of the Pilot Thompson Project meet VRM Class III management objectives in the observed from KOP #2.

KOP #3 is located on Thompson Creek Road near mile post 3.8. Portions of treatment Units 5-1, 5-3, and 5-4 would be visible when facing east to southeast from this KOP. Treatments planned for these units vary from Density Management (DM) to Variable Density Thinning (VDT). Density management consists of cutting small trees (generally less than 8 inches diameter) and vegetation with chainsaws and disposing of the material by hand-piling and burning or use of a lop and scatter method in lighter fuels. Under the Variable Density Thinning (VDT) treatment, project units would be moved from their current condition of crowded, uniform forest stands to site conditions that are more open and spatially heterogeneous (clumpy) in nature. Due the location of on Unit 5-4 (DM) on the landscape, the prescribed treatment of the unit would be obscured by topography and not dominate the landscape.

Treatment of Units 5-1 and 8-1 would be done in accordance with a Riparian Reserve Thinning (RRT) prescription as described in Chapter 1 (Section C.1). Under the RRT prescription, treatments would be limited to non-perennial streams and based on site specific stand/vegetation conditions. Treatments would be designed to maintain or improve aquatic systems, achieving consistency with short and long term ACS objectives. Vegetation treatments would be limited to thinning in young to mid seral stands to reduce stand density and acquire desired vegetation characteristics. These vegetation treatments will increase species diversity and tree vigor within dry Douglas-fir stands that exhibit uncharacteristic stand structure and species composition. Treatment consists of cutting small diameter conifers (generally less than 14 inches), non-riparian hardwoods, and shrubs. Stands would be thinned to a canopy cover range of 50-60 percent. This will remove fuel accumulations in patches while thinning lower and middle tree layers to accelerate development of a mature multi-layered stand structure. Views of harvest corridors created by treatments in Units 5-1 or 8-1 would visible from KOP #3. In the short term, harvest corridors may be visible to observers; however, these corridor openings would result in hardwood and shrub response which would quickly “green up” these corridors obscuring them in the long term. This treatment would result in a weak degree in contrast as compared to the current vegetation landscape components of form, line, and texture due to the unaffected over-story. The treatment as viewed would retain the existing character of the landscape and would not dominate the view of the casual observer. Both of the action alternatives, Alternative 2 and Alternative 3, of the Pilot Thompson Project meet VRM Class III management objectives in the observed from KOP #3.

KOP #4 is located on Thompson Creek Road near county mile post 7.4. Portions of treatment Units 19-11, 19-12, 19-13, 19-18 and 25-6 would be visible when facing east to southeast from this KOP. From Thompson Creek Road, views of proposed treatment units would be obscured by foreground vegetative barriers and landscape topography. Treatments in these units would not dominate the landscape because of the nature of the

treatment and lack of visibility. Where units are visible, the treatment would retain the existing character of the landscape and would not dominate the view of the casual observer. Both of the action alternatives, Alternative 2 and Alternative 3, of the Pilot Thompson Project meet VRM Class III management objectives in the observed from KOP #4.

c. Summary

Silvicultural prescriptions for each unit are described in detail in Chapter 1 (Section C.1). Generally the prescriptions call for an uneven-aged management approaches that encourages the creation of spatial heterogeneity and structural mosaics characteristic of dry forest stands. Desired stand-level features include a diversity of age class and species within the forest canopy. The Variable-Density Thinning prescription designed for this project will combine thinning with gaps and skips (untreated patches) to replicate historical patterns commonly found in mixed species and mixed-age stands. It is expected that the spatial heterogeneity and structural mosaic harvest planned to accomplish silvicultural objectives to mimic conditions found naturally across the landscape would also mimic the visual current conditions. For example, the "skips" that are part of the silvicultural system are expected to resemble natural openings in the forest canopy, and would then soften the visual impacts. Topography and foreground screening would also hide most of the units from observers on Thompson Creek and Ferris Gulch Roads.

Cable yarding corridors following harvest would be visible to an observer from several of the key observation points (KOPs) and by motorists, but are not expected to dominate the view. Corridors would be most apparent in Unit 28-1 and 28-2 because of their position on the landscape, and their proximity to Thompson Creek Road; however, because of the VDT prescription, there would be significant residual tree canopy to hide the corridors, except when an observer is looking straight up corridor. Units 28-1 and 28-2 would be visible from KOP #1, but it is anticipated that the rest of the units would be mostly obscured from casual view by topography and by foreground screening. To observers in a moving vehicle, the length of time during which a person will be looking straight up the corridors is minimal. At other times, the view will be at an angle where residual canopy will disguise the corridors. It is also anticipated that the harvest would be most apparent to casual observers in the first few months following treatment. This is the period of time when slash is "red" in color. Red slash will quickly become less apparent as needles drop to the ground. While KOP #1 has the highest potential for visual impacts due to its proximity and orientation to the road, the nature of harvest prescription for these units create minimal long-term visual detractors.

Four units were identified within the project area as VRM Class IV (Units 3-1, 3-5, 9-1 and 9-4). Treatments in these units would not dominate the landscape because of the nature of the treatment and lack of visibility. Where portions of these units may be visible, the treatment would retain the existing character of the landscape and would not dominate the view of the casual observer. Both of the action alternatives, Alternative 2 and Alternative 3, of the Pilot Thompson Project meet VRM Class IV management objectives.

The effects on the visual resources within the project area (VRM Class III and Class IV zones) are expected to be within the range as described under VRM guidelines, that activities may attract attention but would not dominate the view of the casual observer. The action alternatives in the Pilot Thompson Project would result in a low level of change visually to the characteristic landscape. These changes would not dominate the view of the casual observer. It is determined that both Alternative 2 and Alternative 3 would meet Visual Resource Management objectives for all BLM managed lands within the Pilot Thompson project area.

L. CULTURAL RESOURCES

1. Assumptions

a. Issues and Concerns

Scoping generated the following cultural resource related issues and concerns as they relate to implementing the proposed action. These effects may or may not occur as a result of the proposed action, but were of concern to the BLM ID team specialists and/or the public.

- Activities associated with the proposed action may directly or indirectly affect cultural resource sites/districts that are eligible for inclusion on the National Register of Historic Places (NRHP) by altering the landscape in which they are located.
- Activities associated with the proposed action may directly or indirectly affect paleontological resources that may not be identified prior to project implementation.
- Activities associated with the proposed action may directly or indirectly affect Native American culturally significant sites that have not been disclosed by Native Americans by altering the landscape in which they are located.

b. Desired Condition

The short and long-term future desired condition of archaeological sites is preservation of elements and data that make a site eligible for the NRHP. The short and long-term future desired condition for culturally significant sites, including gathering and spiritual areas is to manage them in a manner that is consistent with and sustains tribal use and needs.

2. Methodology

The National Historic Preservation Act (NHPA) requires agencies to take into consideration the effects of their actions on properties listed or eligible for listing on the National Register of Historic Places (NRHP).

An effect is a direct or indirect alteration of the characteristics of an historic property that qualifies it for inclusion on the NRHP. Effects are adverse when the alterations diminish the integrity of a property's location, setting, materials, workmanship, feeling, or association.

The analysis of effects to cultural and paleontological resources under the alternatives was completed in accordance with 36 CFR 800 and 43 CFR 8200 as shown in Table 3-31.

Table 3-31. Effects Classifications and NHPA Determination

Type	Level Of Significance	Effect	NHPA Determination Of Effect
Negligible	None or barely measurable	Neither beneficial or adverse	No effect
Minor	Measurable, slight and localized	Neither beneficial or adverse	No adverse effect
Moderate	Measurable, changes one or more character defining features	May be beneficial or adverse	No adverse effect if beneficial Adverse effect if not beneficial
Major	Substantial, changes to one or more character defining features are permanent	Adverse	Adverse effect

3. Affected Environment

Prehistoric

Archaeological investigations in southwestern Oregon have been relatively sparse, and the prehistory of the region is not as clearly understood as other areas of the state. The bulk of information relating to the people who inhabited the area prehistorically comes from a small number of informants that had been relocated to the Grand Ronde and Siletz reservations in the latter part of the 19th century (Tveskov and Cohen 2006; Pullen 1995; LaLande 1990; Gray 1985).

The Applegate Valley was occupied prehistorically by the Da-ku-be-te-de people, who spoke an Athabascan dialect (Pullen 1995). Information regarding the occupants of the Applegate Valley area comes not only from a single Native informant, but has also been gleaned from field notes and historic accounts from trappers, miners and other early European visitors to the region. It is thought that Athabascans are relatively late arrivals to southern Oregon, entering into the region sometime in the last 1,000 years (Pullen 1995). At the time of European contact, the area had a very small native population and only three Native American villages have been documented in the Applegate Valley. The closest of these village sites to the project area was located near the modern day town of Ruch.

Da-ku-be-te-de people followed a seasonal subsistence round, procuring food as it became available. Primary food resources included acorns, camas bulbs, salmon, seeds, sugar-pine nuts, hazelnuts, berries, and large game animals. People wintered in semi- permanent villages along the river and then dispersed into smaller extended-family bands during the spring, summer, and fall to collect upland resources. In the fall, they returned to their villages to repair homes and stockpile food for the winter (Pullen 1995). Although the Da-ku-be-te-de relied to a certain extent on salmon and large game, it appears that the majority of their subsistence pursuits were focused on acorns, roots and other vegetable food sources. Early historic accounts highlight the importance of root crops to the local native inhabitants as well as the management of tanoak stands through the use of fall burning (Pullen 1995).

With the large influx of miners and settlers into the area in the early 1850s, conflict with the Native American groups increased. Normal food resources steadily became increasingly scarce for Tribal people living in in the region. Areas formerly inhabited by the Tribes were settled and farmed by Euro-Americans. Gathering and hunting grounds were decimated by livestock raised by the settlers; the food-producing oaks and pines were cut down for lumber, firewood, fence posts; and rivers and streams became choked with sediment by placer mining activities depleting the salmon runs (LaLande 1990). Extermination of the Indians became the policy of self-regulated military volunteers. This conflict escalated into the Rogue River Indian Wars of 1852-1856. By 1856, most Native Americans living in the Rogue Valley and other areas of southern Oregon and northern California were forcibly relocated to the Grand Ronde or Coast (Siletz) reservations.

The most likely type of prehistoric cultural site within the project area would have been small task localities related to the processing of plant and animal resources, significant plant gathering areas, and spiritual/sacred sites. No prehistoric sites were located during cultural resource surveys, and as of the writing of this EA, no Tribe has provided information on sensitive plant gathering areas or spiritual/sacred sites.

Historic

The first known non-native people to enter the Applegate watershed were a group of Hudson's Bay trappers from Fort Vancouver in 1827 under the leadership of Peter Skene Ogden (McKinley and Frank 1995). A camp was set up at the mouth of Thompson Creek from which the group ranged out in search of beaver. Their stay was short-lived, however, since very few of the animals were found. Visits to the area by Europeans were relatively sparse after this initial excursion until the discovery of a rich gold deposit on Jackson Creek in 1851/1852. Small deposits of gold had been found in the Applegate and Illinois Valleys previously, but the Jackson Creek strike sparked the rapid influx of men seeking to make a quick fortune. Within a year roughly a

thousand miners were searching for gold within the two valleys. In February of 1852 a “trading post” was opened in a tent by two packers from Yreka, California. By March, several hundred men were living and working in the area now known as the town of Jacksonville, Oregon (Walling 1884). By 1854, Forest Creek along with other creeks in the area were being heavily worked all the way down to where they met the Applegate River near Ruch. A particularly rich gold deposit was found on Sterling Creek and virtually overnight a town sprang up to service the thousands of miners who flocked to the area (McKinley and Frank 1995). Sterlingville eventually had hotels, stores, saloons and every other amenity a miner could want, including a gambling house to lose their gold in. Within two years of the discovery of gold on Jackson Creek, all of the Applegate River and its tributaries had been searched and/or worked.

Concurrent with the gold rush was the influx of settlers claiming land under the Donation Land Claim Act (DCLA) which went into effect December 1, 1850. Under the DCLA each male settler could claim 320 acres of land and after living on and cultivating the land for four years could then receive title to it. If the man married before December 1, 1851, then his wife could also claim 320 acres and own it in her name. Single women could not file claims on their own. These were the earliest land-owners in the Applegate Valley, and subsequently became the providers of food to the many miners living in and working the hills.

By 1853, the most important route into the gold fields of the Applegate Valley was established. This route traveled up the Smith River from Crescent City, California and over the divide into Oregon. It was eventually extended to Kirby, where it veered east and north over a low divide into Deer Creek, across Crooks Creek below Mooney Mountain, and then down Cheney Creek to the Applegate. A ferry then took people across the river near the present Fish Hatchery Bridge, from which people traveled down the Applegate to Jacksonville. This was the main route for several years, bringing miners, settlers and supplies eastward from travel routes on the coast (McKinley and Frank 1995). By 1855 between 50 and 200 pack mules traversed this route daily.

In 1858 a new stage road was opened along the route of the present day Redwood Highway, over Hays Hill and then down along Slate Creek. The first buggy passed over this route in May of 1858, and a tri-weekly stage service was established (Johnson 1978). In 1860, an alternative route was opened up that followed the south bank of the Applegate through Williams all the way to the mouth of Thompson Creek. Packers continued to use this route until the 1880s, driving as many as 60 mules in a single train.

The predominant archaeological site type in the project area is a reflection of the greater mining history of the region. Several mines and/or mining sites exist within the general project area, as well as a large number of ditches associated with mining and farming activities. No new mining sites, and only two new ditches, were located as a result of cultural resource surveys.

a. Cultural Resources

For the purpose of analysis, cultural resources are divided into two categories: prehistoric and historic archaeological sites and culturally significant resources. While this division does not necessarily alter the way in which the BLM manages a given tract of land, it does provide a better understanding of those properties that require protection.

The cultural resource sensitivity of lands within the project area is considered to be high. That is due to the mining history discussed above in the previous section, and the underlying geology of the area which guided the development of historic mining districts. No prehistoric sites were located by survey, and no sites were identified by Tribes. Significant cultural resources and Native American Traditional cultural properties (if identified by Tribes in the future) would be protected by Project Design Features, (p.2-44 to 2-45) designed to preserve such sites for future scientific research and educational or Native American use.

b. Archaeological Sites

Currently, archaeological sites within the Pilot Thompson project area have been impacted to some degree by looting, wildland fires and fire suppression, timber harvesting, and other land management activities. In general, it appears that historic sites are deteriorating as a result of neglect and illegal artifact collection which results in the collapse of buildings and other structures and the loss of significant data that can help to identify and define site history and significance. Typically, historic sites on the District contain structural, household, or mining materials that are susceptible to damage from various management activities, in particular underburning. Natural processes such as wildland fire, flooding, weathering, or erosion significantly affect historic features, especially those made of materials such as wood and metal, and may destroy a site's NRHP eligibility. To date, over 10 previously recorded archaeological sites are located within the project boundaries, all historic in nature and associated with mining operations.

c. Culturally Significant Resources

Ethnographic information points to the importance of plant resources to the Native American communities that inhabited the project area. Although no culturally significant resources have been identified as of the writing of this EA, Tribal members do still gather plants for edible, medicinal, ceremonial, and utilitarian purposes. Other culturally significant resources include spiritual trails and viewsheds and Traditional Cultural Properties, used by Native Americans for various purposes. If these types of resources are identified by Tribes, appropriate mitigation would be developed as necessary.

d. Paleontological Resources

The Paleontological Resources Protection Act (PRPA) directs federal agencies to coordinate the management and protection of paleontological resources on Federal lands using scientific principles and expertise. It also directs agencies to develop appropriate plans for paleontological resources that address inventory, monitoring, and scientific and educational use. Currently, regulations are being developed to implement the act; however, fossil resources are covered to a certain extent in the existing 43 CFR 8200 regulations. The existing regulations state that federal agencies cannot knowingly disturb, alter, injure, or destroy any scientifically important paleontological remains.

