United States Department of the Interior

BUREAU OF LAND MANAGEMENT
Medford District Office
3040 Biddle Road
Medford, Oregon 97504
email address: Medford_Mail@blm.gov

IN REPLY REFER TO:

1792 (ORM060)

JUN 24 2011

Dear Interested Public:

The attached *Environmental Assessment* (EA) for the Pilot Joe Demonstration project is available for public review. The review provides the public with an opportunity to comment on the Bureau of Land Management's (BLM's) proposed action and the analysis of the effects of the action. A decision document will be issued after the comments have been received and reviewed. The public review period ends on July 27, 2011.

The Pilot Joe Demonstration Project is one of three Secretarial Pilot Projects intended to accomplish several things.

The first purpose of the project is to demonstrate the application of ecological forestry principles brought forward by Drs. Jerry Franklin and Norm Johnson. The intent of these principles is to move current forest conditions toward desired conditions that include the maintenance of older trees, restoration of characteristic structure and composition, and increased heterogeneity.

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.

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

The BLM, Ashland Resource Area, proposes to implement the Pilot Joe Project, by treating 899-acres of vegetation using the methods outlined in detail in the EA. A short section (0.4 miles) of existing road, 39-4-1.1, would be decommissioned. Maintenance of existing roads would take place as part of this project. No new road construction is proposed.

Many of you have participated in field trips, meetings or by providing written comments concerning this project. The development of and changes to the Pilot Joe Demonstration project were influenced directly by comments and concerns that we heard from interested citizens.

During the review period, we welcome your comments on the content of the EA. We are particularly interested in comments that address one or more of the following: (1) new information that would affect the analysis, (2) information or evidence of flawed or incomplete analysis. Prior to making my decision on this project, my staff and I will consider all pertinent site specific comments. Comments that clearly articulate site specific issues or concerns are most useful to us.

Before including your address, telephone number, email address, or other personal identifying information in your comment, be advised that your entire comment, including your personal identifying information, may be made publicly available at any time. While you can ask us in your comment to withhold your personal identifying information from public review, we cannot guarantee that we will be able to do so.

Comments are due by 4:30 PM, July 27, 2011.

All comments should be made in writing and mailed or delivered to Pilot Joe Demonstration Project, Stephanie Kelleher, Ashland Resource Area, 3040 Biddle Road, Medford, OR 97504.

Further information on this proposed project is available at the Medford District Office, 3040 Biddle Road, Medford, Oregon 97504, or by calling Ed Reilly at (541) 618-2497.

Sincerely,

John Gerritsma
Field Manager,
Ashland Resource Area

Enclosure

ENVIRONMENTAL ASSESSMENT
for
PILOT JOE DEMONSTRATION PROJECT

U.S. DEPARTMENT OF THE INTERIOR
BUREAU OF LAND MANAGEMENT
MEDFORD DISTRICT
ASHLAND RESOURCE AREA

DOI-BLM-OR-M060-2011-0016-EA

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

Public notice of the availability of this EA was provided through advertisement in Medford's *Mail Tribune* newspaper.

UNITED STATES

DEPARTMENT OF THE INTERIOR

BUREAU OF LAND MANAGEMENT

MEDFORD DISTRICT

EA COVER SHEET

RESOURCE AREA: Ashland

ACTION/TITLE: Pilot Joe Demonstration Project

EA NUMBER: DOI-BLM-OR-M060-2011-0016-EA

LOCATION: T.38 S. R.3 W., Sections 29,31,32; T.38 S. R.4 W., Sections 22, 25-27,34,35; T.39 S. R. 3 W., Sections 5-7; T.39 S. R.4 W., Sections 1,2,11,12, Willamette Meridian, Jackson County, OR.

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CHAPTER 1 - PURPOSE AND NEED

1.0 Introduction to the Secretarial Pilot Demonstration Projects

The Secretary of Interior designated Pilot Demonstration Projects in 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)*). Part of the intent of his designation of these projects was to help inform long-term planning of BLM O&C lands.

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. Restoration of ecosystems at the stand and landscape scale are a primary focus, rather than singular goals, such as fuel and wildfire abatement, timber production, or wildlife habitat.

The Secretary of Interior and the Oregon Congressional Delegation have expressed a deep need to break existing administrative and legal gridlock in order to move forward with ecosystem restoration **and** with economic recovery in southwest Oregon. As such, the Secretarial Pilot Demonstration Projects would serve to illustrate the various principles and tools of restoration to aid in gauging whether or not broader social support for active management can be achieved.

The BLM will provide opportunities for direct participation by a broad array of interested members of the public, tribal interests, collaborative bodies such as the Applegate Partnership, Southern Oregon Small Diameter Collaborative, and other local partnership organizations. These opportunities involve both facilitated meetings and site visit/working sessions to help build community involvement, and provide for open community dialog on application of the ecosystem restoration principles of Drs. Franklin and Johnson. An important element in these pilots is to make the entire community of stakeholders aware that there are ecological and economical alternatives to the contrasting allocation-based alternatives of preservation and intensive even-aged management for wood production.

1.1 Purpose for the Secretarial Pilot Demonstration Projects

The Secretarial Pilot Demonstration Projects are 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 Section 1.4 for more detail).

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. The Secretarial Pilot Demonstration Projects are also intended to help to inform deliberations around sustaining regional forest workforce and wood products manufacturing capacity and the potential of these efforts to provide revenues for county government

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.

1.2 Need for the Secretarial Pilot Demonstration 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 EA for Dry Forest Silvicultural Prescriptions). There are potentially three Pilot Projects, one each in the Roseburg, Coos Bay and Medford Districts. The Medford Pilot is exclusively in the Dry Forest type.

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 2010 draft revised Northern Spotted Owl Recovery Plan, 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. 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.

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. That is, the pilot projects would serve to demonstrate the various ecosystem restoration principles and tools, and help gauge whether or not broader social support for active management and the approach of allocating lands to one primary purpose or another (reserves or intense wood production) can be developed.

1.3 Pilot Evaluation

An evaluation of each demonstration project would be conducted with participation of interested members of the public. The evaluation would be framed around how well each demonstration project addressed the purposes and needs expressed above. Specific evaluation parameters would be developed collaboratively, but at a minimum would address the following general categories:

- How well did the demonstration conform to the intent to move current conditions toward the desired conditions? (see purpose one)

- 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? (see purpose two)
- Do interested members of the public see substantial impediments to a broader-scale application of the principles of ecological forestry as demonstrated through the pilot projects? (see purpose three)

1.4 Ecosystem Restoration Goals

Consistent with the first purpose stated above, the intent of applying ecosystem restoration principles developed by Drs. Jerry Franklin and Norm Johnson 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. The principles to be applied differ between Dry Forests and Moist Forests. The principles [were] used in the development of the silvicultural prescriptions for the stands, and the project design features for the proposed action.

Dry Forests

- 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 shifted tree species diversity.
- Restore more sustainable structure and composition by reducing stand densities and enhancing tree diversity, including 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 draft revised Recovery Plan for the Northern Spotted Owl.

2.0 Description of the Medford District Pilot Demonstration Project

As part of this broader effort, the Secretarial Pilot Demonstration Project in the Medford District BLM proposes to treat 889 acres of Dry Forest vegetation using various forest management methods described in detail in Chapter 2. The forest management 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 Watershed which covers approximately 80,000 acres. The Pilot Joe Demonstration Project has been planned within the south half of the Humbug Creek sub-watershed planning area and covers 7,536 acres or 11.8 square miles. BLM administered lands comprise about 5,010 acres within this area. The remainder, approximately 2,526 acres are held by private landowners. Jackson County land use planning data within the project planning area shows about 80% of the land is zoned forest resource, 7% woodland resource, and 13% exclusive farm use.

The project is on BLM administered lands within the Adaptive Management Area land allocation as defined in the Northwest Forest Plan and the Medford District BLM Resource Management Plan. Within

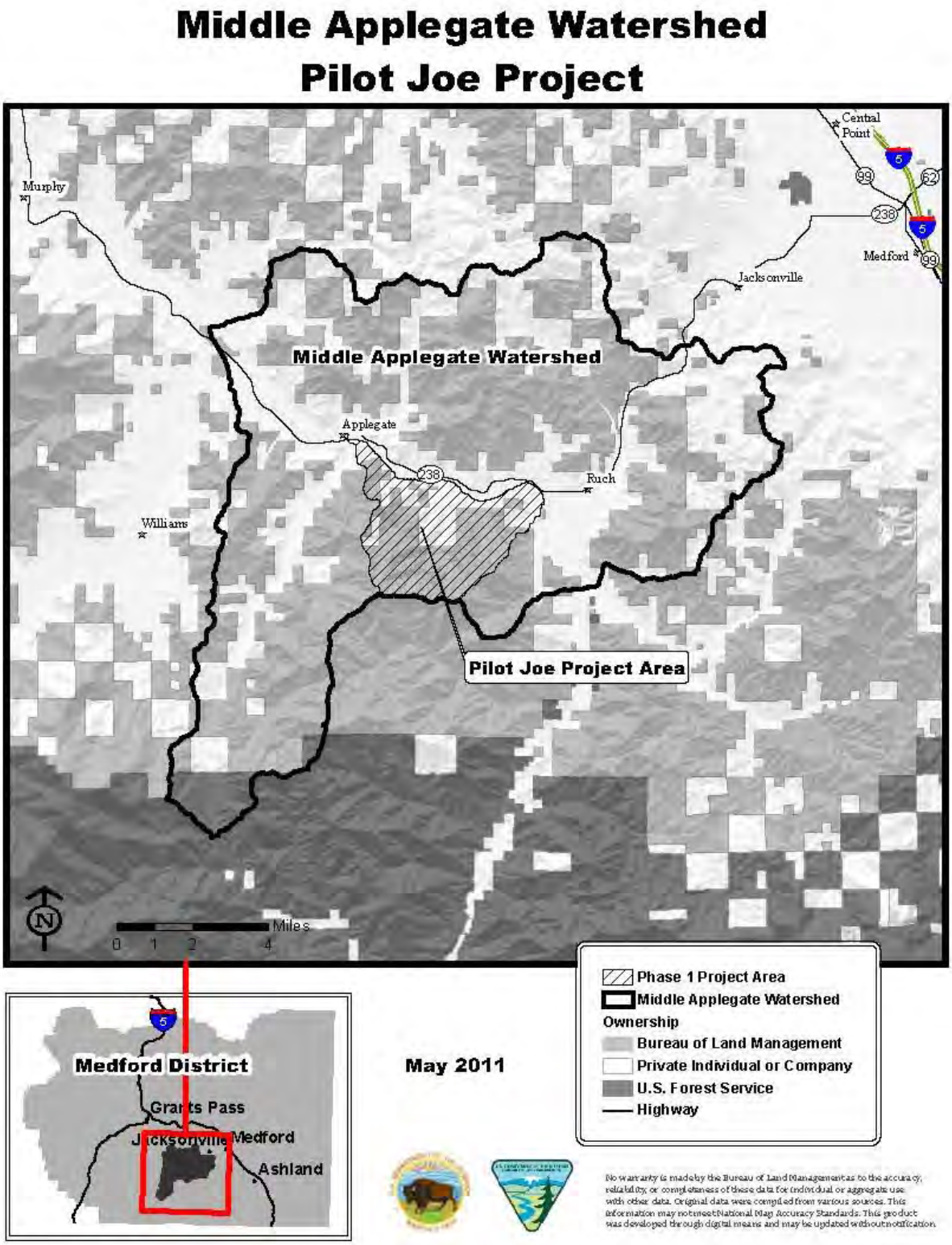
the BLM ownership, Oregon and California Lands (O&C) comprise 87% of the planning area with Public Domain (PD) at 13%. The project proposal would treat 711 acres of O&C and 178 acres of PD lands.

2.1 Medford District – Development of the Pilot Joe Demonstration Project

The Pilot Joe Demonstration Project has been planned and designed under the conceptual framework of the Dry Forest Restoration Principles as described by Drs. Jerry F. Franklin and K. Norman Johnson. The primary focus of this project is to provide a landscape demonstration of an approach that integrates ecosystem restoration, conservation of late successional habitat and recovery of the northern spotted owl. Specifically, the Ecosystem Restoration Strategy for the Medford District Pilot Project 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 critical Northern Spotted Owl habitat is at significant 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 will 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.

Figure 1-1. Vicinity Map – Pilot Joe Project



3.0 Decision Framework

This Environmental Assessment will provide the information needed for the responsible official, the Ashland Resource Area Field Manager, to determine if there would be significant effects of the proposed action and to select an alternative to be implemented for the Pilot Joe Demonstration Project

The responsible official will decide whether or not the impacts of the Proposed Action 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/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 a 30 day review period has ended. The decision record will document the responsible official's rationale for selecting a course of action based on how well the alternatives meet the purpose and need for action and the effects of the alternatives on resources and other resource uses.

4.0 Legal Requirements

4.1 Conformance with Land Use Plans

The forest management proposal 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). The 1995 Medford District Resource Management Plan was later amended by 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*.

Special Status Species

Special Status species are officially designated by the State director. The most recent Special Status Species list went into effect on February 7, 2008 (IM OR 2008-038). This new list has two categories, Sensitive and Strategic. The special status plant list for which surveys are conducted includes Federally-listed species, Bureau Sensitive and Strategic species (USDI, 2008), and Survey and Manage (S&M) Category A and C species (USDA, USDI 2001 S&M list). Bureau Strategic species do not require protection or effects analysis and therefore will not be addressed further in this document.

There have been several changes in the status of the Survey and Manage program over the past few years, including the publishing of the *Record of Decision to Remove the Survey and Manage Mitigation Measure Standards and Guidelines from the Bureau of Land Management Resource Management Plans Within the Range of the Northern Spotted Owl* (USDA, USDI 2007). On December 17, 2009, the U.S. District Court for the Western District of Washington issued an order in *Conservation Northwest, et al. v. Rey, et al.*, No. 08-1067 (W.D. Wash.) (Coughenour, J.), granting Plaintiffs' motion for partial summary judgment and finding a variety of NEPA violations in the 2007 Record of Decision. This decision resulted in a re-instatement the last valid 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) (USDA USDI 2001). Therefore, the Pilot Joe Project meets the provisions for the Survey and Manage species included under the 2001 ROD that occur within the planning area.

4.2 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.

4.3 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 Joe 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 Joe 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 in 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 serve 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/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 Joe Project Area falls within the Humbug Strategic Planning Area of the Applegate Fire Plan. Recommendations for the Humbug Strategic Planning Area include completing the thinning and fuel hazard reduction work in the Chapman and Keeler Creek drainages.

Applegate River Watershed Assessment: Aquatic, Wildlife, and Special Plant Habitat (USDI/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/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 are outlined in the AMA Guide provides an overview of the physical, biological and social setting of the Applegate Watershed and includes key questions and strategies or approaches for management.

5.0 Public Involvement & Scoping

Extensive outreach was made to provide the public information about the project as well as to solicit criteria to be used to build a project proposal that addressed public sentiment concerning how best to create a project to demonstrate the Franklin and Johnson restoration principles.

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 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 Joe Demonstration Project is to demonstrate the application of ecosystem restoration principles developed by Drs. Jerry Franklin and Norm Johnson.

5.1 Public Meetings and Events Addressing the Development of the Pilot.

Solutions for Forests: Active Management Perspectives for SW Oregon. (October 19- 21, 2010)

A three day conference attended by approximately 200 people was held to discuss federal forest management ideas. The first day consisted of a seminar addressing biology, ecology, community values, economics and the restoration of federal forest in SW Oregon. Franklin and Johnson made a presentation to introduce their concept of restoration principles. The second day was devoted to explaining the Franklin and Johnson restoration principles within the Pilot planning area. Landscape and stand level goals were addressed. A review of sample marked stands was conducted. A third day was dedicated to next steps to advance planning associated with ecological forestry.

Middle Applegate Pilot Informational Meetings (March 1 & 2, 2011)

The purpose of these public meetings was to introduce stakeholders to the Pilot: what it is, how it is to be implemented, and how stakeholders can be involved. The meetings were co-sponsored by the Applegate Partnership, Southern Oregon Small Diameter Collaborative, and the Medford District BLM. A brief presentation was given describing the community perspective, the congressional perspective, and the BLM perspective on the pilot project. A slide show presentation was shown to explain the why here, why now, providing meeting participants with some context for the project. Following the slideshow, BLM described how the public can participate and be engaged throughout the process. The remainder of the meeting consisted of a public input, recommendations, and questions and answers session. These meetings were held at the Applegate School and the Upper Applegate Grange on the evenings of March 1st and 2nd, 2011 and were attended by approximately 40 individuals. Notes from these meetings can be found on the Pilot's website.

Collaborative Workshop to Create Forest Restoration Selection Criteria (March 8, 2011)

This meeting was held at the Upper Applegate Grange on March 8th, 2011 and was attended by approximately 30 individuals. The main objectives of this workshop were to develop selection criteria that were used to create an initial pool of stands appropriate for restoration using Drs. Franklin and Johnson's restoration principles, and to develop additional "screens" that address ecological, social, and economic reasons for removing potential restoration stands from the "pool." The meeting began with a

brief overview of the process needed to achieve our goals and a brief review of Drs. Franklin and Johnson's restoration principles. The participants then divided into smaller groups to develop lists of criteria for selecting stands appropriate for restoration (*i.e. if walking through the woods, what triggers you to recommend a treatment to change a stand condition*). There was a discussion on what some of the "hard" screens, or conditions over which there is no discretion over its application are. A condition met under a hard screen would remove a stand from restoration treatment. Together, all participants then worked to develop a list of "soft" screens, or conditions which there is discretion as to its application. Discussion topics were varied and included, but was not limited to issues related to access, communication, the context of the project, economics, methodology and monitoring, old growth, and roads. Another objective of this workshop was to identify prioritization criteria to help BLM determine how much and how fast (when) stands appropriate for restoration would be treated. There was not sufficient time to complete this task. So, as a follow-up to address the preferences for prioritizing stands, an email was sent out to participants of the workshop to provide input on what selection criteria was most important to them. A summary of the results, as well as the selection criteria and soft screens discussion, was posted to the Pilot's website.

Public Field Trip to Demonstration Sites (March 19, 2011)

Approximately 45 individuals participated in this event. The day started with an informational meeting at the City of Jacksonville council chambers where Drs. Franklin and Johnson gave a presentation on the ecological approach to stand selection. A handout, The Applegate Dry Forest Restoration Marking Guide, was circulated, which identified the main objectives and elements of prescription for southern Oregon dry forests. Due to inclement weather, a few people opted out of the field trip portion of the day. Two sites were visited during the field trip. Both site locations were stands that had been selected using the criteria developed during previous workshops and meetings. A sampling of trees was marked in each unit so that participants could see how the marking guidelines would be implemented on the ground. Field trip evaluations were handed out to gain feedback on whether the treatment objectives were clear or if more information is needed, and on the general level of support for the project, and to provide an opportunity to make comments or suggestions. Six evaluation forms were returned and showed a general consensus that there are mixed feelings- they like some of the elements of the proposed treatments, but still have some concerns.

Public Field Trip to Review Stands/Trees Marked for Harvest (May 5, 2011)

The field trip began at 9:00 a.m. at the entrance to Cantrall-Buckley Park. After a brief introduction of the goals for the day, a brief presentation and questions and answers session with Dr. Norm Johnson, participants were taken to a forest stand to review the BLM's implementation of the Franklin marking guidelines. Dr. Loren Kellogg, a professor of forest engineering and timber removal systems was present to discuss equipment and project design related to timber removal and ecological forestry. A total of three sites were visited during the field trip; discussions were largely based around roads, logging systems and the mark. Approximately 45 people attended this field trip.

Public Workshop to Draft a Multi-Party Monitoring Plan (June 14, 2011)

A public workshop was held in to begin to develop a multi-party monitoring plan. The meeting was attended by approximately 23 individuals with a variety of interests. A summary of the group's initial monitoring approach and concerns can be found in the monitoring section in Chapter 2.

5.2 Scoping Letter

A scoping letter was sent to adjacent landowners and interested individuals, groups, and organizations on April 6th, 2011. 275 comments have been received to date, of which 267 of the comments were identical form letter e-mails generated by a web site that required filling in a name and clicking a button. Comments have been reviewed by BLM's Ashland Resource Area Field Manager, the project's interdisciplinary team, as well as by Drs. Johnson and Franklin. Scoping comments have been posted on the BLM Pilot website.

5.3 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 Joe project development and/or analysis. Other issues were also identified. Issues were also considered and addressed during project development (including project design features) and environmental analysis (documented in this EA in Chapter III).

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 EA 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.

Aquatic Systems: Hydrology, Water Quality and Fish
The Applegate River is in the project area and is listed as water quality limited as defined by the Oregon Department of Environmental Quality on the State 303(d) list. Non-point source pollution (sedimentation) from road construction and other ground-disturbing activities could further degrade the aquatic ecosystem (e.g., reduce water quality).

The main stem of the Applegate River is considered critical habitat for Coho salmon (listed as threatened under the Endangered Species Act (ESA) of 1973). Forest management activities could potentially increase sedimentation and negatively impact critical habitat.

Forest Health & Stand Density
Fire exclusion has resulted in dense vegetation throughout the project area. Dense stands are not vigorous (i.e., slow growth rates, competition for water, nutrients, and sunlight) and are more susceptible to insect infestation and high intensity wildfire. Shade intolerant plants such as ponderosa pine are declining in number. Large hardwoods are being overtopped and dying because of competition from encroaching Douglas-fir. Oak woodlands are being lost as shrub and conifer species come in and dominate sites resulting in decline in the health of oak trees.

Wildfire and Fuel Hazard
With effective fire exclusion of low intensity fire, the amount of vegetation (fuel loading) and consequent fire hazard continues to increase. When fires occur, they burn with more intensity and result in more damage. Thinning activities can temporarily increase fuel loadings and subsequent fire hazard for a short time period after treatments occur.

Wildlife
Forest management could affect late successional species such as northern spotted owl and fisher. Reductions in canopy closure could affect late-successional species' habitat and could affect dispersal. Management activities could result in localized, short-term noise disturbances affecting wildlife.

Special Status Animal Species
Special status animal species occur in the proposed project area and would need to be protected from project-related activities through buffers and/or seasonal restrictions appropriate to the species in question. Some species habitats are declining and would benefit from restoration activities.

Special Status Plant Species
Special status plant species occur in the proposed project area and would need to be protected from project-related activities through buffers appropriate to the species in question. Some species habitats are declining and would benefit from restoration activities.

Invasive, non-native plants
Non-native weed species are present in the proposed project area. Some kinds of soil disturbance could facilitate the spread of these species.

Off Highway Vehicle (OHV)
Use of the area by off highway vehicles has been a concern with some. While this is a legal use of public lands, there is concern that undue resource damage associated with OHV activity may occur.

Cumulative Effects
A series of land management actions occurring or planned on private, BLM, and Forest Service lands in the area may have impacts on the watersheds and its resources.

Air Quality
Concerns for management of smoke during prescribed burning operations and wildfires.

5.4 Middle Applegate Watershed Pilot Project Website

A website for the Middle Applegate Watershed Dry Forest Restoration 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 weekly updates. Comments can be made via the website as well.

To date, the BLM has posted all meeting notes and weekly information updates regarding the Middle Applegate Pilot on the Pilot's website. This includes 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/

CHAPTER 2 - ALTERNATIVES

1.0 Introduction

This Chapter describes the Proposed Action 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.

2.0 Alternatives Analyzed in Detail

2.1 Alternative 1 – No-Action

The No-Action Alternative describes a baseline against which the environmental effects of Alternative 2 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. 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.

2.2 Alternative 2 - Proposed Action

Alternative 2, the Proposed Action, was developed to achieve the objectives described in Chapter 1, the Purpose and Need for the Pilot Joe Demonstration Project. The Proposed Action would treat 889 acres of vegetation using various forest management methods described in detail in this section. A short section (0.4 miles) of existing road, 39-4-1.1, would be decommissioned. Maintenance of existing roads would take place as part of this project but also as an ongoing BLM administrative function. No new road construction is proposed.

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 cut. The target density for trees left on each site is based on the individual site's ability to sustain healthy trees long term.

The cutting and removal of trees is accomplished in commercial conifer forest 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 by BLM employees through marking of individual trees with paint and through

contract language. 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.

Transportation system maintenance, including renovation of existing roads and road decommissioning are proposed. Fuel hazard reduction is an integral part of all treatments and would be accomplished using hand and prescribed fire methods.

2.2.1 Silvicultural Objectives and Dry Forest Prescriptions

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

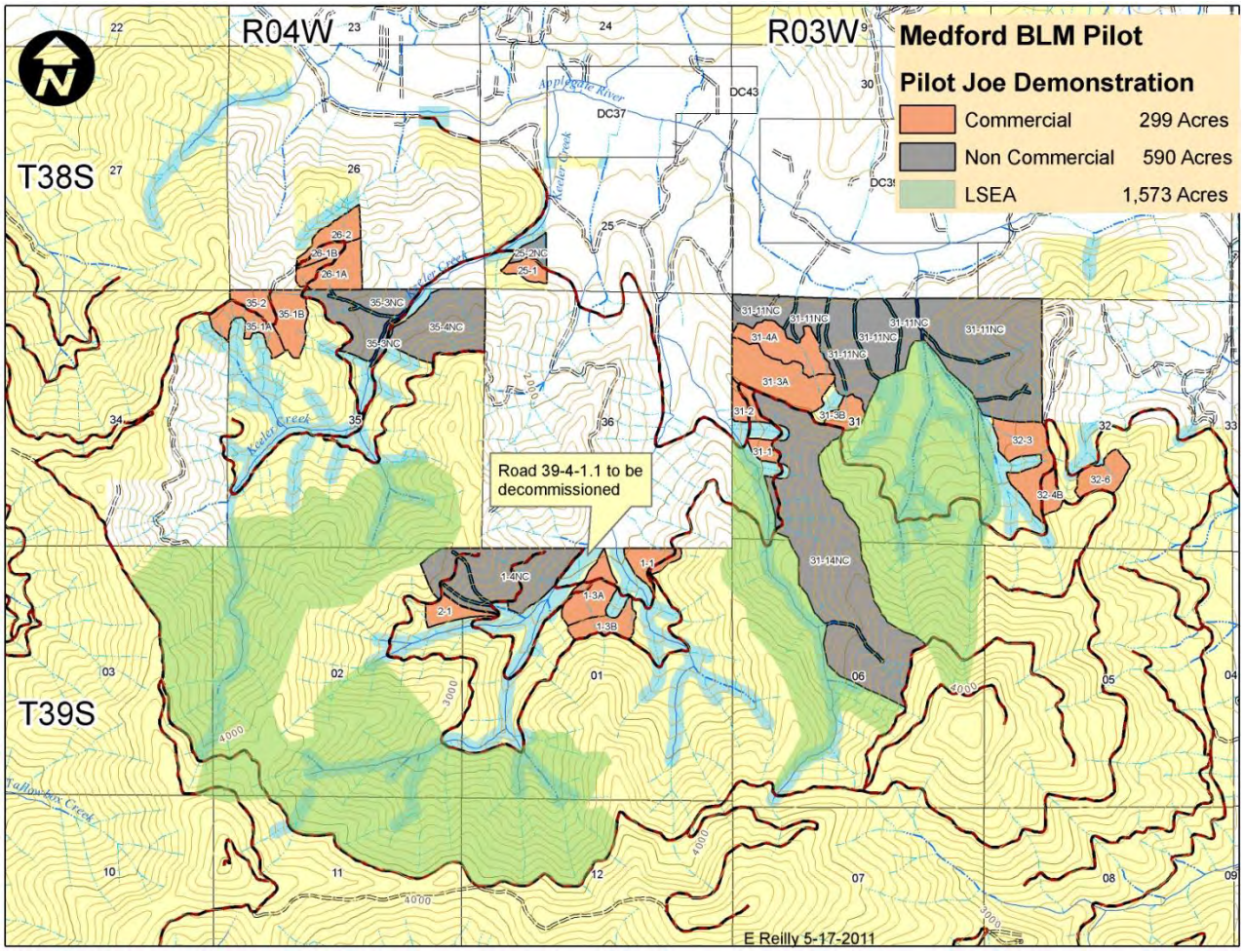
- Conserve and improve survivability of older trees (trees >150 years of age) by reducing nearby fuels and competing vegetation.
- Increase resistance/resilience of forest stands and landscape to wildfire, drought, insects, etc. by reducing stand densities, ladder fuels, and shifting tree species diversity.
- 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 draft revised Recovery Plan for the Northern Spotted Owl.

The treatments proposed under the Pilot Joe 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 DBH.

Table 2-1. Summary of Acres Proposed for Treatment in Alternative 2 by Silvicultural Prescription

Silvicultural Prescriptions – Commercial Harvest	**Est. Acres**
Variable Density Thin – Douglas-fir series	203
Variable Density Thin – Ponderosa Pine series	96
Total	**299**
Non-commercial Prescriptions	**Est. Acres**
Understory Reduction – removal of excess trees < 8 “DBH (these are treatments within the 299 acres of commercial units)	253
Density Management – Pine, Douglas-fir, Oak series	590

Figure 2-1. Pilot Joe Demonstration Project

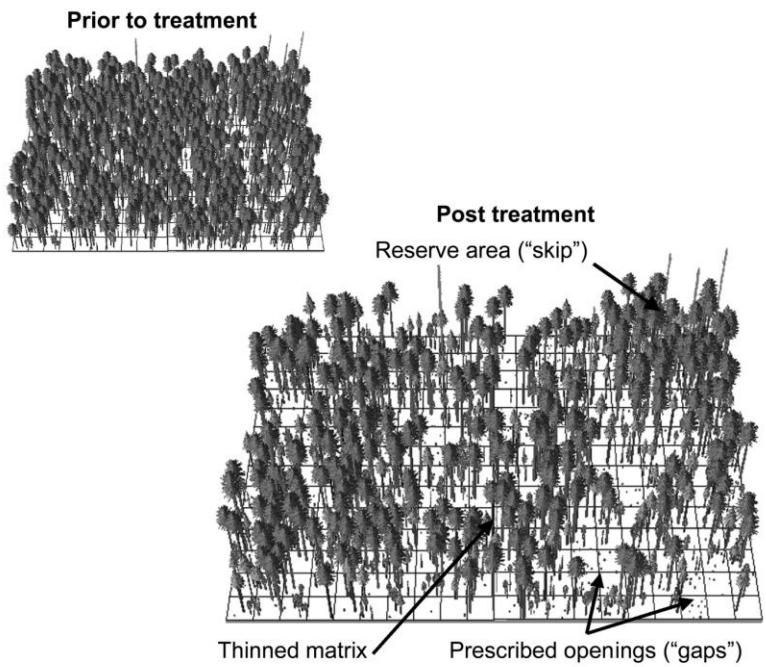


This map shows an overview of the areas selected for demonstration of the ecological restoration work proposed in the Pilot Joe project. The Late Successional Emphasis Areas (LSEA) provide large blocks of dense, older forest cover for species such as spotted owls that require those forest conditions. The proposed restoration work is downslope and adjacent to the LSEAs. Goals of the restoration work include increasing resistance/resilience of forest stands and landscape to wildfire, drought and insects by reducing stand densities and ladder fuels, shifting species composition from the current dominance of Douglas-fir to include more pine and hardwoods and conserving and improving the survivability of trees greater than 150 years old.

Commercial treatments – 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. 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 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 2-2).

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



Elements of the Variable Density Thinning prescription call for:

- 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)
- Thinning the remainder of 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 [but never old] 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.