While the geologic history of Oregon is commonly thought to have its origins in volcanic activity, which is apparent over much of the state, oceanic influences also played an important part in shaping the landscape (Wells 1956). During the Paleozoic, most of the land mass in Oregon was covered by warm-water ocean and these conditions lasted until the late Cenozoic, when volcanic activity was at its peak (Orr et al 1992). In the middle Tertiary, conditions began to dry out and became cooler, leading to the development of hard-wood forests, and the subsequent entry of land mammals into the region. Increased tectonic activity in the Tertiary period saw the rise of the Coast Range and the Cascade Mountain Range (Orr et al 1992). As temperatures continued to cool later in the Cenozoic (Pleistocene), large ice caps covered the mountainous regions of the state while forests expanded and savannas began to develop in the coastal regions. This geologic background has left its mark on the region in the form of fossil plant and animal remains.

A number of relatively important paleontological finds have been recorded in the region. The majority of these fossils have been found in discontinuous exposures of the Hornbrook formation which forms a northwest-trending band that extends from near Yreka, CA, along the valleys of Cottonwood and Bear Creeks to Grave Creek, Oregon (Peck 1956). The Hornbrook Formation includes fossil lenses of cephalopods, gastropods, and other marine fauna in an extremely hard sandstone matrix (Nilsen 1984). While the majority of fossils appear to be plants dating to the Tertiary period, inverterbrates and mammalian fossils have also been located in Jackson County. Ammonites have been found in the Ashland area, while a mammalian fossil of the family Equidae was recovered in Applegate Creek near Jacksonville. Paleontological resource sensitivity in the project area is considered to be moderate.

4. Environmental Effects

a. Alternative 1 – No Action

Because no new management is proposed under Alternative 1, the effects described reflect current conditions and trends that are shaped by past management activities, ongoing management and reasonably foreseeable future actions and events unrelated to the Pilot Thompson Project.

There would be no direct effects to archaeological sites because no new management actions would be implemented. However, there would also be no actions taken in potential project areas to reduce fuels within and around archaeological sites. This would leave a number of the sites at greater risk of destruction due to high intensity wildfires. High temperatures and prolonged exposure to heat may affect artifacts and the ability to acquire relevant data that would affect the information potential and hence NRHP potential of any given site. Wildfire can be especially destructive to historic resources made of wood and some metals, potentially rendering a site ineligible for the NRHP. Therefore, a possible indirect adverse effect resulting from no action is the continued risk of damage to sites from wildfire. Depending on the intensity of any fire moving through sites, effects could be minor to major.

There would be no direct effects to culturally significant areas because no management actions would be implemented. However, fire-adapted plant species (those that respond positively to fire) would not be enhanced without the use of low intensity prescribed fire in project areas, this could result in the long-term degradation or loss of these species. Without proposed thinning in areas where vegetation has encroached on meadows and increased in density in hardwood areas, hardwood diversity and wildlife habitat diversity would continue to decline over the long-term. This indirect, long-term impact could result in reduced opportunity for tribal members to gather high-quality plant material.

There would also be no actions taken in project areas to reduce fuels within and around culturally significant sites to reduce the potential for high intensity wildfire. Effects to these sites from wildfires may result in the loss of important settings and view sheds, which has the potential to affect their continued use for spiritual practices. Short and long-term effects would be minor to major, depending on fire intensity, and the resulting loss of archeological data, plant communities, and spiritual sites.

There would be no direct effects to paleontological properties because no new management activities would be implemented.

b. Impacts Common to Alternatives 2 and 3

Vegetation treatment and timber harvesting analyzed under this REA would be guided by Project Design Features (PDFs) (Chapter 2, Section C.4) to avoid direct and minimize indirect effects to cultural resources. Overall, impacts to cultural resources will vary little between the alternatives; therefore the following discussion outlines potential effects from various treatment options, rather than by alternative.

Commercial Prescriptions

Logging or thinning operations that depend upon “skidding” or dragging logs to a landing can have substantial impacts to cultural resource or paleontological sites through dispersion and mixing of culturally altered soils or the destruction of archaeological features. This has potentially critical implications for buried archaeological deposits, because such disturbance could act to destroy the context of a site and render it ineligible for the NRHP designation. In general, cultural resource surveys within the project area and application of appropriate PDFs would result in no effect to cultural resources as a result of these activities. However, increased visibility of cultural deposits could be a result of timber harvest activities that could have minor to moderate effects as a result of illegal artifact collection or excavation. Vandalism may be precipitated by the disclosure of site locations through “flag and avoid” procedures which could call attention to untreated islands within project areas.

Non-Commercial Prescriptions

In general, non-commercial understory vegetation reduction utilizing chainsaws and hand-piling and burning would have no direct effect on archaeological and culturally significant sites, as long as piles are located off sites. The archaeologist will work with District staff to identify areas near sites for piling cut woody materials for burning as necessary.

Any fire, wild or prescribed, may result in cultural resources being damaged or destroyed or result in inadvertent exposure of sites to increased visibility and illegal collection activities. High intensity wildland fires and prescribed burns could destroy wood and metal remains at historic sites. Fire use and fuels management actions that increase erosion, runoff and compaction rates of soils through vegetation loss and use of heavy equipment could engender minor to moderate adverse effects to cultural resources located near or within the project area. However, direct effects to archaeological sites from underburning for this project would be minimized through avoidance. Sites that are historic in nature would be protected through fire line construction.

New Road Construction, Renovation of Existing Roads, Road Maintenance, and Construction of Landings

The construction of new roads and the reconstruction or opening of existing roadways could result in facilitating public access to otherwise inaccessible areas. It could also directly impact archaeological remains that have not been identified. The use of heavy equipment to open, reconstruct or maintain existing roads could act to crush, disperse or destroy unrecorded cultural and paleontological resources and culturally altered soils. However, all routes and landings have been identified to the archaeologists and examined for cultural resource sensitivity. No sites exist within these areas, so there would be no direct effect to cultural resources as a result of route and landing construction.

Decommissioning of Roads

As with construction of roadways, decommissioning roads could directly impact archaeological remains that have not been identified. The use of heavy equipment to facilitate road closures would have greater impacts to such resources. However, all routes within the project area have been surveyed and no cultural resource sites were located within them, therefore there will be no direct effect to cultural resources. Decommissioning may have a beneficial indirect effect on cultural resource sites, by blocking vehicular access to sensitive areas.

In conclusion, the project will not adversely impact any sites of cultural or historical significance. The State Historic Preservation Office (SHPO) was informed of the BLM's finding in accordance with 36 CFR 800.5(b).

M. CARBON STORAGE

1. Background

The purpose of this section is to provide a basis for the decision maker to determine whether the proposed action or alternatives are likely to significantly impact the human environment with respect to greenhouse gas levels (i.e., atmospheric carbon levels). Changes in greenhouse gas levels affect global climate. Forster et al. (2007, pp. 129-234) which is incorporated here by reference, reviewed scientific information on greenhouse gas emissions and climate change and concluded that human-caused increases in greenhouse gas emissions are extremely likely to have exerted a substantial warming effect on global climate. Because forests store carbon, they affect the atmospheric concentrations of carbon dioxide, a greenhouse gas. Forest management can change the amount of carbon stored in a forest.

Scientific knowledge on the interrelationship between greenhouse gas levels and climate change is rapidly changing, and substantial uncertainties and several key limitations remain. One limitation is the inability of current science to identify a specific source of greenhouse gas emissions or sequestration and designate it as the cause of specific climate impacts at a specific location. This limitation was identified by the U.S. Geological

Survey in a May 14, 2008 memorandum to the U.S. Fish and Wildlife Service, which summarized the latest science on greenhouse gases. That memorandum is incorporated here by reference.

Treatments of the project action alternatives were compared to treatments in another recent project and found to be similar. Carbon storage and carbon emissions of the project action alternatives are compared to similar units that have calculations to determine the net contributions of greenhouse gases resulting from the treatments. Those carbon calculations were based on assumptions in the 2008 FEIS and subsequent improvements to those assumptions, as set forth in R. Hardt, personal communication, November 6, 2009 (on file in the Medford District BLM Office, and incorporated here by reference). Carbon storage was analyzed by quantifying the change in carbon storage in live trees, storage in forests other than live trees (dead wood and roots, non-tree vegetation, litter and soil organic matter), and storage in harvested wood products. Changes in forest ecosystem carbon over time were calculated using site specific data and the ORGANON Growth Model (Hann et al. 1993). Stand volume in cubic feet per acre per year was used to calculate tonnes of carbon stored per year. Carbon emissions (carbon dioxide) were calculated from timber harvest activities (including fuel consumption) and post-harvest fuel treatments. Net carbon storage was calculated by subtracting carbon emitted from carbon stored.

The 2008 FEIS described current information on predicted changes in regional climate (pp. 488-490), and is incorporated here by reference. That description concluded that the regional climate has become warmer and wetter with reduced snowpack, and continued change is likely. That description also concluded that changes in resource impacts as a result of climate change would be highly sensitive to specific changes in the amount and timing of precipitation, but specific changes in the amount and timing of precipitation are too uncertain to predict at this time. Because of this uncertainty about changes in precipitation, it is not possible to predict changes in vegetation types and condition, wildfire frequency and intensity, stream flow, and wildlife habitat. The analysis in this REA therefore does not attempt to predict changes in the project area due to existing or potential future changes in regional climate.

2. Affected Environment

In the Pilot Thompson Project Area, forest stands that are 15 to 160 years old are proposed for treatment. Within these forests, the quantity of stored carbon varies from stand to stand and is influenced by site quality and the amount, type and size of vegetation present. The current amount of vegetation defines the existing levels of on-site carbon and is considered the baseline amount that would be affected by management actions.

3. Environmental Effects

a. Alternative 1 – No Action

Under Alternative 1, no timber management actions would occur. No forest vegetation would be removed; the current amount of on-site carbon would not be affected. In the long term it is expected that continued growth of forest vegetation would result in the increase of stored carbon. Limited reductions in carbon would happen as periodic mortality or decomposition from natural processes occurs. In the absence of catastrophic disturbance events, it is expected that continued forest growth would capture and store more carbon than would be lost from natural processes.

b. Alternatives 2 and 3

Live Tree Carbon Storage

Similar to treatments in the Pilot Joe Project, Pilot Thompson Project treatments would reduce carbon stores temporarily but would result in net increases over time. The Density Management Intermediate treatments, Density Management and Riparian Reserve Thinning treatments proposed in the Pilot Thompson Project would be similar to the Density Management treatments in the Pilot Joe Project. In these units continued forest growth following management is predicted to increase carbon storage approximately 605 cubic feet per acre per decade,

which is equal to about 7.4 tonnes of stored carbon per acre per decade or 0.74 tonnes per year (Hann 2003). Within 5 years after thinning the carbon emission level (3.1 tonnes per acre) for the 20 year analysis period would be offset by carbon storage in tree growth. Total live tree carbon would equal pre-treatment levels after about 12 years of tree growth (Pilot Joe EA p. 3-114).

The proposed variable density thinning treatments in the Pilot Thompson Project would be similar to the variable density thinning treatments in the Pilot Joe Project. Continued forest growth following treatment would increase carbon storage approximately 582 cubic feet per acre per decade which is equal to about 7.1 tonnes of stored carbon per acre per decade or 0.71 tonnes per year (Hann 2003). Within 6 years after harvest the carbon emission level (3.7 tonnes per acre) for the 20 year analysis period would be offset by carbon storage in tree growth. Total live tree carbon would equal pre-treatment levels after about 38 years of tree growth (Pilot Joe EA, p. 3-114).

Carbon Dioxide Emission

Variable Density Thinning treatment effects of Alternative 2 on carbon dioxide emission would result in the emission of about 3.7 tonnes of carbon per acre or about 13 tonnes of carbon dioxide per acre during the 20 year analysis period (Pilot Joe EA, p. 3-113). Thinning 824 acres would result in the emission of 10,712 tonnes of carbon dioxide. The carbon dioxide emission represents 0.0000017 percent of current U.S. emissions.

Variable Density Thinning treatment effects of Alternative 3 on carbon dioxide emission would result in the emission of about 3.7 tonnes of carbon per acre or about 13 tonnes of carbon dioxide per acre during the 20 year analysis period (Pilot Joe EA, p. 3-113). Thinning 1,190 acres would result in the emission of 15,470 tonnes of carbon dioxide. The carbon dioxide emission represents 0.0000025 percent of current U.S. emissions.

In Density Management Intermediate Treatment, Density Management and Riparian Reserve Thinning treatment areas, effects of Alternative 2 on carbon dioxide emission would result in the emission of about 3.1 tonnes of carbon per acre or about 5 tonnes of carbon dioxide per acre during the 20 year analysis period. Thinning 1,532 acres would result in the emission of 7,660 tonnes of carbon dioxide. The carbon dioxide emission represents 0.0000013 percent of current U.S. emissions.

In Density Management Intermediate Treatment, Density Management and Riparian Reserve Thinning treatment areas, effects of Alternative 3 on carbon dioxide emission would result in the emission of about 3.1 tonnes of carbon per acre or about 5 tonnes of carbon dioxide per acre during the 20 year analysis period. Thinning 1,533 acres would result in the emission of 7,765 tonnes of carbon dioxide. The carbon dioxide emission represents 0.0000013 percent of current U.S. emissions.

The total carbon dioxide emitted during the 20 year analysis periods is considered negligible in the context of total U.S. carbon dioxide emissions of 6 billion metric tons (DOE 2009) for both Alternative 2 and 3.

N. OTHER EFFECTS

1. Economics

Below is a table showing helicopter logging costs for the Pilot Thompson Project. Included is a table showing conventional (cable) logging costs with road construction followed by a discussion on how each of the variables were derived.

Table 3-32. Costs of Helicopter Yarding Proposed Under Alternative 3

Units	Road Con. Cost ($)	Logging Costs ($/mbf)	Trucking Costs ($/mbf)	Treatment Acres	Volume/acre (mbf)	Total Pond Value ($)	Total Cost ($)	Surplus/ Deficit ($)
12-2	0	441	60	13	4.5	26325	29309	-2984
12-3	0	441	60	40	4.5	81000	90180	-9180
13-1	0	441	60	26	4.5	52650	58617	-5967
17-1	0	475	60	154	4.5	311850	370755	-58905
25-3	0	441	60	18	4.5	36450	40581	-4131
29-2	0	441	60	35	4.5	70875	78908	-8033
29-7	0	441	60	27	4.5	54675	60872	-6197
34-3	0	441	60	19	4.5	38475	42836	-4361
6-1	0	441	60	52	4.5	105300	117234	-11934
8-2	0	441	60	71	4.5	143775	160070	-16295

Table 3-33. Costs of Cable Yarding and Road Construction for Two Units under Alternative 2

Units	Road Con. Cost ($)	Logging Costs ($/mbf)	Trucking Costs ($/mbf)	Treatment Acres	Volume/acre (mbf)	Total Pond Value ($)	Total Cost ($)	Surplus/Deficit ($)
34-3	3400	231	60	19	4.5	38475	28281	10195
6-1	24000	231	60	52	4.5	105300	92094	13206

Tables 3-32 and 3-33 show cost estimates for timber harvest units proposed under the Pilot Thompson Project EA. Using each of the variables we can estimate the value of the timber to be removed from each unit as well as the cost to remove that timber. Each of the variables was estimated by BLM specialists based on "Logging Cost Estimates" program and experience with recent timber sale and construction contracts.

Road construction costs only apply to units proposed under Alternative 2 and were estimated by the BLM's engineering group. Logging costs were estimated using the program Logging Cost Estimates while values for trucking costs were estimated using comparisons from previous timber sale contracts. Road construction cost is the total cost for road construction for that unit.

Volume per acre is the amount of volume estimated to be removed under the Pilot Thompson Project based on proposed prescriptions and knowledge of past harvest.

Pond value is based on market values compiled each month. In this estimate, pond value is from August 15, 2012 at $450.00 per thousand board feet (mbf). Total pond value was calculated using the following equation: $450.00 x volume per acre x treatment acres = total pond value.

Total cost was calculated as follows: road construction cost + (logging cost + trucking cost) x volume per acre x treatment acres = total cost.

The Surplus/Deficit column shows the difference between the total pond value and the total cost to harvest a unit. If logging costs is higher than pond value this column shows a deficit. Conversely, if logging costs are lower than pond value, this column will show a surplus.

All units that require helicopter logging under Alternative 3 are deficit in this analysis; however, two of the units (34-3 and 6-1), which require road construction under Alternative 2, are surplus if this alternative is selected.

2. Air Quality

Prescribed burns are conducted within the limits of a Burn Plan, which describes prescription parameters so that acceptable and desired effects are obtained. Smoke produced from prescribed burning is the major air pollutant of concern.

Fuels management activities generate particulate pollutants in the process of treating natural and activity related fuels. Smoke from prescribed fire has the potential to effect air quality within the project area as well as the surrounding area. The use of prescribed fire for ecosystem restoration can produce enough fine particulate matter to be a public health and/or welfare concern.

Fine particulates in smoke can travel many miles downwind impacting air quality in local communities, causing a safety hazard on public roads, impairing visibility in class I areas, and/or causing a general nuisance to the public. If properly managed, most negative effects of prescribed fire smoke can be minimized or eliminated.

The National Ambient Air Quality Standards (NAAQS), set by the authority of the Clean Air Act (CAA), cover six “criteria” airborne pollutants: lead, sulfur dioxide, carbon monoxide, nitrogen oxides, ozone and particulate matter. The lead and sulfur content of forest fuels is negligible, so these two forms of air pollution are not a consideration in prescribed burning.

Prescribed burning does emit some carbon monoxide (CO), from 20 to 500 pounds per ton of fuel consumed. This would be a concern if there were other persistent large CO sources in the immediate vicinity. CO is such a reactive pollutant, however, that its impact is quickly dissipated by oxidation to carbon dioxide where emissions are moderate and irregular and there is no atmospheric confinement.

Burning also emits moderate amounts of volatile organic compounds (VOC) and minor amounts of nitrogen oxides (NOx). These are precursors to formation of ground level ozone. Here, fire-related emissions may be seen as important only when other persistent and much larger pollution sources already cause substantial nonattainment of NAAQS.

Particulate matter smaller than 10 micrometers (PM 10) is a term used to describe airborne solid and liquid particles. Because of its small size, PM 10 readily lodges in the lungs, thus increasing levels of respiratory infections, cardiac disease, bronchitis, asthma, pneumonia, and emphysema.

The fate of PM emissions from prescribed burning is twofold. Most (usually more than 60 percent) of the emissions are ‘lifted” by convection into the atmosphere where they are dissipated by horizontal and downward dispersion. The “unlifted” balance of the emissions (less than 40 percent) remains in intermittent contact with the ground. This impact is dissipated by dispersion, surface wind turbulence and particle deposition on vegetation and the ground. The risk of impact on the human environment differs between the two portions of smoke plume.

a. Smoke Aloft

Until recent decades, the impact of the lifted portion of smoke was ignored because it seemed to “just go away.” These impacts are generally not realized until the mechanisms of dispersal bring the dispersed smoke back to ground level. Because the smoke has already dispersed over a broad area, the intensity of ground-level exposure

is minimal. The duration of exposure may include the better part of a day, however, and the area of exposure may be large.

b. Ground Level Smoke

Unlike smoke aloft, the potential for ground level smoke to create a nuisance is immediate. This part of the smoke plume does not have enough heat to rise into the atmosphere. It stays in intermittent contact with the human environment and turbulent surface winds move it erratically. Also in comparison to smoke aloft, human exposure is more intense, relatively brief (a few hours) and limited to a smaller area. Smoke aloft is already dispersed before it returns to the human environment while ground level smoke must dissipate within that environment. Dissipation of ground level smoke is accomplished through dispersion and deposition of smoke particles on vegetation, soil and other objects.

c. Smoke Sensitive Receptor Area (SSRA)

The population centers of Grants Pass, Medford/Ashland (including Central Point and Eagle Point), and Klamath Falls in the past were in violation of the national ambient air quality standards for PM 10 and are classified as non-attainment for this pollutant. The nonattainment status of these communities was not attributable to prescribed burning. Major sources of particulate matter within the Medford/Ashland SSRA are smoke from woodstoves and dust and industrial sources.

The contribution to the nonattainment status of particulate matter from prescribed burning is less than 4 percent of the annual total for the Medford/Ashland air quality management area. Over the past ten years the population centers of Grants Pass and Medford/Ashland have been in compliance for the national ambient air quality standards for PM 10.

The pollutant most associated with the Medford District's resource management activities is PM 10 found in smoke produced by prescribed fire. Monitoring in southwest Oregon consists of nephelometers (instruments designed to measure changes in visibility) in Grants Pass, Provolt, Illinois Valley, Ruch and eventually in Shady Cove. One medium volume sampler is co-located with the nephelometer at the Provolt site. The medium volume sampler measures the amount of PM 10 and smaller at ground level.

d. Administration of Smoke Producing Projects

The operational guidance for the Oregon Smoke Management Program is managed by the Oregon State Forester. The policy of the State Forester is to:

1. Regulate prescribed burning operations on forest land;
2. Achieve strict compliance with the smoke management plan; and
3. Minimize emissions from prescribed burning

For the purpose of maintaining air quality, the State Forester and the Department of Environmental Quality shall approve a plan for the purpose of managing smoke in areas they designate. The authority for the State administration is ORS 477.513(3)(a).

ORS468A.005 through 468A.085 provides the authority to DEQ to establish air quality standards including emission standards for the entire State or an area of the State. Under this authority the State Forester coordinates the administration and operation of the plan. The Forester also issues additional restrictions on prescribed burning in situations where air quality of the entire State or part thereof is, or would likely become adversely affected by smoke.

In compliance with the Oregon Smoke Management Plan, prescribed burning activities on the Medford District require pre-burn registration of all prescribed burn locations with the Oregon State Forester. Registration

includes specific location, size of burn, topographic and fuel characteristics. Advisories or restrictions are received from the Forester on a daily basis concerning smoke management and air quality conditions.

3. Environmental Justice

This project was reviewed for the potential for disproportionately high or adverse effects on minority or low-income populations; no adverse impacts to minority or low-income populations would occur, per Executive Order 12898 (Environmental Justice).

CHAPTER 4 - PUBLIC PARTICIPATION

A letter briefly describing the Proposed Action and inviting comments was mailed to adjacent landowners, interested individuals, organizations, and other agencies on September 11, 2011. The scoping letter requested that people contact the BLM using an attached Interest Response Form, or by sending a comment letter if they wanted to be updated as the project progressed. During this 30 day scoping period, the BLM received 59 comments, of which 46 were identical form letters.

A second scoping period occurred in April 2012 when we sent an update letter to the list of interested individuals, agencies, and organizations. The letter included a more detailed description of the project proposal and the process used to develop the proposal. During this 30 day scoping period we received 13 comments.

Letters were sent on October 2, 2012 to the following Federally Recognized Tribes: the Confederated Tribes of Siletz Indians of Oregon, the Cow Creek Band of Umpqua Tribe of Indians, and the Confederated Tribes of the Grand Ronde Community of Oregon.

In an effort to maximize transparency in the planning and implementation of the Middle Applegate Pilot, all comments received during both scoping periods were posted to the Pilot website. A Final Scoping Report outlining the disposition of comments received was posted to the Pilot website in August 2012.

Numerous public meetings and field trips have occurred to date (see Chapter 1, Section G.2 for more detail).

The original Pilot Thompson Environmental Assessment was published on February 21, 2013 and was open for a 60 day comment period, ending April 26, 2013. A copy of the EA, or a notification letter, was sent to those individuals and organizations who responded to the scoping notices, participated in a public event, or requested to be kept informed. The following organizations were among those who received a hard copy, or notification letter, of the Pilot Thompson Project EA. Twenty one (21) comments were received during the EA comment period. A summary of comments received and responses to those comments can be found in Appendix D of this Revised EA.

Organizations and Agencies

American Forest Resource Council
Association of O & C Counties
Applegate Partnership and Watershed Council
Bureau of Reclamation
Department of Environmental Quality
Department of State Forestry
Friends of the Greensprings
Jackson County Commissioners and Court House
Jackson County Soil and Water Conservation District
Jackson County Stockman's Association
John Muir Project
Klamath Bird Observatory
Klamath Siskiyou Wildlands Center
Legacy Lands Project
Little Butte Watershed Council
Medford Irrigation District
Motorcycle Riders Association
National Marine Fisheries Service
Oregon Department of Fish and Wildlife
Rocky Mountain Elk Foundation
Rogue River-Siskiyou National Forest
Siskiyou Project
Soda Mountain Wilderness Council
Southern Oregon Forest Restoration Collaborative
Southern Oregon Timber Industry Association
The Nature Conservancy
US Fish and Wildlife Service

Notification of the availability of this Revised EA will be sent concurrently with the Decision Record notice to individuals and organizations who responded to the scoping notices, participated in a public event, or requested to be kept informed. Hard copies will be available upon request. This Revised EA will also be posted to the Medford District website at http://www.blm.gov/or/districts/medford/plans/index.php and on the Pilot website at http://www.blm.gov/or/districts/medford/forestrypilot/pilot-projects.php.

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APPENDIX A

GENERAL GUIDANCE APPLICABLE FOR ALL DRY FOREST SILVICULTURAL PRESCRIPTIONS

Strive to create diverse vertical and horizontal stand structure by leaving trees of all crown classes with crown ratios of greater than or equal to30 percent. Strive for stand diversity in regard to diameter classes, species compostion, tree heights (crown classes), trees per acre, and the vigor of individual trees. Some diseased, forked-top, and dying and dead trees should remain.

The following trees with these legacy charactistics should be favored for retention over other trees when marking dry forest stands. Pay particuliar close attention to trees greater than 30 inches diameter at breast height (DBH), because these tree sizes may have the greatest likelihood of being greater than 150 years of age than most trees below this diameter. For more clarification to determine tree age, use the tree age rating systems described in *Identifying Old Trees and Forest in Eastern Washington* (Van Pelt 2008).

- Larger and older than the second growth trees in the current stand; an indication that the tree maybe one of the seed trees of the present day stand. These trees have a bottle-brush shape (non-symmetrical crown).
- Large diameter limbs indicating that the tree was once open grown and had a large crown. Limbs (live or dead) are usually heavy and gnarled, are covered with mosses and lichens, and are close to the ground.
- Douglas-fir will have thick bark with deep fissures and have a chocolate brown color. Second growth trees have more gray color in the bark. Ponderosa pines will have thick bark, plate-like and yellow orange in color.

Do NOT try to create uniformity/evenness in stand conditions in marking; DO try to encourage creation of spatial heterogeneity. Structural mosaics are characteristic of Dry Forest stands.

Retain clusters of trees where appropriate; do NOT feel imperative to thin clustered tree stems. Such clusters of 2, 3, 4, or more stems are characteristic structural features of all natural forest stands.

To encourage the maintenance and establishment of fire resilient species, retain conifers in the following order of species preference: sugar pine, ponderosa pine, incense cedar, Douglas-fir, and white fir. All commercial sized hardwoods are reserved from cutting.

Retain snags of various size and decay classes. Favor large deformed or unique green trees in the stand for future snag recruitment. When available, leave green trees (any diameter) immediately adjacent to snags that are greater than 16 inches DBH. These trees will provide additional structural and habitat diversity.

When practical protect green trees (any diameter) immediately surrounding large (greater than 20 inches DBH and 8 feet in length) pieces of coarse woody debris. Retention of green trees would minimize coarse woody debris disturbance and maintain the functional integrity of the coarse woody debris.

Protect large or exceptional hardwoods, particularly larger cavity-bearing trees for stand diversity and wildlife benefit. Leave conifers that have their crown entangled in a hardwood tree or pose a threat from potential

damage from timber falling. Save large diameter and unique hardwoods for stand diversity, structure and wildlife.

Thin around large (greater than 18 inches DBH) and or old (greater than 150 years) pine, oak and cedar trees. Protect these tree species by increasing growing space and decreasing competition around these trees. Mark all competing conifers around the leave or center tree twice the distance of the trees dripline (distance from tree bole to dripline). Leave all trees in a group if they exhibit these legacy characteristics. Trees that exhibit legacy characteristics should be preferred over tree size when selecting an individual or group to protect. Trees that are associated with legacy trees or create a unique type of stand structure or wildlife habitat shall not be marked.

Leave trees that are associated with old trees (i.e. root grafts, shared crowns) or create a unique type of stand structure for wildlife habitat. Reserve trees with bird nests, wildlife cavities, wide forks with flat nesting spots, or loose bark (bat roosts).

Watch for natural openings (windthrow, fire, etc.) in the timber stands. These can be expanded in size if necessary for gap creation.

In draws which are not designated as Riparian Reserves, leave trees in the center of the draw bottoms for soil stability (10-feet on each side is recommended).

Do not mark seed trees. Do not mark any tree, that if felled, would endanger a seed tree.

Riparian Marking Guide for Dry Forest Stands Using Canopy Cover

Overall Objectives:

- Increase resistance/resilience of forest stands and landscape to wildfire, drought, insects, etc. (e.g., by reducing stand densities, ladder fuels, and increasing tree species diversity);
- Restore more characteristic structure and composition (e.g., reducing stand densities and enhancing tree diversity, including hardwoods, and desirable understory species);
- Accelerate development of structural complexity (e.g., development of larger tree structures and decadence);
- Contribute to development of spatial heterogeneity in stand (e,g, fine-scale structural mosaic); and,
- Reduce risk of wildfire reaching areas where late successional forest conditions are emphasized.
- Meet Aquatic Conservation Strategy objectives

Prescription:

Stands would be selected on a site specific basis and marked for thinning by BLM personnel, with oversight from the Ashland Resource Area's silviculturist, hydrologist, and fish biologist, to ensure that treatment units are marked to meet the objectives of Riparian Reserve Thinning. Thinning would be prescribed in Riparian Reserves that exhibit high density, poor crown ratios, and poor conifer seedling regeneration. Vegetation treatments would be limited to thinning and fuels reduction in young to mid seral stands to control stand density and acquire desired vegetation characteristics. Stands would be thinned to a canopy cover range of 50 to 60 percent. Suppressed trees with low vigor and poor crown ratio would be removed while leaving the largest, healthiest trees**.** These stands would be thinned predominately *from below.* Thinning would generally target trees in the intermediate and suppressed layers in order to maintain a relatively high canopy cover in the overstory.

Marking is based on maintaining 50 percent and 60 percent canopy derived from relative crown size. It enables the marker to vary leave tree spacing within a Riparian Reserve, maintain an average of 50 percent and 60 percent canopy for the Riparian Reserve area, and reduce stand densities. Use table A for 50 percent and 60 percent canopy cover.

Priority for retention trees: 1) Healthy pine with greater than or equal to 30 percent live crown ratio, 2) Healthy conifers that are in the dominant and co-dominant stand layer, and 3) Healthy conifers that are in the intermediate stand layer.

Table A-1: Marking guidelines for leave tree spacing - using crown radius for 50 percent and 60 percent canopy cover.

Average **crown radius** of the conifer tree selected for retention in feet	Maximum spacing between boles of the retention trees to obtain **50%** Canopy Cover target in feet	Maximum spacing between boles of the retention trees to obtain **60%** Canopy Cover target in feet
8 or less	20	18
9	22	21
10	25	23
11	28	25
12	30	27
13	33	30
14	35	32
15 or more	37	34

APPENDIX B

Rationale for an ESA Section 7 and MSA Consultation
No Effect Determination On
Southern Oregon/Northern California Coasts Coho Salmon
Within the Pilot Thompson Timber Sale

February 8, 2012
EA #: OR M060-2013-0003-EA
Administrative Unit: BLM, Medford District-Ashland Resource Area
Prepared by Jen Smith, Ashland Area Fish Biologist

Introduction and Background

The following discussion is based on the proposed action and fisheries and aquatic habitat analysis in the Environmental Assessment (OR M060-2013-0003-EA) for the proposed Pilot Thompson Project, a commercial timber sale. The proposed project is in accordance with the Medford District Resource Management Plan (RMP), and the Northwest Forest Plan (NWFP). The planning area includes the Thompson Creek and Ferris Gulch drainages, in the Middle Applegate Watershed.

Species of Concern

Southern Oregon Northern California Coasts (SONCC) coho salmon (*Onchorynchus kisutch*); The SONCC coho salmon Evolutionarily Significant Unit (ESU) was listed as threatened on May 6, 1997 (62 FR 42588) by the National Marine Fisheries Administration (NMFS) following a conclusion that coho salmon in the ESU were not in danger of extinction but were likely to become so in the foreseeable future if present trends continue. Critical habitat for SONCC coho salmon was designated by the NMFS on May 5, 1999 (64 FR 24049).