Commercial Units - Ponderosa Pine/Oak Sites (Ponderosa Pine Series)

These are areas with southerly or easterly aspects and shallow soils where pine species are best adapted long term. These stands may have developed a substantial component of Douglas-fir as a result of fire exclusion and stands have become overstocked with many age classes of vegetation. These sites are also identified by the presence of ponderosa pine, black or white oak, and white-leaf manzanita (either live or dead) in the understory. They are typically small in size and found on dry ridges and low elevations with Douglas-fir mortality occurring. The goal on these sites is the retention of large ponderosa pine and the subsequent development of young pine. Specifically, the VDT prescription on ponderosa pine / oak sites aims to achieve the following goals:

- Leave 60-80 ft^2 basal area per acre at the stand level.
- Reduce competing vegetation from around healthy pines, oak, and incense cedar to ensure their survival.
- Protect exceptional hardwoods (oak trees 10 inches dbh and larger, madrone trees 16 inches dbh and larger with full live crown ratios of 30% or greater).
- Leave all codominant and dominant pine, cedar, and oak; suppressed individuals can be cut.
- Leave SKIPS (15% +/-) to provide visual barriers, hiding cover, dense habitat, protect seeps and intermittent channels, etc.

Commercial Units - Douglas-fir Sites (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 sq ft.) are acceptable in the "driest" Douglas-fir plant associations where the goal is to restore a pine and oak component within the stand.
- Protect exceptional hardwoods. (See description above)
- Leave all codominant and dominant pine, cedar, and oak; suppressed individuals can be cut.
- Leave SKIPS (+/-15% 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% of the treatment area) to create some larger (1/2 to 2 acre) open areas to the extent of about 1 acre opening every 6 or 7 acres (or ~(+/-15% 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.

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 <8" DBH, Pacific madrone <6" DBH, and canyon-live oak <4" 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 ≥8" DBH and within the dripline of ponderosa pine and sugar pine ≥8" 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 <6" DBH will be cut. Canyon-live oak and black oak will generally not be cut unless appropriate for the plant community. 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.

Non-commercial Treatments – Density Management

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 ≥6" DBH and conifers ≥8" DBH are reserve vegetation and shall not be cut. These trees shall be included in spacing requirements. A minimum of ¼- to ½-acre "skips" or no-treatment areas (15%+/- at the stand level) would be untreated to further facilitate diversity. Plant buffers, hardwood areas, rock out-crops, 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). No removal of white oak, mountain mahogany and manzanita >12" single stem at one foot above ground. Any species of conifer, hardwood or shrubs considered as rare (less than 5% 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.

Douglas-fir Series

Target Plant Association:

- Douglas-fir – Ponderosa Pine/Poison Oak
- Douglas-fir – Black Oak/Poison Oak
- Douglas-fir – Canyon Live Oak/Poison Oak
- Douglas-fir/Dry Shrub

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): (Applies to units 31-11 and 31-14)

Heterogeneous Douglas-fir stands >40 years old (pole 5-11" DBH through mid seral size 11-21" 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. Vegetation 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. All conifer and hardwoods within the driplines of pine >8" DBH will be removed. Trees ≥8" DBH will be included in spacing requirements. 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% 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): (Applies to units 1-4, 35-3 and 35-4)

Homogeneous Douglas-fir stands 15-40 years old that are sapling through pole size (0-11" 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. All conifer and hardwoods within the driplines of pine species ≥8" DBH will be removed. 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 >8" DBH (e.g. acceptable to have a 4" DBH tree next to 15" DBH tree). Acceptable leave tree standards apply (i.e. greater than 3 feet tall, no broken tops, 30% crown or more). The spacing of leave trees <8" DBH is independent of hardwood and conifer trees ≥8" 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" 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 2' 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.

Non-commercial - 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

Non-commercial - Prescription Description and Objectives (Applies to units 25-2, 31-11 and 31-14)

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 <8" DBH will be spaced 20-25 feet in overly dense patches of natural regeneration. 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. 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.

<u>White Oak Series</u>

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, less buckbrush than now present and native grasses.
3. Restore woodland/shrubland communities to sustainable density levels.
4. Create more open mosaic of historic vegetation.

Non-commercial - Prescription Description and Objectives (Applies to Unit 31-11)

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 from 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 >12" single stem at one foot above ground. Conifer, hardwood and shrub snags less than 6 inches DBH shall be felled. In areas where white oak or other reserve vegetation do 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.

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.

(a) **Skyline Yarding:** Also referred to as cable logging. 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. Corridors would be generally less than 15 feet wide, depending on the size of trees to be removed and the terrain; locations are approved by the BLM. Landings would be a minimum of 150 feet apart as operationally feasible. Guyline trees (approximately 3 per landing area), corridor trees and trees posing safety hazards would be removed when operationally required.

(b) **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 sale administrator. Pre-located skid trails minimize the area of ground a tractor operates on, thus, minimizing soil disturbance. Trees posing safety hazards would be removed, and trees in skid trails and landing areas may be removed when operationally required.

Table 2-2. Summary of Acres Proposed for Treatment by Harvest Method

Timber Harvest Method	Est. Acres
Cable Yarding	216
Tractor Yarding	83
Helicopter Yarding	0
Total	**299**

Table 2-3. Pilot Joe Proposed Action – Non-Commercial – Density Management

Unit	T_R	Section	Forest Type	Non-Commercial Rx	Acres
1-4NC	39S-4W	1	Douglas-fir Plantation	Density Management	75
25-2NC	38S-4W	25	Natural stand pine site	Density Management	7
31-11NC	38S-3W	31	Several natural stand types Douglas-fir, Pine, White Oak	Density Management	220
31-14NC	38S-3W	31	Natural DF, Pine	Density Management	193
35-3NC	38S-4W	35	Douglas-fir Plantation	Density Management	42
35-4NC	38S-4W	35	Douglas-fir Plantation	Density Management	53
				Total Acres	**590**

Table 2-4. Pilot Joe Proposed Action – Commercial Harvest Units

Unit	T_R	Section	Logging System	Silviculture Rx	Non-Commercial Rx	Acres
1-1	39S-4W	1	Cable	VDT, DF	Activity	13
2-1	39S-4W	2	Cable	VDT, DF	Activity, UR	10
1-3A	39S-4W	1	Tractor	VDT, DF	Activity, UR	22
1-3B	39S-4W	1	Cable	VDT, DF	Activity, UR	14
25-1	38S-4W	25	Tractor	VDT, DF	Activity	7
26-1A	38S-4W	26	Cable	VDT, PP	Activity, UR	23
26-1B	38S-4W	26	Tractor	VDT, PP	Activity, UR	5
26-2	38S-4W	26	Cable	VDT, DF	Activity	13
31-1	38S-3W	31	Tractor	VDT, PP	Activity, UR	6
31-2	38S-3w	31	Cable	VDT, PP	Activity, UR	10
31-3A	38S-3W	31	Cable	VDT, DF	Activity, UR	40
31-3B	38S-3W	31	Cable	VDT, DF	Activity, UR	10
31-4A	38S-3W	31	Tractor	VDT, PP	Activity, UR	27
32-3	38S-3W	32	Cable	VDT, DF	Activity, UR	32
32-4B	38S-3W	32	Tractor	VDT, DF	Activity, UR	7
32-6	38S-3W	32	Cable	VDT, DF	Activity	15
35-1A	38S-4W	35	Cable	VDT, PP	Activity, UR	17
35-1B	38S-4W	26	Cable	VDT, DF	Activity, UR	19
35-2	38S-4W	35	Tractor	VDT, PP	Activity, UR	9
					Total Acres	**299**

VDT = Variable Density Thin Series UR = Understory Reduction
DF = Douglas-fir PP= Ponderosa Pine Series
Activity = pile & burn tree tops and limbs to reduce fuels as needed

Table 2-5. Proposed Road Decommissioning in the Project Area.

Road Number	Approximate Length (miles)	Existing Surface: Depth (inches) and Type	Control	Possible Improvements	Seasonal Restriction (for log hauling)
39-4-1.1	0.40	NAT	BLM	Decommissioning	Not Used
Total mileage:	0.40				

Natural Decommissioning – Approximately half of the length of the road proposed for decommissioning is presently well drained and has well developed vegetation growing on it. In some places, trees and brush have encroached from the sides and trees have fallen across the road. The section with established vegetation would be allowed to continue to decommission naturally. The second half of this road will require selective ripping, removal of drainage structures, construction of water bars and a barricade established. Decommissioning would occur during dry season – June 1 – October 15.

Table 2-6. Road Table – Proposed improvement and restrictions to roads within the project area.

Road Number	Approximate Length (miles)	Existing Surface: Depth (inches) and Type	Control	Possible Improvements Depth (inches)	Seasonal Restriction (for log hauling)
38-3-31.0	5.14	4"ASC	BLM	-	2
38-3-32.1	5.22	4"ASC	BLM	-	2
38-3-33.0A-E	2.86	BST	BLM	-	2
38-4-28.0	2.9	12"ASC	BLM	-	2
38-4-33.0	1.19	8"PRR	BLM	-	2
38-4-35.3A-B1	1.2	NAT	BLM	Barricade & Waterbar	1
38-4-35.3B2	0.16	NAT	PVT	-	1
38-4-35.3B3-E	1.02	NAT	BLM	Barricade & Waterbar	1
39-4-1.0	0.62	6"ASC	BLM	-	2
Total mileage	**21.60**				

1 = hauling restricted between 10/15 and 6/1 2 = hauling restricted between 10/15 and 5/15
NAT = Native surface road BST = Bituminous Surface Treatment – a form of paving
PRR = Pit Run Rock ASC = Aggregate Surface Course

2.2.2. Road Decommissioning

A 0.4 mile section of road is proposed for decommissioning in the Chapman Creek area. Road 39-4-1.1 is located almost entirely within the Riparian Reserve and crosses Chapman Creek via ford at approximately the midpoint of the 0.4 mile road section. The section of this road that parallels Chapman Creek has re-vegetated and is stable so would not require any additional work to decommission. The stretch of road leading up to the ford would be ripped, mulched, and seeded.

2.2.3 Fuels Reduction and Maintenance

Follow-up Maintenance Underburning would involve 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. Various ignition patterns are used depending on resource objectives and site and weather conditions. The most common ignition technique used is referred to as strip-head ignition. Beginning on the uppermost end of a unit along a control point such as a road or ridgeline, fire is ignited in narrow strips running along the contour of the slope. Working down slope, strips are ignited at intervals and the fire burns upslope toward the previously burned strip of fuels. The speed at which fire is applied and the width between strips adjusts the intensity of fire to address variations in fuel conditions (amount, type, and moisture content), weather, and topography as needed to meet 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.

To meet State air quality requirements, prescribed underburning would be implemented during periods of atmospheric instability (when weather disturbances are moving into or through the area) and air is not trapped by inversions on the valley floor. This allows smoke to be lofted up and away from the Rogue Valley. These atmospheric conditions are more frequent in late winter to spring.

Prescribed Fire Plans, also referred to as Burn Plans, must be completed prior to a planned fire ignition and approved by the Field Manager. Prescribed Fire Plans guide the implementation based on site-specific unit conditions (including fuel moisture and weather conditions) at the time of planned ignition, and provide for pre- and post-burn evaluation to monitor if the burn was carried out as planned and its effectiveness at meeting resource objectives. The Prescribed Fire Plan is an important tool for ensuring that project goals and objectives are met in a safe and carefully controlled manner.

2.2.4 Project Design Features

Project Design Features **(**PDFs) are an integral part of the Proposed Action (Alternative 2). PDFs include seasonal restrictions on many activities in order to minimize erosion and reduce disturbance to wildlife. PDFs also outline protective buffers for sensitive species, mandate the retention of snags, and delineate many measures for protecting Riparian Reserves throughout the project. 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 Proposed Action (Alternative 2).

<u>Applicable Harvest and Logging Project Design Features (PDFs)</u>

Reducing or Eliminating Surface Soil Erosion

- 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.*
- 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. *
- All skid trail locations would be approved by BLM. Maximum area per unit in skid trails would be 12%. 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. *

- All skid trails would be water barred according to BLM standards. Main tractor skid trails would be blocked with an approved barricade 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).*
- Tractor yarding would occur between June 1 to October 15 or on approval by the Contract Administrator. Some variations in these dates (early or later) would be permitted dependent upon weather and soil moisture conditions. The intent is to minimize off-site erosion and sedimentation to local waterways. Sale administrator will work with staff hydrologist and soil scientist to make determination.*
- 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.
- Skyline and tractor yarding would be avoided up and down dry draws. The intent is to minimize the occurrence of erosion and compaction in existing areas of concentrated surface or substrate flow.
- A seasonal hauling restriction would be required on natural surfaced roads during the wet season (see road table). This would protect the road from damage and decrease the amount of sedimentation that would occur. Some variations in these dates (early or later) would be permitted dependent upon weather and soil moisture conditions of the roads. Sale administrator will work with staff hydrologist and soil scientist to make determination.
- Dust abatement required by timber sale contracts would use water or lignin.

Protecting Riparian Reserves

- No use of skid trails in Riparian Reserves.
- No yarding corridors in Riparian Reserves.
- No construction of new landings or expansion of old landings would be allowed in Riparian Reserves.
- Directionally fell away from Riparian Reserves.

<u>Applicable Non-Commercial Silvicultural Project Design Features (Uplands Only)</u>

Reducing or Eliminating Surface Soil Erosion

- 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.
- Old skid roads would not be treated near the intersections with system roads in order to provide a visual screen and discourage vehicular access.

<u>Applicable Non-commercial Silvicultural Project Design Features (Riparian Reserves)</u>

Protecting Function and Character of Riparian Reserves

- Treatments would only take place in Riparian Reserves adjacent to non-commercial treatments (NC) units.

- *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 2-6). *
- Riparian hardwood species such as willow, ash, maple, alder, and black oak would not be thinned.
- Down large woody debris over 16" diameter would not be damaged, driven over, or used for fire wood.

Reducing or Eliminating Surface Soil Erosion

- 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.

Table 2-7. 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

<u>Applicable Road Related Project Design Features</u>

Reducing or Eliminating Surface Soil Erosion

- Landing construction and renovation would not occur during the winter months (October 15 to June 1) when the potential for soil erosion and water quality degradation exists. This restriction could be waived under dry conditions and a specific erosion control plan (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 Contract Administrator. *
- Bare soil due to road renovation would be protected and stabilized prior to fall rains. *
- In order to reduce the amount of road-related soil disturbance, decommissioning would occur during the dry season (usually June 1 to October 15).
- Preservation of Existing Vegetation - Some road sections proposed for decommissioning have significant 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.*

- Full Rip Decommission – The primary objective is to establish a stable, long term drainage configuration that would be self-maintaining. Existing road drainage structures such as ditches, culverts and dips would be replaced with 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. The road surface would be ripped to the extent feasible without compromising the cross drainage.*
- Mechanically-decommissioned roads include ripping, removing drainage structures, seeding and/or planting, mulching, constructing water bars and barricades.
- Areas of disturbed ground on all decommissioned roads would be seeded with native or approved seed and mulched. No fertilizer would be spread within Riparian Reserves.
- 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.
- 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.
- All natural surface roads would be closed during the wet season, October 15 – June15.
- OHV use on decommissioned roads would be discouraged by placement of debris or other appropriate barriers.
- Treatment would depend upon the existing vegetation on the particular road segment.*

Protecting Natural Discharge Patterns

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

Protecting Stream Banks and Stream Channel Integrity

- Stream crossings would be reestablished to the natural stream gradient. This would be accomplished by removing the culvert and the road fill within the stream crossing areas.

<u>Protection of Terrestrial Wildlife Project Design Features</u>

Threatened/Endangered Wildlife

Northern Spotted Owl

Disturbance

- Work activities that produce noise above ambient levels will not occur within specified distances (see table below) of any nest site or activity center of known pairs and resident single between 1 March and 30 June (or until two weeks after the fledgling period) unless protocol surveys have determined the activity center to be not occupied, non-nesting or failed in their nesting attempt.

Table 2-8. 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.

Habitat

- For projects that remove habitat, work activities such as tree felling, yarding, etc, will not occur within 0.25 miles of any **known** nest site or activity center from March 1- September 30, unless protocol surveys have determined the activity center to be not occupied, non-nesting, or failed in a nesting attempt. Waiver of the seasonal restriction is valid until March 1 of the following year.

General Wildlife Habitat

- All snags greater than 16" DBH would be reserved from cutting unless they pose a safety hazard, in which case they would be left on the ground in the unit and a replacement standing tree would be identified for retention.
- Coarse woody debris (CWD) would be retained and protected from disturbance to the greatest extent possible during logging, burning and other project activities.

<u>Protection of Botanical Resources Project Design Features</u>

Special status Plant Species

- Callitriche marginata (SEN): One occurrence protected by riparian reserve; unit 31-11NC.
- Cypripedium fasciculatum (SEN, S&M C): Two occurrences in non-commercial (fuels reduction) unit 31-14NC; protected by 25-100' buffer depending on site conditions. One occurrence just outside of commercial harvest unit 25-1; protected by a 100 foot buffer.
- Cypripedium montanum (S&M C): One occurrence in non-commercial (fuels reduction) unit 35-3NC; protected by 25-100' buffer depending on site conditions.
- Dendriscocaulon intricatulum (S&M B): One occurrence near the boundary of unit 35-1A; protected by 25' buffer and oak retention prescription.
- Zigadenus exaltatus (SEN): One occurrence in non-commercial unit 1-4NC; protected by seasonal restriction and 25 foot no burn pile buffer.

To minimize the spread of noxious weeds

- Pressure wash vehicles and equipment that will travel off system roads prior to entry onto BLM-managed lands.
- Seed or plant highly disturbed areas during project implementation with native plant materials.
- Mulch highly disturbed areas after treatment with weed-free straw or hay, per 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.

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

Protection of Cultural Resources Project Design Features

- 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.
- Timber would be felled away from cultural resource site buffers.
- If previously unrecorded cultural resources are found during project implementation; 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 and concurrence by the Ashland Field Manager and State Historic Preservation Office.

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% of the mound depth/duff layer around pine trees is consumed during burning.
- No more than 25% 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 marked in yellow paint need to be carefully treated around to prevent damage to limbs, tops, and stems. Logging corridors should be designed to avoid or minimize damage to yellow marked trees of both conifer and hardwood species.
- Snags (standing dead trees) not considered as a safety hazard shall be protected and remain standing.
- Fuels treatment activities such as handpiling and burning are not allowed within "Skips". Skips are designated areas within a stand that are not to be treated, manipulated, or managed.

3.0 Ongoing and Foreseeable Future Actions

In addition to the proposal outlined in this document, there are ongoing activities in the Chapman and Keeler Creek drainages that were planned prior to the current Pilot Joe Demonstration Project. Some of the work has been evaluated in project specific NEPA documents. Others are evaluated within programmatic NEPA documents. Others are part of BLM's general administrative activities.

Land Sale

There is a proposal to offer for sale an isolated nine acre parcel of BLM land within the planning area. This project is known as the Keeler Creek Public Land Sale.

Road Maintenance & Culvert Replacement

There are seasonal road maintenance activities occurring on the BLM road system to grade and shape, clean drainage ditches and culvert basins, spot rock, repair 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 plan to replace and upgrade culverts in the planning area. The following table provides details.

Table 2-9. Road Work Planned for Fiscal Year 2011

Where		Description
Road 39-4-1	Mile Post 0.96	Culvert Replacement – Upgrade 48" pipe culvert to 114" by 78"
Road 38-3-32.1	Mile Post 6.07	Culvert Replacement – Upgrade 36" to 72"
Road 38-3-32.1	Mile Post 4.27	Upgrade 72" Culvert to a 12'by 9„ bottom less arch
Road 38-3-31	Mile Post 2.08	Culvert Replacement – Upgrade 30" to 72"
Road 38-3-31	Mile Post 2.24	Culvert Replacement – Upgrade 30" to 36"
Road 38-3-31	Mile Post 3.19	Culvert Replacement – Upgrade 30" to 54"
Road 38-3-31 *	Mile Post 3.54	Culvert Replacement – Upgrade 30" to 72"
Road 39-4-1	Mile Post 0.19	Culvert Replacement – Upgrade 30" to 72"
Road 39-4-1 *	Mile Post 1.37	Culvert Replacement – Upgrade 30" to 54"
Misc. Roads		Grading, shaping, ditch cleaning, spot rock
* These projects are lower priority and will be completed if contract bid prices allow.		

Timber Sales

There are no currently no proposals developed for additional timber sales or landscape level projects in the Pilot Joe planning area. It is likely that a project would be developed in the next two to five years. Future work would build on the foundation established with the current proposal, continuing to create restoration opportunities adjacent to the LSEAs. During the development of the Pilot Joe Demonstration Project, there were numerous areas reviewed for treatment but ultimately rejected for inclusion in the current project. It is estimated that 400-800 acres of commercial timber sale / stewardship and up to 1,000 acres of non-commercial, density management could be proposed in Chapman & Keeler planning area in the future.

There are plans to develop additional landscape level projects based on the Franklin & Johnson ideas in planning areas adjacent to the Pilot Joe planning area in Thompson Creek and Spencer Gulch-Applegate River sub-watersheds. These are both within the greater Middle Applegate watershed.

4.0 Actions and Alternatives Eliminated From Detailed Study

Actions and Alternatives Eliminated From Detailed Study

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.

Create a project that treats a larger area but do so without a need for new roads. Use helicopter logging to treat more commercial forest land.

Rationale for Elimination: While numerous other areas were identified as candidates for restoration treatment, these areas are not accessible for timber harvest using the existing road system. Helicopter yarding was eliminated as a viable economic method at this time due to current economic and market conditions, the high cost of helicopter yarding, and the per acre volumes associated with thinning prescriptions. Simply put, the cost of timber removal via helicopter exceeds the value of the material to be removed. Therefore, developing a proposal to include helicopter logging was eliminated from detailed study.

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: Several routes were considered to provide road access to additional areas proposed for treatment but ultimately rejected from the Proposed Action.

1) In the case of a road that was considered for access into stands in the south end of section 32, a Survey and Manage lichen species was found on numerous trees along the ridge top route where the road would have been built. This eliminated the road from being included in this proposal along with two commercial units that would have been accessed form this road.

2) Access through private land to the bottom of unit 31-4A was considered to allow more economical tractor logging to take place and assure the ability to reach and treat the entire area. This route would have required a ford across Chapman Creek, a COHO stream. It would have also required building new road construction extending the existing road on private land onto BLM. This road was ultimately eliminated from inclusion in the present proposal because of a concern for potential impacts to the COHO stream, cost of construction and the fact that the majority of the area would be able to be cable logged from the existing road.

3) Two additional units were identified for inclusion in the pilot but ultimately dropped from the final project proposal. The first unit was near the center of section 34 and would have been accessed by extending an existing road through private land and building about 0.2 miles of new road on BLM land to provide cable logging access to treat 20 acres. While there was dense forest that would have benefitted from thinning, this unit was not strategic in its reduction of fire threat abatement to the LSEAs. It was felt that a more comprehensive harvest plan should be considered that would take into account stands to the west in the Thompson Creek drainage before committing resources to build a road to access this 20 acre stand.

Another 20 acres of commercial harvest and 21 acres of non-commercial were identified in the eastern portion of section 27. The commercial portion has dense low vigor forest treatment opportunities on the

upper slopes and edges. The interior of this unit generally has more open wider spaced trees that are not facing much competitive stress. This unit was ultimately rejected as not begin a good candidate for restoration forestry prescriptions. This unit would have required building 0.6 miles of new road for access. This area was also not strategic in its contribution towards fire threat abatement. Both the commercial and non-commercial units were dropped from consideration in the Pilot Joe project.

Treat Mistletoe Shelter wood units at top of the drainage

Rationale for Elimination: Approximately 125 acres of previously managed „shelter wood' units were identified for possible inclusion in the Pilot project. The shelter wood technique typically harvests about 75% of the trees on a site and leaves an overstory of large mature trees remaining to provide a seed source and shade to nurture and naturally regenerate another stand of trees. The current stand has a dense young stand of 20-30 foot tall Douglas-fir saplings with an overstory of large trees with a fairly strong dwarf mistletoe component amongst the Douglas-fir. It was determined that the Franklin and Johnson restoration approach was not well suited to this „artifact' of past management.

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 demonstration 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.

Impose a Diameter Limit for commercial tree harvest:

Rationale for Elimination: Imposing an upper diameter limit for harvesting trees was suggested by the public. This alternative would have imposed an upper diameter limit on timber harvesting trees greater above some set limit measured by diameter breast height (DBH). Suggestions included 20" DBH and 16" DBH limit. The prescriptions and approach advanced by Franklin and Johnson recognizes the importance of older trees but frames it 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 Demonstration 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.

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 Demonstration Project. Variations in approach that would not achieve those objectives would not be analyzed because it 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.

Use prescribed fire to thin forest stands. 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 Joe 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.

5.0 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 Bureau of Land Management has committed to monitoring the Pilot Joe project. Monitoring is essential to demonstrate the ability of the Franklin and Johnson principles to accomplish pilot project restoration goals. Monitoring is also important in the context of adaptive management, enabling project learning to inform future 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.

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.

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).

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 the Pilot Joe treatment area. Data collected for each plot will include general site attributes, an inventory of tree characteristics (species, density, size, age), vegetation composition, fuel loading and photo points following methods outlined in FIREMON protocols. These plots will be re-sampled 1 and 5 years after project implementation. Plot data will be analyzed to determine if objectives were achieved.

Implementation monitoring is primarily 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. Project design features 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.

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 stand damage from skyline yarding, soil impacts, use of support trees and tail trees, timber volume removed and utilized, effects of skyline corridors in regards to protecting leave trees and general observations of the equipment used and what worked well and what aspects were difficult to implement.

The Southern Oregon Small Diameter Collaborative and Applegate Partnership and Watershed Council have also committed to monitoring the Pilot Joe project through a multi-party framework. A pilot steering team has been created and a recent community meeting was convened to begin shaping a plan for this additional community-based effort to assess on-the-ground progress toward pilot project goals. The steering team will work with community, agency and academic advisors to create task groups to inform specific issues or topics related to monitoring.

Project monitoring can be time consuming, complicated and expensive. To address these issues, multi-party monitoring will address the purpose and need of the pilot (Chapter 1), be framed by realistic expectations, track measurable indicators and create a transparent process to engage community, academic and agency partners in monitoring activities. In addition to ecological concerns, attention to the collaborative context and timeline of the pilot, as well as social, economic and operational considerations will be addressed.

CHAPTER 3 – AFFECTED ENVIRONMENT & ENVIRONMENTAL CONSEQUENCES

1.0 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 Proposed Action Alternative. 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 EA vary by resource. For all resources it includes the project area, which encompasses the areas where actions are proposed for the Pilot Joe Demonstration Project.

The Medford District Proposed Management Plan and Environmental Impact Statement (PRMP/EIS) describes the affected environment for the Medford District Bureau of Land Management PRMP/EIS planning area which covers approximately 860,000 acres of BLM administered lands in both the Cascade and Siskiyou mountain ranges across five counties in southwestern Oregon (PRMP/EIS p. 1-3). The Pilot Joe project is located the Siskiyou mountains in Jackson County. This EA incorporates by reference information included in the PRMP/EIS and will provide additional site-specific detail needed for project level planning.

The terms **Project Area** and **Analysis Area** are used throughout this chapter. The following defines each term:

> The terms **Project Area,** or treatment area, are used interchangeably to describe where action is proposed, such as units where forest thinning is proposed and where road decommissioning or road improvements are proposed. Project area can refer to an individual treatment unit but also describes the setting of the entirety of the proposed action.
>
> **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.

1.1 Effects Assumptions

The current conditions on the lands affected by the proposed action have resulted from a multitude of natural 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 easier, more accurate, and less costly ways to obtain the information concerning 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.)

A description of the current state of the environment inherently includes the effects of past actions and serves as a more accurate and useful starting point for a cumulative effects analysis, than attempting to

establish such a starting point by ―adding" up the described effects of individual 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. Here the cataloguing and analysis of the effects of other present and reasonably foreseeable actions relevant to the effects of the proposed action is necessary, and has been described below. By comparing this total effect of the ―no action" alternative to the effects described when adding the proposed action, we can discern the ―cumulative impact" resulting from adding the ―incremental impact" of the proposed action to the current environmental conditions and trends.

Watershed analysis, a component of the Aquatic Conservation Strategy developed under the Northwest Forest Plan and incorporated into the Medford District RMP, is a useful analysis for gaining an understanding of ecological processes and how those processes are functioning within a given watershed. Watershed analysis characterizes the human, aquatic, riparian and terrestrial features, conditions, processes, and interactions within a watershed. Knowledge gained through watershed analysis enhances the agency's ability to estimate direct, indirect, and cumulative effects of our management. The 1995 Middle Applegate Watershed Analysis provided a coarse filter analysis generally using existing data and information, but is useful in identifying issues of importance to analyze in greater detail during project specific analysis. Some issues identified during watershed analysis have been analyzed and addressed at broader scales in association with regional and land use plans, the link from this site specific project to these broader analyses have been noted where applicable in this Environmental Assessment.

Direct, indirect, and cumulative effects analyses completed for resources affected by the Pilot Joe project, describe indicators of importance along with the spatial and temporal scale of importance (analysis area) 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. For example:

- Road densities occurring within the planning area or various analysis areas and the attributes of the road system (surfaced or unsurfaced, location related to streams, slope position, general condition, etc.) are important for understanding the potential for cumulative effects of the proposed action. This information can easily be obtained from the Districts GIS system, aerial photos, and field reconnaissance. To catalogue each road by year of construction and name of the project would be irrelevant detail for understanding the incremental impact of the Pilot Joe project when added to other past, present, and reasonably foreseeable future actions.

- Knowing whether a plantation was created in 1975 or 1985 and with what project does not contribute to knowing how that plantation will influence fire behavior, as fuel specialists recognize plantations as a certain fuel type and they are addressed accordingly in the analysis of fuel hazard mapping.

- Silvicultural information is obtained for stands within a planning area providing information on species composition, stand age, growth, vigor, and presence of disease and insects needed to prescribe treatments to maintain productive forest stands. Having the exact stand history does not lead to better silvicultural prescriptions and decisions and would be unnecessary detail.

- Information on vegetation structural components (tree size, canopy closures, snags and coarse woody material, etc.) and species composition can easily be obtained from aerial photography, silvicultural surveys, and vegetation and habitat data layers contained in GIS combined with on-the-ground reconnaissance. This information is used by wildlife biologists to assess current conditions from past actions and determine the effects of a proposal on various wildlife habitats and species.

For the reasons described above, this document does not contain a detailed catalogue (or chronology) of past actions, to do so would provide irrelevant detail and would not contribute to a better understanding of conditions which are to be addressed through this analysis. Rather, the analysis of direct, indirect and cumulative effects contained in this EA focuses on cause and effect relationships deemed important for determining the impact on the environment which may result from the incremental impact of the Pilot Joe Demonstration Project when added to other past, present, and reasonably foreseeable future actions and whether or not there is potential for this proposal to contribute to significant cumulative effects beyond those addressed in programmatic land use plans.

The format for this chapter discusses issues, anticipated effects, past actions and environmental consequences by each major resource.

2.0 Vegetation

This section discloses effects on vegetative composition and structure, insects and diseases. Noxious weeds are covered in the Botany section.

2.1 Issues/Concerns

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.

- Densities of forest stands are too high for long term forest health.
- Forest stands are declining in vigor.
- There is substantial loss of shade intolerant species such as ponderosa pine and sugar pine.
- Large trees should be protected from timber harvest.

2.2 Affected Environment

Landscape Pattern

The Pilot Joe Project is located in the Middle Applegate Watershed, which is a tributary to the Rogue River. The Planning Area is larger than the Analysis Area and for purposes of analyzing the affected environment and the proposed project; the Analysis Area for silviculture considers BLM lands within the southern portion of the Humbug Creek sub-watershed of the Middle Applegate Watershed, which is a tributary to the Rogue River and represent 7th field hydrologic unit. The total size of the Planning Area is 7,536 acres or 11.8 square miles. BLM administered lands comprise 5,010 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

[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)

different species composition because of the more open conditions (USDI 1995b). These stands were composed of more ponderosa pine, oak species, and incense cedar and native grasses. Table x-xx lists the vegetation condition classes defined in the Medford District Watershed Analysis Guidelines (USDI 1994b).

Table 3-1. Vegetation Condition Classes – Pilot Joe Analysis Area; BLM Lands

Vegetation Condition Class	Acres
Grass, Shrubs, Non-forest Land	13
Hardwood/Woodland	308
Early (0-5 years) and Seedlings/Saplings (0-4.9 inches DBH)	211
Poles (5-11 inches DBH)	608
Mid (11-21 inches DBH)	2117
Mature (21+ inches DBH)	1753
Total Acres	**5010**
Total Forest Land Acres	**4689**

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.