Determination of Effect *No Effect*

Haul, the proposed skid trial across an intermittent channel, and one proposed road renovation may generate some sediment that could potentially reach aquatic features. Haul is proposed on 46 miles of road located throughout Thompson Creek and Ferris Gulch, covering approximately 23,268 acres of land base. Most of the roads are either paved (3.6 miles) or rocked (32.6 miles) with 9.7 miles on natural surface roads. Most of this haul route is located on high in the drainage network and is not connected to the stream network. There are eleven (11) perennial and 38 intermittent haul route crossings well distributed throughout the analysis area. Haul would likely result in some sediment entering aquatic habitats, the magnitude of the inputs would be small because dry season haul restrictions, the large spatial scale of activity, additional PDFs, and because most of the crossings are on intermittent channels. The amount of sediment to reach and settle out in any one pool would be insufficient to adversely modify aquatic habitats or meaningfully affect aquatic organisms. Additionally, in most cases there is at least ¼ mile between the hydrologically connected action and CCH allowing adequate stream length to filter, sort, and store sediment.

The Pilot Thompson Project includes only one element with proximity to coho habitat; a haul route crossing on Thompson Creek. This haul route crossing is a bottomless arch, in good condition. Approximately 131 truckloads of material would be hauled out over this crossing and onto the paved Thompson Creek Road. The road at this crossing is in an area of low topography so there is only a short distance (200 feet on either side of the stream) of road that would be served by the adjacent ditch. In addition the ditch turn-out empties onto vegetated banks of Thompson Creek and there are no signs of sediment deposition at the ditch turn-out. Based on the condition of the ditch and ditch turn outs, it appears that this is a ditch section that very rarely flows water. In addition, a PDF requires that hay bales be added to the ditch to filter any road related sediment from entering Thompson Creek.

Suspended sediment inputs resulting from haul would only occur during a precipitation event following a season of haul and would be spatially spread over many input locations at a time when stream levels are elevated and naturally turbid. This fine sediment would occur as increased turbidity and would not be detectable above background levels. No measurable effects to CCH are anticipated.

Use of ground based equipment is only proposed in one of the riparian units. In unit 25-3, a designated skid trail would cross a short duration intermittent channel to access the western portion of this unit approximately 0.25 miles upstream of coho critical habitat. (approximately 100 logs would be skidded out across this channel). The channel depth is shallow, 3-4 inches and the width is approximately 18 inches. Prior to harvest, bump logs would be placed in the channel to provide some protection to the steram bank. Equipment would only cross the channel at this location. Following harvest bump logs would be removed and berms or ruts would be leveled to match the existing topography and the disturbed area would be mulched and seeded. Loose soil generated by the activity would be removed from within the channel. The proposed PDFs would maintain channel integrity while also eliminating any loose sediment resulting from the crossing. Removing all the loose material from the stream channel would eliminate potential downstream effects to CCH approximately ½ mile downstream.

All but one of the roads proposed for renovation are located on or near ridgetops. One road crosses an intermittent channel approximately 0.3 miles from CCH. This segment would be hydrologically connected with aquatic habitat, but as the stream would be dry during renovation, and PDFs would limit the amount of in-channel disturbance, no direct effect to aquatic habitat would occur as a result of renovation.

There are several proposed actions that are hydrologically connected to the stream network and could potentially input sediment into the natural system (small intermittent channel in the North Fork side of the mountain). However, dry season restrictions coupled with the nature of the streams in the area (small, intermittent channels) preclude the potential for direct contributions. Dry season haul will minimize the amount of erosion the haul routes would experience. The magnitude of sediment generated would therefore be minimized. Any sediment generated by the break-down of aggregate would only be input indirectly into the intermittent streams during high precipitation events following a season of haul, and at such time these small streams would either capture, store, and slowly release the sediment to downstream habitats in such a way as to render it undetectable to CCH in Ninemile and Thompson Creeks, or would pass the sediment as a brief flush of elevated turbidity contributed to the North Fork during high flow events, when the stream would naturally experience elevated turbidity, rendering the inputs undetectable behind background conditions and not biologically meaningful to coho or their critical habitat.

No project elements have any mechanisms to directly or indirectly measurably affect streamflow, shade, large wood recruitment, or any other component of critical habitat for SONCC coho salmon.

Proximity

The bulk of the activities proposed would occur further than ¼ mile from coho streams, with the previously mentioned exception of the haul route crossing on Thompson Creek. PDfs and seasonal wet weather restrictions arrest sediment delivery from these actions. There is no expectation of an effect to the survival or production of listed fish and/or their habitat. Any sediment generated would be diluted to a point of being immeasurable and not meaningful to CCH.

Conclusion

Because coho salmon and their habitats would not be meaningfully affected from any sediment deposition, temperature change, large wood reduction, or peak flow changes, the proposed action would have no effect on Southern Oregon/Northern California Coasts coho salmon, their critical habitat, or on Essential Fish Habitat (Magnuson-Stevens Act).

APPENDIX C – ACRONYMS & GLOSSARY

ACS – Aquatic Conservation Strategy
AMA – Adaptive Management Area
AML – Adandoned Mine Lands
ARPA – Archaeological Resources Protection Act
ASQ – Allowable Sale Quantity
AUM – Animal Unit Month
BA – Biological Assessment
BAFH – Biological Assessment of Forest Habitat
BCC – Bird Species of Conservation Concern
BCR – Bird Conservation Region
BLM – Bureau of Land Management
BMP – best management practice
BOR – Bureau of Reclamation
CAA – Clean Air Act
CAP – capable habitat
CC – canopy cover
CCH – Coho Critical Habitat
CEQ – Council on Environmental Quality
CFR – Code of Federal Regulations
CHU – critical habitat unit
COE – US Army Corps of Engineers
COR – Contracting Officer's Representative
CWA – Clean Water Act
CWD – coarse woody debris
DBH – diameter at breast height
DEQ – Department of Environmental Quality
DOT – Department of Transportation
DSP – dispersal habitat
DST – designated skid trail
EA – Environmental Assessment
EF – east fork
EFH – essential fish habitat
EIS – Environmental Impact Statement
ENSO – El Nino Southern Oscillation
EP Act – Energy Policy Act
ESA – Endangered Species Act
ESU – evolutionarily significant unit
EO – Executive Order
FAA – Federal Aviation Administration
FCC – Federal Communications Commission
FEIS – Final Environmental Impact Statement
FERC – Federal Energy Regulatory Commission
FG – fragile for slope gradient
FLPMA – Federal Land Policy Management Act
FMP – Fire Management Plan
FOI – Forest Operations Inventory
FONSI – Finding of No Significant Impact
FP – fragile for mass movement
FW – fragile for ground water
GBBDC – Game Birds Below Desired Condition
GFMA – General Forest Management Area
GIS – Geographic Information System
GGO – great gray owl
GTRN – Global Transportation Network
HUC – hydrologic unit code
IDT/ ID Team – interdisciplinary team
IM – instructional memorandum
JCEP – Jordan Cove Energy Project
KLE – Klamath East Critical Habitat Unit
KOP – known observation point
KSA – Klamath Study Area
KSOAC – Known Spotted Owl Activity Center
LAA – likely to adversely affect
LNG – liquefied natural gas
LSEA – Late Successional Emphasis Area
LSR – Late Successional Reserve
mbf – thousand board feet
MOA – memorandum of agreement
MOU – memorandum of understanding
NAAQS – National Ambient Air Quality Standards
NEPA – National Environmental Policy Act
NF – north fork
NGA – Natural Gas Act
NH – nesting habitat
NLAA – not likely to adversely affect
NMFS – National Marine Fisheries Service
NRCS – National Resource Conservation Service
NRHP – Narional Register of Historic Places
NRF – nesting, roosting, and foraging habitat
NSO – northern spotted owl
NWFP – Northwest Forest Plan
O & C – Oregon and California Act, 1938
ODA – Oregon Department of Agriculture
ODEQ – Oregon Department of Environmental Quality
ODF – Oregon Department of Forestry
ODFW – Oregon Department of Fish and Wildlife
OHV – off-highway vehicle
OM – organic matter
ORS – Oregon Revised Statutes
OSHA – Occupational Safety and Health Administration
OSMP – Oregon Smoke Management Plan
PCE – primary constituent element
PCGP – Pacific Connector Gas Pipeline
PCT – pre-commercial thinning
PDF – Project Design Features
PDO – Pacific Decadal Oscillation
PE – polyethylene
PM – particulate matter

PM 2.5 – particulate matter smaller than 2.5 microns
PM 10 – particulate matter smaller than 10 microns
PNW – Pacific Northwest
QMD – quadratic mean diameter
RA-32 – Recovery Action 32
RAWS – Remote Automated Weather Station
RDI – relative density index
RMP – Resource Management Plan
ROD – Record of Decision
ROW – right of way
RR – Riparian Reserve
S&M – Survey and Manage
SDWA – Safe Water Drinking Act
SEIS – Supplemental Environmental Impact Statement
SF – south fork
SHPO – State Historic Preservation Office
SNEP – Sierra Nevada Ecosystem Project
SONCC – Southern Oregon/Northern California Coasts
SSP – Special Status Plants
SSRA – Smoke Sensitive Receptor Area
SSS – Special Status Species
SVS – Stand Visualization System
T&E – Threatened and Endangered
TMDL – total maximum daily load
TP – tree planting
TPA – trees per acre
TPCC – timber production capability class
TSZ – transient snow zone
USDA – United States Department of Agriculture
USDI – United States Department of the Interior
USFS – United States Forest Service
USFWS – United States Fish and Wildlife Service
VRM – visual resource management
WA – Watershed Analysis
WF – west fork
WOPR – Western Oregon Plan Revision
WQMP – Water Quality Management Plan
WUI – Wildland Urban Interface
WQRP – Water Quality Restoration Plan

Glossary of Terms

A

Abiotic: Non-living elements of an environment.

Activity Fuel: The combustible material resulting from or altered by forestry practices such as timber harvest or thinning, as opposed to naturally created fuels.

Adit: An entrance or passage leading into a mine.

Affected Environment: The area impacted by the proposed action.

Alternative: Other options to the proposed action by which the BLM can meet its purpose and need.

Animal Unit Month (AUM): The amount of forage required to sustain the equivalent of one cow and a calf for one month.

Anthropogenic: Of human origin or influence.

Aquatic: Living or growing in or near the water.

Available Water Capacity: That portion of soil water which plants can extract.

B

Basal Area: The cross-sectional area of a single stem including the bark, measured at breast height (4.5 ft. above the ground); the cross-sectional area of all stems of a species or all stems in a stand measured at breast height and expressed per unit of land area.

Baseline: The starting point for analysis of environmental consequences.

Best Management Practices (BMPs): State-of-the-art mitigation measures, generally considered benchmark standards.

Biotic: Living elements of an environment.

Brush: To remove shrubby undergrowth.

Bryophyte: A type of nonvascular plant including mosses, liverworts, and hornworts.

C

Canopy Cover: The percent of a fixed area covered by the crown of an individual plant species or delimited by the vertical projection of its outermost perimeter; small openings in the crown are included.

Chlorotic: The yellowing or whitening of normally green plant tissue because of a decreased amount of chlorophyll, often as a result of disease or nutrient deficiency.

Cultural Resources: Those resources of historical and archaeological significance.

Cumulative Effects: Those effects on the environment that result from the incremental effect of the action when added to past, present, and reasonably foreseeable future actions regardless of what agency or person(s) undertakes such other actions. Cumulative effects can result from individually minor but collectively significant actions taking place over a period of time.

D

Decadence: Marked by decay or decline.

Decommission: To remove those elements of a road that reroute hillslope drainage and present slope stability hazards. This usually involves removing the culverts, ripping the road prism, installing drainage facilities (i.e. waterbars, waterdips, etc.) and replanting the road surface with grasses, legumes, shrubs, and trees.

Dispersal: The movement of an individual from their origin to a new site.

Dispersal Habitat: Northern spotted owl habitat which is not suitable for nesting, roosting, or foraging, but has sufficient patchy cover to be used for travel between suitable stands, a minimum of 40% canopy cover, and an average tree diameter greater than 11 inches with flying space for owls in the understory.

Diversity: The aggregate of species assemblages (communities), individual species, the genetic variation within species, and the processes by which these components interact within and among

themselves. The elements of diversity are 1) community diversity (habitat, ecosystem), 2) species diversity, and 3) genetic diversity within a species. All three change over time.

Dripline: The line extending vertically from the exterior edge of a tree's live crown to the ground.

Duff: The partially decomposed organic material of the forest floor beneath the litter of freshly fallen twigs, needles, and leaves.

Dry Forest: (vs. Moist Forest): A classification of federally controlled forests in the PNW, rather than the traditional "westside" and "eastside", using scientifically defined plant associations to assign forest sites as either Dry Forest of Moist Forest categories. These plant associations reflect distinctive compositions, growth conditions, and historical disturbance regimes, such as broad gradients in fire behavior in PNW forests that reflect variability in both site and landscape conditions (Franklin and Johnson 2012, p.2).

E

Ecological Forestry: Drs. Franklin and Johnson's proposals are based on "Ecological Forestry" concepts, which incorporate principles of natural forest development, including the role of natural disturbances, in the initiation, development, and maintenance of stands and landscape mosaics. In this way, Ecological Forestry contrasts with Production Forestry, which utilizes agronomic and economic models in the efficient production of wood. Key elements of Ecological Forestry include: (1) retaining structural and compositional elements of the pre-harvest stand during regeneration harvests; (2) utilizing natural stand development principles and processes in manipulating established stands to restore or maintain desired structure and composition; (3) using return intervals for silvicultural activities consistent with the recovery of desired structures and processes; and (4) planning management activities at landscape scales, using knowledge of spatial pattern and ecological function in natural landscapes (Johnson and Franklin 2013, p.4).

Ecosystem: A system made up of a community of animals, plants, and micro-organisms and its interrelated physical and chemical environment.

Edge Effect: The modified environmental conditions or habitat along the margins of forest stands or patches.

Effects Analysis: Predicts the degree to which the environment will be affected by an action.

Endangered Species: Any animal or plant species in danger of extinction throughout all of a significant portion of its range. These species are listed by the US Fish and Wildlife Service.

Endemic: A species that is unique to a specific locality.

Environmental Assessment (EA): A concise, public document containing a federal agency's analysis of the significance of potential environmental consequences of a proposed action. The EA need not contain the level of analysis contained in an Environmental Impact Statement (EIS). An EA is used to determine whether an EIS is needed or a "finding of no significant impact" (FONSI) is warranted.

Environmental Impact Statement (EIS): A detailed statement of a federal project's environmental consequences, including adverse environmental effects that cannot be avoided, alternatives to the proposed action, the relationship between local short-term uses and long-term productivity, and any irreversible or irretrievable commitment of resources.

Ephemeral Stream: A stream that flows only in direct response to precipitation, and whose channel is at all times above the water table.

Erosion: The detachment and movement of soil or rock fragments by water, wind, ice, or gravity.

F

Fauna: The animals of a specified region or time.

Finding of No Significant Impact (FONSI): A finding that explains that an action will not have a significant effect on the environment and, therefore, an EIS will not be required.

Fire Regime: The characteristic frequency, extent, intensity, severity, and seasonality of fires within an ecosystem.

Flora: The plants of a specified region or time.

Fuel load: the oven-dry weight of fuel per unit area.

G

Ground Water: Water in the ground that is in the zone of saturation; water in the ground that exists at or below the water table.

GTRN (Ground Transportation): Roads over which the BLM has jurisdiction and maintenance responsibilities.

H

Habitat: A specific set of physical conditions in a geographic area(s) that surrounds a single species, a group of species, or a large community. In wildlife management, the major components of habitat are food, water, cover, and living space.

Habitat Fragmentation: The breakup of extensive habitat into small, isolated patches which are too limited to maintain their species stocks into the indefinite future.

HUC5: Fifth field hydrologic unit code, or watershed.

HUC6: Sixth field hydrologic unit code, or subwatershed.

HUC7: Seventh field hydrologic unit code or tributary to a subwatershed.

Hydrology: The science dealing with the properties, distribution, and circulation of water.

I

Impact: Synonymous with "effects." Includes ecological, aesthetic, historic, cultural, economic, social, or health, whether direct, indirect, or cumulative. Impacts may also include those resulting from actions which may have both beneficial and detrimental (adverse) effects. Impacts may be considered as direct, indirect, or cumulative.

Implementation Action: An action that implements land use plan decisions.

Indicators: Parameters of ecosystem function that are observed, assessed, measured, or monitored directly or indirectly to determine attainment of a standard(s).

Infiltration: The downward entry of water into the soil.

Infiltration Rate: The rate at which water enters the soil.

Intermittent Stream: Seasonal stream; a stream that flows only at certain times of the year when it receives water from springs or from some surface source, such as melting snow in mountainous areas.

Invertebrate Species: Any animal without a backbone or spinal column.

K

Key Watershed: A watershed containing (1) habitat for potentially threatened species or stocks of anadromous salmonids or pother potentially threatened fish, or (2) greater than 6 square miles with high-quality water and fish habitat.

L

Landing: A cleared area in the forest to which logs are yarded or skidded for loading onto trucks for transport.

Late Successional Emphasis Area (LSEA): large blocks (300-500 acres) of land identified during the planning process that would serve as areas of dense, closed-canopy contiguous forests within which little or no treatments would be proposed. LSEAs were developed in response to Franklin and Johnson's dry forest restoration strategy that calls for the retention of dense forest habitat patches (in the hundreds of acres) at the landscape level, preferentially located in less fire-prone areas, such as steep north-facing slopes, riparian areas, and site protected by natural barriers, such as lakes (Franklin and Johnson 2012).

Late-successional Forest: Forest seral stages which include mature and old-growth age classes.

Lichen: A composite organism formed from the symbiotic association of a fungus and an alga.

M

Mass Movement: Soil and rock movement downslope (e.g. slumps, earth flows).

Matrix: BLM-managed lands designated by Congress under the Northwest Forest Plan where most timber harvest and other silvicultural activities would be conducted.

Mesic: Relating or adapting to a moderately moist habitat.

Mitigating Measures: Constraints, requirements, or conditions imposed to reduce the significance of or eliminate an anticipated impact to environmental, socioeconomic, or other resource value from a proposed land use.

Mixed-Conifer Forest: A mix of tree species that include Douglas-fir, ponderosa pine, sugar pine, incense cedar, and white fir.

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

Morphology: The study of the form and structure of organisms and their specific structure features, internal and external.

N

Nonpoint Source Pollution: Pollution that arises from an ill-defined and diffuse source, such as runoff from cultivated fields, agricultural lands, urban areas, or forests and wildlands.

Nonvascular: Plants with specialized methods of transporting water and nutrients without xylem or phloem (e.g. mosses, hornworts, liverworts, algae).

Noxious Plants: Those plants which are injurious to public health, agriculture, recreation, wildlife, or any public or private property.

O

O&C Lands: Public lands managed by the BLM under the O&C Act of 1937 for permanent forest production, in accord with the principle of sustained yield. Lands administered under the O&C Act must also be managed in accordance with other environmental laws.

O horizon: The layer of loose leaves and organic debris at the surface of soil.

Off-Highway Vehicles (OHV): Any motorized vehicle designed for or capable of cross-country travel over land, water, sand, snow, ice, marsh, swampland, or other terrain.

Organic Matter: Plant and animal residues accumulated or deposited at the soil surface; the organic fraction of the soil that includes plant and animal residues at various stages of decomposition; cells and tissues of soil organisms, and the substances synthesized by the soil population.

P

Perennial Stream: A stream that flows continuously. Perennial streams are generally associated with the water table in the localities through which they flow.

Permeability: The ease with which gases, liquids, or plant roots penetrate or pass through bulk mass of soil or a layer of soil.

Planning Area: All of the lands within the BLM management boundary addressed in a BLM resource management plan; however, planning decisions only apply to BLM-administered lands and mineral estate.

Plant Community: An association of plants of various species found growing together in different areas with similar site characteristics.

Point Source Pollution: Pollution that arises from a well-defined origin, such as discharge from an industrial plant or runoff from a feedlot.

Prescribed Fire: Controlled application of fire to natural fuels under conditions of weather, fuel moisture, and soil moisture that will allow confinement of the fire to a predetermined area and, at the same time, will produce the intensity of heat and rate of spread required to accomplish certain planned benefits to one or more objectives for wildlife, livestock, and watershed values. The overall objectives are to employ fire scientifically to realize maximum net benefits at minimum environmental damage and acceptable cost.

Prey species: An animal taken by a predator as food.

Proposed Action: A proposal for BLM to authorize, recommend, or implement an action to address a clear purpose and need.

Public Lands: Any lands administered by a public entity, including (but not limited to) the Bureau of Land Management and the US Forest Service.

Pyroclastic: Composed chiefly of fragments of volcanic origin.

R

Ravel: Loose rock material on a hillslope, usually of gravel or cobble size.

Record of Decision (ROD): The decision document associated with an environmental impact statement.

Refugia: Locations and habitats that support populations of organisms that are limited to small fragments of their previous geographic range.

Resource Management Plan (RMP): A land use plan prepared by the BLM under current regulations in accordance with the Federal Land Policy and Management Act (FLPMA).

Restoration: Franklin and Johnson define "restoration" broadly to encompass activities that are designed to restore forests and landscapes to conditions that are both more resistant and resilient to disturbances and that provide the diversity needed to restore and maintain native biodiversity and essential ecosystem functions.

Right-Of-Way (ROW): Federal land authorized to be used or occupied for the construction, operation, maintenance, and termination of a project, pursuant to a ROW authorization.

Rip: Decompacting the surface of a road to a depth of 12 inches.

Riparian Area: An area containing an aquatic ecosystem and adjacent upland areas that directly affect it.

Riparian Habitat: The living space for plants, animals, and insects provided by the unique character of a riparian area.

Riparian Reserve (RR): A federally designated buffer around streams, springs, ponds, lakes, reservoirs, fens, wetlands, and areas prone to slumping, on federal lands only. The Northwest Forest Plan's Aquatic Conservation Strategy defines riparian reserve widths for the above water bodies.

S

Scope: The extent of an analysis in a NEPA document.

Scoping: The process by which BLM solicits internal and external input on the issues and effects that will be addressed in planning, as well as the degree to which those issues and effects will be analyzed in the NEPA document.

Sediment Yield: The quantity of soil, rock particles, organic matter, or other dissolved or suspended debris which is transported through a cross-section of stream during a given period.

Sensitive Species: Those species that (1) have appeared in the Federal Register as proposed for classification and are under consideration for official listing as endangered or threatened species or (2) are on an official state list, or (3) are recognized by a land management agency as needing special management to prevent their being placed on Federal or state lists.

Seral Stage: A temporal or intermediate stage in the process of succession.

Shelterwood: The cutting of most trees, leaving those needed to produce a new age class in a moderated microenvironment.

Silviculture: The science of controlling the establishment, growth, composition, health, and quality of forests and woodlands to meet diverse needs.

Silvicultural System: A planned sequence of treatments or prescriptions over the entire life of a forest stand needed to meet management objectives.

Skid: To drag a log from within a harvest unit to a collection point (landing).

Slash: The residual vegetation (e.g., treetops and branches) left on the ground after logging.

Soil Series: The lowest or most basic category of the U.S. system of soil classification.

Species: A group of related plants or animals that can interbreed to produce offspring.

Special Status Species (SSS) include:

> **Proposed species** – species that have been officially proposed for listing as threatened or endangered by the Secretary of the Interior. A proposed rule has been published in the Federal Register.
>
> **Listed Species** – species officially listed as threatened or endangered by the Secretary of the Interior under the provisions of the ESA. A final rule for the listing has been published in the Federal Register.
>
> **Endangered Species** – any species which is in danger of extinction throughout all or a significant portion of its range.
>
> **Threatened Species** – any species which is likely to become an endangered species within the foreseeable future throughout all or a significant portion of its range.
>
> **Candidate Species** – species designated as candidates for listing as threatened or endangered by the FWS and/or NMFS. A list has been published in the Federal Register.

Sporocarp: The fruiting body of a fungus.

State Listed Species: Species listed by a state in a category implying but not limited to potential endangerment or extinction. Listing is either by legislation or regulation.

Subwatershed: The sixth level in the hydrologic unit hierarchy. A subwatershed is a subdivision within a fifth level watershed.

Succession: A series of dynamic changes by which one group of organisms succeeds another through stages leading to potential natural community or climax.

Sustained Yield Forestry: The yield that a forest can produce continuously at a given intensity of management; the achievement and maintenance in perpetuity of a high-level annual or regular periodic output of the various renewable resources without impairment of the productivity of the land.

T

Tier 1 Key Watershed: areas that either provide, or are expected to provide, high-quality aquatic habitat. These watersheds are intended to serve as refugia for maintaining and recovering habitat for at-risk stocks of anadromous salmonids and resident fish species.

Tiering: Using the coverage of general matters in broader NEPA documents in subsequent, narrower NEPA documents, allowing the tiered NEPA document to narrow the range of alternatives and concentrate solely on the issues not already addressed.

Tonne: 1000 kilograms.

Topography: The configuration of a surface area including its relief, or relative elevations, and position of its natural and anthropogenic features.

Total Maximum Daily Loads (TMDLs): Pollution load limits calculated by DEQ for each pollutant entering a water body. TMDLs describe the amount of each pollutant a waterway can receive and still not violate water quality standards. Both point and non-point source pollution are accounted for in TMDLs as well as a safety margin for uncertainty and growth that allows for future discharges to a water body without exceeding water quality standards.

Transient Snow Zone (TSZ): The area where a mixture of snow and rain occurs, sometimes referred to as the rain-on-snow zone. The snow level in this zone fluctuates throughout the winter in response to alternating warm and cold fronts. Rain-on-snow events originate in the transient snow zone.

Turbidity: The cloudy condition caused by suspended solids, dissolved solids, natural or human-developed chemicals, algae, etc. in a liquid; a measurement of suspended solids in a liquid.

U

Understory: That portion of trees or other woody vegetation which forms the lower layer in a forest stand which consists of more than one distinct layer.

V

Vascular: Plants having phloem- and xylem-conducting elements that facilitate the moving of water and nutrients.

Vertebrate Species: Any animal with a backbone or spinal column.

W

Watershed: All land and water within the confines of a drainage divide.

Watershed Analysis: A systematic procedure for characterizing watershed and ecological processes to meet specific management and social objectives. Watershed analysis provides a basis for ecosystem management planning.

Wetlands: Lands including swamps, marshes, bogs, and similar areas, such as wet meadows, river overflows, mud flats, and natural ponds.

Wildland-Urban Interface (WUI): The area where structures and other human development meet or intermingle with undeveloped wildland.

Windthrow: A tree or trees uprooted or felled by the wind.

Y

Yarding: The act or process of conveying logs or whole trees to a landing, particularly by cable, tractor, or helicopter.

APPENDIX D – RESPONSE TO COMMENTS

Written comments received in response to the Pilot Thompson Project Environmental Assessment were reviewed by the interdisciplinary team and the responsible official. Substantive comments were identified and the BLM has responded to substantive comments listed below.

Substantive Comments are those that:

- Provide new information pertaining to the Proposed Action or an alternative;
- Identify a new relevant issue or expand on an existing issue;
- Identify a different way (alternative) to meet the purpose and need;
- Identify a specific flaw in the analysis;
- Ask a specific relevant question that can be meaningfully answered or referenced;
- Identify an additional source of credible research, which if utilized, could result in different effects.

Non-substantive comments are those that:

- Primarily focus on personal values or opinions;
- Simply provide or identify a preference for an alternative considered;
- Restate existing management direction laws or policies that were utilized in the design and analysis of the project (or provide a personal interpretation of such);
- Provide comment that is considered outside of the scope of the analysis (not consistent or in compliance with current laws and policies, is not relevant to the specific project proposal, or is outside of the Responsible Officials decision space);
- Lack sufficient specificity to support a change in the analysis or permit a meaningful response, or are composed of general or vague statements not supported by real data or research.

COMMENT ANALYSIS

This section contains comments received and the BLM's response to comments. Some comments listed below were received from more than one commenter. To avoid duplication, comment statements with similar content were summarized into one comment statement. The comments and responses are intended to be explanatory in nature and, where applicable, to guide the reader towards analysis or information contained in the Revised Environmental Assessment (REA).

Comment #1: The Purpose and Need is narrowly defined, a violation of NEPA.

Response: The BLM has properly defined the agency's purpose and need in the Environmental Assessment. The NEPA document must briefly specify the underlying purpose and need to which the agency is responding (40 CFR 1502.13). It would be inappropriate to analyze for alternative management schemes for Pilot Thompson when the primary purpose is to *continue* to implement the Middle Applegate Watershed Pilot, as designated by the Secretary of the Interior, to understand its effects on a landscape scale (i.e. 80,000 acre watershed) and to determine whether a broader base of social acceptance is occurring. However, within the established purpose and need for Pilot Thompson, there are alternatives designed to address public issues related to road construction, helicopter yarding, and treatments in riparian reserves.

Comment #2: Not all dominant and co-dominant trees are being retained and old-growth is being cut, in violation of the EA.

Response: The silvicultural prescription described in Appendix A of the Revised EA provides for thinning across diameter ranges, but focuses on trees in the intermediate and suppressed layers (p. A-2). The harvest of

some dominant and co-dominant trees is accounted for in the prescription. The effects of removing some of the dominant and co-dominant trees is acknowledged and analyzed in the REA for effects to wildlife including northern spotted owls, great gray owls, terrestrial mollusks, and fishers (pp. 3-106 to 3-120); to stand health and resilience (pp. 3-12 to 3-19) ; and to fire resiliency (p. 3-29 to 3-30).

While it is impossible to know without coring all trees selected for harvest to determine age, the prescriptions provide for retention of older trees using a tree age rating system. It is neither practical nor financially feasible to core in excess of 20,000 trees to determine the age of every tree. No old-growth trees are being targeted for harvest in the prescription.

Implementation monitoring was conducted to determine how well markers achieved the age-based criteria in commercial harvest units. The results of implementation monitoring show that marking crews were highly efficient at retaining large trees (greater than 26 inches diameter) that are over 150 years old. Of the 48 trees over 26.1 inches diameter at breast height (dbh) designated for harvest, eight trees were over 150 years old and were reserved from harvesting. Over the project, these eight trees represent less than 0.2 percent of trees marked in commercial units for the Pilot Thompson Project.

Note: definitions of an old-growth tree by commenters include trees over 150 years of age. This is not a definition used by BLM to determine an old-growth tree. The Medford District RMP defines old-growth stands, but not an individual tree. Old-growth *stands* generally have an age between 175-200 years old (RMP, p. 109). By extension, the BLM assumes a tree 175 years or older is an old-growth tree. Franklin and Johnson do not define old-growth at 150 years of age, but note that the characteristics of old-growth trees begin to develop around 150 years of age.

Comment #3: Removal of trees over 20 inches diameter constitutes a violation of BLM's legal requirement to conserve and/or recover the northern spotted owl.

Response: There is no legal requirement to retain trees over 20 inches diameter to recover the northern spotted owl. According to the Biological Opinion,

> The proposed action will primarily use a variable density thinning (VDT) prescription (Appendix A) in non-high-quality spotted owl nesting, roosting, foraging habitat (NRF) (see Recovery Plan section below). The intent of the prescriptions are to move the current condition of crowded, uniform forest stands to stands that are more open and spatially heterogeneous (clumpy). Benefits anticipated from this treatment include increased vigor of remaining trees, reduction of fire risk, and increased diversity and productivity within these stands. In the long term these stands are anticipated to become higher quality NRF habitat than what currently exists (USDI FWS 2013, p.7).
>
> The Service acknowledges the short-term risks to spotted owls and their habitat due to the proposed action. However, the proposed action is largely in alignment with the Recovery Plan's dry forest restoration treatment principles (USDI FWS 2011: pg III-34-35) and strategy for Habitat Management in Dry Forests (USDI FWS 2011: pgs III-20—III39); thus, we anticipate the proposed action will result in long-term benefits to the conservation of spotted owl habitat in the action area (USDI FWS 2013, p. 8).

Comment #4: The EA has failed to demonstrate how the removal of trees greater than 20 inches in diameter at breast height (dbh) is contributing to Dry Forest Restoration goals, especially given the deficiency of large tree structures throughout the project area.