There are three plant series types in the Analysis Area: Douglas-fir, ponderosa pine, and white oak (Table 3-2). Plant association (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 1996).

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

Douglas-fir Series / Plant Associations	Ponderosa Pine Series / Plant Associations	White Oak Series/Plant Associations
PSME (Douglas-fir)-ABCO (White Fir)	PIPO–PSME	QUGA (Oregon White Oak)-PSME/RHDI6
PSME-QUCH2/RHDI6 (Canyon live oak/poison oak)	PIPO-QUKE (California Black Oak)	QUGA/CYEC (Hedgehog Dogtail)
PSME- QUCH2/BENE (Dwarf Oregon Grape)		
PSME-PIPO/RHDI6 (Ponderosa Pine)		
PSME/HODI/WHMO (Ocean-Spray/Whipplevine)		
PSME-QUKE/RHDI6 (California Black Oak)		
PSME/DRY SHRUB		

Douglas-fir plant associations comprise 96 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, 40 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-QUKE/RHDI6 plant association is the largest represented forest land plant association in the Analysis Area at 32 percent. According to the Field Guide to the Forested Plant Associations of Southwestern Oregon, this association is the warmest of the Douglas-fir dry associations, and is one of the lowest in elevation. California black oak is frequently present with covers usually greater than 15 percent. Currently 5 percent of the Analysis Area is in the ponderosa pine plant series.

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 (USDI 1995b). 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 (USDI 1995b). 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 1995b). As a result of fire exclusion, the Analysis Area has missed multiple cycles over the last 100 years.

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 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. 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.

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 & 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. Of the total land acreage of vegetation series exhibited in the Analysis Area, stands in the Douglas-fir Series comprised 89 percent compared to stands in the Ponderosa Pine Series at 5 percent (6 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, resulting 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 and considered forthcoming with continued overstocking and increasing stand age. The relative density index of Douglas-fir stands should range between .25 and .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 1994) recommends 60 to 120 ft^2 BA/AC as an acceptable level of basal area on these sites. On these sites the relative density index may be below .35 because there is evidence that heavy thinning to a relative density index of .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. All of the forested stands in the Middle Applegate Pilot Area that were inventoried have relative density indices between 0.65 and 1.00, which bounds the zone of imminent competition-mortality (Drew & Flewelling, 1979). Currently, the relative densities of stands throughout the Analysis Area are high. This is primarily due to the lack of natural or manmade disturbance. The overall average relative density for the forested stands inventoried is 0.77, indicating that physiologically the trees have entered the zone of imminent competition induced suppression and mortality.

Tree Growth and Vigor

Trees in the Middle Applegate Watershed are growing at the slowest rates since the 1800‘s. 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 1995b). 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. 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 and others (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.

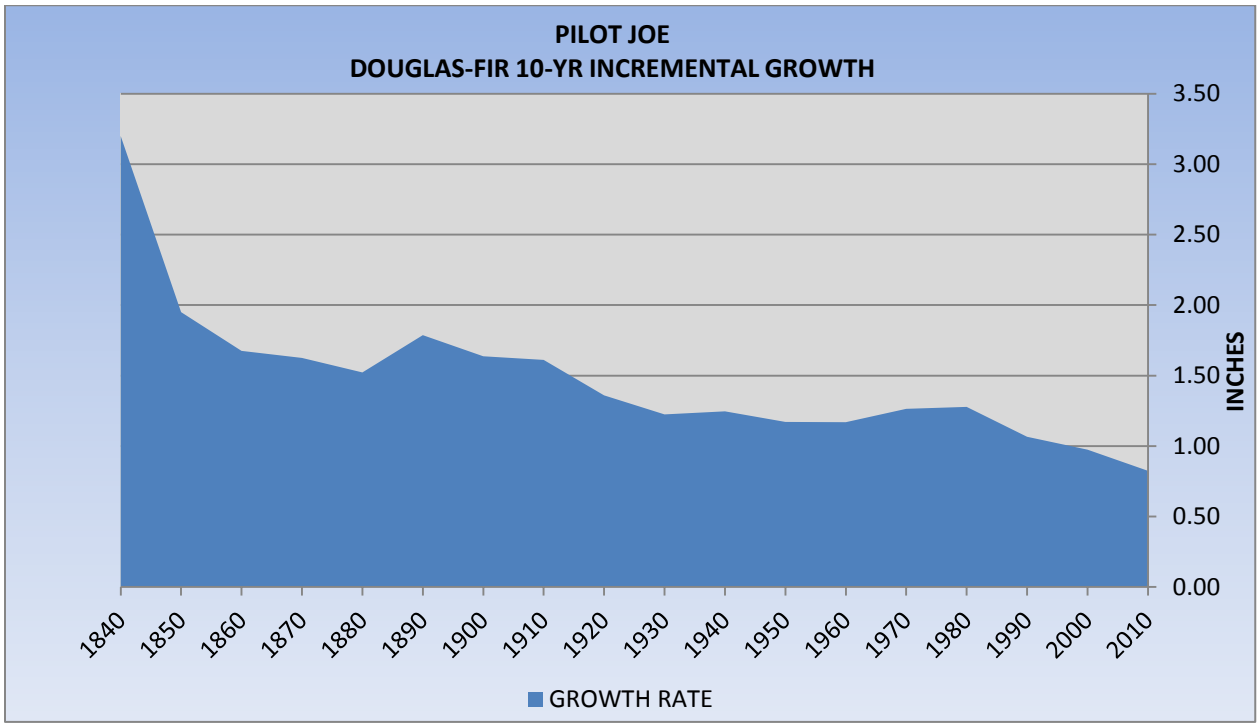
Vigor rating index numbers are calculations of stem growth per unit of leaf area expressed as grams of stem growth per meter squared per year ($g/m^2/yr$). Trees with vigor ratings below 30 ($g/m^2/yr$) will succumb to attack from bark beetles of relatively low intensity. Trees with vigor from 30-70 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 & Pitman, 1985).

Core measurements were taken from 58 Douglas-fir sample trees representing all vegetation condition classes. Sample tree cores were taken from 13 forest stands across the Analysis Area representing all vegetation condition classes, major conifer species, and plant association groups across the Analysis Area. The average DBH for of all sample trees equaled 17.4 inches and the average age cored was 109 years. Each core was measured to determine individual tree age and growth rates. 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 3-3 illustrates the 10-year growth rate of all 58 Douglas-fir sample trees, spanning a period from the year 1840 to 2010.

Pine species in the Analysis Area are becoming scarce. 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. The current average relative density index for ponderosa pine stands is 0.79. At this density, pine stands exhibit reduced growth, crown decline, and competition-induced mortality. 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.

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



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 prone to pine bark beetle attack. Stands on south and east aspects below 3,500

[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.

foot elevations are particularly vulnerable when their densities are high (USDA 1998). Western pine beetle (*Dendroctonus brevicomis)* is attacking ponderosa pine in the Analysis Area, particularly in Unit #31-4A. 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 (Larson, 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." The Goheens (1995) state that 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 1995b).

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 & 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 Joe Analysis Area for Douglas-fir was 0.82 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, that is, 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 Joe Analysis Area. Western pine beetles (Dendroctonus brevicomis) are attacking pines while flat headed fir borers (Melanophila 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 13 stands where tree core measurements were taken, the average tree vigor rating as measured by leaf area index was 40. Of the 58 trees measured in these stands, 55 percent of the trees had vigor ratings below 30. Trees with vigor ratings below 30 will succumb to attack from bark beetles of relatively low intensity. Trees with vigor from 30-70 can withstand progressively higher attacks but are still in danger of mortality from infestation (Christiansen et al., 1987; Waring & 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. In addition, the 10-year diameter growth of 0.82 average inches in the last decade indicates that Douglas-fir is predisposed to bark beetle attack.

Forest pathogens and subsequent beetle kill continue shaping 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 appears to be more common on dry sites when trees are stressed, while Douglas-fir dwarf mistletoe is more commonly found above 3500' elevation in the Analysis Area. These forest pathogens continue to persist on site until a disturbance shifts their populations.

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.

Approximately eight-thousand nine-hundred feet (1.68 miles) of woody material transects were sampled in the Middle Applegate Watershed. The average amount of coarse woody material is 8.3 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 ranges from 3 to 31 inches and averaged 841 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 ranges from 1.9 to 29.7. 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 40, and ranges from 0 in some young pole stands to 152 damaged trees per acre in older, mature forest stands. The average number of snags (3 inch DBH trees and larger) per acre is 54 and ranges from 0 to 227 (2.9 to 27.6 inches DBH). The present amounts of CWM fall within the ranges discussed in White's (2001) publication for respective plant association groups (PAG).

2.3 Environmental Consequences

2.3.1 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 growing space for vegetation increase 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 has 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 is reduced (Atzet and Martin 1991). The No Action alternative allows stands to remain outside the natural range of variability.

Without management action, individual trees including old-growth ponderosa pine, sugar pine, and Douglas-fir trees, with saplings through poles 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 old growth 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 spaces 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. On pine sites, that require at least 25% full sunlight, 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 1995a). 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 reinitiation 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. In 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 less 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.

2.3.2 Alternative 2 – Proposed Action

Refer to Chapter 2 for Silvicultural Prescriptions of the proposed action for the Pilot Joe Project.

Effects of Management on Stand Growth and Vigor

Stands were modeled in a growth and yield modeling system called ORGANON (Hann 1992). Developed at Oregon State University, College of Forestry, the model predicts forest growth outputs based on scientific formulas programmed into it. 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 growth of a pole conifer stand (5 to 11 inches DBH), mid size conifer stands (11 to 21 inches DBH) and mature conifer stands (21+ inches DBH) 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 RDI	PROJECTED RDI AFTER INITIAL HARVEST	PROJECTED RDI IN 20 YEARS UNTHINNED	PROJECTED RDI IN 20 YEARS THINNED
POLES								
154504†	59	1227	165	72	.753	.271	.785	.348
156510†	83	1226	216	111	.934	.379	.906	.441
156532†	80	704	188	90	.749	.277	.666	.329
MID								
156175✦	102	384	201	101	.701	.283	.686	.332
157395✦	125	453	262	110	.895	.343	.907	.384
157660✦	130	323	252	97	.813	.283	.810	.309
157670✦	122	361	221	117	.747	.302	.789	.377
157137✦	105	353	236	92	.783	.300	.792	.344
129198⊠	105	810	209	67	.836	.226	.887	.295
129199⊠	103	1017	172	57	.748	.213	.771	.269
MATURE								
154779✦	140	613	197	110	.757	.304	.748	.343
159837✦	119	151	238	119	.667	.333	.716	.386
157979✦	140	155	227	101	.646	.305	.678	.340

UNIT # POLES MID MATURE	STAND AGE	CURRENT TREES PER ACRE	CURRENT BA/AC (FT^2)	PROJECTED BA/AC (FT^2) AFTER INITIAL HARVEST	CURRENT RDI	PROJECTED RDI AFTER INITIAL HARVEST	PROJECTED RDI IN 20 YEARS UNTHINNED	PROJECTED RDI IN 20 YEARS THINNED
158428✠	152	369	221	98	.750	.300	.764	.338
156175✠	151	361	250	112	.824	.352	.839	.393
✠ VARIABLE DENSITY THINNING (DOUGLAS-FIR SERIES) PRESCRIPTION ✠ VARIABLE DENSITY THINNING (PONDEROSA PINE SERIES) PRESCRIPTION † DENSITY MANAGEMENT PRESCRIPTION								

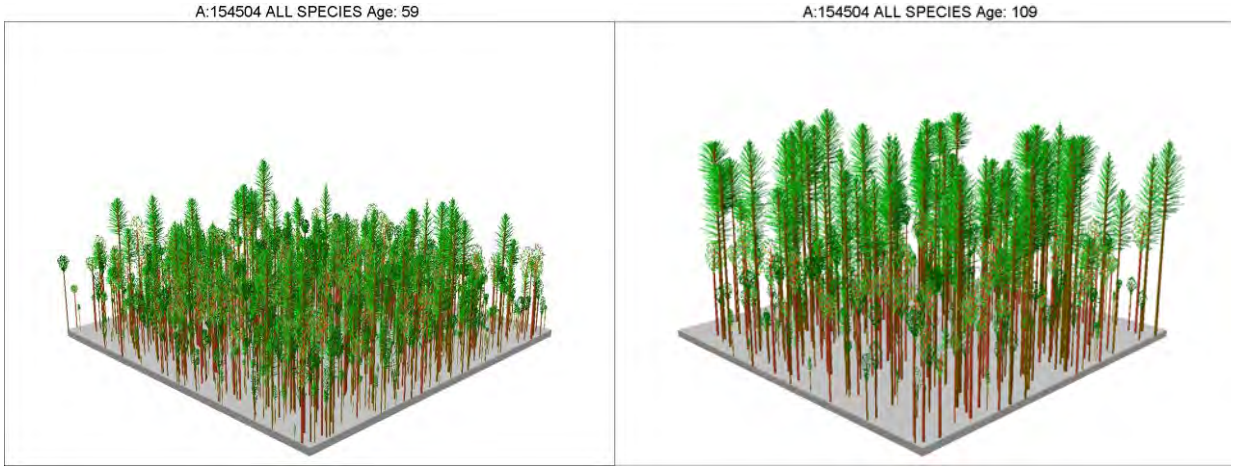
Table 3-4 displays the difference between no action and a Density Management treatment that involves the management of small trees (<8" DBH) in pole size stands (5-11"DBH). No action exhibits tree loss through competition mortality versus a selective thinning treatment that reduces stand densities uncharacteristic of dry forest condition. Table 3-5 compares the difference between the treated and untreated condition of stand 154504 throughout a 50 year time period. The untreated stand, immediately following treatment, projects a reduction in relative density and an increase in quadratic mean diameter.

Table 3-4. Description of Stand 154504 with and without Density Management

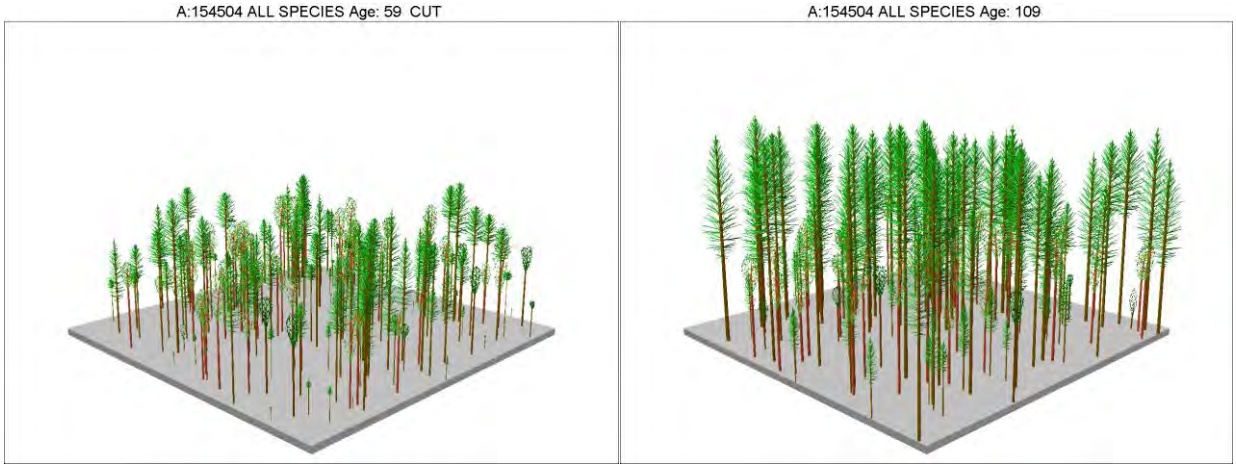
Existing Stand: 154504 (Pole Stand)										
Stand Age	Trees Per Acre	Basal Area	Relative Density Index			Quadratic Mean Diameter			Mean Live Crown Ratio	
59	1227	165	.753			5.0			.326	
Growth of Stand if Not Treated (note the decline in trees / acre from natural mortality						Growth of Stand if Thinned				
Stand Age	TPA	BA	RDI	QMD	Mean Live Crown Ratio	TPA	BA	RDI	QMD	Mean Live Crown Ratio
69	900	183	.768	6.1	.339	155	84	.290	10.0	.481
79	714	199	.785	7.1	.341	148	102	.337	11.3	.530
89	585	213	.796	8.2	.337	143	124	.390	12.6	.534
99	485	224	.799	9.2	.333	139	147	.445	13.9	.445
109	405	232	.794	10.3	.325	135	169	.495	15.1	.467

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 154504 (Figure 3-2).

Figure 3-2. Stand 154504



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



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

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 156175 throughout a 50 year time period. The original stand exhibited a RDI of 0.701 (a RDI from 0.55 to 1.00 bounds the zone of imminent mortality and suppression) and 384 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 0.701 to 0.283. After 50 years, the untreated stand holds 166 TPA at a stand RDI of 0.717. In contrast, the 50 year treated stand holds 54 trees per acre at a stand RDI of 0.415 (still below the threshold of 0.550; anything at 0.55 and greater results in mortality from competition between trees for limited resources).

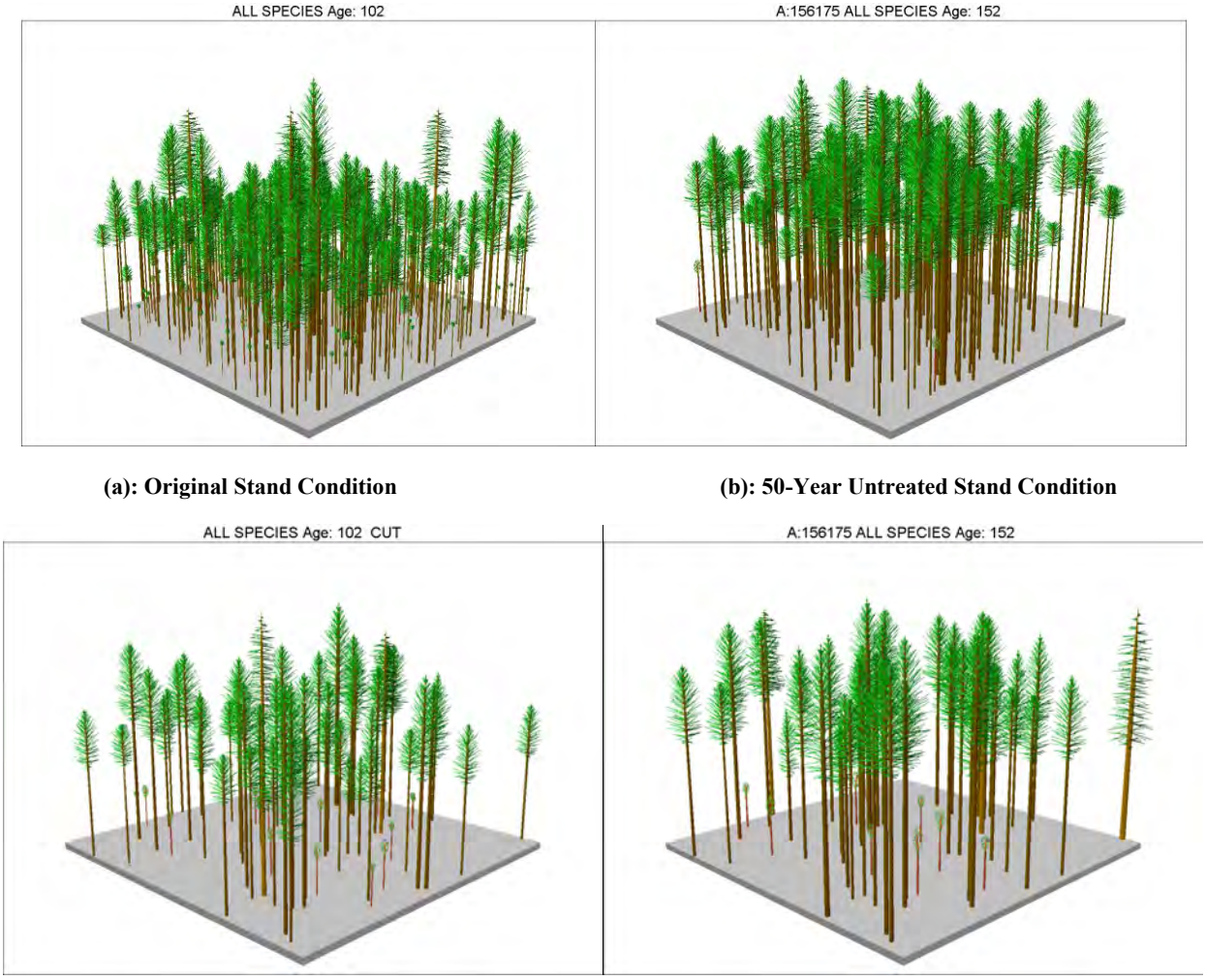
Table 3-5. Description of Stand 156175 with and without Variable Density Thinning

Stand Age	Trees Per Acre	Basal Area	Relative Density Index	Quadratic Mean Diameter	Mean Live Crown Ratio
102	384	201	.701	9.8	.259

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
112	277	211	.683	11.8	.292	60	113	.305	18.6	.414
122	228	223	.686	13.4	.302	58	126	.332	20.0	.439
132	200	234	.695	14.6	.302	56	141	.361	21.4	.443
142	181	244	.706	15.7	.297	55	155	.388	22.8	.429
152	166	254	.717	16.7	.292	54	170	.415	24.0	.415

Figure 3-3 illustrates the pre and post-harvest stand conditions of a mid seral Douglas-fir stand in the Douglas-fir-black oak/poison oak plant association. Currently, the stand has 384 TPA, a relative density index of 0.701, and a mean live crown ratio of 0.259 percent (Figure 3-2(a)). The species composition after a 50 year untreated stand projects 95% Douglas-fir, 3% hardwoods (black oak and Pacific madrone), and 2% ponderosa pine (Figure 3-2 (b)).

Figure 3-3. Stand 156175



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

(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 0.283 (Figure 3-2 (c)). Immediately following harvest the stand exhibits a projected 63 TPA, a basal area of 101 ft² per acre, and a mean live crown ratio of 0.375 (Figure 3-2 (c)). The species composition after a 50 year post harvest projects 81% Douglas-fir, 13% hardwoods, and 5% ponderosa pine (Figure 3-2 (d)). Openings created from thinning would allow suitable growing conditions for shade intolerant oak and pine species to regenerate, thereby increasing species diversity within the stand.

Alternative 2 includes 299 acres of Variable Density Thinning, representing 6% of the BLM lands in the Analysis Area. Under this alternative only 6% of the forest land base in the Analysis Area is proposed for commercial treatment. This amount constitutes 4% of the land base in the Planning Area (4,387 acres of forest land in the Analysis Area are not being treated commercially). Density Management (DM) treatments are proposed on 590 acres, representing 12% of the land base in the Analysis Area under this alternative. Approximately 590 acres of forest stands with proposed non-commercial treatment would be thinned. Additionally, 251 acres of Understory Reduction (UR) treatments are prescribed in stands with Variable Density Thinning. Thus, the total footprint of all non-commercial vegetation treatments in the Analysis Area for this alternative is 841 acres or 11% of the Planning Area.

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. The no action alternative would compromise these benefits to wildlife, that require 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.

Tree species diversity would continue to decline without treatments to maintain shade intolerant species such as pine. The effects would be as described above in the No-Action Alternative. Mortality of untreated Douglas-fir and pine stands as a result of competition could cause increasing levels of bark beetle species that could infect adjacent forest stands. Bark beetles are opportunistic creatures that have the ability to detect the chemical signature that a non-vigorous tree emits when it is weakened by competition, drought, disease, or a combination of all three. Leaving these acres untreated would also decrease the effectiveness of fuels hazard reduction in adjacent treated stands. Leaving diseased forest land untreated could increase disease and insect mortality. After initial hosts die out, re-colonization of susceptible species occurs readily in the Analysis Area.

If surrounding private lands are lost from wildfire, BLM-administered lands would leave patches of forest with thinning treatments that would help the landscape in providing long term forest complexity which is the result of variability. If active forest management is to occur 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 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 or health of these stands into the future is critically important in protecting social and ecological values that are in there own right diverse in nature.

3.0 Fire/Fuels Management

This section discloses effects of forest management activities such as prescribed fire, thinning, logging, and fuels reduction treatments. Smoke impacts, as a result of prescribed fire, are discussed in —Air Quality".

3.1 Issues/Concerns

Scoping (external and internal) generated the following issues/concerns 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.

- Timber harvesting would increase surface fuels over the short-term (6 months to 2 years) in stands treated. Some people expressed their concern that leaving untreated logging slash, even if only for a short period of time, could lead to increased wildfire behavior and increased risk of escape from initial attack.

- 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. These changes in microclimates and vegetation structures can alter wildfire behavior and its effects on the land (fire severity).

- Some comments were received suggesting that untreated forest stands with closed canopy conditions result in lower fire severity when burned by wildfire than open and non-forest vegetation conditions. This information was also correlated, by commenter‘s, to a conclusion that long absence of fire is a predictor of low severity fire effects.

3.2 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-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. However, there is evidence that stand replacement fires did occur historically, but they likely affected a smaller proportion of the landscape in comparison to wildfire incidents experienced across the Pacific Northwest over the last two decades.

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 southwest Oregon and Northern California Siskiyous prevents generalizations about

fire and its ecological effects (Agee 1993 p. 283-284). This is also true for the lower to mid elevations of the Pilot Joe 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's 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.):

> 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 north American west's 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 and others 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 (Hann and others 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 and others, CB 891). Higher severity fires in low-severity fire regimes are more apt to have detrimental effects on soils, watersheds, and wildlife habitat (Brown and others 2004 CB 907).

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 mosaics 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) (CB 892). Severe fires currently on the landscape are more apt to result with severe effects than would have occurred historically (Agee 1998; Agee 2002). However, Odion and others (2004 CB 927) found the proportion of low to high severity fire effects in the Western Klamath Mountains (same bioregion as this project area) to be comparable to both contemporary and historical proportions of low to high fire severity.

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 (The JISAO Climate Impact Group- Mote et al 2003; Drought and Pacific Decadal Oscillation Linked to Fire Occurrence in the Pacific Northwest Hessl 2004; Preparing for Climatic Change: The Water, Salmon, and Forests of the Pacific Northwest- 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 be a product from this climatic variation and wildland fire will be one of the agents that causes the changes in the ecosystems. One option land managers have to affect the change, protect private property, and ecosystems are through silvicultural and fuels management treatments.

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.

The forest stands 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 exclusion of fire.

Past Actions and Events Affecting the Fire Environment

A catalogue of past actions with specific dates and units of treatments/events is not necessary, nor is it relevant. A catalogue of actions simply breaks down history, reflected as the current condition, into its component parts. Simply knowing that these events/actions occurred over a given timeframe yields no useful information when adding the effects of ongoing, reasonably foreseeable and proposed actions, because the starting point of additive effects *is* the current condition, which accounts for all past actions. The relevant part of analyzing past actions is to determine whether current proposals have similar or different anticipated effects. A detailed catalogue of past actions is not necessary to obtain that information.

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 20 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.

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 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 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 absence of fire has had negative effects on grasslands, shrublands, and woodlands. Research in the last few decades has shown that many southern Oregon shrub and herbaceous plant species are either directly or indirectly fire-dependent.

Indirectly fire-dependent herbaceous species are crowded out by larger-statured and longer-lived woody species. This is particularly so for grasses and forbs within stands of wedgeleaf ceanothus and whiteleaf manzanita with a high canopy closure. High shrub canopy closure prevents herbaceous species from completing their life-cycle and producing viable seed. Many grass species may drop out of high canopy shrublands in the absence of fire because of their short-lived seed-bank.

Odion and others (2004 CB) argue that the fuel build-up scenario resulting from fire suppression is not appropriate for the Klamath-Siskiyou region. By studying the severity of fire effects in the Northern California area of the Klamath National Forest, the authors concluded that closed canopy forests burned with less severe fire effects, and that forests become less combustible with time since fire. The study does not identify what defines ―closed canopy", nor the role of stand age. The study describes the vegetation as ―tall, temperate forest characterized by a relatively open Douglas-fir overstory with a subcanopy of tan oak." Not knowing what constitutes ―closed canopy" makes it unlikely that a meaningful comparison can be made to proposed treatments in the Pilot Joe project.

Odion's study links open canopies with increased severe fire effects. Because the study concludes that the proportion of high severity fire (resulting in substantial to complete stand mortality) has not changed in the last 80 years (despite increasing human intervention resulting in roads, tree plantations, and opened canopies), one of two situations regarding open canopies must have existed historically. There was less open canopy (because less human manipulation early in the 20th century), so severe fire effects were more abundant in closed canopies; or (2) there has always been a specific proportion of the forest with open canopy, and fire suppression has resulted in increased amounts of closed forest canopy. Without knowing the historic role of forest canopy, the study has limited utility in analyzing the significance of severe fire effects in open and closed canopy forests on a landscape scale.

The authors further describe the role of shade in shaping the effects of wildfire, especially those forests that have not burned within the last 80 years or so. Essentially, the study merely confirms that as timber stands age, they become more fire resilient. This is due to the spatial location of fine fuels (needles, small branches, etc.) in relation to adjacent trees, and other sources of forest fuels such as forest floor debris and brush. Older stands with closed canopies allow little if any light for brushy species and young trees to persist, thereby naturally reducing the flashy fuels that may result in fire ―laddering" from the ground to tree canopies resulting in a crown fire. Young stands cannot benefit from the shade phenomena, simply because the young trees themselves provide the flashy, ladder fuels, due to proximity of the tree canopy to the ground. Therefore, stand age is very important, because it relates to tree size and heights to forest crowns/canopies which have a direct bearing on the development of crown fire. Based on the description of the vegetation in the study (―tall…relatively open Douglas-fir overstory…"), one must infer that these are mature to old growth stands. Therefore, the results of this study are not comparable to young stand conditions which are the subject of thinning proposals in the Pilot Joe project area.

Effects of Logging

Commercial timber harvesting has occurred in the Pilot Joe analysis area on BLM managed lands since the 1940s. The intensity and acres harvested increased in the 1970s and 1980s, and decreased again in the 1990s (USDI 2000: 44). Past harvest techniques such as clearcutting or overstory removal, which results in stands of young, more flammable trees contributed to the current fire hazard ratings for the fire analysis area. Many of the units included in the Pilot Joe Project were previously harvested around the 1970s through 1990s using selective harvest methods. Selective harvesting removed trees in the small to large diameter classes to thin forest stands and remove trees that were declining due to drought periods, high forest stand densities, and insects and disease.

Studies that show logging increases the effects or intensities of wildfire attribute these increased fire effects to the harvest of stands of large, more fire-resistant overstory trees along with not treating logging

slash. These logging practices also replaced stands of dense canopies with open canopies and clearcutting or even-aged management established plantations.

Unmanaged blocks of contiguous mature and old growth forests generally have sufficient structural diversity to create microclimate effects that inhibit extremely hot fires (DellaSalla 1995). Many of these natural checks to intense fire behavior and high severity effects (large down trees, shade from intact canopies) were removed by timber harvest in the 1980's. This was the case on timber sales that the BLM conducted in the project area in the 1980's where the liquidation of old growth trees was an objective in order to maximize fiber production. This project is not treating unmanaged blocks of contiguous mature and old growth forests. The commercial thinnings proposed are generally in stands that are less than 150 years of age and are removing the smaller diameter trees from the understory.

These management and human influences may not have severe fire effects different from those that were present historically and were the drivers of the forest dynamics that shaped the patchy nature of forests in the project area. In a comparison of 1987 fires to other wildfires since 1911 in forests in Northern California of the Klamath-Siskiyou Province, Odion and others (2004 CB 933) found, despite human influences and a fire-suppression policy, most large wildland fires have been dominated by low-severity wildfire, and even though fire size was increasing. While the effects were statistically different in closed canopy areas and plantations, aggregate effects across the landscape were still dominated by low-severity fire. The authors identified the area as generally a mixed fire severity regime.