The REA does contain a thorough analysis of how the proposed actions would contribute to the Dr.'s Dry Forest Restoration goals (REA, p. 3-12 to 3-19). Please also refer to Chapter 2, Section D of the REA (p. 2-47) for more rationale as to why a diameter limit was not imposed.

During the field trip to Pilot Thompson on May 23, 2013, Drs. Norm Johnson and Jerry Franklin both stated that the species and structural diversity, and density objectives of their dry forest strategy cannot be achieved by

limiting harvest only to trees less than 21 inches dbh. While the intent is to leave the larger trees, the Dr.'s acknowledged that to achieve density goals and to reduce competition, some larger trees may need to be cut. The Dr.'s emphasized that it is important to consider where the larger tree sits on the landscape and what the specific scenario is, rather than to impose a certain diameter limit.

Comment #5: Interpretations of the Franklin and Johnson principles that are based on age (i.e. 150 years old) does not meet the intent to retain all old trees, especially those under 30 inches DBH.

Response: In their paper titled "*Applying Restoration Principles on the BLM O&C Forests in Southwest Oregon*", Drs. Franklin and Johnson state the desire to retain trees over 150 years old is based on an age where trees in Dry Forests begin to exhibit characteristics of old trees, and that fire exclusion began about 150 years ago influencing the numbers of trees that are less than 150 years old. Franklin and Johnson also explain in their 2012 Journal of Forestry article titled "*A Restoration Framework of Federal Forests in the Pacific Northwest*" that "stakeholders and agency personnel must agree on some allowance for errors in age estimation." Nonetheless, Franklin and Johnson also believe "additional levels of calibration and review will undoubtedly be needed during implementation." That additional level of calibration was done on Pilot Thompson by coring all trees to be harvested over 26.1 inches dbh. Of the 48 trees over 26.1 inches that were designated for harvest in the project area, 40 trees were less than 150 years of age. The eight trees identified as greater than or equal to 150 years were reserved from harvesting (USDI 2013a, p.1).

While the intent is to retain all older trees, it is impossible to achieve 100% attainment without coring ***all*** trees selected for harvest to determine age. It is neither practical nor financially feasible to core in excess of 20,000 trees to determine the age of every tree. Thus, the project clearly meets the intent of applying the Franklin and Johnson principles related to retention of older trees.

Comment #6: "Desired forest conditions" have been identified as including the maintenance of older trees and increased heterogeneity, yet there is no data in the EA to define these goals.

At the evening public meeting hosted by Dr.'s Norm Johnson and Jerry Franklin on May 23, 2013, Jerry led a discussion to further define and understand "ecological forestry," which seeks to reduce risk for major disruption of the forest function, increase complexity, value heterogeneity, and provide for planning at the landscape level. Ecological forestry provides for the continuity between generations of the forest and the important forest structure, function and composition. The basis for ecological forestry is to use natural forest ecosystems as the model for understanding, in contrast to Production Forestry, which utilizes agronomic and economic models in the efficient production of wood (REA, p.1-1).

The basis for the development of the Dry Forest restoration principles lies in the understanding of frequent fire regimes. A soon to be published study in the Middle Applegate Watershed by Oregon State University clearly established Pilot Thompson as a frequent fire ecosystem. In addition, there is a vast and common knowledge of frequent fire regimes across the United States.

At the stand level, and consistent with the understanding of frequent fire regimes, the Johnson and Franklin prescriptions for the dry forests include approximate 15% each of skips and gaps and thinning within the remainder of the stand. These are clearly defined goals and are reflected in the Revised EA (pp. 2-25 to 2-32).

Comment #7: The EA has not demonstrated how a variation to the Dry Forest strategy, developed for the eastside of Oregon, has been developed for SW Oregon. The forests of the Klamath/Siskiyou are simply too diverse and important to simplify with generalized prescriptions developed for forests of another region.

The basis for the development of the Dry Forest Restoration Principles, which the prescriptions in the REA are based on, lies in the understanding of frequent fire regimes. A soon to be published study in the Middle Applegate Watershed by Oregon State University clearly established Pilot Thompson as a frequent fire ecosystem.

Dr.'s Franklin and Johnson recognize that knowledge of historic reference conditions of forests in SW Oregon is lacking. Therefore, they believe it is important to examine other frequent fire sites across the northwest as they have many attributes in common; for example, a more complex forest mosaic. The goal for frequent fire ecosystems is the same; increase resiliency and redesign the architecture of a varied structural landscape, promoting shade intolerant species. Thus, the Dry Forest strategy for SW Oregon was not simply developed in the eastside of Oregon.

Comment #8: Many proposed treatments, including gaps, will result in a heavy response of dense undergrowth, increasing fuels in opposition to the Franklin and Johnson recommendations to avoid such outcomes.

Response*:* Franklin and Johnson's *Restoration of Federal Forests in the Pacific Northwest* (2009) suggests potential shrub responses to reduction in stand densities must be considered. They state this is particularly the case in Dry Forests that exhibit more even-sized and dense structures. They also noted that the potential for development of shrubby understories should be evaluated on a stand by stand basis considering plant associations and current stand structures.

Depending on site conditions the response of vegetation from proposed treatments, including gaps, will vary dramatically. Understory species and/or early seral species will respond to increased light environments, just like they do in response to natural disturbances. Some gaps will eventually become occupied with tree species, while others could fill in with grasses and forbs. Aspect, elevation, and soil type will dictate the outcome or vegetation response in gaps. Gaps make up a relatively small percentage of area (15% +/-) and are scattered throughout the matrix of a stand. These gaps may result in increased fuels; however, the spatial arrangements of these gaps do not create a horizontal contiguous fuel load at the stand level. Nitrogen fixing species, such as deerbrush (brush), may occupy gaps, creating a natural and suitable environment for tree species in the future. Outside of gaps (matrix) the stands will be thinned to a level that creates a light environment more suitable for tree species, rather than grasses and shrub (brush) species. In some stands, ground and ladder fuels will eventually return in the form of tree and shrub species and will require a follow up non-commercial or intermediate treatment to reduce stand densities (REA, p. 3-18).

As discussed in the Fire and Fuels section of the Revised EA, two landscape projects (Buncom and Forest Creek) were implemented in the late 1990's within the Pilot Thompson planning area. These treatments included the commercial thinning of approximately 3,859 acres of "Dry Forest." Both these projects had large acres along major ridgelines that were logged to approximately 80 to 100 square feet of basal area/acre. The majority of these acres were handpiled, burned, and then followed up with underburning to reduce the fuel loading that was created from the commercial thinning operations (REA, p. 3-22). These stands have been visited on a regular basis since they were harvested to determine if maintenance burning was needed in the event of a heavy response of undergrowth. The main response of undergrowth in these stands has been the re-sprouting of madrone trees in the areas where madrone trees were cut during the commercial thinning operations. In isolated areas, in some of the units, there has been some growth of brush since the fuels treatments. These areas had a brush component before they were harvested and burned. This response was expected. The overall fire hazard has not increased since the commercial harvesting occurred and none of the acres that were thinned have needed a maintenance burn.

The basal area that was retained in these stands varied from 40 square feet per acre to areas that exceeded 200 square feet per acre. The basal area that would be retained under the Pilot Thompson project ranges from 80 square feet to 120 square feet per acre. Based on what has occurred in the past there is no reason to expect a heavy response of dense undergrowth after the Pilot Thompson project is implemented. Just as the acres in the past have been monitored, any acres that are treated under this project would also be monitored to determine if maintenance burning would be needed in the future.

The Buncom and Forest Creek projects also treated approximately 2,364 acres of Oak woodlands, shrublands and Pine sites. These areas had a heavy component of brush. The fuels treatments that occurred on these sites targeted this brush component. In most of these stands the brush component re-sprouted after approximately

five years. These acres have been burned at least once, and some acres several times, over the past 15 years to manage the re-sprouting of brush.

Some brush response can be a positive outcome, providing ecological diversity in both plants and associated animals.

Comment #9: Proposed basal area targets are not consistent with dry forest principles because they will result in stand simplification by encouraging removal of large, old trees, especially in naturally occurring groups of trees.

***Response**:* The general guidance provided for applying the silvicultural prescriptions described in the REA focuses on retaining larger and older trees by retaining trees over 150 years old as best determined by a tree age rating system, avoiding creation of uniformity/evenness, and retaining clusters of trees (Appendix A).

Implementation monitoring was conducted to determine how well markers achieved the age-based criteria in commercial harvest units. The monitoring included coring all trees to be harvested over 26.1 inches dbh. Of the 48 trees over 26.1 inches designated for harvest in the project area, 40 trees were less than 150 years of age. The eight trees identified as 150 years old or older were reserved from harvest.

The basal area ranges described in the REA (p. 2-27) are not only a broad range (i.e. 60-120 square feet per acre), but are also averages. There is an infinite range of combinations of dense and open forest conditions that will result on a micro-scale, yet meet the overall average desires for the prescribed basal area range. Therefore, the prescribed basal area ranges do not encourage simplification of stands and removal of large, old trees.

Comment #10: The project will increase sedimentation by increasing road density and disturbing Fragile Gradient (FG) soils.

***Response**:* The project will increase erosion as a result of new road construction. The erosion increase caused by road construction is discussed in the REA (pp. 3-42 to 3-47) which concludes that "soil particles displaced from the road is expected to move only a short distance from the road" (REA, p. 3-45). The REA (p. 3-70) reveals that "The implementation of Project Design Features (PDFs) and BMPs would result in minor increases of sediment routed to stream channels…" and "[s]ediment production from new road construction would be short term and is not likely to reach surface water" (REA, p.3-71). However, road density will not increase. Overall, the project would result in a net reduction of road miles within the analysis area ranging from 2.18 miles in Alternative 2 to 2.55 miles in Alternative 3 (REA pp. 3-71, 3-72).

Also, the soils discussion in the REA (p. 3-40) notes that there are 121 acres of soils that are classified for slope gradient (FG) and are withdrawn from management. There are also fragile gradient soils that are suitable for management activities. The FG soils are classified as fragile due to the potential for surface ravel (REA, p. 3-54). Fragile Suitable for slope gradient sites are less fragile than the non-suitable areas but are subject to unacceptable soil and organic matter losses from surface erosion or mass soil movements as a result of forest management activities, <u>unless</u> mitigating measures (Best Management Practices) are used to protect the soil/growing site (page 9.1 TPCC). An example of a mitigating measure for road construction is: Road locations should seek areas of high stability and avoid side casting material in headwall and slide prone areas, or on very steep side slopes (+80s).

The REA noted observations from similar activities on the adjacent Pilot Joe timber sale that validated the minimal effects predicted for Pilot Thompson (REA p. 3-56).

Comment #11: Impacts associated with temporary road design and decommissioning are not fully analyzed in the EA, specifically increased risk of sedimentation transport to streams, illegal OHV use, trash dumping, noxious weed spread, and compaction.

***Response**:* The effects of sedimentation from temporary roads, as well as new roads and decommissioning activities, are discussed in the REA on pages 3-42 to 3-47, and 3-68 to 3-72. Soil erosion from the construction

and decommissioning of the temporary routes is expected to be avoided or minimized due to the implementation of Project Design Features. For example, seasonal restrictions during all road construction activities would reduce the potential for runoff and erosion from intensive winter storms and saturated soil conditions. All new temporary roads are on an upland ridge or stable slopes which also decrease the potential for soil erosion (REA, p.3-47).

Temporary roads would be fully decommissioned or obliterated when the project is completed. Fully decommissioning would include decompacting the surface to a depth of 12 inches, and slash and other debris would be placed along the road's length to provide ground cover and discourage OHV use. Blockage at the entrance would consist of placing earthen berms, logs, slash, boulders, and other material so the entrance is camouflaged and vehicle use is precluded. Obliterated roads would be treated similar to fully decommissioning; however, where fill occurs, recontouring and outsloping the travelway to disperse runoff would occur. Both methods would include the removal of all drainage structures (REA, p.3-47).

Decommissioning would likely not return the soil to the original bulk density in the short term. However, through seeding and mulching it would discourage soil displacement, reintroduce organic material and rooting systems into the soil and facilitate the vegetative recovery of the soil. Soil productivity is expected to be returned in the long term (REA, p.3-47).

Illegal OHV trails within units would be blocked, where applicable, upon completion of the project. Blockage would consist of placing logs, slash, and other material both at the entrance, so that it is camouflaged, and at sufficient intervals along the routes length. This is expected to reduce soil displacement and compaction in units where it is possible to effectively block the trail (REA, p. 3-53).

By implementing PDFs, such as washing vehicles prior to deployment and using weed-free straw, and continuing weed treatments, the risk of overall noxious week spread is minimized (REA, p. 3-133).

Comment #12: There is significant cumulative impact of past logging, road construction, skid trail establishment, road blading, landing construction, proliferation of OHV trails, fire exclusion, and concurrent and future planning efforts that is not considered in the EA. Cumulative impacts of transportation system actions proposed result in increased Equivalent Roaded Area that is also not considered in the EA.

***Response**:* The BLM has adequately analyzed the cumulative impacts of the alternatives, and has adequately described those impacts in the REA. The REA acknowledges the effects of past management within the Affected Environment sections of the REA. Past events are manifested in current conditions, the starting point for consideration of cumulative impacts of this project.

The REA acknowledges that impacts from roads, recreation, and past logging have altered watershed processes in the upper drainages of the planning area. In the lower stream reaches of the drainages and sub-watershed grazing, roads, residential development, channel alteration, and water diversions are responsible for degraded aquatic processes and conditions. The REA states that the project does not elevate the potential for cumulative effects beyond those that may be currently occurring. Sediment production resulting from road use and construction may increase in the short term. In many cases riparian vegetation vigor would improve over time, thus potentially decreasing stream temperatures. Although there are both natural and human induced risk factors for cumulative effects, the proposed actions are not expected to increase these within the project area drainages, or the larger sub-watersheds (REA, p.3-71 and 3-72).

No cumulative effects to soils are anticipated as soil disturbance from forest management is expected to be minimal and erosion rates would return to near normal within approximately 5 years (REA, p. 3-58). The REA notes that although some soil disturbance would occur during road construction, renovation, and decommissioning, a small net decrease in total road miles would occur and implementation of associated Project Design Features would minimize the potential for impacts from construction, renovation, and decommissioning to occur (REA, p. 3-50). The REA also notes that almost all of the designated skid trails and swing trails are on

ridgetops on existing footprints, and all landings are on existing footprints, and will result in minimal erosion (REA. p. 3-52).

The REA contains measures (PDFs) to eliminate or minimize the potential for increased OHV use following harvest (pp. 2-35, 2-36, and 2-38), therefore, the BLM does not anticipate a proliferation of OHV trails as a result of the project.

The REA does not use the Equivalent Roaded Area methodology for determining effects. Instead road density and road density within Riparian Reserves is one metric used to assess potential cumulative effects. The cumulative effect of temporary and permanent road construction, road decommissioning, and road renovation on road density are discussed in the REA (pp. 3-50, 3-70, and 3-72). This proposal reduces road density, including within Riparian Reserves where effects are more likely (REA, p. 3-70). The REA acknowledges there may be short term increases in sedimentation from road maintenance and construction; however, effects would be minimized with the implementation of PDFs (REA, p. 3-69).

Comment #13: Erosion following road construction is not compatible with meeting the goals of the Aquatic Conservation Strategy.

Response*:* Soil particles displaced from road construction are expected to move only a short distance from the road due to the position of the road, the soil types, and surrounding vegetation (REA p. 3-45). There is no road construction proposed within Riparian Reserves (REA p. 3-69). Without the connectivity to streams, there is minimal risk of increased sedimentation to any aquatic habitats, thus maintaining water quality and meeting the ACS objectives at all spatial scales of analysis.

Comment #14: Extending road 39-4-20 for unit 19-4 will result in it becoming a firing range, OHV track, and garbage dump.

Response*:* The 39-4-20 road, which stems off the 39-4-19.1 road, would be extended by 633 feet (0.12 miles) to access unit 19-4 under Alternative 2. There is a gate at the start of 39-4-19.1, approximately 5 miles from where the proposed road construction would take place, which has been effective in keeping vehicles out, including OHVs. The road would continue to be closed after project implementation. Therefore, it is highly unlikely that the extension of road 39-4-20 would result in the alleged activities.