Timber harvest has increased fire severity, *if not* accompanied by adequate reduction of fuels, by increasing surface dead fuels (SNEP, 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 which 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 in JFS conference procedings) 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. (KS)

Plantations are more susceptible to severe fire effects than unmanaged older forests (DellaSalla and others 1995, 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. (ONRC)

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.

The 7,536 acre planning area was used for a fire history analysis. Information from the Oregon Department of Forestry database from 1960 to 2009 show a total of 35 fires occurred throughout the planning area. Fire suppression was in full effect during 1960-2009 and all fires were attacked to keep them as small as possible. Lightning accounted for 37 % of the total fires and human caused fires accounted for 63%. 11 of the 35 fires (31%) started on BLM managed lands. Lightning accounted for 9 of the 11 fires that started on BLM land. 77% percent of the fires in the project area were less than one acre in size. One fire in 1968 was approximately 20 acres in size, was human caused and started on private property.

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 planning area and reflect the results of past human and natural disturbances. In general the existing fuel profile within the project area represents a moderate to high resistance to control under average climatic conditions. The following table summarizes the percent of acres of all the BLM land in each fire hazard rating category for the entire project area. This data is from the Jackson County Fire Risk Analysis.

Table 3-6. Fire Hazard Rating Category for the Pilot Joe Fire Analysis Area.

Fire Hazard Rating	Percentage by Hazard Category
Low hazard	23%
Moderate hazard	26%
High hazard	51%

Fuels Reduction/Fire Restoration

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-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 and others 2004 CB 880).

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 that have developed during the fire exclusion period (Agee and

Huff 1986 CB 908).

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 and others (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 (Forest Trust; Omi and Martinson; *Pollet and Omi 2002;* Agee1993, Alexandar 1988, Alexander and Yancik 1977…in Graham*)*. 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 (Arno and others 1995; Fule and others 1997; Moore and others 1999; Stephenson 1999 in CB 907). 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). (CB 907). 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 and others 2004).

Fuels reduction through ―commercial thinning" is offered by some to be experimental and controversial (DellaSalla and Frost 2001). DellaSalla and others (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, DellaSalla 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 (Comments to previous BLM projects). The recommendation of thinning trees up to 12 inches includes ―commercial" component (those trees between 8-12 inches). Thus, the applicability of studies regarding the effectiveness of commercial thinning must be examined. The efficacy of 12 inch diameter limits is untested (Brown and others 2004 CB 905), and is often touted more as a social solution rather than a tested ecological solution (ONRC input to previous BLM projects).

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) CB 905. 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 (Finney and others 2002a) CB 906. 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 Cone Fire of 2002, which burned in the cascade mountains of northern California, showed that stands that were thinned experienced lower fire severity than untreated stands (Skinner and others 2004). It was also observed and documented that stands that were thinned from below and followed up with prescribed fire experienced the lowest fire severity and the fire dropped out of the crowns and died out after entering these stands.

In a study of five recent wildfires and determining the effectiveness of pre-fire fuel treatments it was found that ―treatments that included reduction of surface fuels were generally effective" (Omi 2006). The best results were produced when commercial thinning was followed by slash treatment. In the same study it was found that ―only treatments that reduced both canopy and surface fuels in combination showed a significant correlation to weather conditions and the effectiveness of these treatments actually increased with weather severity".

Fire Suppression

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 are 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 lands the following guidelines would be followed:

BLM resource advisors will be dispatched to fires which occur on BLM 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.

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 affect 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 lb. 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%) 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%) remain 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.

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.

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.

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 nonattainment 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% of the annual total for the Medford/Ashland air quality management area. Over the past decade 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 (instrument designed to measure changes in visibility) in Grants Pass, Provolt, Illinois Valley, Ruch and eventually in Shady Cove. One medium volume sampler is collocated with the nephelometer at the Provolt site. The medium volume sampler measures the amount of PM 10 and smaller at ground level.

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…
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.

3.3 Environmental Consequences

3.3.1 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 Pilot Joe project described under the Affected Environment.

The current trend of increasing stand density which results in increased mortality to the timbered stands would continue. The transition from ponderosa pine stands to dense fir stands would also continue at the lower elevations within the project area. 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, density management and fuels reduction under the proposed action, all of which are in fire regime condition classes 2 and 3, would not be treated so the ecological restoration and corresponding fuels reduction objectives for these areas would not be accomplished. Without treatment the condition class of these stands would continue to deteriorate to a condition class 3.

The loss of hardwoods and ponderosa pine to excessively dense fir stands would continue at the lower elevations within the project area. Trees growing under these conditions often become weakened and are highly susceptible to insect epidemics and tree pathogens. Younger trees (mostly conifers) contribute to stress and mortality of mature conifers and hardwoods.

Ladder, surface fuels and aerial fuels (crown density) would also increase within these stands. Increasing stand densities and fuel loadings would increase the chance of more acres that would burn in high intensity fires within the project area. There is an increasing chance that the high quality late successional habitat in the upper reaches of the planning area would be lost to wildfire. Fire fighter safety would continue to be an issue as well as the potential of resource damage.

Seventy seven percent of the project area will remain in moderate to high fire hazard resulting in a continued high chance that when a wildfire occurs, a large portion of the burn would exhibit high severity fire effects. As fire is continually excluded and stand densities continue to increase, coupled with expected climatological changes, the chance for higher proportions of high severity fire effects increases. Air quality would be impacted in the event of a large wildfire. Emissions from wildfires are significantly higher than from prescribed burning. The wildfires which occurred in southern Oregon in 1987 emitted as much particulate matter as all the burning that occurred within the state that year.

Based on trends in the last 49 years, humans will continue to be responsible for the majority of wildfires (63%), but be responsible for only a small portion of the total acres burned. On BLM lands, lightning will continue to be the major cause (82%) for fire starts. Most of the human-caused fires will continue to be associated near residences and roads.

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. 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. 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.

3.3.2 Alternative 2 - Proposed Action

A forest that is fire-resilient has characteristics that limit fire intensity and increase resistance of the forest to mortality. Increasing forest fire 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-tree crown fire less probable; and keeping large diameter trees that are more fire resistant. Fire resiliency is especially important in dry pine and mixed conifer forests that comprise the low severity fire regime.

Prescriptions for thinning treatments are based on increasing forest health and increasing fire resiliency. Ecological restoration prescriptions proposed in the Pilot Joe project focus on reducing tree density and

removing ladder fuels, and target smaller diameter trees for removal. Thinning is also necessary before returning fire to the site in the form of prescribed fire.

This alternative results in 889 acres of timbered stands that are in condition class 2 and 3 being thinned. The thinning prescriptions target suppressed and co-dominant trees. Some of the smaller diameter commercial trees that are proposed for harvest act as ladder fuels and can contribute to fire reaching the canopy of mature trees.

The end result of these stands being thinned will be a reduction in ladder fuels, an increase in the height to the base of tree crowns and the reduction of crown bulk density. All these are important factors in reducing crown fire potential and sustaining a crown fire in these stands (Omi and Martinson 2002). Over time, the commercial thinning would also increase diameter growth of the residual stand. Larger diameter trees are more tolerant to surface fires so there would be less mortality to the stand in the event of a surface fire. The 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 (Agee and Huff, 2000).

The strategic positioning of the treatments downslope of and adjacent to the LSEAs will help to reduce the intensity of any fire in those areas thus reducing the likelihood of complete loss of the LSEAs.

The prescriptions employed in Pilot Joe target removal of smaller suppressed or co dominant trees and the retention of the largest, oldest trees. Thinning treatments will reduce tree canopies to an average of 40% to 60% canopy closure. Monitoring of past thinning operations that occurred five to seven years ago in the Applegate using similar prescriptions, show stands that were thinned to a residual basal area of 100 square feet and average canopy closure of 40% to 50% showed no increase in understory vegetation. The surface fuel models in these stands are a fuel model 8 and 9 which are the targeted fuel models after commercial thinning and fuels treatment. The same observations have been made in stands that were thinned from below and left canopy closures from 60% to 75%.

Any treatment that removes trees and leaves tops and limbs on the forest floor will temporarily increase fuel. 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 are 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 being 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, recent research indicates that a reduction in crown fuels outweighs any increase in surface fire hazard (Omi and Martinson 2002). The intent here is not to leave the slash on the ground but to treat all activity slash. This temporary increase in surface fuels is usually less than one year. One year is the time period that it takes to implement the fuel treatments to dispose of the surface and ladder fuels in these stands.

Treatment of slash created from commercial thinning is prescribed for all stands being commercially thinned. Ladder fuel removal in addition to activity fuel is prescribed for 85% of the commercial thin units. By treating the noncommercial sized material in these stands, ladder fuels would be reduced. The reduction of this material along with the treatment of surface fuels would reduce fire behavior characteristics 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 these stands would be greatly reduced. Also,

mortality of the smaller diameter conifers would be reduced. The reduction of flame length would also increase the chance that direct attack of a wildfire could occur which would reduce acres burned in the event of a wildfire.

Thinning and subsequent slash treatments are 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. Underburning for stands that are commercially thinned are proposed for treatment within two to four years after a unit is harvested. Treatments should ensure that under most climate conditions, flame lengths would be less than three feet allowing for direct attack of a wildfire. Because of the strategic placement of the commercial thinning, density management and fuels reduction within all units, there should be an increase in the likelihood of the important late successional habitat remaining after a wildfire. There should be an increase in vigor and growth in remaining stands where trees will attain fire resistant characteristics sooner.

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 (slashing, hand piling and burning). Even after manual treatments surface fuel levels in the 1, 10 and 100 hour fuels (1/4" to 3") are often so high that a low intensity burn is not possible. When this is the case underburning is done in the spring.

Burning in the fall with high surface fuel loadings may 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" - 3") 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 residual vegetation is minimized and the chance of escape is also lessened. Visual observations of areas that have been underburned in the spring in the Applegate over the past six years have not shown any negative impacts to the site. It is expected that a small percentage of trees will die as a result of the application of prescribed fire. This will aid in the establishment of new snags leading to down wood and the continuance of ecosystem processes.

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 occur 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, and benefits from prescribed fire will be maximized.

Logging and thinning actions would not significantly increase fire behavior because large, fire resistant trees are generally retained; slash is being treated; and large, flammable plantations are not being created. Improving fire resiliency decreases the effects on fire severity caused by global climate change.

The thinning and associated fuel reduction 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.

Because tree cutting prescriptions and slash treatments proposed in this project are vastly different than those of the past which often left slash and encouraged high density of young trees, the proposed treatments will result in conditions favoring increased fire resiliency in the area. As discussed above, the direct and indirect effects of current thinning (logging and prescribed fire) proposals is an increase in fire resilience.

In a study on the effects of thinning on fire behavior, Graham and others (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; 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).

There are no other large scale timber harvest or vegetation projects known except thinning of brush and small trees for fuels reduction on private lands. Most homeowners in the area already have completed defensible space fuels reduction, so very little additional work is anticipated. Road construction is limited to potential development of private lands, but is considered to be minor because roads are for private, limited use, and generally very short. Thus foreseeable future actions are very narrow in scope and potential cumulative impacts from the proposed actions under Alternative 2 are equally narrow and minor.

As a result of past actions that have created younger, dense forest conditions with missing fire return cycles, fire suppression will continue to increase potential fire behavior in stands which are not treated by Alternative 2. Stands selected to be maintained in dense, late successional habitat are expected to be retained longer as a result of strategic thinning adjacent to and downslope. Because the thinned stands are placed on a maintenance schedule, fire suppression will not have much cumulative effect to treated stands because fire will be continually applied over time, as needed. Maintenance burns will continually reduce accumulated forest debris and new plant growth.

Changes in micro-climate and effectiveness of fuels treatments

Management of forest stands can result in altered micro climates (Agee 1996). Increasing spacing between the canopies of trees can contribute to increased wind speeds, increased temperatures, drying of topsoil and vegetation (Countryman 1955) (Countryman 1972), 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).

Effects of canopy reduction on fuel moistures

Silvicultural prescriptions proposed for stands under the proposed action vary on how much canopy cover will remain after commercial thinning occurs.

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 moistures. An ambient air temperature of 90 to 109 degrees and a relative humidity of 15 to 19 percent would result in a 3% fuel moisture for 1-hour time lag fuels. The fuel moisture of 10-hour fuels would be 5%; and the 100-hour fuel moisture would be 7%.

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% shading (shaded) or less than 50% 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%) to correct fuel moisture on a site that has the following attributes you would add 3% to the fuel moisture for a total of 6%.

- north slope
- slope greater than 31%
- 12:00 pm in August
- shading greater than 50%
- no cloud cover

Utilizing the same parameters but for an area that has shading that is less than 50% you would add 4% for a fine fuel moisture of 7%. The difference between the two sites is 1% which would have minimal impacts to fire behavior.

This proposed action proposes to use prescribed fire so consequently there would be some smoke related impacts.

Under this alternative, prescribed burning would comply with the guidelines established by the Oregon Smoke Management Plan (OSMP) and the Visibility Protection Plan. Prescribed burning under this alternatives is not expected to affect visibility within the Crater Lake National Park and neighboring wilderness smoke sensitive Class I areas (Kalmiopsis and Mountain Lakes) 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, under this alternative is not expected to adversely effect annual PM2.5 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.

Other measures to reduce the potential level of smoke emissions from proposed burn sites would include mop-up to be completed as soon as practical after the fire and covering hand piles 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 reduces the total emissions by accelerating the ignition period and reducing the total combustion process due to the reduction in the smoldering stage.

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.

However, the effects of smoke are minimized because 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.

Smoke 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 the material dry to permit burning during the rainy season when there is a stronger possibility of atmospheric mixing and/or scrubbing, thus dispersing the smoke.

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 this alternative 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. Relief for these individuals is simply leaving the area for a short time. While smoke effects to these individuals are real, the effect of smoke from this alternative is very minor because it may affect only a few out of 150,000+ people (approximate population in the Medford/Ashland area). There are a small number of residents who live near the treatments areas who may be directly impacted by smoke. Timing of slash burning in the project area will account for the time periods that allow smoke to rise aloft and to the south thus minimizing any impacts to the residents.

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 this alternative.

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" to 3") 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" - 3") 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.

Wildland Urban Interface

The entire project area is within the Applegate wildland urban interface. The effect of reducing home ignitions by reducing forest fuels around structures has been demonstrated by Cohen 1998; Cohen 1999). He found that even severe fires will not directly ignite structures at distances beyond 200 feet. However, fire brands from beyond 200 feet may land on combustible surfaces and ignite structures. In cooperation with fire agencies, the community developed the Applegate Fire Plan. Using the Fire Plan as both a guiding document and leverage for obtaining assistance funds, Fire Plan personnel and Applegate Valley Rural Fire Department #9 have spearheaded significant efforts to create defensible space around structures, driveways, and important roads. As a result of education and outreach efforts involving the Fire Plan, 87% of homeowners in the Applegate Valley have created defensible space around their homes (pers. Com., Brett Fillis, Fire Chief). Because of the leadership of a few residents in the project area, defensible space is expected to be at least as high as the Valley average. Many local residents have expressed concern for loss of their forest resources to wildfire in addition to their homes. This concern has motivated a number of landowners to perform thinning operations on private forest land in order to create conditions that will allow for less damaging wildfires to occur on their property.

4.0 Soils

4.1 Issues/Concerns

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.

- Logging, using ground based machinery, is perceived to disturb and compact the soil, which could result in increased erosion and reduced soil productivity.
- Logging, using cable systems, is perceived to disturb and compact the soil
- Prescribed fuel treatments are perceived to increase soil erosion.

4.2 Affected Environment

This section discloses impacts resulting from potential actions that may result in ground disturbance that affect soil erosion and soil productivity. While this section discloses disturbances resulting in erosion and possible sediment production, the ―Water Resources" section discusses the fate of those sediments as they relate to water quality. The ―Water Resources" section also discloses the effects of altered hydrological functions as a result of soil compaction and disturbance.

The soils in the project area are identified by soil series using the methodology of the National Cooperative Soil Survey. The major soil series identified in proposed project area are listed in the table below along with a brief description of the soil and its characteristics such as permeability, runoff and erosion potential. Erosion potential relates to the ease of detachment and movement of soil particles on the landscape. It is not meant to imply that all the eroded material will enter the aquatic environment. Natural erosion is part of the soil building process but excessive long term erosion would reduce soil productivity. Soil Category refers to the sensitivity of the soil to prescribed fire with category one being highly sensitive. The Medford District Resource Management Plan provides soil management direction based on these categories.

Table 3-7. Soils in the Pilot Joe Project Area

Soil Map Unit #	Soil Map Unit Name	Soil Category
1C	Abegg gravelly loam, 7 to 12 percent slopes	3
25G	Caris-Offenbacher gravelly loams, 50 to 80 percent north slopes	1
26G	Caris-Offenbacher gravelly loams, 50 to 75 percent south slopes	1
108D	Manita loam, 8 to 20 percent slopes	3
108E	Manita loam, 20 to 35 percent slopes	3
108F	Manita loam, 35 to 50 percent slopes	3
113G	McMullin-Rock outcrop complex, 35 to 60 percent slopes	1
158D	Ruch gravelly silt loam, 7 to 20 percent slopes	3
195E	Vannoy silt loam, 12 to 35 percent north slopes	2
195F	Vannoy silt loam, 35 to 55 percent north slopes	2
197F	Vannoy-Voorhies complex, 35 to 55 percent south slopes	2

Figure 3-4. Soils in the Pilot Joe Project Area –West Units

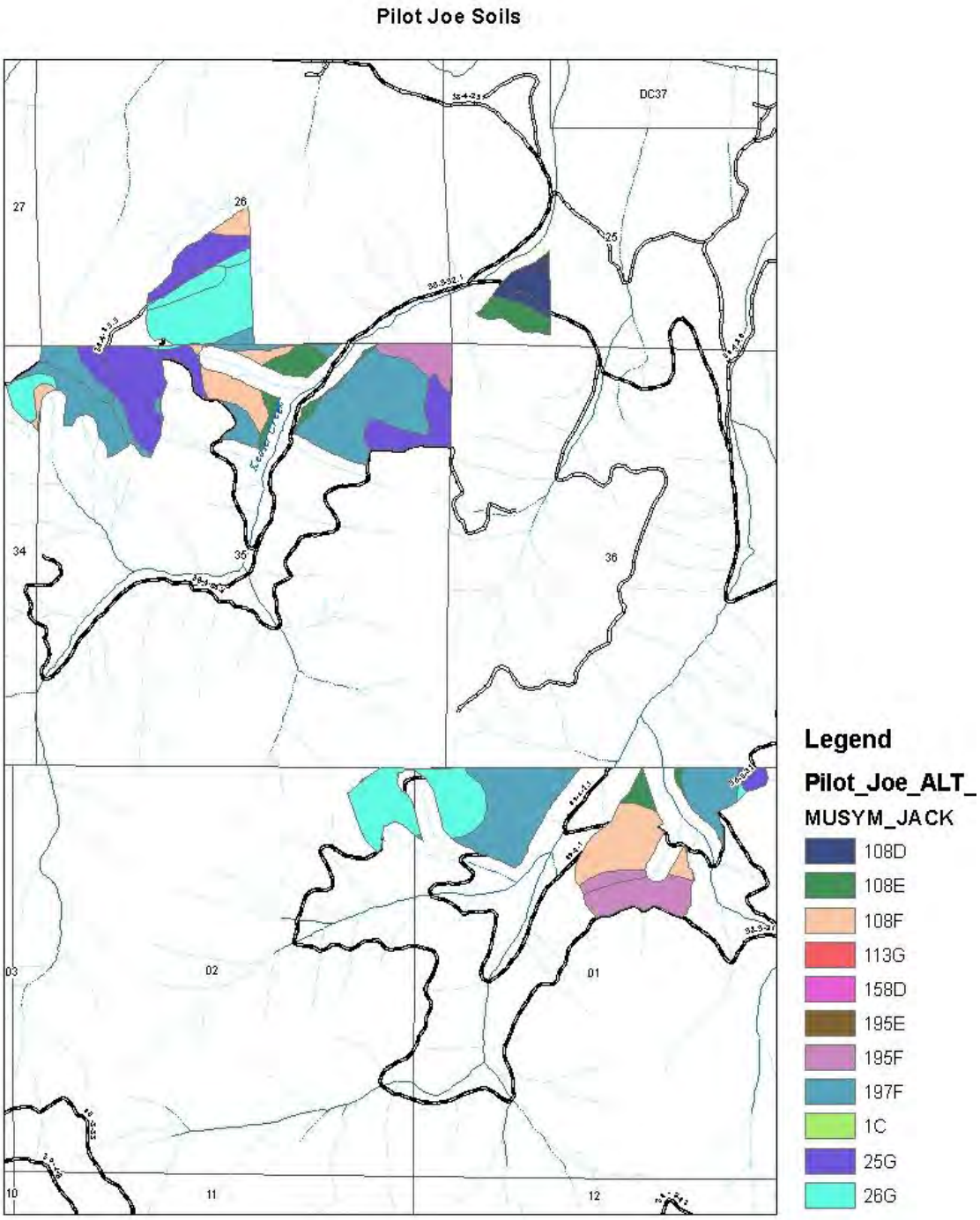
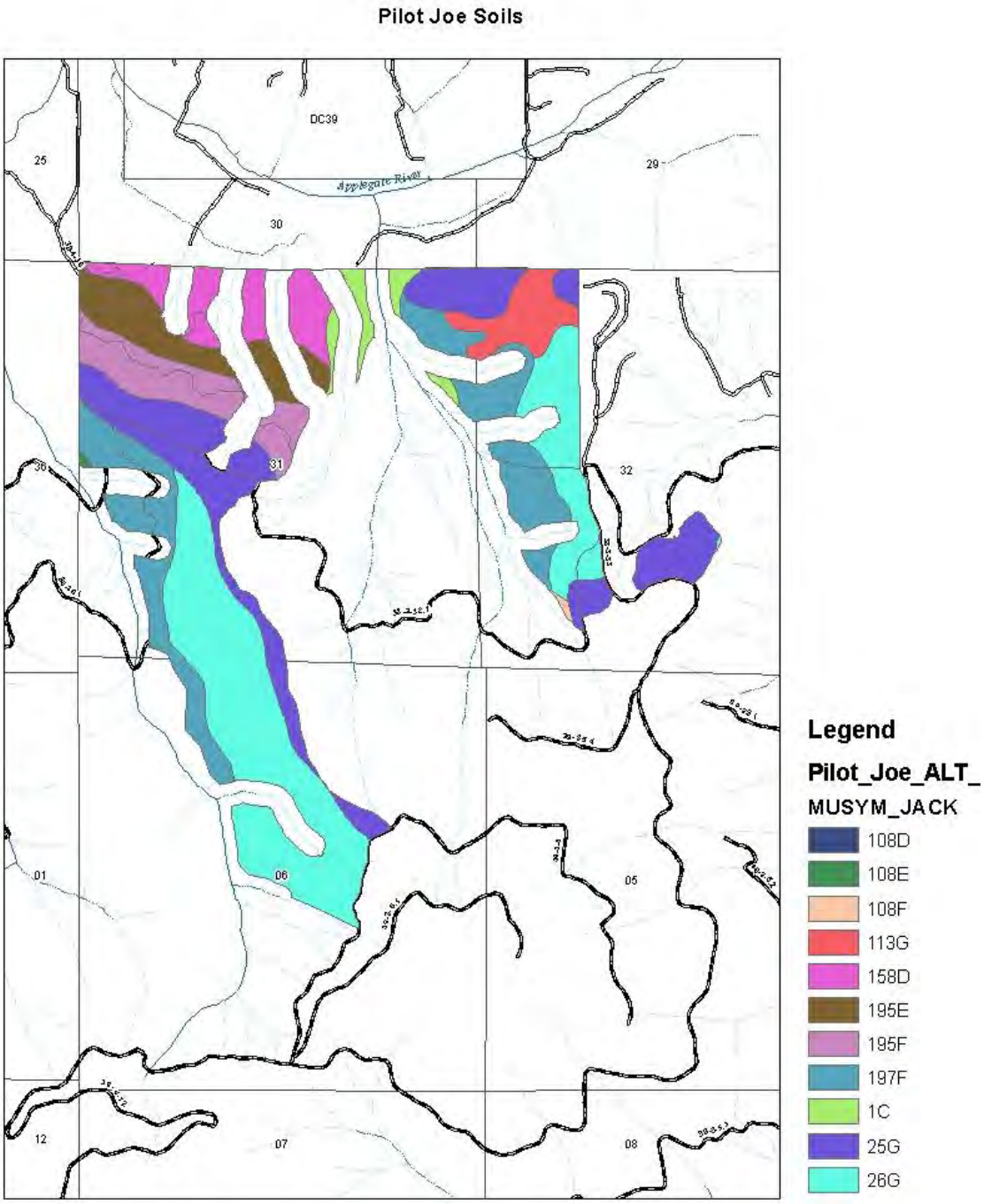


Figure 3-5. Soils in the Pilot Joe Project Area –East Units



Soil Characteristics

Abegg gravelly loam (1)
This very deep, well-drained soil is on alluvial fans. It formed in alluvium derived dominantly from metamorphic rock. Typically, the surface is covered with a layer of needles, leaves, and twigs about 1/2 inch thick. The surface layer is very dark grayish brown gravelly loam about 5 inches thick. The next layer is very dark grayish brown and brown very gravelly loam about 17 inches thick. The upper 16 inches of the subsoil is dark yellowish brown extremely gravelly loam. The lower 28 inches is brown and yellowish brown extremely gravelly clay loam. The depth to bedrock is 60 inches or more. In some areas the surface layer is cobbly or stony. Permeability is moderate in the Abegg soil. Available water capacity is about 4 inches. The effective rooting depth is 60 inches or more. Runoff is slow, and the hazard of water erosion is slight.

Caris-Offenbacher complex (25, 26)
The Caris and Offenbacher soils are intricately intermingled across the landscape in this map unit. These soils have surface textures of gravelly loam but in much of the proposed project area, rock fragments overlay the soil surface forming talus. Talus is angular rock fragments, mainly of gravel or cobble size, that was derived from and lying at the base of a cliff or on steep, rock slopes. Not all of the talus is easily identified, as it is covered with a layer of needles, leaves, and twigs.

The Caris soil is moderately deep and well drained. It formed in colluvium derived dominantly from metamorphic rock. Typically, the surface is covered with a layer of needles and twigs about 1 inch thick. The surface layer is very dark grayish brown gravelly loam about 7 inches thick. The upper 13 inches of the subsoil is dark yellowish brown very gravelly clay loam. The lower 11 inches is dark yellowish brown extremely gravelly loam. Bedrock is at a depth of about 31 inches. The depth to bedrock ranges from 20 to 40 inches. Permeability of the Caris soil is moderate. Runoff is rapid, and the water erosion potential is high. In some areas the surface layer is very gravelly loam or is stony.

The Offenbacher soil is moderately deep and well drained. It formed in colluvium derived dominantly from metamorphic rock. Typically, the surface is covered with a layer of needles, leaves, and twigs about 1 inch thick. The surface layer is dark grayish brown and dark brown gravelly loam about 9 inches thick. The subsoil is reddish brown and yellowish red loam about 25 inches thick. Bedrock is at a depth of about 34 inches. The depth to bedrock ranges from 20 to 40 inches. Permeability of this soil is moderate. Runoff is rapid, and the water erosion potential is high. In some areas the surface layer is very gravelly loam or is stony.

Manita loam (108)
This deep, well drained soil is on alluvial fans. It formed in alluvium derived dominantly from metamorphic rock. Typically, the surface layer is dark brown loam about 8 inches thick. The upper 5 inches of the subsoil is dark reddish brown clay loam. The lower 45 inches is yellowish red clay loam. Weathered bedrock is at a depth of about 58 inches. The depth to bedrock ranges from 40 to 60 inches. Permeability of the Manita soil is slow. In some areas the surface layer is gravelly. Permeability is moderately slow in the Manita soil. The effective rooting depth is 40 to 60 inches. On slopes under 35 percent, runoff is moderate and the potential for water erosion is moderate. On slopes over 35 percent, runoff is rapid, and the hazard of water erosion is high.

McMullin gravelly loam (113)
The McMullin soil is shallow and well drained. It formed in colluvium derived dominantly from igneous and metamorphic rock. Typically, the surface layer is dark reddish brown gravelly loam about 7 inches thick. The subsoil is dark reddish brown gravelly clay loam about 10 inches thick. Bedrock is at a depth of about 17 inches. The depth to bedrock ranges from 12 to 20 inches. 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 rapid, and the hazard of water erosion is high. This is a highly sensitive soil as related to soil

productivity effects from disturbance (i.e., prescribed burning). This soil is often associated with rock outcroppings.

Ruch gravelly silt loam (158)
This very deep and well drained soil is on alluvial fans and foot slopes. It formed in alluvium derived dominantly from metamorphic rock. Typically, the surface layer is dark brown gravelly silt loam about 7 inches thick. The upper 10 inches of the subsoil is reddish brown loam. The lower 53 inches is yellowish red loam. The depth to bedrock is 60 inches or more. In some areas the surface layer is cobbly or stony. 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 silt loam (195, 196, 197)
The Vannoy soil is moderately deep, well drained on hillslopes. It formed in colluvium derived dominantly from metamorphic rock. Typically, the surface is covered with a layer of needles, leaves, and twigs about ¾ inch thick. The surface layer is dark brown silt loam about 4 inches thick. The next layer is reddish brown silt loam about 7 inches thick. The subsoil is yellowish red clay loam about 27 inches thick. Weathered bedrock is at a depth of about 38 inches. Permeability of the Vannoy soil is moderately slow. The depth to bedrock ranges from 20 to 40 inches. In some areas the surface layer is gravelly or very gravelly loam. Runoff is medium and the potential for water erosion is moderate on slopes less than 35 percent. On slopes over 35 percent, runoff is rapid and the water erosion potential is high.

Voorhies very gravelly loam (197)
The Voorhies soil is moderately deep and well drained. It formed in colluvium derived dominantly from metamorphic rock. Typically, the surface is covered with a layer of needles and twigs about 1 inch thick. The surface layer is very dark grayish brown and dark brown very gravelly loam about 8 inches thick. The upper 10 inches of the subsoil is brown very gravelly clay loam. The lower 18 inches is brown very cobbly clay loam. Weathered bedrock is at a depth of about 36 inches. Permeability of the Voorhies soil is moderate. The depth to bedrock ranges from 20 to 40 inches. As this soil is mainly found on slopes over 35 percent, runoff is rapid and the water erosion potential is high.

Existing Conditions
Except for miscellaneous salvage projects, the Chapman/Keeler drainages were last entered for timber harvest by BLM around 1987 when approximately 96 acres were shelterwood cut and about 106 acres had the overstory removed. It appears as there have been a couple of entries on private land in Section 36 (38S-4W) since the early 1990s where several hundred acres have been harvested. Both the Chapman and Keeler drainages have recovered from previous management activities with erosion rates being near natural levels except where roads exist. It is estimated that the natural erosion rate for soils in the Applegate geomorphological erosion response unit (GERU) is approximately 0.7 yd^3/ac/yr. (Amaranthus, 1985, p.230). The roads in the Chapman/Keeler either traverse across the hill slope or are located near ridge tops. Roads that would be used for timber hauling under this project are in stable condition. BLM road 38-4-35.3 is a natural surface road that is open for use during the wet season. This road is currently rutted and producing high amounts of sediments to local waterways. This road is scheduled to be maintained and brought up to BLM standards before the project is initiated.

4.3 Environmental Consequences

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 Joe project. Discussions for Alternatives 2 reflect the direct and indirect impacts of the proposed action(s) of this alternative. Effects discussion also includes cumulative impacts of those direct/indirect actions when added incrementally to actions past, present, and reasonably foreseeable.

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 Resource section for analysis areas). Short-term impacts (or affects) are those being ten years or less and long-term more than ten years.

4.3.1 Alternative 1 – No-Action

The effect of the no action alternative on the soil resource would be the continuance of existing erosion rates that are near natural levels throughout the project area except for where roads exist.

With no action, the risk of high severity fire in the drainage is projected to increase (see Fire/Fuels Management section). Almost a century of fire exclusion has occurred in this area and, consequently, "natural" conditions no longer exist. Fuel loading is greater and duff/litter layers are often greater than would naturally occur. Given the natural fire frequency in this area, many low-severity fire events have likely been suppressed over the past century. Fire exclusion in mixed conifer forests has increased the risk of fire due to decades of fuel accumulation (Taylor, 2003 p.704). Consequently, the inevitable but unpredictable, uncontrolled natural burn (wildfire) could be of such intensity as to severely increase erosion and sedimentation, and severely set back the community of microorganisms. When compared to the proposed action alternative, there would be no increase in erosion rates short-term but long-term erosion from roads would probably increase due to lack of road maintenance and the risk of a high severity wildfire would increase.

4.3.2 Alternative 2 – Proposed Action

Under this alternative, no roads will be constructed and an estimated 22 miles of existing roads would be used as haul routes and improved as needed to meet BLM standards. Road improvements could include such items as spot rocking, cleaning road drainage ditches and culvert basins, repairing and installing water dips, grading and shaping road surfaces. BLM road 39-4W-1.1 road is proposed for natural decommissioning and will be blocked at the junction with the 39-4W-1.0 road. Natural decommissioning would cause minimal soil disturbance. All road work would be accomplished during the "dry" season which will minimize off-site sedimentation as a result of the soil disturbance.

Approximately 83 acres would be tractor logged using designated skid trails and 216 acres would be skyline-cable logged using partial suspension. A skyline cable system would provide for maximum suspension decreasing the ground disturbance. Slash created by the logging would be treated by burning to reduce the total fuel loading on-site. Approximately 590 acres would have treatments applied that would include cutting non-commercial size vegetation to meet density management objectives

Under undisturbed forest conditions, surface erosion processes are generally unimportant and considered a natural part of the ecological processes. Because of the importance of surface protection, the degree of soil disturbance has often been used as an index to compare surface erosion hazards for alternative log yarding systems. Studies have shown that in the western United States, the degree of soil disturbance is closely correlated to the amount of activity on the site. In comparing studies of selective type yarded units, on average tractor logging causes soil disturbance on about 15 percent of the site, 4 percent for skyline cable yarding and 2 percent for helicopters (Megahan, 1986). A study of timber harvest related erosion in the Klamath Mountains, Amaranthus et.al. found erosion rates increased slightly in harvest areas from 0.7 to 0.8 yd^3/ac/yr. (Amaranthus, 1985, p.232).

It is estimated the commercial timber harvest activities planned in this alternative would disturb, on average, about 10 percent of the ground in the proposed harvest units. As a result of implementing designated skid trails, the units tractor logged would result in approximately twelve percent or less of the area compacted (USDI, 1995. p.156). Designating skid trails would most likely minimize the area that would be deeply disturbed during tractor logging operations. In a study of thinnings and partial cutting

by yarded systems, tractor logging caused soil disturbance on about 21 percent of the site resulting in 13 percent displacement and 8 percent compaction. Skyline cable yarding disturbed about 7 percent of the site, with 7 percent displacement and <1 percent compaction (Landsberg, 2003. p.29).

Short-term erosion rate potential would increase moderately in the tractor units where slopes exceed 20 percent and where the skid trails are not on the contour. Most of the eroded particles would not enter local waterways as a result of yarding operations being fragmented, waterbars and Riparian Reserves. The decrease in soil pore space, as a result of the compacted skid roads, causes a slower infiltration rate and larger amounts of surface runoff. On slopes less than 20 percent and skid roads that follow the contour, runoff velocity tends to be reduced and soil particles transported only a short distance. Erosion rates in the cable units would exhibit only a slight increase over natural levels. In the cable units, disturbance other than in the yarding trails would not be extensive. The yarding trails are usually narrow, shallow compacted troughs of surface soil partially covered by scattered litter and slash. On steeper slopes (>60%) with higher erosion potential, waterbars would be constructed manually to direct water off the yarding trails. Although erosion rates would increase, most soil particles would remain on-site and return to near normal rates usually within 5 years as vegetative cover is reestablished.

Findings suggest that surface erosion resulting from the logging operation itself is not serious as most of the area remains 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, 1972). For most silvicultural regimes on most sites, soil productivity decline should not be expected as a short-term effect, as a result of harvest per se. Short-term declines are likelier to result from associated effects such as compaction, loss of organic layers, or erosion. The probability of productivity decline resulting from forestry practices is least when regimes of low intensity are performed on sites with high productivity or favorable conditions (Beschta, n.d.).

The presence of compaction, an on-site effect, can contribute to the occurrence of offsite effects, the most obvious of which is erosion and sedimentation. Infiltration of precipitation into compacted soil is impeded, increasing the efficiency and concentration of runoff, which increases its depth, velocity, and erosivity. This suggests that semi-permanent or permanent compaction may contribute to chronic or cumulative surface erosion. 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 this proposed alternative.

Prescribed burning planned under this alternative would be in the form of handpile burning or broadcast burning. As the broadcast burning planned in this project would be an underburn, the intensity of the burn would be light to moderate and have slight direct short-term effect on soil properties. A light surface fire will generally only char the litter, leaving most of the mineral soil at least partially covered. 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, 2005. p.5).

The increase in erosion rates over present levels would be minimal as a result of burning handpiles because the piles would be spaced throughout and occupy approximately 3 to 5 percent of the total area. Piled slash burns hotter than broadcast slash, increasing consumption of organic matter and nutrient losses. High soil temperatures generated under burning piles severely and negatively affect soil properties by physically changing soil texture and structure and reducing nutrient content (Perry et al, pg. 115). The increased potential of soil particles reaching the local waterways as a result of the prescribed burning would be low as underburning and/or handpiling of slash would not occur near waterways. High

soil temperatures generated by burning piles would severely and negatively affect soil properties in the 3 to 5 percent of the unit by physically changing soil texture and structure and reducing nutrient content. 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. Large proportions of the total Nitrogen budget can be lost through volatilization. Total foliar Nitrogen content also is reduced (14% in moderate burns, 33% in intense burns), and the effects last at least 4 years (Atzet, 1987 p.193). Overall, soil productivity would experience a slight, negative decrease short-term but potential long-term positive effects would be realized from the proposed actions as the risk of catastrophic fire is diminished.

Broadcast burning associated with the non-commercial treatments such as fuel reduction would have a moderate effect on the soil resource the first few years after implemented. Broadcast burning increases the amount of mineral soil exposed by a varying amount, depending on the depth and consumption of the litter layer on the forest floor. Observations leave little doubt that accelerated erosion is a common result of fire on forested lands. In slash disposal fires, by regulating burning, it is possible to control the amount of litter consumed and, presumably, the resulting erosion. In wildfires, litter and other fuels are so dry that almost all fine organic matter is consumed leaving virtually the entire soil surface exposed to erosion (Rice, 1972).

In summary, there would be a slight(<15%), short-term increase in erosion rates as a result of timber harvesting activities which would return to near pre-harvest levels within 5 years. 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. The loss is accounted for in the (Medford District) non-declining timber harvest calculations (PRMP 1994. p.4-13). Soil productivity would experience a slight, negative decrease short-term but potential long-term positive effects would be realized by thinning and prescribed fire. There would be a moderate, short-term cumulative increase in erosion rates as a result of harvesting timber and fuel reduction activities (i.e., slashing, prescribed burning) which would last about three to five years. A slight long-term decrease in erosion rates would occur as the affected harvest units re-establish ground cover and the overall risk of catastrophic wildfire in the area is reduced.

5.0 Water Resources

Characterization

The proposed Pilot Joe project area is within the central portion of the Middle Applegate River Watershed. All of the land within the project area drains into the portion of the Applegate River between Forest Creek on the east and Thompson Creek on the west. The planning/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 Humbug Creek where treatments are proposed. Humbug Creek is referred to as a sub-watershed and represents a 6th field hydrologic unit code or HUC. This sub-watershed is further subdivided into 7th field HUC's called drainages which range in size from 907 to 2,717 acres (Figure 3-6). The analysis area for water resources is those 7th field drainages where activities are proposed. The total size of the analysis area is 7,385 acres or 11.5 square miles. 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.

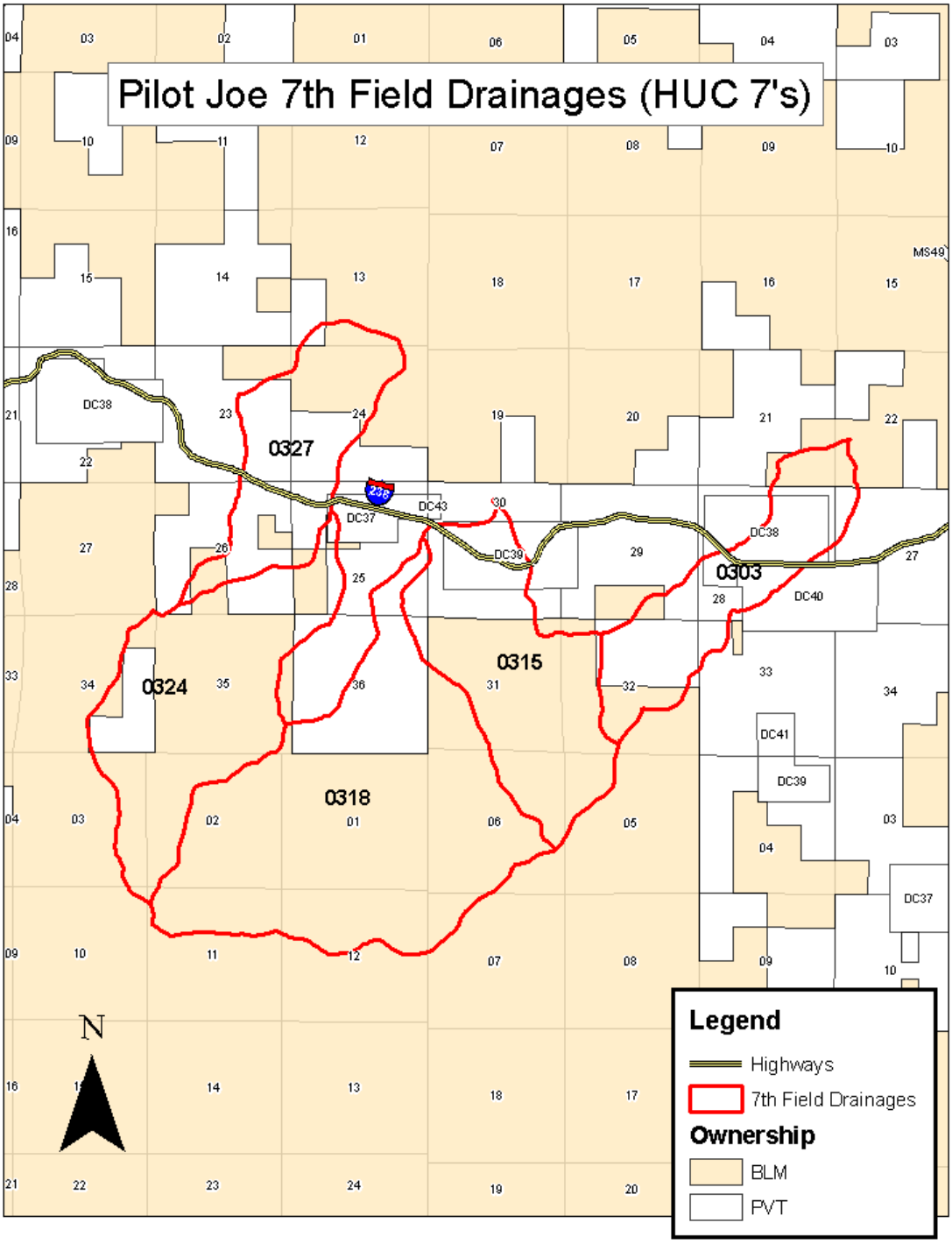
The major drainages, Chapman Creek and Keeler Creek each drain their respective watershed into a single outlet point at their confluence with the Applegate River. The remaining drainages are frontal watersheds that drain into both sides of the Applegate River along the entire river interface either by means of surface flow in small, individual channels or by subsurface flow. Note that three of these drainage areas (0303, 0315, and 0327) have a portion of the drainage on the north side of the river that is not included in the project area. Obviously, these areas will not be directly affected by project activities that occur on the other side of the river.

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 3-8. Analysis Areas and Ownership Associated with the Pilot Joe Project Area.

Drainage	HUC 7 #	HUC Acres	BLM (Percent)	Private (Percent)
Between Forest Ck and China Gulch	0303	907	24	76
Between Long Gulch and Chapman Ck	0315	1,308	70	30
Chapman Creek	0318	2,717	83	17
Keeler Creek	0324	1,513	78	22
Between Keeler Ck and Gage 14366000	0327	940	39	61
	Total	**7,385**	**59**	**41**

Figure 3-6. Pilot Joe Analysis Area and Associated Drainage Areas



5.1 Issues/Concerns

Water

This section discloses the impacts from various vegetation treatments and ground disturbing activities on water quantity. Impacts to water quality are discussed in the subsequent water resources section. Habitats and wildlife related to water are discussed in the ―Fish" section.

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.

- Concerns that roads alter natural drainage patterns.
- Concern that forest thinning will have negative effects on water quantity and quality.

5.2 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 the local, high intensity summer storms though these events are relatively rare and their effect is limited to the local 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% 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: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% of the area in the transient snow zone may be at risk for possible peak flow increases.

Chapman Creek (0318) is the only drainage in the project area with more than 25% of the area within the transient snow zone (Table 3-8) and therefore, may have a risk of increased peak flows. The OWAM risk assessment chart (Figure 3-7) indicates that more than 85% of the area in the transient zone would have to have less than 30% crown cover to cause a detectable increase in peak flows (based on Figure 3, Page IV-11 of the OWAM). Aerial photo analysis (2001 aerial photos) shows that approximately 2% of the transient snow zone in Chapman Creek has less than 30% crown cover. Consequently, the risk of increased peak flows in Chapman Creek is low under current conditions.

It should be noted that, for this eco-region, the historic crown closure is listed as greater than 30% (WPN 1999: Appendix A) and current closure in this transient zone is estimated at 69% which is well above the 30% minimum value. Consequently, under current conditions, snow accumulation in the transient zone of the Chapman Creek drainage may be less than what may have occurred historically.

Surface water in the proposed Pilot Joe 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). 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. The majority of the springs are located within the Chapman Creek drainage.

Table 3-9. 7th Field HUC Stream Miles, BLM and Other.

Subwatershed	HUC 7 (drainage)	Stream Miles		Total Miles
		BLM	Private	
Between Forest Ck and China Gulch	0303	2.9	8.0	10.9
Between Long Gulch and Chapman Ck	0315	12.6	2.7	15.3
Chapman Creek	0318	26.9	7.2	34.1
Keeler Creek	0324	17.0	4.6	21.6
Between Keeler Ck and Gage 14366000	0327	3.8	5.8	9.6
	Total	**63.2**	**28.3**	**91.5**

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: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 (USDI and USDA 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. Necessary federal and state permits would be obtained for any proposed instream work.

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 October 15-May15. Alternately, the Applegate River was delisted in 2004 for summer temperature following approval of the TMDL.

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 indicates that the major tributaries (Chapman Creek, and Keeler Creek) on BLM-administered land in the Pilot Joe area meet the 64.4°F maximum criterion with the exception of a small portion of Keeler Creek. The BLM conducted temperature monitoring in 1998-2000 and 2003 on Keeler Creek at the lowest BLM boundary in section 25, approximately 0.25 mile above the confluence with the Applegate River. The 64.4°F criterion was exceeded in 1998, 2000, and 2003. Additional upstream data from 2000 and 2003 indicates that points in Keeler Creek above the 26/35 section line meet the 64.4°F criteria.

From aerial photo review, the higher Keeler Creek temperatures below the 26/35 section line appear to be the result of past road building and timber harvest within the riparian area on both private (section 26) and BLM-administered (section 25) lands. The WQRP implementation assures that under future actions, the stream will receive the maximum shade possible on federal lands.

Roads built in riparian areas can adversely affect both stream temperature and sediment. Drainage areas 0318 (Chapman Creek) and 0324 (Keeler Creek) have the most road miles in Riparian Reserves, with 3.2 and 2.4 respectively. In general, channel stability is expected to improve as Riparian Reserves mature and additional structural material is added to the channel area.

Roads on BLM-administered lands in the analysis area are stable with no 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 source of road-generated sediment, especially in the 0318 (Chapman Creek) and 0324 (Keeler Creek) 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 upgrading seven large culverts in the Chapman and Keeler Creek drainages to improve aquatic passage and increase flow capacity.

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.

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 1995a) 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 2004). Over the past 10 years, road construction has declined and road decommissioning and upgrading has slightly increased. Implementation of best management practices during road and logging operations have reduced impacts on 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 minimal. Around 1982, approximately 231 acres of partial cut and about 225 acres of overstory removal were harvested in drainage areas 0315 (between Long Gulch and Chapman Creek), 0318 (Chapman Creek), and 0324 (Keeler Creek). The harvested areas are stable and have recovered from harvest-related disturbances.

Off Highway Vehicle (OHV) trails are a more recent development affecting water quality. Although no comprehensive inventory of Off Highway Vehicle (OHV) trails exists for the planning area, numerous field observations indicate that OHV use is occurring in non-designated areas of the Pilot Joe project area but due to the steep forested topography is not extensive at this time. 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 trail becomes impassible due to rutting, frequently a new, adjacent trail is established.

The interaction of roads with streams is considered an indicator of potential for sediment impacts to be conveyed to the stream. Road densities are high in all but one of the drainage areas analyzed and range from 2.4 to 10.6 mi./mi.^{2} (Table 3-10).

Groundwater supplies in the project area are limited and primarily found in valley bottom alluvium of the Applegate River corridor (USDI 1995b: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 1994:3-13). The 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 1994:3-13).

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 to 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% 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 runoff.

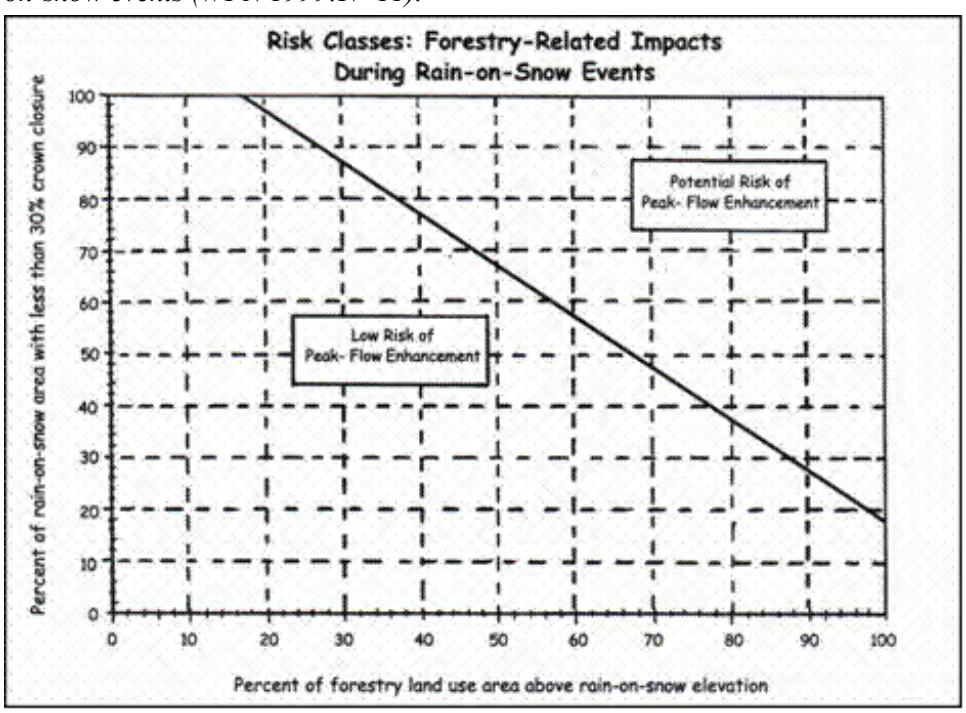
Reduction in vegetation canopy has the potential to cause the following hydrologic process changes: reduced interception and transpiration; increased snow accumulation in transient snow zone; increased snow melt rate; decreased snow melt time in transient snow zone; and increased soil water content (Chamberlin,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

Table 3-10. 7th Field HUCs Canopy Cover, Percent within the TSZ and Road Density.

Subwatershed	HUC 7 (drainage)	Percent Canopy Cover [1]	Percent Within The Transient Snow Zone	Road Density (miles/square mile)
Humbug Creek	0303	30	0	10.6
	0315	55	4	4.3
	0318	68	29	2.4
	0324	79	16	4.6
	0327	56	0	7.3
	Total	**58**	**10**	**5.8**

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

Figure 3-7. 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. Roads hidden by tree canopy, jeep and OHV trails and recently new private roads are not included in the table. It is estimated that the percentage of undetected roads may be as much as 30% on private lands and 10% on federal lands (Squyres 2003).

Road density provides a general index of relative extent of the amount of road in the project drainages (Table 3-10). 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. High road densities are found in all drainage areas associated with the project area except 0318 (2.4 mi./mi.^{2}), due in part to the higher residential use along the Applegate River. Overall road density is 5.8 mi./mi.^{2}.

Several tributaries in the project area are experiencing channel downcutting and streambank erosion due to road crossings with undersized or ―shotgun" culverts. The majority of road-related problems were identified in the Chapman Creek and Keeler Creek drainages.

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 2001 aerial photos. The historic crown closure for this eco-region is listed as greater than 30% (WPN 1999: Appendix A). The crown cover across all the drainage areas is at or greater than 30% and on the BLM-managed lands it is well above the lower end of the historic range (Table 3-10).

5.3 Environmental Consequences

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 Joe project. Discussion for Alternative 2 reflects the direct and indirect impacts of the alternative's 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 1994:4-4).

For purposes of analyzing environmental consequences of the no action and the proposed action on water resources, the project area is divided into drainage areas ranging in size from 864 to 2,714 acres (Table 1). This size of analysis watershed 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 significant 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.

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 the action alternative, 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. Alternately, roads and road construction can decrease watershed resiliency. Overall, this proposal decreases road mileage by a small amount. Given the uncertainty in climate models and predicted effects on a site specific scale, it is difficult to make accurate statements pertaining to this projects effect on climate change and resultant impacts.

5.3.1 Water Quantity

Alternative 1- No-Action

There are no actions proposed under Alternative 1 (the No Action Alternative); therefore direct and indirect effects are the current conditions in the project area which are the result of past actions not related to the Pilot Joe project. Alternative 1 describes anticipated effects of not implementing an action at this time.

Under Alternative 1, there would be no changes in road densities, number of stream crossings, or percent of area in nonrecovered openings within the transient snow zone. There would therefore be no changes to the magnitude and frequency of peak flows. The potential for peak flow increases would continue in drainage 0318 (Chapman Creek) identified as having a slight potential for peak flow increases due to percent of the area within the transient snow zone.

Older roads in the area would be maintained but not upgraded or decommissioned and would continue to influence local runoff and groundwater flow. In the long term, older roads with limited drainage capability are more likely to experience a road failure during an extreme precipitation event causing subsequent adjustments to local flow and groundwater conditions. For example, severe downcutting may occur in the vicinity of the failure that would result in the lowering of the local water table causing an associated reduction in summer flow. Or, a channel may become diverted and an alternative drainage developed.

Past events in the project area that currently increase the potential for altered peak streamflows include past timber harvesting and mechanical ground-based fuel treatments, road construction, and land development. All of these activities potentially influence peak streamflows through soil compaction or alteration of drainage networks. Substantial removal of vegetation is not a factor that currently contributes to altered peak flows because the average crown cover is at or above the lower end of the historic range for all drainages analyzed and the area in the transient snow zone has greater than 30% crown cover. Risk assessments for potential increased peak flows consider the effects of these past actions in their methodology.

The most significant past event on lands adjacent to the project area was the building of the Applegate Lake Dam, which drastically moderated peak flows in the Applegate River. Because there are no gaging stations in the Pilot Joe project area drainages, the amount of current flow into the Applegate River is unknown. However, the flow contribution of the project area to the Applegate River is expected to be roughly proportional to the contributing area or about 4%.

In summary, there is virtually no risk to increased peak flow from rain on snow events in the transient snow zone as a result of past timber harvest because drainage areas in the project area have greater than 30% crown cover. Past road construction has resulted in a moderate potential of peak flow increases in two drainage areas (0303, 0327) mostly due to the small size of the drainage areas and extensive road development on private land. Therefore, the factors that would result in increased peak flows are minimal.

Reasonably foreseeable future actions planned for BLM-administered lands in the project area include the potential sale of approximately 9 acres along Keeler Creek. Sale of the parcel along Keeler Creek includes only 300 feet of stream. If BLM sells this parcel, deed restrictions if properly monitored and enforced would protect the riparian vegetation so there would be no impact on water quantity. Most areas that could be harvested on non-BLM lands are accessible by existing roads, so no new road construction is likely. Future intensive timber harvests on non-BLM lands are possible in most drainage areas. It is assumed that private lands would continue to be intensively managed for timber production on approximately a 60-year rotation (USDI 1994:4-5). The actual timing of any private lands timber harvest is dependent on many factors, including valuations based on supply/demand, ownership, etc. Any potential future wildfire would likely accelerate harvesting/salvage on non-BLM lands. Using aerial photos and assuming a 60-year rotation for private timber lands, a reasonably foreseeable future scenario was developed for private timber harvest within the project area. The projected change in average canopy cover was estimated by drainage area, assuming that the reasonably foreseeable future harvest units would have 0% crown cover (Table 3-11). The largest change in percent crown cover (-4%) is projected to occur in drainage area 0318 (Chapman Creek). This drainage area would still be well above the 30% historic canopy cover. Canopy cover in drainage area 0303 (between Forest Creek and China Gulch) is estimated to decrease by 1% which would put it slightly under the 30% historic canopy cover. This would be expected to be a short-term concern, as other portions of the drainage area would experience vegetative recovery with increased canopy cover.

Table 3-11. 7th Field HUCs Canopy Cover for Reasonably Foreseeable Timber Harvest on Private Land.

Subwatershed	HUC 7 (drainage)	% Canopy Cover BLM	% Canopy Cover PVT	%Canopy Cover Total Drainage	% Change in Canopy Cover
Humbug Creek	0303	75	14	29	-1
	0315	70	16	53	-1
	0318	70	39	65	-4
	0324	80	71	78	-1
	0327	50	58	55	-1

In the long term, with no stand management on BLM-administered lands, a high intensity, stand-replacement fire would likely occur (see Fire section) and it could drastically alter the surface water and groundwater regime. Immediately after a high intensity fire, the loss of vegetation would make more groundwater available for streamflow and low summer flows would likely increase. However, the absence of vegetation would also result in an increased risk of higher peak flows. The Applegate River would receive higher peak flows from the tributaries after a severe fire event. The net effect on the river flow would not likely be noticeable since the flow contribution from the project area only amounts to approximately 4% of the Applegate River flows and a very small percentage of the area is within the transient snow zone.

Over time, recovery from the effects of a high intensity fire would occur. In a relatively short time vegetation would reestablish and less water would be available for summer flow. Since channel storage would also likely be reduced, there would probably be a net decrease in water available for summer flow.

In conclusion, past and present actions within the project area have not resulted in any major increase in the magnitude and frequency of peak streamflows because the factors most likely to cause increased peak flows are not a concern in the drainage areas analyzed. Of the reasonably foreseeable future actions analyzed, a large, severe, stand-replacement wildfire would be the greatest concern for potential increases in the magnitude and frequency of peak streamflows in the drainage areas analyzed. A high intensity,

stand-replacement fire in drainage area 0318 (Chapman Creek) would be of particular concern since it is the only drainage in the project area with more than 25% of the area within the transient snow zone.

Alternative 2 - Proposed Action

Under Alternative 2, 0.40 miles of a road in drainage area 0318 (Chapman Creek) would be decommissioned to reduce the road surface compaction, restore drainage patterns, and reduce erosion. This action would tend to reduce the influence of the road on the local drainage and local flows (both groundwater and surface), especially since the majority of this road falls within a Riparian Reserve. The decommissioning would entail both mechanical and natural methods.

Under Alternative 2, a total 0.40 miles of road decommissioning would occur, resulting in a net decrease of 0.40 mile. Road density would slightly decrease in drainage area 0318 (Chapman Creek). However, overall road density in the drainage areas associated with the proposed project would essentially remain the same.

Alternative 2 proposes 83 acres of tractor yarding and 216 acres of cable yarding. Tractor yarding would be limited to designated skid trails, minimizing the compacted area. No ground-based non-commercial treatments are proposed under Alternative 2. Thus, peak streamflows are not expected to be affected by soil compaction resulting from this project**.** Project design features such as no yarding in Riparian Reserves, waterbarring tractor skid trails, and avoiding tractor skid trails on slopes over 35 percent, would prevent surface flow from traveling very far down skid trails or reaching stream channels.

Changes in vegetation canopy have the potential to alter peak streamflows. Low canopy cover usually corresponds with increased exposed soil, rapid runoff, increased snow accumulation and associated erosion. High canopy cover generates more moderate flows but has an associated higher risk of a severe fire. The Ecoregion mapping (WPN 1999:Appendix A) for this area indicates a natural canopy cover of greater than 30%.

Alternative 2 proposes to commercially harvest approximately 299 acres and non-commercially treat approximately 590 acres. The minimum expected post treatment canopy cover would range from 30-60% depending on the harvest prescription. Harvest prescriptions are described in Chapter 2.

Under Alternative 2, proposed treatments would maintain the average canopy cover above the natural minimum of 30% for all drainage areas. On BLM-administered lands, the proposed treatments would tend to reduce the risk of severe fire while keeping the canopy cover well above the natural minimum of 30%. No noticeable increase in the magnitude or frequency of peak streamflows would be expected as a result of canopy cover reductions proposed under Alternative 2. Vegetation canopy cover reductions in the transient snow zone have a greater potential to influence changes in peak flows than reductions outside the transient snow zone. According to the OWAM (WPN 1999:IV-9-11), drainages with more than 25% of the area in the transient snow zone may be at risk for possible peak flow increases. No change in the amount of area below the critical 30% canopy closure level would occur and no increased risk of peak flows associated with rain-on-snow events is expected to occur.

Alternative 2 is not expected to noticeably increase peak flows in any of the drainage areas affected by the proposed project because: 1) there would be no new roads, therefore road density would slightly decrease in drainage 0318; 2) the average canopy closure on BLM-administered lands would remain well above the natural canopy cover of 30%.

The analysis of the direct and indirect effects of Alternative 2 on water quantity incorporates past and present actions that may affect watershed conditions. For the cumulative effects analysis, the reasonably foreseeable future actions identified under Alternative 1 need to be added to the direct and indirect effects of Alternative 2. There are no reasonably foreseeable future actions planned for BLM-administered lands

in the project area other than what is proposed under Alternative 2. Most areas that could be harvested on non-BLM lands are accessible by existing roads, so no new road construction is likely.

Future intensive timber harvests on non-BLM lands are assumed to be the same as under Alternative 1. The cumulative effect of canopy cover changes that would result from Alternative 2 and reasonably foreseeable future timber harvest on non-BLM lands are determined from Table 4. Under this scenario, drainage area 0303 would be the only area with an average crown cover slightly less than the historic 30% minimum. Only one stream originating in drainage area 0303 reaches the Applegate River, the rest are intercepted by irrigation ditches. The high level of agricultural and residential use in this drainage area would likely have more effect on peak flow increases than a reduction in average canopy cover.

In conclusion, the cumulative effects of the past, present, and reasonably foreseeable future (including Alternative 2) actions would not result in a discernable change in peak flows at or beyond the mouths of the individual drainage areas analyzed. Streamflows in the Applegate River would not be affected by these cumulative effects.