Comment #15: Proposed skid T38S-R4W-S20 (unit 20-1) would not be developed on an existing footprint and would severely impact a relative intact oak woodland and area of native grassland.

The proposed skid trail in unit 20-1 does cross through very small patch of oak woodland. It is not possible to avoid all oak woodland patches and still provide access to unit 20-1. While ground disturbance may occur, it is likely that few, if any, small oak trees would be removed. As per project guidelines, large or exceptional hardwoods would be protected (Appendix A). The REA discussed the impacts associated with skid trails (pp. 3-50 to 3-53, 3-69 to 3-72, 3-80, and 3-135).

Comment #16: The EA fails to analyze that treatments will result in increased solar radiation, air movement, and dense understory, thus increasing fire hazard.

Response*:* Altered micro-climate as a result of canopy reduction was analyzed in the REA (pp. 3-30 and 3-31). The REA concluded there is minimal difference in fuel moistures between existing and post-project conditions.

Depending on site conditions the response of vegetation from proposed treatments, including gaps, will vary dramatically. See Comment Response #8 for more details.

Comment #17: In light of the BLM's inability to adequately fund and eradicate noxious weeds, the disturbance of over 1,200 acres of commercial units, many miles of road renovation, and the construction of new roads, skid trails and tractor swing trails is faulty and insufficient, especially given the long term potential irreversible impact of noxious weed spread.

Response: The assumption that BLM inadequately funds the treatment of noxious weeds is incorrect. The REA makes no such assertion. The REA concludes that implementing the Project Design Features and continuing weed treatments, such as those described in the REA, eliminates small infestations and decreases larger ones (REA, p. 3-133). Overall weed density and cover has decreased since treatments in the project area were initiated two years ago which is consistent with the Medford District Resource Management Plan (RMP) (p. 92) that states to "contain and/or reduce noxious weed infestations on BLM lands using an integrated pest management approach.

Comment #18: The EA has not adequately analyzed impacts to the primary constituent elements (PCE) of northern spotted owl habitat, specifically large snags, live trees with deformities, multi-layered canopies, trees greater than 20 inches, and downed wood.

Response*:* The REA describes the PCE for the northern spotted owl to include multi-layered, multispecies canopies with large (greater than 20 inches DBH) overstory trees, large snags, live trees with deformities, and downed wood (pp. 3-97 to 3-98).

All non-hazardous snags would be retained, and if felled, are to be retained on site as large down wood; coarse, woody debris would be retained and protected from logging and burning operations to the extent possible; no broadcast burning would occur in NRF habitat, and large, green broken-top trees and large snags with loose bark would be retained (REA, pp. 2-39, 2-40, and A-1). Therefore, it is reasonable to conclude that the project would retain sufficient amounts of large snags and downed wood.

Prior to identifying stands for treatment, about 5,200 acres (36% of the analysis area) with the most valuable and complex habitat identified as Late Successional Emphasis Areas (LSEA), late successional complex definition under Recovery Action 32, and Northwest Forest Plan Reserves related to old-growth and northern spotted owl habitat was set aside (REA, p. 1-2, 3-108 and 3-112 to 113). Thus, the context for the REAs analysis on the primary constituent elements of northern spotted owl habitat was on the remaining less valuable and less complex owl habitat.

The US Fish and Wildlife Service concluded that the Pilot Thompson Project will not result in destruction or adverse modification of critical habitat, which is determined at the Unit or range-wide scale, nor will it reduce critical habitat's contribution to recovery of the spotted owl (USDI FWS 2013).

Comment #19: The impacts of the Barred Owl are not sufficiently analyzed.

Response*:* A more detailed analysis of effects of Barred Owls on Northern Spotted Owls is included in the Revised EA (pp. 3-94, 3-111 to 3-112).

Comment #20: The EA has not adequately analyzed the impact of severe canopy and basal area reduction on northern spotted owl habitat.

Response*:* The project's impact on the northern spotted owl is discussed in the Revised EA (pp. 3-106 to 3-113). The project would result in either 152 acres (Alternative 2) or 244 acres (Alternative 3) of nesting, roosting, and foraging (NRF) downgrade, meaning such habitat becomes dispersal habitat after the proposed treatment. This represents less than one percent (0.08) of the Applegate Watershed (USDI FWS 2013, p. 52). Because the majority of the physical structure of the habitat in the treatment areas would still be present after implementation, the effects are mostly to changes in canopy cover and the understory composition. Downgrading up to 244 acres of NRF habitat is considered to be a short-term effect with long-term benefits for the following reasons: (1) only 0.08% of the total NRF habitat in the Applegate Watershed would be downgraded; (2) the project was specifically designed to retain all high-quality NRF habitat (RA-32), (3) the project strategically located and would retain habitat generally used by known owls (2,036 acres of Late Successional Emphasis Areas); (4) treatments would result in greater stand resiliency resulting in more structurally complex future stands; and (5) treatments would increase growth rates of residual trees resulting in larger, future old-growth.

Comment #21: Impacts to northern spotted owl prey species will be significant.

***Response**:* The Revised EA discusses impacts to owl prey species on pages 3-108 to 3-109. Implementation of Project Design Features that would retain and/or place large down wood while also retaining snags in the treatment units will provide cover for prey species, and will help minimize harvest impacts to prey habitat. In addition, the project will retain 10% of the handpiles of slash to provide habitat for woodrats (REA, p. 2-43).

The Biological Opinion concludes that while the availability of flying squirrels will diminish both short and long-term, woodrat populations will continue to be available to owls. The Service also noted the skips in the harvest units will provide refugia for spotted owl prey species (USDI FWS 2013, p.59).

Neither theR EA nor the Service concluded the impacts to prey species to be significant.

Comment #22: The EA provides no quantitative analysis of the project's impacts on fisher populations or the connectivity of habitat provided post-harvest. The BLM did not survey for fisher denning sites. Design features to mitigate impacts to fisher are not identified. This constitutes an insufficient and faulty analysis.

***Response**:* BLM manages habitat, not populations. The Revised EA discusses the impacts to fisher on pages 3-114 to 3-116. The REA notes that the best tool for determining suitable fisher habitat is to use the spotted owl habitat models because nesting, roosting, foraging (NRF) habitat can contain similar decadent attributes or structural elements that fisher use for denning and rest sites (REA, pp. 3-100 and 3-114). While two (2) percent of NRF habitat within the analysis area is proposed for treatments, areas such as Riparian Reserves, NSO RA-32 habitat, 100-acre KSOAC owl cores, LSEAs, and other designated reserves will continue to provide undisturbed habitat for fishers.

The BLM is not required to survey for fisher; however, fisher presence and absence surveys using baited camera stations and hair snares have been conducted in portions of the Applegate River watershed and in the analysis area. Fishers were detected at camera stations in the analysis area. The habitat within the Pilot Thompson project area and analysis area is likely used for all stages of fishers' life history (i.e.: foraging, resting, dispersing, reproduction) (REA, p. 3-100).

There are Project Design Features that were included to minimize impacts to fishers. These include the retention of key structural elements such as mature and decadent trees, snags, CWD, mistletoe, and large hardwoods for denning.

There are no models for quantitatively analyzing fisher habitat connectivity. Consistent with the strategy outlined in the Northwest Forest Plan, the Medford District RMP noted that the reserves that comprise nearly ¾ of the forested lands on the Medford District were designed to provide habitat connectivity (USDI 1995, p.21). Therefore, the limited amount of NSO downgrade (up to 244 acres in scattered units) does not compromise the reserve network and function of the habitat connectivity designed in the Northwest Forest Plan.

Comment #23: Effects on wildlife corridors recommended in the Middle Applegate Watershed Analysis have not been analyzed. The EA also fails to show how connectivity between LSEAs will be facilitated, as well as between Thompson Creek and Carberry Creek watersheds.

***Response**:* Watershed Analysis is not a decision making process. Rather, Watershed Analyses provides information and non-binding recommendations for agencies to establish the context for planning and project design (REA, p. 1-11). The need for wildlife corridors identified in the recommendations of the Middle Applegate Watershed Analysis in the project planning and design have been considered in the Revised EA (p.3-108).

The watershed analysis recommends the use of "appropriate silvicultural prescriptions to maintain forested timber stands within and between adjacent watersheds" in the wildlife corridor represented by sections 9, 10, 11, 12 and 16 in Township 39 South, Range 4 West near Tallowbox Lookout (p. 97). Units 9-1, 9-2 and 9-3 (38

acres) are located in the northern portion of section 9 in that recommended wildlife corridor. Applying the silvicultural prescriptions proposed in the REA for these units would result in sufficient stand densities to maintain and enhance forested timber stands. No other treatments are proposed in the recommended wildlife corridor. The majority of sections 9 and 10 are comprised of a 523 acre Late Successional Emphasis Area (LSEA), an area of dense forest conditions where succession continues uninterrupted by active management that provides fairly contiguous blocks of mature and late-successional habitat.

Moreover, the Medford District RMP provides for connectivity via Riparian Reserves; "The Riparian Reserves will also serve as connectivity corridors among late-successional reserves" (USDI 1995, p. 26). The LSEAs, coupled with Riparian Reserves, NSO NWFP core areas, Survey and Manage species buffers, and other reserve areas, will provide wildlife corridors across a significant portion of the project area. For these reasons, the connectivity recommended in the watershed analysis will be maintained.

Comment #24: Dr.'s Franklin and Johnson and the BLM incorrectly assume that fuel reduction logging can provide net benefits to spotted owls.

The Dr.'s Dry Forest restoration strategy does not simply focus on fuels reduction, but rather focuses on conserving and improving the survivability of older trees, increasing resistance/resilience of forest stands, and accelerating the development of structural complexity and diversity.

The USFWS stated in their recent Biological Opinion for the Pilot Thompson Project that:

> Potential benefits from the proposed action are anticipated. For example, treatments in younger homogenous forest stands are anticipated to accelerate the development of these stands into spotted owl NRF habitat. Dry Forest Restoration Principles, as opposed to traditional silviculture, are being applied, which is likely to result in forest vegetation conditions that are both resistant and resilient to disturbances, such as wildfire. Additionally, the District is attempting to locate treatments around Late Successional Emphasis Areas (LSEAs) so as to provide a measure of protection to existing high value, late seral (spotted owl) habitat in the LSEAs by reducing the potential impacts of high severity fire activity in the LSEAs (USDI FWS, p. 60).

Comment #25: The EA did not explain the need to manage for abundant dead wood (one of the specified PCEs) in owl critical habitat. This will require retention of all large and most medium sized trees.

***Response**:* The RMP (pp. 73-75) provides standards for recruitment and retention of abundant dead wood through retaining specified amounts of down wood and snags. The silvicultural prescriptions for the Pilot Thompson Project were designed to create conditions that are favorable for the initiation, creation, and retention of snags, down wood, large vigorous hardwoods, and understory vegetation diversity in areas where these are lacking (REA, pp. 2-25, 3-108, 3-109). The REA included specific Project Design Features to address the need to manage for abundant down wood (p. 2-41 and 2-43).

Comment #26: Extensive thinning in Riparian Reserves will likely capture too much mortality and violate the ACS requirement to maintain natural rates of wood recruitment.

***Response**:* Thinning in Riparian Reserves would be focused on select young to mid seral stands to reduce stand density and acquire desired vegetation characteristics. Treatments would consist of cutting small diameter conifers (generally less than 14 inches diameter), non-riparian hardwoods, and shrubs (REA, p 2-28). Treatments would occur in non-perennial streams (for example, with stream depths of 3-4 inches and 18 inch-wide channels (REA, p. 3-80) and outside of a 50-foot no treatment buffer, which would be maintained for filtering runoff, protecting habitat for riparian-dependent species, and maintaining large wood for distribution to downstream fish-bearing waters (REA, p. 2-28). The treatment would result in fuels removal in patches, while thinning lower and middle tree layers to accelerate development of a mature multi-layered stand structure.

According to the Middle Applegate Watershed Analysis (p. 48), there are approximately 986 stream miles in the watershed including 46 miles of fish-bearing streams and 940 miles of permanently flowing non fish-bearing

and intermittent streams. This equates to approximately 24,000 acres. Pilot Thompson is proposing treatment on 83 acres, or 0.3% of the Riparian Reserves in the watershed.

Thus, there is no "extensive" thinning in Riparian Reserves to impact aquatic habitat and fish (REA p. 3-85). The REA appropriately concludes that the Aquatic Conservation Strategy objective #8 to provide for course woody debris sufficient to sustain physical complexity and stability is met (REA, pp. 3-91, 3-92).

Comment #27: Spotted owl habitat is growing and developing faster than owl habitat is being lost to fire which means aggressive fuel treatments will degrade far more owl habitat than will be degraded by fire.

Response*:* The Revised Recovery Plan for the Northern Spotted Owl notes that the greatest percentage of Federal land habitat loss was in Oregon, specifically the Klamath Province (almost 11%) due to wildfire (USDI FWS, p. B-7). The Plan also notes that no conclusions can be reached regarding habitat recruitment (USDI FWS, p. B-8). Thus, this comment is unsupported.

Comment #28: The EA notes that some haul routes are adjacent to critical habitat for Southern Oregon Northern California Coho, thus having significant impacts from hauling.

Response*:* The effects of haul on aquatic habitats, including Coho Critical Habitat, are discussed on pages 3-82 to 3-86 of the REA. The REA (pp.3-86) concludes because there is adequate vegetation filters and dust abatement PDFs, wet weather haul restrictions, the fact that most roads are paved or are well rocked, and that there are relatively few crossings over aquatic habitat, that any sediment inputs resulting from haul would be of insufficient magnitude and would occur at such a time to not meaningfully affect SONCC Coho or Coho Critical Habitat.

Comment #29: How can the EA analyze or disclose impacts when page 3-34 of the EA indicates that "at the discretion of the resource specialists, planned [fuel] treatments may be changed to better meet objectives outlined in this EA?"

Response: The very next sentence in the REA states: "Proposed changes will be limited to treatments and their anticipated effects analyzed under this REA" (p.3-34).

Comment #30: BLM's accounting of road density is flawed because temporary roads are not considered in the density calculation, and roads naturally closed are being counted as a road density reduction in a paper exercise.

Response*:* Road densities are a calculation of roads per square mile for the purpose of assessing general effects to hydrology. It is easy to confuse the accounting side of roads with the analysis of effects of roads.

The Ashland Resource Area has developed a standard approach for calculating road densities beginning with identifying all road segments in a project area whether they are system roads or not. A system road is one which BLM has determined to be a road needed for resource management. A road may have been identified as a system road decades ago, but is now determined to no longer be needed, or has high environmental impacts, if re-used, that it is more desirable to remove from the system. Therefore, there are overgrown roads, whose last use was many decades ago, that are still being accounted for as a road in the road density determination. Thus, road density is often overstated. So, yes, there is a paper exercise that occurs to remove roads from road density calculations. As you indicated, we have disclosed such in the REA.

Temporary roads are not counted in road density calculations because they are fully decommissioned or obliterated immediately after use, but the effects of permanent roads are considered (REA, pp. 3-42 to 3-49, 3-50, 3-69 to 3-71, and 3-80 to 3-82).

Comment #31: Many BLM closure devises have simply proven ineffective.

***Response**:* We acknowledge that it can be difficult to effectively close features associated with forest harvest; however, as a byproduct of adaptive management, this REA contains many PDF's that we believe will increase the effectiveness of closures (REA pp. 2-34 to 3-39).

Comment #32: There is no exemption in the Northwest Forest Plan for logging in the Riparian Reserves to demonstrate the restoration principles of the Pilot.

***Response**:* The RMP (p. 27) allows the application of silvicultural practices for Riparian Reserves to control stocking, reestablish and manage stands, and acquire desired vegetation characteristics needed to attain Aquatic Conservation Strategy and Riparian Reserve objectives. "Forest condition (forest health) restoration would be done where required to attain objectives of the Aquatic Conservation Strategy (USDI 1995, p. 195).

The REA concludes that the silvicultural prescriptions would improve species composition and structural diversity while meeting the ACS (REA, pp. 3-89 to 3-92).

Comment #33: Page 3-110 of the EA indicates that the BLM intends to log both NRF and Dispersal habitat within occupied spotted owl habitat "cores".