5.3.2 Water Quality

Timber harvesting operations have variable effects on sediment production (Everest et al. 1987). No harvest in Riparian Reserves prevents disturbance to stream channels during the felling and yarding operations. Yarding operations can cause extensive ground disturbance in harvested areas; however, cable systems that partly or fully suspend logs generally cause minimal disturbance to the soil surface (Everest et al. 1987). Increased surface erosion can result from ground disturbance and soil compaction caused by tractor logging (Sidle 1979). A buffer width of 100-200 feet is sufficient to prevent most sediment from reaching streams (A.C. Kindig and Cedarock 2003).

Most of the increase in sedimentation associated with forestry activities is attributed to forest roads (Sullivan 1985). There are two processes by which roads increase sediment loads in streams: 1) by increasing the incidence of mass failures; and 2) by erosion of the road surface, cut banks, and ditches and subsequent transport of this material to the stream (Duncan et al. 1987). In the Pilot Joe project area, surface erosion from road surfaces, cut banks, and ditches represents the dominant source of road-related sediment input to streams.

There is high variability in sediment production from road segment to road segment. Most segments produce little sediment, while only a few produce a great deal (Luce and Black 1999). Sections of road having a steep gradient, being heavily used, and draining directly into larger streams have the highest potential to produce and deliver material of a size most apt to deposit on or in the streambed (Bilby et al. 1989). Older roads in mid-slope positions dominate the production of sediment during extreme storms (Wemple et al. 2001). Ridgetop roads usually have the least effect on streams (Furniss et al. 1991).

A study of soil loss from forest roads in the southern Appalachian Mountains (Swift 1984) concluded that soil loss rates from a non-surfaced roadbed were eight times greater than from roadbeds with six to eight inches of gravel. New fill slopes, although uncompacted and unvegetated, eroded only where storm runoff from culverts or dips flowed over loose soil. Vegetation on the cutslope and ditch was shown to be effective in reducing erosion from forest roads in the Oregon Coast Range (Luce and Black 1999). Road segments where vegetation was cleared from the cutslope and ditch produced about seven times as much sediment as road segments where vegetation was retained.

Studies conducted in western Washington and Oregon found that 80 percent of the road runoff points emptied directly into the drainage system (Duncan et al. 1987). Of the stream entry drainage points, 88 percent entered first or second order channels while only 13 percent emptied directly into permanent water. Thus, the delivery of road sediment to larger streams often depended on its transport through these

smaller, often ephemeral channels. Woody material in these small channels acted to trap and hold sediment, thus preventing it from reaching larger channels downstream.

Sediment production from forest roads declines substantially with time. A study of 74 road segments with road surfaces graded in western Oregon found 70 percent recovery by the second year and 90 percent recovery by the third year (Luce and Black 2001).

Stream sediments may negatively impact aquatic species such as salmonids, amphibians and insects, and may impair the quality of domestic water supplies.

Alternative 1- No-Action

There are no actions proposed under Alternative 1 (the No Action Alternative); therefore direct and indirect effects are the current conditions in the project area which are the result of past actions not related to the Pilot Joe project. Alternative 1 describes anticipated effects of not implementing an action at this time.

Under Alternative 1, there would be no change in existing water quality on BLM-administered lands. Streams in the analysis area would continue to meet the Oregon water temperature standard except for the short term in the lower portion of Keeler Creek and the Applegate River. Surface erosion from roads and OHV trails would be expected to remain a concern, and the risk of sediment inputs to streams would be expected to remain relatively constant. A minimum level of BLM road maintenance would occur to prevent major sediment input or repair drainage failures. There would be no action to decrease overall road densities or decrease road interactions with streams.

In the long term, with no vegetation treatments and the subsequent increase in stand densities and fuel loading, there is a high probability that a high intensity, stand-replacement fire could possibly burn across the project area (see Fire section). A high intensity fire could reduce or eliminate riparian vegetation, resulting in increased stream temperatures, and expose large areas of bare soil to the erosive forces of rainfall, potentially increasing soil erosion and sedimentation.

Effects from past and ongoing actions are summarized as follows. Stream temperatures are on an upward trend on BLM-administered land as previously harvested riparian vegetation recovers. However, roads built in riparian areas continue to contribute to temperature increases. On non-BLM lands, near-stream vegetation disturbance/removal and water withdrawals continue to adversely affect stream temperatures (ODEQ 2003b). Surface erosion from existing roads contributes to low levels of sediment input primarily at road-stream crossings and where fill slopes closely parallel streams.

Reasonably foreseeable future actions planned for BLM-administered lands in the project area include the potential sale of approximately 9 acres along Keeler Creek. Sale of the parcel along Keeler Creek includes only 300‘ of stream. If BLM sells this parcel, deed restrictions if properly monitored and enforced would protect the riparian area and streambanks so there would be no impact on water quality. There is no foreseeable road construction in the project area; most areas that could be harvested on private lands are accessible by existing roads. Future intensive timber harvests and fuel reduction treatments on non-BLM lands are possible in most drainage areas and potential changes in vegetation canopy closure are identified under the Alternative 1 discussion in the Water Quantity section. Private forest lands in the project area would be managed according to the Oregon Forest Practices Act and agricultural/rural residential lands would be managed according to county ordinances. Management of these lands is addressed in the Applegate River WQMP (ODEQ 2003b). Conforming to the WQMP should ensure achievement of the Applegate Subbasin TMDL.

In conclusion, past actions from the 1850s to the 1970s on both private and BLM-managed lands throughout the project area contributed to water quality degradation, specifically summer stream temperature and sediment increases. With the cessation of some activities, such as hydraulic mining, and

the moderation of impacts from other activities, such as logging and road building, water quality conditions are improving. Present and reasonably foreseeable future actions would be required to adhere to the Applegate Subbasin TMDLs and WQMP and water quality in the tributary streams would be expected to continue to improve. Water temperatures in the Applegate River are not likely to noticeably improve since even at system potential it is not predicted to meet the temperature criteria during the hottest time of the year (ODEQ 2003b). The lack of vegetation management on BLM-administered lands could lead to a high intensity fire that would likely set-back the shade recovery and expose large areas of bare soil, thus increasing stream temperatures and sedimentation.

Alternative 2- Proposed Action

Alternative 2 would have no direct or indirect effects on summer stream temperature for any stream in the project area as shade on perennial streams would be maintained.

Under Alternative 2, no direct effects on sedimentation would occur because no commercial harvest is planned within Riparian Reserves. Road decommissioning and maintenance proposed under Alternative 2 would have the greatest, although minor, likelihood of having indirect effects on sedimentation to waterbodies in the Pilot Joe project area and over the long term slight reductions in sediment delivery are expected.

The primary sediment source would be from surface erosion of cut and fill slopes and the road surface. Best Management Practices (BMPs) are designed to minimize soil disturbance, sediment entry into stream channels, and downstream sediment movement:

Approximately 0.40 road miles would be decommissioned in drainage area 0318 (Chapman Creek), including a majority located within the Riparian Reserve. In general, the long term benefits of decommissioning roads outweigh the relatively short term effects. Any increase in sedimentation due to soil disturbance from the proposed decommissioning would be minimal with no discernible effect on the Applegate River.

Proposed road work under Alternative 2 would include drainage improvements to further disperse road runoff and decrease the rapid, concentrated routing of water to streams during storm events. Proposed decommissioning near streams would result in a slight long term net reduction in sediment delivered to streams. Sedimentation as a result of log truck travel on roads in the project area would likely be minimal if BMPs for seasonal hauling restrictions are correctly adhered to. The increase in vehicular traffic associated with this project would increase the risk of an accident that results in a fuel or other chemical spill. Spilled material that would reach a perennial stream would have a direct effect on water quality. Appropriate measures would be taken to prevent and, if necessary, respond promptly to a spill situation.

In addition to road related actions, management activities proposed under Alternative 2 that could have an indirect effect on sedimentation to streams in the Pilot Joe project area include commercial harvest and non-commercial treatments.

Proposed actions due to commercial harvest would include tree felling and log yarding. Of these actions, yarding would be most likely to lead to sedimentation due to ground disturbance. Alternative 2 proposes approximately 83 acres of tractor yarding and 216 acres of skyline cable yarding, and 590 acres of non-commercial treatments. No increase in stream sedimentation would occur as a result of commercial harvest due to BMPs such as no harvest or yarding in Riparian Reserves and minimizing and waterbarring skid trails. Soil that moves on cable yarding corridors during storm events would be trapped by logging slash or by ground cover on undisturbed ground at the bottom of or adjacent to yarding corridors. On steeper slopes with higher erosion potential, waterbars would be constructed manually to direct water off the cable yarding trails. Waterbars on tractor skid trails would prevent water from concentrating on bare, compacted ground and move it to adjacent vegetated or slash covered slopes.

Under Alternative 2, 590 acres of non-commercial treatments would not involve any ground disturbance and therefore would not have any effect on erosion rates or sedimentation in the project area. Manual treatments would not occur: within 50 feet of the perennial stream; within 50 feet from the edge of springs, seeps, and wetlands; within Riparian Reserves for unstable and potentially unstable areas; and within 25 feet of long-duration intermittent streams.

Under Alternative 2, prescribed fire would primarily consist of handpile burning of tree tops and limbs. Spring underburning would result in a low intensity burn with minimal duff consumption. Sediment increases from spring underburning would be very slight given the low intensity burn and BMPs that stipulate no ignition or fire lines in Riparian Reserves. Fall underburning would only be undertaken if "spring-like" conditions exist for soil and duff moisture levels. An area burned in the fall would not revegetate until the following spring; intense fall and winter rains immediately following the burn could move soil and ash to stream channels. Any turbidity and sediment increases resulting from underburning would be within the scope of the increases analyzed in the Medford District PRMP/EIS (USDI 1994:4-19).

Alternative 2 would have no direct or indirect effects on stream temperature and minimal effects on sedimentation because: 1) shade on perennial streams would be maintained with all vegetation treatments and proposed road work; 2) the net miles of existing roads would be decreased by 0.40 miles 3) the total road miles in Riparian Reserves would be slightly reduced, decreasing sediment sources over the long term; 4) no sediment increases would occur as a result of commercial harvest due to BMPs, including Riparian Reserves; 5) manual non-commercial treatments would not involve any ground disturbance and therefore would not have any effect on erosion rates or sedimentation in the project area; 6) sediment increases from prescribed fire would be very slight given the low intensity burn and BMPs that stipulate no ignition or fire lines in Riparian Reserves. No direct or indirect effect on water quality of the Applegate River would be anticipated under Alternative 2. "Minimal effects" means water quality will not be measurably degraded and not result in the listing of streams.

The cumulative effects of Alternative 2 on summer stream temperature when added to the past, present and reasonably foreseeable actions would be the same as described under Alternative 1 since there would be no direct or indirect effects of Alternative 2 on perennial streams. However, the implementation of Alternative 2 would likely reduce the risk of a high intensity wildfire as described under Alternative 1, thus stream shade would likely continue to be maintained in the long term.

Existing sediment sources are primarily related to the road network and OHV trails created by past actions. Measurable changes in sedimentation resulting from Alternative 2 implementation and reasonably foreseeable actions (see Alternative 1) would be minimal. Any soil that reaches the stream system due to road decommissioning and renovation under Alternative 2 would be minimal. Therefore, the cumulative effects on sedimentation resulting from Alternative 2 would be slightly greater than Alternative 2 for all drainage areas.

6.0 Aquatic Habitat and Fish

6.1 Issues/Concerns

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.

- Forest management and ground disturbing activities may negatively affect aquatic habitat.
- Concern that non-ground-disturbing activities like thinning non-commercial material could negatively affect riparian habitat.

- Forest management could negatively affect listed Southern Oregon/Northern California coho salmon (*Oncorhynchus kisutch*) or its habitat.

6.2 Background

Threatened and Endangered Aquatic Species and Essential Fish Habitat

In 1997 the Southern Oregon/Northern California (SONC) 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). SONC coho are known to occur in the mainstem of the Applegate River and several of its larger tributaries, including lower reaches of Chapman and Keeler Creeks.

A much more extensive project in this same planning area was developed and analyzed in 2004 & 2005 but never implemented. That project (China Keeler Landscape Project) was originally determined to be a ―May Affect, Not Likely Adversely Affect (NLAA)" for listed SONC coho salmon, their Critical Habitat, and Essential Fish Habitat. Project design features, Riparian Reserve stipulations and buffers, and site conditions would ensure that there is a less than negligible chance of negatively affecting Critical Habitat for listed SONC coho or Essential Fish Habitat for coho and chinook. The Southwest (SW) Oregon Level 1 Team has reviewed the earlier project, which included more harvest, more road construction, more road decommissioning in Riparian Reserves, more fuels work, and culvert removal and replacement in fish-bearing streams. This earlier project was determined to be ―May Affect, Not Likely to Adversely Affect (NLAA)." The SW Oregon Level 1 Team concurred with the NLAA determination. Medford BLM received a Letter of Concurrence from NOAA Fisheries August 27, 2005 for the China Keeler Project as described in the May, 2004 EA. This Letter of Concurrence is sufficient for this much ―reduced version" of the China Keeler Project. Reinitiation of section 7 consultation would only be needed if the decision in the FONSI would have more effects on listed species and their habitat than was previously analyzed [see Federal Regulation 50CFR§402.16(b)].

Coho Critical and Essential Fish Habitat

On May 5, 1999, NMFS designated Coho Critical Habitat (CCH) for SONC 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, whom 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. This document will consider unoccupied CCH to include all waters known to be accessible to steelhead trout, including the lower 1½ - 2 miles of Keeler Creek and the lower 2 miles of Chapman Creek. The Applegate River is considered occupied CCH.

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.

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 300‘ or twice the length of a site potential tree (whichever is greater) for fish bearing streams, 150‘ or the length of one site potential tree for non-fish bearing perennial streams, and 100‘ 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‘ on BLM lands in the analysis area catchments. These Riparian Reserve widths are in accordance with the Medford District Resource Management Plan (RMP). See Appendix A, pg. C-31 of the Medford District RMP, 1994. 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).

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 preferred alternative are presented below.

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 Project, within the analysis area. Anticipated direct and indirect affects 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 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.

Future Fuels Treatments: Fuel 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. Overstory 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. Conversely, at limited sites fuels treatments may occur in areas where overstory canopy is lacking (streamside plantations or brush fields). These fuels treatments would influence microclimate and water temperature by increasing solar radiation and air temperature influences. Overall, fuels treatments are not expected to impact fisheries resources, and hence they would not contribute to cumulative impacts.

Road Maintenance: Road maintenance including spot rocking, drainage improvements, and nine major culvert upgrades are anticipated to occur prior to Pilot Project implementation. Maintenance activities are generally undertaken to improve drainage issues associated with roads, such as upgrading culverts to reduce the risk of failure during flood events, 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. Different activities associated with maintenance are coupled with varying degrees of impacts; for example, a culvert replacement on a perennial stream would be expected to result in the input of fine sediment to the stream below the location of the culvert, while the action of adding additional rock surfacing would not be expected to generate sediment. Of the foreseeable future maintenance activities planned in the analysis area, upgrading the six culverts located on perennial sections of Chapman and Keeler Creeks would be the most likely to contribute sediment but would also improve aquatic connectivity and at least one culvert replacement would restore fish passage.

Project design features (PDFs) for road maintenance projects such as culvert replacements include dewatering the channel through the work area, use of sediment fences, and adherence to the instream work period. These PDFs would serve to minimize the amount of sediment turned loose during this project, and should confine immediate impacts to one pool below the culvert. Anticipated effects resulting from this project would be a shallow layer of fine sediment deposited over natural substrate in the pool below the culvert. This sediment would remain settled in the pool throughout the summer following the replacement, and would be transported throughout the aquatic system during subsequent high flows, eventually either settling out in natural depositional areas, or in the case of a large flood, entrained and carried downstream as pulse of increased turbidity, which would not likely be noticeable beyond background turbidity levels likely to occur during a flood event. Though a short term negative impact, upgrading the culvert would reduce the likelihood of a future failure of the culvert, which would potentially result in an input of sediment many times larger.

6.3 Current Watershed Conditions/Environmental Consequences

This section will present baseline conditions for streams within the analysis area, 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 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.

6.3.1 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 1995b). Several non-native species have also invaded or been introduced to the river, among them smallmouth bass (*Micropterus dolomieu*) and golden shiners (*Notemigonus crysoleucas*). Population records for all fish species are not available; however spawning surveys (USDI BLM, 1998/1999, unpublished), snorkel surveys (USDI BLM 2003, unpublished), and smolt trap data (ODFW 1999-2003) from nearby streams all indicate that coho numbers are low.

Historically, fish were probably abundant in Chapman and Keeler Creeks, and opportunistically used the lower reaches of smaller intermittent streams for flood refugia or possibly even spawning. Currently, fish numbers in Chapman and Keeler Creeks are very low. Recent BLM surveys have found cutthroat in Chapman Creek and cutthroat and one rainbow/steelhead in lower Keeler Creek. (USDI BLM 1980, 1997, 1999, 2003, unpublished).

***Special Notes**:* The stream and riparian information that follows has been compiled from the following sources, except where otherwise noted: 1997 ODFW fish habitat survey data from Chapman Creek and Keeler Creek (ODFW 1997a and 1997b); 1997 BLM Hydrology riparian survey data from Chapman Creek, Keeler Creek, and surrounding fishless streams (USDI BLM 1997); and site visits by BLM fisheries personnel (1980 – 2002).

6.3.2 Effects to Fish and Designated Habitat

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. Affects already occurring to fish habitat as a result of past and ongoing activities are presented in the Aquatic Habitat and Riparian Reserve sections following.

Alternative 2 – Proposed Action

The BLM consulted on and received a Letter of Concurrence for the China Keeler Landscape Project in 2004. The China Keeler Landscape Project consultation was in the same general area but covered considerably more acres (over 3,500 acres) of treatment, road construction, and more road decommissioning than is proposed in the Pilot Project. The much reduced scale of the Pilot Project would therefore still be covered by the original determination of *"May affect/Not Likely to Adversely Affect*" SONC coho salmon, CCH, and EFH. This determination was made based on analysis to fish and aquatic habitat in the Biological Assessment prepared for the NMFS. Effects to aquatic habitat were determined to be of insufficient magnitude to meaningfully impact aquatic habitats in fish bearing channels.

6.3.3 Aquatic Habitat Current Condition

Humbug Creek Sub-basin

The Applegate River bisects the Humbug Creek Sub-basin and the Pilot Project is located in the southern half of this sub-basin. 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 (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 consequent 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 BLM 1995) or the Applegate Aquatic Health Assessment (USDA FS and USDI BLM, 1995).

The project area is comprised of north-flowing stream systems that flow into the Applegate River, from west to east, Keeler Creek, Chapman Creek, and Offenbacher Creek with several unnamed frontal tributaries interspersed throughout the project area. North-facing slopes tend to be moist compared to their south-facing counterparts. They typically support mixed conifer forests of Douglas fir, Ponderosa pine, cedar, and madrone. Oak woodlands cloak the lower elevations. Riparian areas are vegetatively diverse, supporting all the usual southern Oregon riparian species: big leaf maple, yew, cedar, ninebark, willow, dogwood, black oak.

Keeler Creek

The forested reaches of Keeler Creek maintain cool temperatures (USDI BLM, unpublished thermograph data, 2002), despite the fact that in many places, riparian areas are recovering from past logging. Fines are limited; the stream bottom is primarily composed of cobbles and boulders, providing an excellent substrate for aquatic insect production and many small pocket pools for amphibians. The channel has appropriate width-to-depth ratios. Large wood is in limited supply, however one reach on BLM has enough large-diameter wood to be rated Properly Functioning. More information can be found in the "Water Resources" section of this document. Keeler Creek was historically mined for gold, which always raises the spectre of mercury stored in sediment.

Road densities in the Keeler Creek drainage are high. See the "Water Resources" section for more information. Roads paralleling Keeler Creek limit the recovery of riparian areas. There is a perched culvert at river mile 0.7 that appears to be blocking upstream fish passage. There are also other problem culverts in the drainage.

Chapman Creek

Chapman Creek supports some of the best fish habitat in the Middle Applegate Watershed. In 1997, 50% of the surveyed stream miles on federal land were rated Properly Functioning (PFC) or Functioning-At-Risk with an Upward trend (FARU); only 20% Functioning-At-Risk with a Downward trend (FARD) or Not Properly Functioning (NPF).

Chapman Creek's riparian areas (on BLM) are the healthiest in the Middle Applegate Watershed. Alder, bigleaf maple, canyon live oaks, incense cedar, and Pacific yew add diversity to a mixed conifer overstory. A diverse mix of shrub and forb species add canopy layers for shading and nutrient supply. Shading and a cool riparian microclimate are the norm in the Chapman drainage, despite a history of clearcut logging near stream channels (on both private and federal lands). The stream was probably protected from the north-facing aspect and narrow canyon of Chapman Creek. Now, decades later, shrubs protect the stream channels in these locations.

Chapman Creek boasts several stream reaches on BLM with an adequate amount of instream wood. Over two miles of stream have >25 pieces of large-diameter wood (>24"dbh)/mile in and adjacent to the stream, the standard for Proper Functioning Condition in the Klamath-Siskiyou (east) Matrix of Pathways and Indicators. Over four miles of stream have 10-25 pieces/mile (functioning, although "at risk.").

The most pressing problem for aquatic habitat in Chapman Creek is the location and design of particular roads and culverts and road density. One perched culvert on mainstem Chapman Creek blocks the upstream passage of fish and amphibians and the downstream movement of spawning gravels and wood. There is also an active gold dredging operation on Chapman Creek.

In general, the small frontal Applegate River tributaries within the project area reflect the same channel and habitat patterns as Chapman and Keeler Creeks, just on a smaller scale.

Past Actions

The effects of past actions are manifested in the current condition described above. Actions and events that have shaped the existing condition include, but are not limited to: logging and road building, wildfires, fire suppression, gold and gravel mining, water diversion, and the development of private lands for both agricultural and personal uses. See the Middle Applegate Watershed Analysis (USDI BLM 1995) and other sections of this document for more detail on past actions.

6.3.4 Effects to Aquatic Habitat

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.

Future fuels reduction projects in the area are not anticipated to have any adverse impacts to aquatic habitats. Fuels treatments projects proposed in the area would remove only small diameter vegetation, would require minimal ground disturbance, and would leave vegetative buffers around most stream channels (short duration channels may receive channel adjacent treatments, as needed, to accomplish fuels objectives). All check lines would be rehabbed after ignition operations, minimizing the risk of erosion and transport of sediment down the lines towards aquatic habitats.

Alternative 2 – Proposed Action

Under Alternative 2, log truck haul routes would have slightly negative direct and indirect effects to aquatic systems. No instream work is proposed as part of the Pilot Project.

Haul Routes

Repeated use of the unpaved haul roads may both directly and indirectly contribute fine sediment to streams as rocked surfaces become pulverized rock (i.e. dust, a form of fine sediment) surfaces after repeated heavy truck traffic. Natural surfaced roads are vulnerable to rutting and erosion from use, particularly if the road is used during the wet season. Direct contributions of fine sediment could occur if dust mobilized by haul should settle out in stream channels crossing or adjacent to the haul route. Indirectly, the fine sediment that remains on the road prism would be available to be transported off of the road during the first significant rain event following a season of haul. Properly engineered roads are capable of shedding the majority of mobilized sediment off of the road (or road ditch) downslope and into vegetation. However, the road/ditch distance from the last cross drain located on either side of a channel crossing would directly contribute captured water and mobilized sediment into the stream channel. Therefore, use of the roads for haul would increase the risk of road derived sediment transport to stream channels, particularly in the vicinity of road/stream crossings.

Log hauling would occur on 15.4 miles of rocked roads, 0.2 miles on bituminous surface road, and 2.0 miles on natural surfaced roads. Log hauling would occur mainly in the Chapman, Hinkle, Keeler, and Offenbacher Creek drainages. Haul routes would be located on BLM and private timber land roads. An estimated 4.8 miles of unpaved haul roads would exist within a Riparian Reserve width distance of stream channels (includes riparian areas on private lands), most (4.5 miles) are rocked.

Over half of all the riparian haul routes proposed for this project are located in the Chapman Creek catchment. In this catchment, 7.2 miles of road are proposed for haul with approximately 2.6 miles within the Riparian Reserve. The main line haul routes are rocked surfaces that traverse the catchment with a ½ mile stretch on private land that parallels Chapman Creek. There are 56 stream crossings along the haul route proposed in this catchment: 40 are on dry draws, 6 on intermittent channels, and 10 perennial crossings. Three of these crossings would occur over fish-bearing, perennial, stream channels.

Approximately 133 truckloads of logs would be hauled through this catchment. The roads are rocked and in good condition.

Approximately 3.3 miles of the Keeler Creek road system would be used for haul with approximately 1.5 miles in the Riparian Reserve. Routes in the Keeler Creek catchment parallel the stream for approximately 1.2 miles before climbing up and over into the Hinkle Gulch drainage. The road is rocked along Keeler Creek and changes to natural surface as it moves out of the riparian area and up and over to Hinkle Gulch. Within the catchment there are 22 stream crossings: 14 on dry draws, 5 on intermittent channels, and 3 on perennial channels. Approximately 40 truckloads of logs would be hauled through the Keeler Creek drainage.

In Hinkle Gulch, the haul route circles the basin ridgeline before descending down through Hinkle Gulch and out to Thompson Creek. Approximately 0.5 miles of the proposed haul route is within the Riparian Reserve; however, most of this haul route (4.3 miles) is on a well rocked road, outside of the Riparian Reserve. There are 15 dry draw crossings, 1 intermittent crossing, and 2 perennial crossings along this haul route, located approximately 1 mile upstream of fish habitat in Thompson Creek. Approximately 80 truckloads of logs would be hauled out of the Hinkle Creek catchment. Given the crossing locations and limited amount of haul in this catchment, there is little potential that haul would adversely modify any aquatic habitat in the Hinkle Gulch or Thompson Creek catchments.

The haul route crosses through a small, perennial, frontal drainage basin between Chapman and Keeler Creek. The haul route is approximately 0.7 miles of rocked road with four stream crossings: 2 dry draw crossings, 1 intermittent channel crossing, and 1 perennial crossing. This is not a fish bearing stream and the nearest fish presence is downstream approximately 0.8 miles in the Applegate River. The stream is no longer connected to the Applegate River because it flows subsurface through a section of the Applegate River floodplain. There is little potential for haul to adversely modify any aquatic habitat in this basin.

Most of the haul (approximately 281 truckloads) would pass through the drainages east of Chapman Creek (including Offenbacher Creek). The haul route consists of 2.0 miles of rocked road with 10 crossings: 4 intermittent and 6 dry draw crossings. These are not fish bearing drainages and the nearest fish presence is downstream approximately 0.5 miles in the Applegate River. The stream is no longer connected to the Applegate River because it flows subsurface through a section of the Applegate River floodplain. There is little potential for haul to adversely modify any aquatic habitat in this basin

Direct inputs of sediment could occur along Chapman and Keeler Creeks where the haul route parallels the stream channels, as dust disturbed from dry road surfaces near the stream channel could potentially settle out in adjacent stream areas. Direct inputs of dust where the haul route crosses stream channels would also probably occur. However, the magnitude of the dust/sediment inputs would be small because of dry season haul restrictions, dust abatement PDFs, and filtering effects of riparian vegetation. It is not anticipated that the amount of sediment input into aquatic habitats in any of the stream channels within this project area resulting from dust would be discernable above contributions which occur chronically. As such, the amount of dust (sediment) to reach and settle out in any one pool would be insufficient to adversely modify aquatic habitats.

Indirect sediment inputs to aquatic habitat may also result from haul. Potential sediment sources from log hauling in upland areas are surface erosion from truck traffic and dust. Surface erosion would be minimized because PDFs would limit log hauling to 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 (15 of 17 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.

Road Decommissioning
A short section of road is proposed for decommissioning in the Chapman Creek catchment. The road is located almost entirely within the Riparian Reserve and crosses Chapman Creek via ford at approximately the midpoint of the 0.4 mile road section. The section of this road that parallels Chapman Creek is overgrown and stable so would not require any additional work to decommission. The stretch of road leading up to the ford would be ripped, mulched, and seeded. This decommissioning would not require any instream work so there is not a mechanism for sediment to enter Chapman Creek. As a result, this activity is not expected to contribute any sediment to Chapman Creek.

Aquatic Habitat Effects Summary
Short term (one to three years) there would likely be small inputs of sediment to channel crossings and reaches adjacent to some rocked and natural surfaced roads used for haul, particularly in the Chapman and Keeler Creek catchments. Any sediment increases would be minor and undetectable relative to existing sediment 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 Project would, in the short term contribute a small amount of sediment to channels in the Chapman and Keeler Creek catchments, 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. Road decommissioning proposed under this alternative would offer minimal benefits to aquatic resources in Chapman Creek (i.e. road decommissioning). In sum, no measurable changes in the aquatic habitat conditions are anticipated to result from implementation of this alternative.

6.3.5 Riparian Reserves Current Conditions

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% shade desirable, and less than 60% 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 summer stream temperature and fine sediment. Elevated water temperatures can affect spawning and incubation time, feeding, growth, and survival of salmonids (Meehan 1991).

Within the planning area catchments, there are an estimated 1,067 acres of Riparian Reserves (calculated from GIS) on BLM managed lands. 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 RR‘s on BLM managed lands within the Pilot Project Analysis Area is presented by catchment in the table below.

Table 3-12: Seral state of Riparian Reserves in the Pilot 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
Chapman Creek	2	1	40	33	86	187	349
Keeler Creek	0	0	0	60	91	79	230
Offenbacher Creek	0	24	0	0	52	151	227
Frontal tributaries	1	10	0	0	18	50	79
Hinkle Gulch	0	65	13	8	74	22	182
Project total	**3**	**100**	**53**	**101**	**321**	**489**	**1067**

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 11" in diameter at breast height (DBH)) or older will function to provide sufficient shade to stream channels, and that pole size trees (< 11" 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 (>21" 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. The table 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 3-13. Percent of all reserves in mid seral or greater, and mature seral stages in the planning area

Catchment in Planning area	% of Reserves in Mid Seral Stage or Greater (Trees >11" DBH)[1]	% of Reserves in Mature Stage (Trees >21" DBH)[1]
Chapman Creek	78	54
Keeler Creek	74	34
Offenbacher Creek	100	74
Frontal Tributaries	99	72
Hinkle Gulch	82	19
Project Average	**87%**	**51%**

[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 Project analysis area, Riparian Reserves are in relatively good condition and are capable of providing both maximum shade and inputs of large wood. 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.

6.3.6 Effects to Riparian Reserves

Alternative 1– No-Action

The no action alternative would have no direct or indirect effects to RR‘s 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.

Alternative 2 – Proposed Action

Activities proposed in RRs include road decommissioning and log haul. Log haul would not change the existing condition of the RRs. Road decommissioning would improve a small stretch of Riparian Reserve along Chapman Creek by ripping the existing road, seeding and mulching. Over the long term, trees would grow in the road prism, eventually providing shade and large wood.

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 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).

6.3.7 Aquatic Conservation Strategy

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 Project is comprised of 10 7th field drainages, located in the Humbug and Thompson Creek 6th field subwatersheds. The Pilot Project is located entirely within the Middle Applegate 5th field watershed. How the four components of ACS relate to the Pilot Project is explained below: is located in the and

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.

Evaluation of the Pilot Joe Demonstration Project 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.

> *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% 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 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 Project would affect spatial and/or temporal connectivity, as no culverts are proposed for addition, replacement, or removal on perennial channels under this project.*

3. Maintain and restore the **physical integrity** of the aquatic system, including shorelines, banks, and bottom configurations.

> *There are no instream projects proposed as part of the Pilot Project so the physical integrity of the aquatic system would not be compromised.*

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 Chapman and Keeler Creek catchments from haul. Sediment increases resulting from this activity would be minor relative to existing sediment levels, and detectable behind background levels only 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. Haul would likely input a very small amount of fine sediment to aquatic habitats adjacent to or crossing haul routes. This sediment would affect site level habitats during an uncharacteristic time of year (i.e. during haul, which would likely occur during the summer). However, given the small magnitude of sediment anticipated to be input from hauling, it would be undetectable in downstream habitats. Also see ACS Objective #4. In general, high road densities, mining and extensive agricultural and urban development 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 Project. Please see the Hydrology report 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 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.

Non Commercial density management 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, faster, thus speeding up 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.

7.0 Wildlife

This section discusses terrestrial wildlife habitats and connectivity. Fragmentation, as it relates to biological integrity, is discussed in the Biological Diversity section.

7.1 Issues/Concerns

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.

- Concerns that forest management will have negative effects on native wildlife populations and/or species.
- Degrading habitats for special status species may result in further population declines and/or trends away from recovery of the species.
- Logging may degrade suitable habitat for northern spotted owls resulting in perceived adverse effects.

7.2 Introduction

This section discusses terrestrial wildlife habitats and the potential impacts to wildlife species from the proposed action as described in Chapter 2 of this document. Two wildlife related issues associated with the Pilot Joe Project have been identified and key issues will be addressed in this document. These key issues are:

1) Listed (T &E and Candidate) and Sensitive wildlife species and their habitat are located within the project area and may be affected and

2) Survey and Manage (S&M) species and their habitat are located within the project area and may be affected by the proposed actions.

Only federal listed (Threatened & Endangered or Candidate), Bureau Sensitive and Survey and Manage species known or suspected to be present within the Ashland Resource Area *and* affected by the proposed actions are addressed in this EA.

The Pilot Joe project is located within the southern portion of the Humbug Creek sub-watershed of the larger Middle Applegate 5th field watershed. The total size of the Planning Area is 7,536 acres, and BLM administered lands comprise 5,010 acres within this area.

As described in more detail in section B, Vegetation, the lands within the Project Area were classified into broad level vegetation condition classes. The table below illustrates the acres of each vegetative condition class found within the Project Area, and a list of some of the typical wildlife species that are commonly associated with these vegetative condition classes.

Table 3-14: Vegetative Condition and associated wildlife species

Vegetation Condition Class	Acres	Representative Species
Grass, Shrubs, Non-forest Land	13	Gopher snake, California ground squirrel, western meadowlark
Hardwood/Woodland	308	Western fence lizard, ringneck snake, wrentit, Acorn woodpecker, dusky-footed woodrat, western gray squirrel
Early -Seedlings/Saplings	211	Northwestern garter snake, mountain quail, pocket gopher
Poles (5-11 inches DBH)	608	Southern alligator lizard, Golden-crowned kinglet, porcupine
Mid (11-21 inches DBH)	2117	Ensatina, Stellar's jay, mountain lion
Mature (>21 inches DBH)	1753	Northern spotted owl, northern flying squirrel, pileated woodpecker, Pacific Fisher

7.3 Affected Environment

7.3.1 Affected Environment – Northern Spotted Owl

Northern spotted owls (*Strix occidentalis caurina*) (NSO) are a federally listed threatened species and are closely associated with old forests for nesting, foraging, and roosting throughout most of their range (Forsman et al. 1984; Carey et al. 1990; and Solis and Gutierrez 1990). The ideal NSO habitat consists of large trees in the overstory, smaller trees of varying sizes and species in the lower and middle story, large standing and fallen dead trees, and patchy shrub and herb communities (Spies and Franklin 1991).

On September 8, 2010, the USFWS released the *Draft Revised Recovery Plan for the Northern Spotted Owl* for public comment (USDI FWS 2010). The plan is currently under review and has not been finalized. The draft plan recommends retaining all occupied spotted owl sites as well as all existing high quality, structurally complex habitat. The plan provides guidance to bring about recovery through prescribed management actions and supplies criteria to determine when recovery has been achieved.

The current foundation of the spotted owl recovery plan is the 1994 Northwest Forest Plan. Management direction and land allocations in the standards and guidelines of the Northwest Forest Plan are intended to constitute the Forest Service and BLM contributions to the recovery of the northern spotted owl (USDA USDI 1994b). The Northwest Forest Plan provides a network of late-successional reserves, 100-acre activity centers, connecting riparian corridors, and connectivity blocks across the lands within the Plan area.

The Northwest Forest Plan designated 100 acres of the best habitat on Federal lands to be retained as close as possible to the spotted owl nest site, or owl activity center, for all sites known as of January 1, 1994 (USDA USDI 1994a). This was intended to preserve an intensively used portion of the breeding season home range close to a nest site or center of activity (USDI BLM 1995).

Approximately 200 northern spotted owl 100-acre activity centers have been designated and mapped as late-successional reserve in the Medford District BLM. Critical Habitat was designated by US Fish and Wildlife Service (USFWS) on BLM lands in 1992 (USDI FWS 1992) and revised the designation in 2008 (USDI FWS 2008a). Critical Habitat identifies geographic areas that contain features essential for the conservation of the spotted owl and may require special management considerations. For the northern spotted owl, these features include particular forest types of sufficient area, quality, and configuration to support the needs of territorial owl pairs throughout the year distributed across the species' range, including habitat for nesting, roosting, foraging, and dispersal. There is no Critical Habitat, as designated

in 2008 (USDI FWS 2008a), located within the Pilot Joe planning area. The current habitat modeling effort initiated by the USFWS, as described in the 2010 draft revised recovery plan, will be used to develop potential habitat conservation networks and map new critical habitat across the range of the northern spotted owl.

For the purposes of this analysis, the vegetation within the Pilot Joe planning 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. These habitat categories are:

- Nesting, Roosting and Foraging (NRF)
- Dispersal-only
- Unsuitable

Nesting, Roosting, and Foraging (NRF) Habitat for the spotted owl consists of habitat used for nesting, roosting, *and* foraging. Spotted owl NRF habitat also functions as dispersal habitat. Generally, this habitat is multistoried, 80 years old or more (depending on stand type and structural condition), and has sufficient snags and down wood to provide opportunities for nesting, roosting, and foraging. The canopy closure generally exceeds 60 percent, but canopy closure or age alone does not qualify a stand as spotted owl NRF habitat. Other attributes of NRF habitat include: a high incidence of large trees with various deformities (e.g., large cavities, broken tops, mistletoe infestations, and other evidence of decadence); large snags; large accumulations of fallen trees and other woody debris on the ground; and sufficient open space below the canopy for spotted owls to fly (Thomas et al. 1990). Spotted owl NRF habitat in southwest Oregon is typified by mixed-conifer forest, recurrent fire history, patchy habitat components, and a relatively high incidence of woodrats, a high quality spotted owl prey species in the Klamath Province (Forsman et al. 1984, 2004, Ward et al. 1998, Hamer et al. 2001).

Forsman et al. (1984) described some of the differences in NRF habitat within the Klamath Mountains Province that are typical of large parts of the Medford District:

—Eighty-one percent of all nests in northwestern Oregon were in cavities, compared to only 50 percent in the Klamath Mountains. These differences appeared to reflect regional differences in availability of the different nest types. Dwarf mistletoe infections in Douglas-fir (and numerous debris platforms that were associated with dwarf mistletoe infections) were common in the mixed coniferous forests of the Klamath Mountains and the east slopes of the Cascades, but did not occur in western Oregon."

Forsman et al. (1984) documented the range of nest trees for platform nests (n=47) as 36 to 179 cm (14.2 to 70.5 inches) DBH averaging 106cm (41.7 inches) DBH. Mistletoe is occasionally used as a nesting substrate in southwest Oregon, which sometimes makes smaller trees suitable as nest trees. For spotted owls, features that support nesting and roosting habitat typically include a moderate to high canopy (70 to 90 percent); a multistoried, multi-species canopy with large overstory trees (greater than 30 inches DBH); a relatively high incidence of larger trees with various deformities, including mistletoe, large snags, large accumulations of fallen trees and wood on the ground; and flying space (Thomas et al. 1990). NRF habitat also functions as dispersal habitat.

Dispersal-Only Habitat is a subcategory of —all dispersal" habitat for northern spotted owls. Throughout this document, —dispersal" will be used to describe dispersal-only habitat. Thomas, et al. (1990), defined dispersal habitat as forested habitat more than 40 years old, with canopy closure more than 40 percent, average diameter greater than 11 inches, and flying space for owls in the understory but does not provide the components found in NRF. It provides temporary shelter for owls moving through the area between NRF habitat and some opportunity for owls to find prey, but does not provide all of the requirements to support an owl throughout its life. Dispersal will be used throughout this document to refer to habitat that

does not meet the criteria to be NRF habitat, but has adequate cover to facilitate movement between blocks of NRF habitat. Owls also disperse through NRF habitat.

Unsuitable Habitat for the northern spotted owl is forest land that currently does not meet either the NRF or Dispersal-only habitat definitions.

In locations where commercial treatments are proposed, field walk-throughs were conducted by the Resource Area (RA) biologist to evaluate the habitat conditions currently present within each proposed treatment area. The remaining areas of the BLM lands that were not field assessed were assigned a habitat value by the RA biologist through the use of aerial photo interpretation, and cross referencing the habitat values attributed to these stands given under other NSO habitat models in the GIS environment, as well as extrapolation of habitat values from stands that appeared to have similar characteristics to those stands that received on-the-ground habitat evaluations. Figure 3-8 depicts the results of this habitat typing exercise. This habitat typing system was designed specifically for spotted owls, but can be used to assess habitat availability for other species that are associated with late-successional habitats because the habitat typing accounts for habitat condition and structure important to other species, especially those that utilize late-successional forest habitat, including the pacific fisher.

Figure 3-8. Types of Northern Spotted Owl Habitat in the Pilot Joe Planning Area

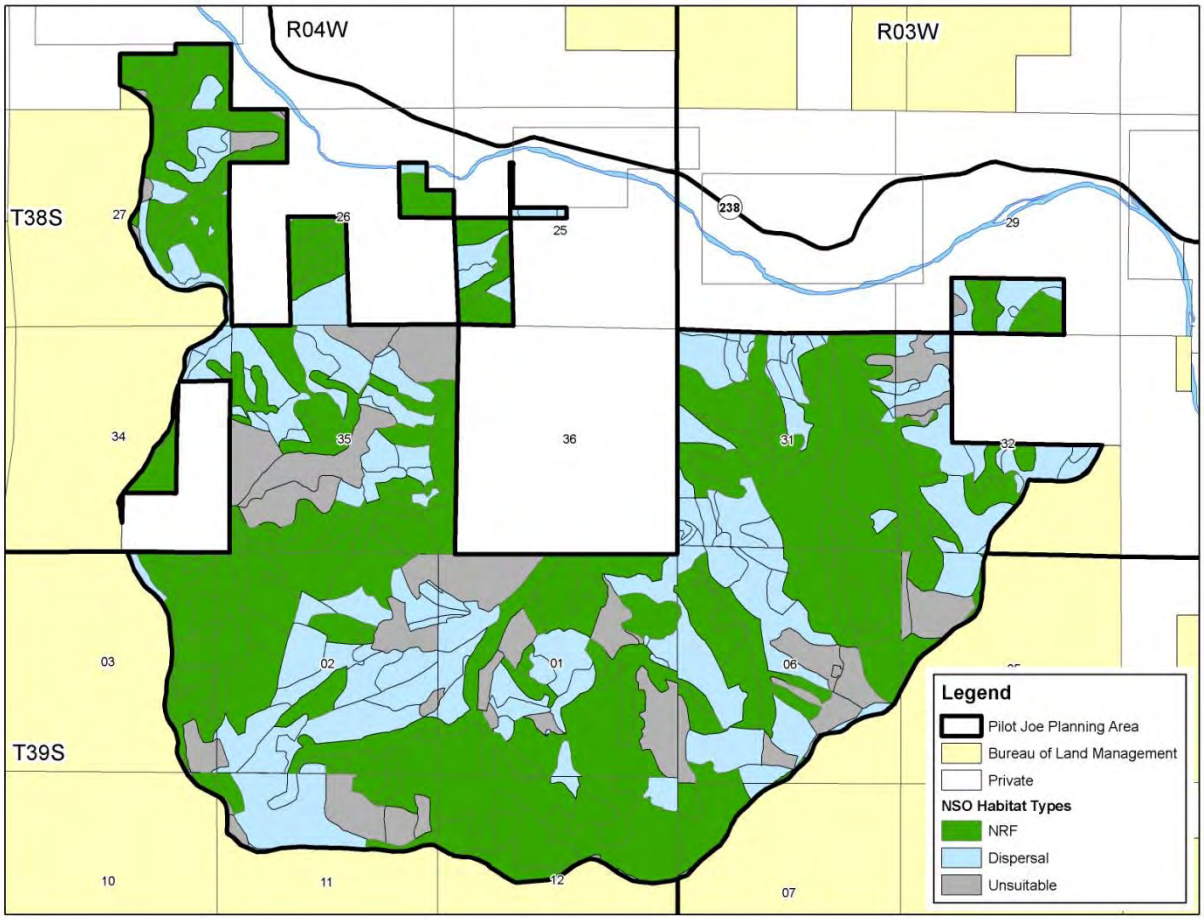


Table 3-15 depicts the acres and the equivalent percentages of each habitat type found on the BLM administered lands located within the Pilot Joe planning area. Approximately 2,822 acres of the BLM lands within the planning area are classified as NRF (late-successional) habitat, or approximately 56% of the BLM administered lands in the watershed. There are approximately 1,522 acres (30% of BLM lands) of dispersal-only habitat within the Pilot Joe planning area on BLM lands. As NRF habitat also supports

owl dispersal, the total acres of BLM lands that support owl dispersal in this sub-watershed is 4,344 acres (86% of federal lands). The remaining 669 acres of BLM lands (13%) are considered currently unsuitable habitat for owls, although these acres may provide habitat for some of the prey species utilized by owls. Not all lands in the watershed are capable of becoming NRF habitat due to the natural limitations of some soil types.

Table 3-15. Acres of NSO habitat on BLM Lands within the Pilot Joe Planning Area.

Habitat Type	Acres	Percent
NRF Habitat	2,822	56%
Dispersal-Only Habitat	1,522	30%
Unsuitable Habitat	669	13%
Total	**5,012**	**100%**

* = Total dispersal habitat is the combination of NRF habitat and Dispersal-only habitat.

All of the areas that would receive commercial treatments under the Pilot Joe project were field evaluated to determine the habitat condition within each proposed unit, and this evaluation included an assessment for structurally complex habitat, as described in Recovery Action 32 in the Draft Recovery Plan for the NSO (USDI FWS 2010). None of the areas that would be treated as part of the Pilot Joe project contain structurally complex habitat.

The Pilot Joe project area is located within the provincial home ranges (1.3-mile radius from the site center) of five known NSO sites, which include sites outside the Humbug Creek 6th field sub-watershed. The survey history for each NSO site with the planning area is variable, but the majority of the survey efforts were done throughout the 1990's, and very limited surveys have been conducted across the planning area over the past 10 years. For purposes of this analysis all sites are conservatively assumed to be occupied. While there is no requirement to survey for spotted owls prior to implementing forest management actions, all of these sites are being surveyed this field season (2011).

Northern Spotted Owl Critical Habitat

The proposed project is not located in any designated critical habitat for the northern spotted owl.

7.3.2 Affected Environment– Pacific Fisher

The Pacific fisher (*Martes pennanti*) was petitioned for listing as endangered or threatened under the Endangered Species Act on December 12, 2000. In 2003 the USFWS released their notice of 90-day petition finding and initiation of status review (USDI FWS 2003) and in 2004 published their Notice of 12-month petition finding, concluding that listing fishers as threatened was warranted, but was precluded by higher priority listing actions (USDI FWS 2004). The species remains a USFWS candidate species. In their 2006 update on the status of the Pacific fisher, the USFWS define the reasons for listing as: "Major threats that fragment or remove key elements of fisher habitat include various forest vegetation management practices such as timber harvest and fuels reduction treatments. Other potential major threats include: Stand-replacing fire, Sudden Oak Death, (*Phytophthora*), urban and rural development, recreation development, and highways" (USDI FWS 2006). The USFWS also states that the three remaining fisher populations "appear to be stable or not rapidly declining based on recent survey and monitoring efforts" (USDI FWS 2006).

Fishers are closely associated with low to mid elevation (generally <4,000 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 to support adequate prey populations (Aubry and Lewis 2003). Powell and Zielinski (1994) and Zielinski et al. (2004) suggest that habitat suitable for denning and resting sites may be more limiting for fishers than foraging habitat. The NRF habitat type described above for the NSO

also 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.

Based on the NSO habitat analysis, approximately 2,822 acres of suitable fisher denning and resting habitat exists within the Pilot Joe planning area. However, all of these acres may not provide optimal fisher habitat because past harvest practices and land ownership patterns have fragmented this habitat. BLM checkerboard ownership may be one of the primary factors limiting the ability of BLM lands to provide optimal habitat for fishers (USDA USDI 1994b).

The precise habitat requirements of fishers in the Pacific Northwest are poorly understood. 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). 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.

Fishers have large home ranges and male home ranges are considerably larger than those of females. Fisher home range sizes across North America vary from 3,954 to 30,147 acres (ac) (16 to 122 km^2) for males and from 988 to 13,096 ac (4 to 53 km^2) for females (Powell and Zielinski 1994; Lewis and Stinson 1998). However, Beyer and Golightly (1996) reported that male home ranges in northern California may be as large as 31,629 ac (128 km^2). Researchers have suggested that the home range size of fishers increases with decreasing habitat quality (Truex et al. 1998).

Forest carnivore surveys using bait stations with motion and infrared detection cameras were conducted across much of the Pilot Joe planning area during the winter and spring of 2011. Six cameras were placed throughout the planning area at strategic locations following the standard survey protocol procedures used to survey for forest carnivores (Zielinski and Kucera 1995). During the course of these surveys, fishers were detected at five of the six camera stations, confirming fisher inhabit the Pilot Joe planning area.

7.3.3 Affected Environment - Great Gray Owl

Great gray owls (*Strix nebulosa*) (GGO) nest in open forests adjacent to meadows. Broken top trees, abandoned raptor nests, mistletoe clumps, and other platforms provide suitable nest trees (USDA USDI 2004); suitable nesting habitat is defined in the protocol as large diameter trees with roosting cover within 200 meters 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 (USDA USDI 2004).

The majority of the forested stands present within the Pilot Joe planning area are highly dense, are very steep and do not provide an open, grassy understory condition typical of GGO habitat. The current pattern of dense, closed-canopy Douglas-fir forest across the majority of the planning area provides only marginal foraging habitat for this species. A limited amount of suitable foraging habitat is present within northwest corner of the planning area.

Two-year protocol surveys were conducted across the planning area where the habitat conditions were adequate to trigger pre-disturbance surveys (USDA USDI 2004). These surveys found GGOs in the northwest corner of the planning area (in sections T38S-04W-22/26/27), and a 30 acre core area has been established around this nest site to provide protection to the nest stand. There are no proposed activities within 0.5 miles of this core area, and private lands occur between the GGO core and the nearest area where treatments are proposed on BLM lands.

7.3.4 Affected Environment - Mollusks

Potential habitat exists throughout the project area for two Survey and Manage mollusks, *Helminthoglypta hertleini* and *Monadenia chaceana* (USDA USDI 2001, 2003). Both of these species are currently Bureau Sensitive species as well. *Helminthoglypta hertleini* utilizes down woody debris, rocky areas, including talus deposits and outcrops, which contain stable interstitial spaces large enough for snails to enter. Previous Medford District detections were found in rocky areas associated with damp grassy areas, oak woodlands, and shrub lands, or in conifer forests closely associated with these habitat types. *Monadenia chaceana* is associated with rocky areas, talus deposits, associated riparian areas, and coarse woody material (USDA USDI 2003).

Protocol Surveys for terrestrial mollusks were conducted throughout the Pilot Joe planning area where the proposed management activities and the habitat conditions were adequate to trigger pre-disturbance surveys (USDA USDI 2003). These surveys did not detect any Survey and Manage mollusk species within the planning area.

7.3.5 Affected Environment - Red Tree Vole

The red tree vole (*Arborimus longicaudus*) is an arboreal rodent species with very low dispersal capabilities. Red tree voles (RTVs) depend on conifer tree canopies for nesting, foraging, travel routes, escape cover, and moisture (Carey 1991). Douglas-fir needles provide the primary food and building materials for nests (USDA USDI 2002). The broad management objective for this species under the Survey and Manage program is to retain sufficient habitat to maintain its potential for reproduction, dispersal, and genetic exchange (USDA USDI 2000).

Surveys for RTVs were conducted across the Pilot Joe planning area in locations that have management activities proposed that would trigger the need for pre-disturbance surveys and contain suitable habitat for RTVs (USDA USDI 2002). These surveys detected only three active RTVs throughout the planning area. The Pilot Joe Planning area is located at the edge of the known range of this species, and the general habitat conditions (dry Douglas-fir plant associations) within the project area are marginal for this species.

7.3.6 Affected Environment - 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 planning area, but none of these locations occur within any of the treatment areas proposed under the Pilot Joe project.

The Medford BLM is a signatory member of the Conservation Agreement for the Siskiyou Mountains Salamander in Jackson and Josephine Counties of Southwest Oregon (Olson et al, 2007). This conservation agreement describes the management actions necessary to maintain a high likelihood of well-distributed populations across the northern portion of the Siskiyou Mountains salamander‘s range. The conservation agreement identified high-priority sites across the northern range of the species, and six of these high-priority sites are within the Pilot Joe Planning Area. However, no proposed activities would occur within these areas under the Pilot Joe project.

7.3.7 Affected Environment– Bureau Sensitive Species

The BLMs Special Status Species (SSS) list was most recently modified on February 7, 2008 (USDI BLM 2008a). This new list has two categories, Sensitive and Strategic. According to BLM Special Status Species Management (USDI BLM 2001), only Sensitive species (T & E are also sensitive) are required to be addressed in NEPA documents. 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. Appendix X includes a table of all the current SSS that occur on the Ashland Resource area and specific information if these species are present within the planning area.

7.3.8 Affected Environment– Neotropical Migratory Bird Species of Conservation Concern and Game Birds below Desired Condition

BLM has issued interim guidance for meeting BLM's responsibilities under the Migratory Bird Treaty Act 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 (IM) No. 2008-050 (USDI BLM 2008b). The IM relies on two lists prepared by the U.S. 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 and *Game Birds Below Desired Condition* (GBBDC). In December, 2008, the USFWS Service released *The Birds of Conservation Concern 2008* (USDI FWS 2008b). This publication identifies species, subspecies, and populations of migratory and nonmigratory birds in need of additional conservation actions. Medford BLM biologists conferred with local bird groups and knowledgeable individuals to identify which birds on the list in our region (Bird Conservation Region 5, USFWS Region 1) are present within Medford BLM lands. Table 3-15 displays a list of the Migratory Birds of Conservation Concern (BOCC) and Game Birds below Desired Condition (GBBDC) in the Ashland Resource Area that are known or likely to be present in the Planning Area and could be affected by the proposed actions.

Table 3-16: Birds of Conservation Concern and Game Birds Below Desired Conditions that could be affected by the Pilot Joe Project

Species	Species Status	Presence in the Planning Area
Black-throated Gray Warbler (*Dendroica nigrescens*)	BCC	Unknown
Flammulated Owl (*Otus flammeolus*)	BCC	Present
Golden Eagle (*Aquila chrysaetos*)	BCC	Unknown
Lewis' Woodpecker (*Melanerpes lewis*)	BCC	Present
Grasshopper Sparrow (*Ammodramus savannarum*)	BCC	Unknown
Red-naped Sapsucker (*Sphyrapicus thyroideus*)	BCC	Unknown
Williamson's Sapsucker (*Sphyrapicus ruber*)	BCC	Unknown
White-headed Woodpecker (*Picoides albolarvatus*)	BCC	Unknown
Northern Goshawk (*Accipiter gentilis*)	BCC	Unknown
Olive-sided Flycatcher (*Contopus cooperi*)	BCC	Present
Rufous Hummingbird (*Selasphorus rufus*)	BCC	Present
Mourning Dove (*Zenaida macroura*)	GBBDC	Unknown
Band-tailed Pigeon (*Columba fasciata*)	GBBDC	Present

BCC - Bird of Conservation Concern GBBDC - Game Birds Below Desired Condition

These species use a wide variety of habitats, including late-successional forests, riparian areas, brush in recovering clear-cuts, and small trees in developing stands. Some birds, such as the olive-sided

Flycatcher, use residual canopy trees for perching and forage over adjacent clear-cuts. Recovering clear-cuts in the planning area with lower tree and shrub heights would provide these optimal foraging conditions. Many birds are associated with deciduous shrubs and trees in early-successional habitats (e.g.., Rufous hummingbirds).

7.4 Environmental Consequences

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 stand structure 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) and intensity of the treatments.

7.4.1 Environmental Effects - Northern Spotted Owl

Alternative 1 – No-Action

The current habitat conditions within the Pilot Joe Planning area are a result of the complex interactions of the historic vegetative patterns and the changes to that historic vegetation from human activities and disturbance events. Prior projects and disturbance events form the existing habitat pattern (current condition) that occurs across the watershed today.

Under Alternative 1, the No Action alternative, none of the proposed BLM activities under this EA would occur. Forest stand conditions would continue to develop along the general current trends toward higher density stand conditions, especially in the understory, than what was historically present in the area. It is likely that many of the stands within the project area would eventually contain tree densities two to three times that of historic levels (Hardy and Arno 1996). The majority of the lower elevation forests exhibit stand conditions that are the result of fire exclusion. As discussed in further detail in previous sections of this document, high stocking levels, competition mortality, fuel loading and ladder fuel conditions work to increase the susceptibility of the existing late-successional and NRF habitat currently present within the planning area to high severity fire.

The No Action Alternative would not alter the current habitat conditions across the project area, and the NSOs that inhabit and utilize the Pilot Joe planning area would not be impacted from any loss of habitat or project related disturbance. NSOs would be expected to behave and utilize the habitat within the project area in the same fashion as they have in the past.

Under the No Action Alternative, no loss of NRF or dispersal habitat would be expected across the planning area from active forest management. Estimating the potential loss of NRF or dispersal habitat due to wildfire or other disturbance events is a much more difficult and enigmatic question. The recent trends in Southwest Oregon illustrate that fire has been converting mature forest structure at a higher rate than harvest, making the retention of these types of forests problematic in dry forested ecosystems (Courtney et al. 2004; Spies et al. 2006).

In general terms, wildfire would remain the most immediate hazard to late-successional forest habitat (NRF) and its associated species (Courtney et al. 2004), including the NSO. High severity fires could be expected to remove or downgrade habitat randomly across the landscape, setting back forest succession and development, and likely resulting in the loss of large tree structure critical to late-successional forest habitat dependent species. High severity fires resulting from these dense stand conditions would cause more severe impacts to soils, which may prolong the recovery and colonization of mycorizzal processes,

and macroinvertebrate and small mammalian prey food webs important to suitable foraging areas for spotted owls.

Alternative 2 – Proposed Action

The management treatments proposed under Alternative 2 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 is ongoing for the activities proposed under this Action Alternative, and will be completed before any decision on this activity is signed.

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 Joe planning area. The activities proposed under the Pilot Joe Project can be assigned into one of the following general effect types:

1) A **Downgrade** of NSO habitat means to alter the function of spotted owl NRF habitat so the habitat no longer supports nesting, roosting, and foraging behavior, but will retain enough tree cover to support spotted owl dispersal. 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).
2) 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.

All of the treatments proposed under Alternative 2 can be assigned into one of the general effect types listed above. These classes of effects are used to assess the treatment impacts to the existing habitat present within the planning area. Implementation of the commercial treatments (variable density thinning) proposed under the Pilot Joe Project are anticipated to result in a downgrade in NRF habitat and a treat and maintain in dispersal habitat. All of the non-commercial treatments proposed under the Pilot Joe Project are anticipated to result in a treat and maintain effect to the habitat type where these activities are implemented, or are expected to have no effect in unsuitable habitat. Table 3-17 illustrates the type of habitat where these treatments are proposed, and the potential effect to each habitat type that would result under full implementation of alternative 2.

Table 3-17. Treatment effects to each NSO habitat type in the Pilot Joe Planning Area.

Habitat Type	Pre-project Acres (%)	Downgrade	Treat and maintain	Post-Project Acres (%)	Percent Change
NRF	2,822 (56.3%)	175	123	2,647 (52.8%)	-3.5%
Dispersal-only	1,522 (30.4%)	0	406	1,697 (33.9%)	+3.5%
Unsuitable	669 (13.3%)	0	185	669 (13.3%)	0
Total	**5,012**	**175**	**714**	**5,012**	**NA**

In total, the Pilot Joe Project proposes approximately 175 acres of treatments that would result in a downgrade of NRF habitat. Currently, approximately 2,822 acres of NRF habitat is present within the planning area, and after implementation of the project, approximately 2,647 acres of NRF habitat would remain across the planning area. This reduction of 175 acre of NRF habitat represents a 3.5% reduction of the total NRF habitat present within the planning area.

The remaining treatments (123 acres of commercial treatments in dispersal habitat and the 591 acres of non-commercial treatments) will minimally alter the forest environment where the treatments are proposed, and are considered a treat and maintain treatment type. Therefore, these remaining treatments will not result in any additional habitat downgrade. In total, 529 acres of NRF and Dispersal-only habitat will be treated and maintained. An additional 185 acres of unsuitable habitat will be treated, which would not affect NSOs, as this habitat type does not support any of the life functions of the NSO.

All of the prescriptions included under the Pilot Joe 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 shifted tree species diversity.
- Restore more sustainable structure and composition by reducing stand densities and enhancing tree diversity, including 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

While the implementation of this project under Alternative 2 would result in the downgrade of 175 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 Joe 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.

As described in the Affected Environment, there are five NSO sites with at least a portion of their home range (1.3 mile radius from the center of activity) within the project area. The LSEAs contain the known nest sites of the NSOs that inhabit the planning area, and provide a great deal of protection to the existing NRF habitat that surrounds these NSO sites.

When examining the impacts to NSOs from timber harvest, the amount and intensity of harvest are not the only factors to consider. One critical factor to consider is the spatial arrangement of the habitat found across the landscape and where the proposed treatments would occur in relation to known NSO nest sites. The areas surrounding a NSO nest site can be delineated into three concentric circles. These concentric circles represent three scales of use during the course of breeding and non-breeding season, and represent the home range, core area and nest patch for each owl site. These areas of use are defined as follows:

- **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 Klamath Mountains Province the home range is a 1.3 mile radius circle (approximately 3,400 acres (USDI et al. 2008). The home ranges of several owl sites may overlap.

- **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 (USDI et al. 2008).

- **Nest Patch** is the 300-meter radius area around a known or likely nest site; it is included in the core area (USDI et al. 2008).

These three areas represent to the best of our knowledge 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, and 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 in the Methodology for Estimating the Number of Northern Spotted Owls Affected by Proposed Federal Actions (USDI et al. 2008).

Researchers have found that the habitat quality within 300 meters of a nest site (the nest patch area) is critically important to determining nest positioning across the landscape (Perkins et. al 2000). Therefore, two similar treatments in very similar habitat types could have differing impacts to NSOs depending on if the treatment would occur within close proximity to NSO nest locations (i.e. the nest patch).

None of the commercial treatments in Alternative 2 would occur within known nest patch areas associated with any of the NSO sites in the project area. Of the 175 acres of proposed treatments that would result in a downgrade of NRF habitat, only 19 acres (11%) of treatment are proposed within a core area of one NSO territory. The remaining 156 acres (89%) of proposed NRF downgrade will occur within the home range scale of the NSO territories present in the planning area.

The non-commercial treatments proposed under Alternative 2 would primarily affect NSO prey, including woodrats, red tree voles, and flying squirrels. It is anticipated that the majority of the proposed treatments as described under alternative 2 would have short term (1-5 years) negative to neutral effects to NSO prey across the treatment areas. Individual prey animals may be killed or displaced from logging operations or have nests or nest trees removed or destroyed. This would occur across a relatively small amount of the available NRF habitat within the planning area (10.5%). The treatment areas (units) do not form a contiguous block, but rather are well dispersed throughout the project area, and thus any impacts to prey animals will be spread across the project area and not concentrated in any one area. The prescription included under Alternative 2 includes leaving approximately 15% of the treatment areas untreated as

—skips". This prescription will further reduce potential impacts to NSO prey species by providing untreated islands throughout the treatment areas.