***Response**:* That is correct. There are approximately 158 acres of proposed treat and maintain of dispersal habitat and approximately 80 acres of proposed treat and maintain of NRF habitat and approximately 4 acres of proposed downgrade of NRF habitat in the two spotted owl Core Areas combined. Where downgrading would occur, the amount of NRF habitat would still be above thresholds after treatment (USDI 2013, p.36) (REA, p.3-108).

"The BLM has determined the maintenance of … NRF habitat associated with these projects is not likely to adversely affect (NLAA) northern spotted owls because:

- The conditions that characterize a stand as NRF would be retained following treatment.
- Removal of suppressed and dying trees and providing additional space to residual trees will aid their diameter and height, which should make the stand conditions better for owls as the stand recovers, vs. the overly dense pre-treatment condition.
- Canopy cover within treated NRF stands will be retained at or above 60 percent.
- Stands with a QMD of > 16 " DBH will maintain a basal area between 180-240 ft2/ acre in NRF (McKelvey 1) and between 150-240 ft2/acre in Foraging (McKelvey 2). The reduction of basal area will not be more than 20 percent and will depend on site specific information to ensure NRF, foraging, and dispersal stands will still function post treatment.
- Treated stands would be more suited to the water and light available to the site.
- Decadent components important to owls such as large snags, large down wood, and large hardwoods would be retained." (USDI 2013, p. 38)

"The BLM has determined that the maintenance of 2,657 acres of dispersal habitat associated with these projects may affect, but is not likely to adversely affect (NLAA) northern spotted owls because:

- Canopy cover in treated stands will be maintained at 40 percent and would continue to function as dispersal habitat.
- These treatment acres would be expected to continue to provide dispersal opportunities post-treatment and may improve the flying space of the post-treatment dispersal.
- The proposed treatments will be dispersed throughout the watersheds to minimize the potential for adversely affecting spotted owl dispersal.

- Decadent components important to owls such as large snags, large down wood, and large hardwoods would be retained." (USDI 2013, p. 38)

Comment #34: The areas where bureau sensitive (BSS) bat species habitat loss will occur, the amount of habitat loss, the amount of local disruption to bat populations, and the population dynamics of the BSS species are not disclosed or analyzed.

***Response**:* The BLM manages habitat, not populations. The REA (p. 3-116) acknowledged disruption to this species and concluded there is minimal effect because snags and decadent wildlife trees would be retained, mines would be buffered, and Riparian Reserves, 100-acre spotted owl KSOAC cores, NSO Nest Patches, and other reserves, would continue to provide undisturbed habitat for these sensitive bat species.

Comment #35: The point of skips is to exclude an area that would normally have been harvested, not exclude an area with no commercial timber and little cover so you can justify "gapping" a timbered area. This is inconsistent with the principles of Norm and Jerry and a failure to demonstrate them.

The REA clearly identifies one of the elements of the Variable Density Thinning prescription is to leave **skips** (+/-15 percent of the treatment area) to provide dense/shaded forest patches as habitat, hiding cover, and visual barriers; **and** ecologically significant patches, such as seeps, rock outcrops, and hardwood groves (p. 2-27) .

During the field trip to Pilot Thompson on May 23, 2013, Dr.'s Norm Johnson and Jerry Franklin both stated that skips indeed include natural openings and vegetation not normally included in a timber sale harvest. They explained that the intent of skips is to increase heterogeneity, provide hiding cover, provide for cooler/moister areas, and protect biologically diverse areas. They noted that there should be a blend of dense patches of forest and other non-forested vegetation types, depending on what exists on the landscape and what is unique to the stand. The skips in Pilot Thompson are a mix of both timber and non-timber vegetation, and are therefore consistent with the Norm and Jerry principles.

Comment #36: Adversely affecting the NSO is another failure fulfilling the objectives of the Pilot.

Adverse can mean a wide range of things in relation to spotted owl effects determination. The USFWS stated in their recent Biological Opinion for the Pilot Thompson project that:

> It is the Service's opinion that the downgrading of 388 acres of NRF habitat will have an adverse effect on spotted owls in the action area by negatively impacting breeding feeding and sheltering. However, the Service does not anticipate harm to occur to spotted owls because four sites (2396O, 3384O, 3560O and 4064) will retain sufficient habitat post treatment. Additionally, current surveys at the other sites indicate non-occupancy of spotted owls and/or if project surveys locate resident spotted owls, the District will modify the proposed action so no harm to spotted owls will occur, or will reinitiate consultation with the Service.
>
> Potential benefits from the proposed action are anticipated. For example, treatments in younger homogenous forest stands are anticipated to accelerate the development of these stands into spotted owl NRF habitat. Dry Forest Restoration Principles, as opposed to traditional silviculture, are being applied, which is likely to result in forest vegetation conditions that are both resistant and resilient to disturbances, such as wildfire. Additionally, the District is attempting to locate treatments around late successional emphasis areas (LSEAs) so as to provide a measure of protection to existing high value, late seral (spotted owl) habitat in the LSEAs by reducing the potential impacts of high severity fire activity in the LSEAs (USDI FWS, p. 60).

The Dr.'s Dry Forest restoration strategy focuses on conserving and improving the survivability of older trees, increasing resistance/resilience of forest stands, and accelerating the development of structural complexity and diversity. Though some of the treatments would have short term impacts, these are all factors that benefit the spotted owls in the long term.

Comment #37: Because of the harvest about 15 years ago, most of the commercial units are not "crowded" or densely treed. Many are open grown with wide open spaces between trees, not overly dense unmanaged forests. This is a violation of the Franklin and Johnson principles.

***Response**:* It is correct that a number of stands proposed for treatment are not overly dense. The objectives of Drs. Franklin and Johnson's principles not only include a reduction of forest density, but also the restoration of species and structural diversity. The stands treated about 15 years ago are homogenous in size and structure, and almost exclusively Douglas-fir. Proposed treatments will increase both species and structural diversity by allowing space for new trees to become established and grow, providing the understory that was removed in past harvests.

Another over-arching objective of the Franklin and Johnson principles is that prescriptions should "develop spatial heterogeneity within stands (e.g. fine-scale structural mosaic)," thus encouraging the development of multi-story and multi-aged stands (REA, p. 2-25). Forest stands were inventoried in both upland and riparian zones and showed high average relative density levels above the critical threshold (RDI 0.55), which leaves stands more vulnerable to disease and insect threat (REA, p. 3-6, 3-13). Stand exams also indicate that these stands are dominantly even-aged and homogenous in stand structure and species composition.

Comment #38: The building of new roads and "restoration" do not go together.

Response: On the May 23 field trip, Dr.'s Norm Johnson and Jerry Franklin stated that road building is consistent with their principles simply because sometimes additional access is needed to treat a stand. They also noted that Pilot Thompson has a net reduction of roads.

Comment #39: Road "renovation" is misleading and is the same as new road construction and all its inherent issues, as illustrated by the re-opening of road 38-4-20.1.

***Response**:* The impacts associated with road renovation and road construction are very different. Road renovation describes the need to do more than just road maintenance work to prepare the road for use in the project. Renovation of roads would include reshaping the road with a blade, brushing, and restoring water drainage (REA, p. 2-9). Road construction would entail a much higher level of vegetation removal than road renovation. In addition, rather than just blading the road, new construction would involve cutting into the bank and pushing soil downslope, which results in higher levels of ground disturbance.

The fact that the road has a number (38-4-20.1) indicates it is a system road. The BLM does not distinguish between a system road that is open and being used or a system road that is closed and has vegetation overgrown in describing its effects on the landscape. BLM has accounted for all system roads in the REA and has considered the effects of the proposed road construction and road renovation (REA, p. 3-18, 3-38, 3-42 to 3-52, 3-58 to 3-59, 3-68 to 3-72, 3-80 to 3-82, 3-110 to3-111, 3-113 to 3-116, 3-131, 3-133 to 3-134, 3-146, and 3-148 to 3-150).

Comment #40: The EA does not address the recent Goff Fire in the No Action Alternative.

***Response**:* To begin, the Goff Fire occurred outside the planning area (watershed boundary) and is therefore outside the scope of this project. However, even if the Goff Fire did occur in the planning area, the Burned-Area Report would not be relevant to the analysis of the proposed action or the no action alternative. A burn severity report examines the severity of a wildfire to the soil of an area that burns. All wildfires burn differently depending on the time of year the fire burns and the climatic conditions present when a fire burns. You cannot take a burn severity report and conclude that if a wildfire burns in another area that the burn severity would be the same. Also, there is nothing new in the Burned-Area Report for the Goff Fire that contradicts the analysis of fire behavior in the Pilot Thompson planning area.

Comment #41: The EA does not disclose what chemicals are produced with the burning of polyethylene plastic; disclosure is required in an EIS.

***Response**:* The REA (p.3-33) states that Jung et al. (2009) concluded that no increase in any hazardous chemical species as a function of low density polyethylene was found. Commenters have suggested that Kraft Paper should be used in place of polyethylene plastic to cover the burn piles. Combustion studies involving lignocellulosic materials suggest that uncoated Kraft Paper may produce some of the same substances as polyethylene (Garcia et al. 2003). It also states that from an operational standpoint, Kraft paper is a more expensive, less durable, and less effective means of minimizing moisture intrusion into the pile because of its tendency to degrade more rapidly than polyethylene. In turn, fuel moisture is increased, combustion efficiency is reduced, and more accelerants may be needed for pile ignition.

The determination of whether or not to prepare an EIS rests on whether the proposed major federal action will have a significant effect on the quality of the human environment (42 U.S.C. 4332(2)(C)). One element that is weighed in determining significance is the intensity, or severity of the potential impact (40 C.F.R. 1508.27(b)). The degree to which the effects are likely to be highly uncertain, or to involve unique or unknown risks, is one factor in that analysis (40 C.F.R. 1508.27(b)(5)). NEPA does not require certainty, even in an EA, only a 'hard look' at the possible environmental impacts. The BLM takes a "hard look" when the NEPA document contains a "reasonably thorough" discussion of an action's environmental consequences, and the agency can make an informed decision about whether there are any significant environmental impacts.

Comment #42: The analysis and disclosure of impacts to Great Gray Owls is inadequate due to unsupported conclusions and guesswork – BLM does not know where GGOs are located in the project area.

***Response**:* The BLM conducted surveys as required for GGOs in and surrounding all Pilot Thompson proposed units that contain or are in proximity to GGO habitat (REA, p. 3-98). All known GGO Known Sites are protected as required by the NWFP Survey and Manage guidelines. The BLM is not required to locate all GGOs within a given project area.

Comment #43: The EA does not disclose the location of Great Gray Owl sites, Pacific fisher denning sites, or high priority sites for the Siskiyou Mountain Salamander.

***Response**:* The BLM is not required to disclose exact locations of wildlife species in EAs.

Comment #44: The analysis for impacts on the Elk Management Area is insufficient; the EA contains no site specific information, data, or analysis.

***Response**:* The REA (pp. 3-118) addressed the impacts on the Elk Management Area as follows:

> Under Alternative 2 approximately 464 acres would be treated within the Elk Management Area. No new road construction would take place within the Elk Management Area. Current road density on BLM ownership within this Elk Management Area is 2.19 miles per square mile. This exceeds the RMP target of 1.5 miles per square mile. Approximately 1.5 miles of existing road within the Elk Management Area would be decommissioned.
>
> Under Alternative 2, the BLM proposes to maintain about 45 miles of roads (i.e., road grading, rock surfacing, and water drainage improvements). Approximately 0.62 miles of new road would be constructed under Alternative 2, of which 0.25 miles would be temporarily constructed and decommissioned at the completion of the project. Additionally, 2.55 miles of road would be decommissioned under Alternative 2. There are a number of ways roads affect wildlife in addition to habitat removal during the construction process. Some of the more common ones are vehicular noise disturbance which affects behavior patterns, increased potential for poaching, increased potential for over hunting along roads due to easy access, and microclimatic changes to the habitat adjacent to roads. Road maintenance has the potential to influence wildlife species through noise, but would be of short duration and subject to wildlife seasonal PDFs. Effects to big game as a result of project implementation are expected to be minimal and no significant cumulative effects are anticipated to these species.

Comment #45: The prescriptions for non-commercial units fail to incorporate dry forest restoration principles.

Response: The REA clearly states the objectives of the non-commercial prescriptions are to maintain a multi-layered mix of conifer, hardwood, and shrub species appropriate to the plant series, reduce understory vegetation density, and maintain and enhance vegetation diversity. Understory vegetation density would be reduced by cutting and spacing trees. Vegetation diversity would be obtained by maintaining species occurring at low frequencies in the stand (i.e. incense cedar, sugar pine, white oak, black oak). Density Management would increase tree growth rates promote horizontal and vertical structural diversity in stands and capitalizes on existing stand diversity to promote further stand diversity over time (pp. 2-28 to 2-29). The REA concludes that non-commercial prescriptions would reduce stand densities, and tree growth and vigor would improve by reducing competition for limited site resources, thus increasing the resiliency of stands (p. 3-17). These outcomes are consistent with dry forest restoration principles.

Comment #46: There has been insufficient public involvement during the planning process; there has been a remarkable decrease in opportunities for public involvement compared to Pilot Joe.

Response*:* During the Pilot Joe planning process, there was one scoping period where we sought public input (April 2011); two public field trips (March and May 2011); and four public meetings and/or workshops (March and June 2011). All issues and concerns that were raised during the public involvement process for Pilot Joe were carried forward and incorporated into the Pilot Thompson Project.

To date, the Pilot Thompson planning process has included two scoping periods where we have provided opportunities for the public to comment on the project (September 2011 and April 2012); we have co-hosted six field trips (November 2011, September and October 2012, March, April, and May 2013); we have co-hosted four public meetings; we have participated in 2 neighborhood meetings in the Thompson Creek area; and we sent an update letter to interested parties that outlined the preliminary proposed action alternatives prior to the EA being published. All planning documents, including interdisciplinary team meeting notes, public comment letters, maps, and field trip and public meeting information has been posted to the Pilot website (http://www.blm.gov/or/districts/medford/forestrypilot/pilot-projects.php) in a timely manner. In addition, three members of the public were invited to participate on the IDT this year, rather than only one for the Pilot Joe project (REA, p. 1-12 to 1-14).

Therefore, it is very clear that the Pilot Thompson planning process has provided a remarkable **increase** in public involvement opportunities compared to Pilot Joe.

Comment #47: Waiving seasonal wet weather haul restrictions renders the restrictions meaningless and prevents reasoned analysis of project impacts.

Response*:* The REA states that hauling would be allowed on natural surfaced roads from June 15 to October 15; and from May 15 to November 15 on surfaced roads with at least 6 inches of pit-run rock or 8 inches of crushed rock. An extension of these dates may be permitted by the Authorized Officer with a conditional waiver depending on weather, soil moisture, and surface condition of the roads (p. 2-37). The extension simply allows for flexibility in dates; circumstances would still need to meet dry season conditions.

Comment #48: The EA does not disclose the location and impact of yarding corridors that cross riparian features.

Response*:* Project Design Features call for minimizing yarding corridors within Riparian Reserves (RR) and requires full suspension of logs across all stream channels (REA, p. 2-35). Within Riparian Reserve Thinning units, trees would be directionally felled and end lined out of the unit () from the road (pp. 3-79, 3-80). No ground based equipment would be permitted off of roads within RR. There is one exception where a designated skid trail is proposed within the RR (Unit 25-3). The impacts were described and evaluated in the REA (pp. 3-51 to 3-53, 3-70, and 3-80).

Comment #49: The implementation monitoring described in the EA is inadequate for an adaptive management project.

Response: The monitoring section was updated in the Revised EA to better reflect the monitoring efforts that are underway with the Middle Applegate Watershed Pilot (REA, p.2-48 to 2-51).

Comment#50: The EA did not consider the potential impacts of fuels treatments on spotted owls.

Response: The effects of Fuels Reduction Treatments on Northern Spotted Owl were addressed in the REA (p. 3-110).

LIST OF SCIENTIFIC REFERENCES SUBMITTED WITHIN EA COMMENTS:

Rather than address each scientific reference submitted within the content of EA comments, the BLM has reviewed the articles and where applicable, has incorporated or considered the relevant information in the Pilot Thompson Project analysis.

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