Spotted owl prey animals may be more exposed in treatment areas, or may move away from the area over the short term. As prey change location in response to the proposed treatments they may become more vulnerable and exposed to predation by spotted owls. The disturbance might attract other predators such as other owls, hawks and mammalian predators, which may increase competition for spotted owls in the treatment area. Some changes to habitat features caused by the proposed action may improve forage conditions for spotted owls, provided understory structure and cover are retained. Removal of some tree canopy, provided it is not too extreme, will bring more light and resources into the stand, stimulating forbs, shrubs and other sources of food for NSO prey. Once the initial impact of disturbance recovers (6 months to two years), the understory habitat conditions that provide food for NSO prey would increase over the next few years, until shrubs and residual trees again form a tight and closed overstory.

Overall, the spacing, timing and the retention of key habitat features as called for under the proposed action and PDFs for this project are likely to avoid adverse impacts to spotted owls with respect to prey availability. Localized, short-term changes in prey species distribution and abundance are likely to occur within a treated stand. The dispersion of treatment sites over a large area is especially important in maintaining spotted owl prey populations within the project area. Large dominant trees, snags, and down wood retained in the treated stands would continue to provide cover and nest structure for prey species and would help reduce harvest impacts to some prey species, such as dusky-footed woodrats and red tree voles. Treatment implementation would be spread out temporally and spatially within the project area, and a large percentage of the landscape would remain untreated, providing large, undisturbed areas for spotted owl foraging.

Additionally, research has indicated that thinning treatments are not necessarily detrimental to small mammal communities as a whole. In an experimental study, researchers found of 12 mammal species studied, the number of captures increased for four species and decreased for only one species two years after moderate to heavy thinning occurred in the Oregon coast range (Suzuki and Hayes 2003). This study also found the total number of small mammal captures was higher in previously thinned vs. unthinned stands. Gomez et al. (2005) noted that commercial thinning in young stands of coastal Oregon Douglas-fir (35-45 yr) did not have a measurable short-term effect on density, survival or body mass of northern flying squirrels, an important prey species for spotted owls.

The long term (>10 year) effects of the proposed action 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 old growth characteristics within the treated areas than would occur if left untreated.

In summary, Alternative 2 would have minimal impacts to the NSOs found within the planning area given that:

- A relatively small amount (3.5%) of the total NRF habitat located within the planning area would be downgraded
- The majority (89%) of the proposed treatments that would downgrade NRF habitat would occur at the home range scale of the NSO territories present in the planning area.
- None of the proposed treatments would downgrade habitat within any NSO nest patch

- Negative impacts to NSO prey are anticipated to only occur in the short term (<5 years) and would be spatially separated and well distributed across the planning area.

7.4.2 Environmental Effects– Pacific Fisher

Alternative 1 – No-Action

Under Alternative 1, the No Action alternative, none of the proposed BLM activities under this EA would occur. Forest stand conditions would continue to develop along the general current trends toward higher density stand conditions, especially in the understory, than what was historically present in the area.

The No Action Alternative would not alter the current habitat conditions across the planning area. Fishers would be expected to behave and utilize the habitat within the planning area in the same fashion as they have in the past. Particularly to fishers, the greatest risk of No Action is the potential wildfire related loss of large live remnant conifers as well as snags and down wood important to fisher natal and denning habitat. Much of the discussion under the NSO no action alternative is also relevant to the fisher, as both species are associated with mature and late-successional habitats.

Alternative 2 – Proposed Action

The activities proposed under Alternative 2 are likely to affect fishers within the planning area in two principal ways: 1) reduction in the amount of existing dening and resting habitat (also described as NRF habitat), and 2) potential disturbance from project activities.

The effects of timber harvest on fisher habitat depend on the silvicultural prescriptions used and the condition of the habitat prior to harvest. Habitat fragmentation is a concern. Timber harvest activities change the suitability of fisher habitat by removing overhead cover and insulating canopy, exposing the site to the drying effects of sun and wind (Buck *et al.* 1994) or to increased snow deposition, removing prime resting and denning trees, and increasing exposure of the fisher to predators.

As described more fully under the NSO analysis, the management activities proposed under Alternative 2 would reduce the amount of suitable dening and resting (NRF) habitat present in the planning area by 175 acres, or 3.5% of the suitable dening and resting (NRF) habitat present within the planning area.

Based on the available information on the average home range size of fishers, the Pilot Joe planning area would be likely to support approximately one and a half home ranges for a male, and up to five home ranges for females. It appears fisher require larger home range areas in the Pacific Northwest as compared to other portions of their range (Beyer and Golightly 1996), and a more accurate estimate of the number of fisher that would occupy the planning are is one to two adult territories. The 175 acres of proposed treatments within suitable dening and resting (NRF) habitat would fall within a range from <0.6% to 17.7% of a fishers individual home range.

The LSEAs located within the planning area contain the majority of the un-entered and highest quality late-successional habitat found within the planning area. These areas are likely the most probable location for female fishers to establish natal and maternal den sites, and should serve as refugia during project implementation.

Although fishers were detected at baited camera stations within the project area, it is unknown to what extent fishers use the planning area. No known denning sites would be impacted and proposed activities, and the management activities under Alternative 2 would not be expected to cause direct mortality of any fishers. Disturbance from project activities would likely be the principal effect on any fisher within the planning area. However, fishers are highly mobile and have large home ranges and would likely move to another part of their home range while the activity is ongoing.

The commercial treatments under Alternative 2 would have short term negative effects to habitat for some fisher prey species due to the reduced vegetation. These effects are relatively short term, as understory vegetation typically returns within 5 years. However, these short term effects to fisher prey species would be minimal, because the large amount of untreated areas within the project area would continue to provide forage habitat while canopy cover in the treated stands increases. Additionally, these treatments would retain key habitat characteristics such as large snags and coarse woody debris (CWD) to provide existing and future habitat for fishers.

The non-commercial treatments proposed in chapter 2 are not anticipated to alter the overstory forest structure or remove key habitat components related to fisher habitat. In some instances, mechanical fuels treatments can reduce the habitat quality by simplifying the forest structure. The Project Design Features in chapter 2 include the retention of snags and CWM, which are important habitat features for fisher. This provision, along with the spatial and temporal staggering of treatments across the landscape would ameliorate the potential negative effects of these fuels treatments on prey species at the landscape level.

Project activity disturbance effects to fishers are not well known. Fishers may avoid roaded areas (Harris and Ogan 1997) and humans (Douglas and Strickland 1987; Powell 1993). Disturbance from project activities would be temporally and geographically limited and would occupy a geographic area smaller than the average fisher home range. Seasonal restrictions listed as Project Design Features for other resources would also benefit fishers by restricting project activities until young are approximately six weeks old, approximately the age when fisher move young from natal dens and become more mobile. Fishers have large home ranges and would be able to move away from the action area while the disturbance is occurring, without impacting their ability to forage and disperse within their home range.

A key design component of the Pilot Joe project is the retention and nurturing of the large hardwoods present across the planning area. The treatments as proposed under Alternative 2 are expected to result in long-term beneficial effects to fisher by promoting and retaining existing large hardwoods across the treatment areas, which is expected to result in increased longevity and vigor in these trees, resulting in an increase in the potential denning habitat available in the future across the planning area in comparison to the No Action alternative.

In summary, the proposed action would have minimal impacts to the fishers found within the planning area given that:

- The treatments would reduce the amount of suitable dening and resting habitat within the planning area by 3.5%, and
- A large amount (82%) of the planning area will not receive any treatments and fishers would be able to utilize the majority of the planning area in the same fashion as prior to project implementation,
- Fishers occupy large home ranges, and the activities proposed under alternative 2 would occur within only a small portion of the planning area, which would likely impact a portion of one or two fisher home ranges.

7.4.3 Environmental Effects – Great Gray Owl

Alternative 1 – No-Action

Under the No Action Alternative, none of the proposed harvest activities would occur, and the forested stands in the Planning area would continue to develop along their current pathways. Therefore, none of the potential nesting habitat found within the planning area would be altered. GGOs would continue to utilize the planning area in more or less the same fashion as they have in past years.

Specific to GGOs, the No Action Alternative would not affect GGO's use of the planning area for nesting or foraging in the short term. At longer time scales, the open meadow habitats that provide foraging areas would continue to be encroached upon by fire intolerant plant species, thereby reducing the amount of potential foraging opportunities found within the Planning area. Stand replacement fire would remain the greatest risk to the nesting habitat found within the planning area.

Alternative 2 – Proposed Action

Alternative 2 would commercially thin 299 acres of forest habitat, of which 175 acres is classified as suitable nesting habitat for GGOs. While commercial thinning treatments may remove individual potential nest trees, the thinning treatments are not expected to affect the majority of the stands or individual nest trees found throughout the planning area. A small portion of the mature and late-successional forest habitat located in the planning area would receive treatment (3.5%), and the remaining 96.5% of the mature or late-successional habitat found within the planning area would remain unaffected by the Pilot Joe Project. There is a low likelihood that GGOs would be directly affected because no nests have been found in or adjacent to units proposed for treatment.

Short term effects would include reduced canopy closure and structural complexity, and the loss of future potential nest trees. However, these habitat changes would also open stands for unobstructed flight and increased foraging success. Long term beneficial effects include accelerated development of late-successional forest habitat suitable for potential GGO nesting and improved potential GGO foraging as understories respond from increased light penetrating to the forest floor .

The non-commercial treatments proposed under Alternative 2 would remove primarily vegetation from the understory or the smaller components of the midstory. This would have minimal effects on GGO habitat, as the trees removed by this type of treatment do not provide nesting habitat for GGOs. These treatments have the potential to improve foraging conditions in treated stands by opening the understory and increasing access to prey species.

A very small amount (3.5%) of the suitable nesting habitat present in the project area would be impacted by the activities proposed under alternative 2. Therefore, the activities proposed under alternative 2 would minimally affect the GGO population within the planning area.

7.4.4 Environmental Effects – Mollusks

Alternative 1 – No-Action

Under Alternative 1, forested stands would continue to develop along their current pathways. Successional stand development would continue to be influenced by fire exclusion and high stem densities. For mollusks as a group, this trend of higher stem densities and an increase towards closed canopy forests is favorable, because these trends work to provide additional moisture and shade for these species. However, the increased risk of stand replacing fire would remain the greatest threat to this species group as high severity fire would make these areas uninhabitable for mollusks as well as precluding dispersal across heavily burned areas.

Alternative 2 – Proposed Action

There are no anticipated impacts to these two former survey and manage mollusk species from Alternative 2, because no detections of either species (*Helminthoglypta hertleini, Monadenia chaceana)* occurred during protocol surveys across the planning area. Analysis of the survey data across the Medford District also showed the majority of the *Helminthoglypta hertleini* sites were not found in late-successional forest habitat and do not depend on late-successional forest components for persistence. Additionally, none of the proposed treatments in the Pilot Joe project would occur in *Helminthoglypta hertleini* habitat typical of known sites within the Medford District, so this species should remain unaffected by Alternative 2.

7.4.5 Environmental Effects- Red Tree Vole

Alternative 1 – No-Action

Under the No Action Alternative, none of the proposed harvest activities would occur, and the forested stands in the Project Area would continue to develop along their current pathways. Therefore, none of the potential RTV habitat found within the project area would be altered. Stand replacement fire would remain the greatest risk to the existing RTV habitat found within the project area.

Alternative 2 – Proposed Action

All known active and associated inactive RTV nests located from protocol survey efforts in commercial treatment areas would be protected in accordance with the management recommendations for this species (USDA USDI 2000). Therefore, no direct impacts to RTVs are anticipated as a result of implementing the actions included under Alternative 2.

Alternative 2 proposes commercial treatments across approximately 175 acres of potential RTV habitat. This thinning would be expected to remove some individual trees from the overstory and midstory, particularly those with suppressed crowns or the less fire-resistant individuals that could provide RTV nesting structure. The commercial treatments that occur within these areas would reduce the overall cover and inter-connectivity of the canopy remaining in the residual stand, reducing the habitat quality for RTVs in these treatment areas.

The non-commercial treatments proposed under Alternative 2 would remove primarily vegetation from the understory or the smaller components of the midstory. This would have minimal effects on RTV habitat, as the trees removed by this type of treatment are rarely used by RTVs and do not provide high quality nesting habitat. These treatments would potentially reduce the connectivity of the canopy, but adequate arboreal pathways would remain throughout the treated areas for RTVs to travel and disperse.

A very small amount (3.5%) of the suitable RTV habitat present in the project area would be impacted by the activities proposed under alternative 2. Additionally, all known active RTV sites would be protected in accordance with current management guidelines (USDA USDI 2000). Therefore, the activities proposed under alternative 2 would minimally affect the RTV population within the planning area.

7.4.6 Environmental Effects – - Siskiyou Mountains Salamander

Alternative 1- No-Action

Under Alternative 1, forested stands would continue to develop along their current pathways. Successional stand development would continue to be influenced by fire exclusion and high stem densities. For the Siskiyou Mountains salamander, this trend of higher stem densities and an increase towards closed canopy forests is favorable, because these trends work to provide additional moisture and shade for this species. However, the increased risk of stand replacing fire would remain the greatest threat to this species, as high severity fire would reduce habitat quality across heavily burned areas.

Alternative 2 – Proposed Action

There are no anticipated impacts to the Siskiyou Mountains Salamander (SMS) from the activities proposed under Alternative 2. There are no known SMS sites located in any of the treatment areas, and very little, if any talus habitat present in any of the treatment areas. Therefore the SMS would be unaffected by the activities proposed under Alternative 2.

7.4.7 Environmental Effects - Bureau Sensitive Species

As mentioned above in the Affected Environment, only federally listed or Bureau Sensitive species known or suspected to be present within the project area *and* impacted by the proposed actions are

addressed in this EA. Appendix C includes the full list of the current Bureau Sensitive Species and documents the basic conclusions of this assessment by species.

The actions proposed under Alternative 2 are likely to impact a limited assortment of habitat components important to the SSS species present in the planning area. Generally, these impacts would be limited to the reduction of the existing snags present across the treatment area, and would primarily affect the woodpecker and bat species that utilize snags for foraging and roosting (primarily Lewis‘ woodpecker, white-headed woodpecker, fringed myotis and pacific pallid bat). Although the PDFs in Chapter 2 require the retention of all snags and CWM whenever feasible, it is sometimes necessary to fall some snags during commercial harvest operations due to safety concerns.

Alternative 2 proposes 299 acres of commercial thinning treatments where there would be the potential need to fall snags for safety concerns. This represents approximately 6% of the planning area. Most existing snags should remain present within these treated areas. This small reduction in the quantity of the existing snags across the planning area would result in a minimal and inconsequential reduction in the available habitat for those species that relay on snags as a primary habitat feature, and would not result in a loss of species viability or create significant trends toward federal listing for any Special Status Species.

7.4.8 Environmental Effects – Neotropical Migratory Bird Species of Conservation Concern and Game Birds below Desired Condition

Alternative 1 – No-Action

Neotropical birds that favor dense conditions may benefit for a time from the No Action Alternative because the dense understories would continue to build within the project area. However, the increased chance of stand replacing fires that would eventually be a result of No Action Alternative would also lead to the loss and decline of a variety of habitat conditions, including the present dense conditions that benefit some species.

Alternative 2 – Proposed Action

Any action that changes or removes vegetation used by one species may benefit another. Species requiring dense cover that have benefited from the dense understories created by the lack of fire could be negatively affected by thinning treatments designed to reduce vegetation density. Due to habitat removal, songbird composition and abundance in treated stands could be reduced in the short term (Janes 2003; Hagar et al. 2001; and Siegel and DeSante 2003). Thinning treatments would remove hiding cover and nesting habitat for neotropical birds that use older forests. However, the large amount of untreated mature and late-successional forest habitat present across the planning area would continue to provide adequate hiding cover, foraging, and nesting habitat within the planning area for birds that use older forests. Additionally, existing large diameter snags and down wood found in older seral stands would be retained in the project area, and would continue to provide nesting, roosting, or foraging opportunities for species dependent on these key habitat structures.

Some individual birds may be displaced and nests could be destroyed during project activities. However, untreated areas adjacent to and within the treatment areas (15% leave islands) would provide refuge and nesting habitat, minimizing short term loss of habitat. Some nests may be destroyed from timber harvest and thinning occurring during active nesting periods. However, the failure or loss of a nest during one nesting season would not be expected to reduce the persistence of any bird species in the watershed. That is because sufficient habitat of all types remains to support the wide diversity of bird species in the area. As >82% of the lands found within the planning area would remain untreated, impacts to these species are anticipated to be negligible at the landscape scale. The small amount of habitat loss or reduction in fecundity in a given year would not be measurable at the regional scale; therefore, populations in the region would be unaffected; Partners in Flight support the eco-regional scale, as appropriate, for analyzing bird populations (California Partners in Flight 2002).

7.5 Cumulative Effects for Wildlife

Cumulative effects for wildlife species and habitat are discussed at the watershed level to capture the varying habitats, species home ranges, and varying degrees of species mobility. Fire suppression, road building, and timber harvest throughout the project area have resulted in habitat loss and fragmentation, and have changed the distribution and abundance of many wildlife species in the Middle Applegate watershed. Timber harvest has occurred on BLM lands in the Middle Applegate watershed since 1950. The associated habitat loss 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.

7.5.1 Northern Spotted Owl

The Pilot Joe project proposes commercial harvest of 175 acres of NRF and 123 acres of dispersal-only NSO habitat. These treatments, coupled with the other recent and future foreseeable projects described above would increase fragmentation within the watershed. However, the only activity that is likely to remove suitable habitat within the watershed would be private harvest. 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 Middle Applegate Watershed. Additionally, even with the Pilot Joe project area combined with current and future foreseeable actions, it is unlikely the actions proposed in the Pilot Joe project would appreciably reduce or diminish the survival or recovery of the spotted owl, due to the small percentage of habitat this would affect at the provincial and the range-wide levels. Additionally, with the small level of harvest, this project would not preclude owls occupying viable territories and continuing to reproduce in the watershed.

7.5.2 Other Wildlife Species

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 Middle Applegate watershed. The combination of all treatments proposed under Alterntive 2 would treat only 18% of the planning area. Because of the relatively small foot-print of the project, and because of the dispersed distribution of proposed treatments across the watershed, no substantial negative effects are anticipated to any Bureau Sensitive or Survey and Manage wildlife species.

8.0 Botany

This section discloses the impacts to threatened, endangered, special status, survey and manage (including fungi) and invasive plant species.

8.1 Issues/Concerns

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.

Forest management degrades habitat for native plant (including special status plant and fungi species) populations.

Invasive plant species may become established or more widespread as a result of forest managment.

8.2 Affected Environment

The proposed harvest and treatment areas are located within the Humbug Creek 6th field sub-watershed of the Middle Applegate 5th field watershed – bordered on the north by Highway 238 and on the south by Tallowbox Mountain. The planning area is 7,536 acres – 5012 acres of which is BLM administered land. The analysis area is the southern portion of the Humbug Creek sub-watershed as described above and is comprised of primarily three plant series: Doug fir, Ponderosa Pine and White Oak. In the Middle Applegate, these three plant series provide habitat for several special status and survey and manage plant species.

8.2.1 Bureau Special Status and Survey and Manage Plant and Fungi Species

Recent changes to the survey and manage program are described above in the Wildlife Affected Environment section. The Pilot Joe project is compliant with applicable botanical surveys and protection measures pertaining to survey and manage plant and fungi species,.

Special Status species are officially designated by the State director. The most recent Special Status Species list went into effect on February 7, 2008 (IM OR 2008-038). This new list has two categories, Sensitive and Strategic. The special status plant list for which surveys are conducted includes Federally-listed species, Bureau Sensitive and Strategic species (BLM, 2008), and Survey and Manage (S&M) Category A and C species (FS/BLM, 2001 S&M list). 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 a status change to common is warranted.

All of the proposed treatment areas will be surveyed for bureau special status and survey and manage vascular and nonvascular (lichens and bryophytes) plants prior to any Decision being made to proceed with the project. At the time of writing, June, 2011, approximately 95% of the project area has been surveyed to protocol. Surveys were conducted in 2002, continuing in ‘06, ‘07, _08, and currently continuing in areas needing updated surveys or second year *Fritillaria gentneri* surveys per BA/BO (BLM 2009). Surveys are conducted by professional botanists using an intuitive controlled survey method. Those areas supporting high potential habitat for target species were surveyed more intensively.

Botanical surveys documented eight occurrences of four Bureau Sensitive and two Survey and Manage plant species within the project area. No other occurrences of Federally-listed, Bureau special status or Survey and Manage plant species have been detected within the project area.

Botanical surveys documented eight occurrences of four Bureau Sensitive and two Survey and Manage plant species within the project area. No other occurrences of Federally-listed, Bureau special status or Survey and Manage plant species have been detected within the project area. The entire project area received two years of surveys for Fritillaria gentneri, with the exception of 60 acres in a non-commercial unit receiving a one year survey. Since no Fritillaria gentneri nor Fritillaria spp. leaves have been found in the project area, it is expected that Fritillaria gentneri does not exist in the project area. Consultation with USFWS concerning Fritillaria gentneri will occur for the Pilot Joe Project prior to a Decision document being issued.

Table 3-18. Bureau Special Status / Survey and Manage Plant Species

Lifeform	Species name (followed by number of occurrences in proposed treatments)	Common Name	Status	Occurrences in analysis area
Vascular	*Callitriche marginata* (1)	Winged Water-starwort	BSO	1
Vascular	*Cryptantha milo-bakeri* (1)	Milo Baker's cryptantha	BSO	1
Vascular	*Cypripedium fasciculatum* (3)	Clustered Lady's-slipper	BSO	19
Vascular	*Cypripedium montanum* (1)	Mountain Lady's-slipper	S&M C	2
Lichen	*Dendriscocaulon intricatulum* (1)	Olive-thorn lichen	S&M B	4
Vascular	*Zigadenus exaltatus* (1)	Giant Death Camas	BSO	7
Status definitions: BSO=Bureau Sensitive Oregon – manage so treatments do not trend species towards listing under ESA (BLM Manual 6840); **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 (FS, BLM , 2001).				

Detected special status and survey and manage species descriptions are as follows:

Callitriche marginata: Winged water-starwort is a floating leaved aquatic species. The single occurrence in the project area in 38S3W35 is in a riparian reserve on the edge of a unit proposed for treatment.

Cryptantha milobakeri: Milo Baker‘s cryptantha is a southwestern Oregon and northern California endemic that occurs in dry meadows, conifer-hardwood forests, and white oak woodlands. There is one historical occurrence in 38S4W35. The site was discovered in 1998, but has not been observed at the site since and attempts to relocate in 2007, 2010 and 2011 were unsuccessful.

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 found 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.

Dendriscocaulon intricatulum: Olive-thorn lichen is a minute, fruticose lichen that is usually 3-5 mm, but up to 1 cm tall. Its appearance has been compared to a tiny brown steel wool pad or a miniature oak tree. It occurs primarily on oaks that occupy ridges in the analysis area. It is endemic to North America, occurring sporadically from southeastern Alaska through British Columbia, the Washington Cascades, the Siskiyou Mountains in Oregon, and reaching the southern limit of its range in coastal northern California.

Zigadenus exaltatus: Giant death-camas is known from western California and southwestern Oregon. There are taxonomic questions related to the plants found in the Applegate Valley of southern Oregon and they may represent a new species. 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. Soils are often cobbly to gravelly loams.

Fungi

The BLM is not required to survey for Sensitive fungi or S&M Category B fungi in stands less than 180 years old. The BLM assumes that protecting known Sensitive and S&M fungi sites (current and future found), the presence of suitable habitat in reserves, and completion of equivalent effort fungi surveys in stands greater than 180 years old will prevent this project and future projects from contributing to the need to list Sensitive fungi and will ensure the persistence of S&M fungi (OSO IB-OR-2004-145).

Although not required, approximately 350 acres in or adjacent to proposed treatment areas were surveyed with three visits during fall and spring during peak sporocarp fruiting time. No Bureau Sensitive or S&M fungi on current lists were detected during these surveys. No special status fungi are known to occur in the project or analysis area.

Twenty Bureau Sensitive fungi are documented or suspected of occurring on the Medford District BLM administered lands. (Table 3-19). Most Sensitive and S&M fungi grow in later 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, *Rhizopogon ellipsosporous*, occurs over four miles north of the project area in a dry, mixed conifer/hardwood forest.

Table 3-19. Medford District Sensitive/S&M B Fungi Species (ORBIC, 2010)

Scientific Name	Status	2007 Heritage Rank**	ORBIC List***	NWFP Sites
Boletus pulcherrimus	S&M B	G2G3/S2	1	23
Dermocybe humboldtensis	S&M B	G1G2/S1	1	4
Gastroboletus vividus	S&M B	G2?/S1	1	5
Gomphus kauffmanii	S&M B	G2G4/S3?	1	74
Gymnomyces fragrans	BSO	G2G3/S1S3	3	2
Helvella crassitunicata	S&M B	G3/S2	1	29
Leucogaster citrinus	S&M B	G3G4/S3S4	2	48
Otidea smithii	S&M B	G2/S2	3	10
Phaeocollybia californica	S&M B	G2?/S2?	3	44
Phaeocollybia olivacea	S&M B	n/a	1	115
Phaeocollybia oregonensis	S&M B	G2?/S2?	n/a	15
Phaeocollybia pseudofestiva	S&M B	G3/S3?	1	49
Pseudorhizina californica	BSO	G4/S2	3	42
Ramaria largentii	S&M B	G3/S2?	2	20
Ramaria spinulosa var. *diminutiva*	S&M B	GUT2/S1?	3	1
Rhizopogon chamalelotinus	S&M B	G2G3/S1S2	1	1
Rhizopogon clavitisporus	BSO	G2G3/S1S2	2	3
Rhizopogon ellipsosporus	S&M B	G2G3/S1S2	2	5
Rhizopogon exiguus	S&M B	G2G3/S1S2	2	3
Sowerbyella rhenana	S&M B	G3G4/S3	2	66

Status definitions: BSO=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 (FS, BLM , 2001).
Heritage Rank: an international system for ranking rare, threatened, and endangered species: G = Global Rank; S = State Rank
1 = Critically imperiled because of extreme rarity or because it is somehow especially vulnerable to extinction or extirpation, typically with 5 or fewer occurrence.
2 = Imperiled because of rarity or because other factors demonstrably make it very vulnerable to extinction (extirpation), typically with 6-20 occurrences.
3 = Rare, uncommon, or threatened but not immediately imperiled, typically with 21-100 occurrences.
4 = Not rare and apparently secure, but with cause for long-term concern, usually with more than 100 occurrences.
5 = Demonstrably widespread, abundant and secure.
? = Not yet ranked or assigned rank is uncertain.
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.

8.2.2 Noxious Weeds

Noxious weeds are plants growing outside their native lands or habitats that are injurious to public health, agriculture, recreation, wildlife, or public or private property (Oregon Department of Agriculture 2011, 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 (BLM 1995, 92-93).

The Oregon Department of Agriculture (ODA) designates and classifies noxious weeds according to their detrimental effects, reproductive strategies, distribution, and difficulty of control (Table 3-20).

Table 3-20. ODA Noxious Weed Control Rating System (ODA, 2011, 6)

Category	Criteria	Recommended Action
A	Weeds that occur in the state in small enough infestations to make eradication or containment possible; or are not known to occur, but their presence in neighboring states makes future occurrence in Oregon seem imminent.	Infestations subject to eradication or intensive control when and where found.
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.

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 resprout 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 seedbanks 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 the current non-native habitats.

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 3-21).

Table 3-21. 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 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 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.

The BLM treats noxious weed populations on their 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 (BLM 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 land and within project areas that pose a risk of spreading weeds during project implementation. The BLM treats weeds by manual, chemical, mechanical or biological means.

All of the proposed treatment areas were surveyed for noxious weeds by qualified botanists over a time period extending from 1998 through 2011. Historically, surveys have documented nine occurrences of Yellow Starthistle (YST), four occurrences of Bull Thistle, two occurrences of Armenian (Himalayan) Blackberry, one occurrence of Medusahead Rye and one occurrence of St. Johnswort.

Table 3-22. Noxious Weeds in the Pilot Joe Project Area

Name	Status	Number of Sites or Frequency: current (historic)	Ecology and Habitat*	Ashland Resource Area Management Strategy
Bull thistle *Cirsium vulgare*	B	2 (4)	Biennial herbaceous plant. Reproduces from seeds. Common along roadsides, where soil is disturbed and canopy cover removed.	Treat specific populations in high risk areas (Special Status plant sites, special areas)
Himalayan blackberry *Rubus armeniacus*	B	3% of project area - < 1% of BLM land in planning area; (unknown)	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 roadsides in Pilot Joe project area.
Medusahead Rye *Taeniatherum caput-medusae*	B	1 (0)	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.
St. Johnswort/ Klamath weed *Hypericum perforatum*	B	1 (0)	Perennial herbaceous plant. Reproduces vegetatively via rhizomes. Invades roadsides and other disturbed open areas. More prevalent in eastern Jackson County than western Jackson County.	Treat populations in quarries or near Special Status plant sites or other special areas. A beetle introduced as a biocontrol has been effective at reducing St. Johnswort populations at lower to middle elevations.
Yellow star-thistle *Centaurea solstitialis*	B	3 (9)	Annual, occasional biennial. Reproduces from seeds; one plant can produce more than 10,000 seeds. Root system consumes more water than native vegetation. Creates 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.
* (Oregon State University Extension Service 2003)				

As a result of weed control treatments and infestations that initiated on poor habitat for YST (shaded sites) only three roadside infestations remain in or near the project area – two in 39-4W-35 and one in 38-3W-32. These three sites are small patches measuring less than 100m^2 collectively. Herbicide and/or hand-pulling treatments will continue in 2011. It is expected that these infestations will be extirpated in 1-2 years. Of the four Bull Thistle patches, two small (<25m^2) infestations currently are extant and shall be treated with backpack herbicide spray during summer 2011. Armenian Blackberry is widespread along most of the roads and in the northern portion of the project area. Approximately 1.5 miles of roadside Armenian Blackberry has been mowed and subsequently sprayed with glyphosate to kill sprouts. The one occurrence of St. Johnswort in 38-4W-35 will be treated by backpack herbicide spray during summer 2011, since no biocontrol insects were noticed during detection this year.

Adjacent private lands in the Applegate drainage are also known to harbor many populations of noxious weeds. BLM is not authorized to survey private lands and as a consequence, the extent of these populations is currently unknown.

8.3 Environmental Consequences

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 considering the range of alternatives plus the effects of other actions that are currently happening or will be happening in the foreseeable future

8.3.1 Alternative 1 – No-Action

Direct and Indirect Effects

Special Status and S&M Vascular and Non-vascular plants and fungi
Under 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 are the conditions which 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. A result of this 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 than rare plant sites, contiguous blocks of BLM land, or special areas such as ACEC's or the Cascade Siskiyou National Monument. When the BLM decides to implement a project in a specific area, it raises the priority level for treating local infestations.

Without treatment, roadside and riparian Blackberry infestations increase over time to create impenetrable thickets. Klamath Weed would slowly increase along roads. The remaining infestations of Starthistle and Bull Thistle are located at roadside areas with ample sunlight giving them a competitive advantage over other vegetation in the area. They would likely increase due to natural processes, inherent competitiveness and other potential disturbances. (See table 3-17)

Cumulative Effects

Data are not available for the presence or abundance of rare plants or fungi in the project area before BLM surveys began. While surveys have identified locations of rare plants on BLM-managed lands, they are not sufficient to show trends over time or quantify impacts to these species‘ populations from specific activities or events. It is not known if the rare vascular and nonvascular species or fungi that occur in the Pilot Joe project area are more or less rare now than in the past. Plant species may be naturally rare or may become rare over time because of loss of populations or changes to their habitats or environmental conditions, over-collection, or direct impacts to plants resulting in extirpation of populations.

Past activities on both private and public lands in the Pilot Joe project area that altered conditions on the land and may have affected rare plants or fungi include road building, timber harvest, livestock grazing, wildfire, fire suppression, agriculture, rural land development, mining, diversion dams and other changes to hydrological processes, and recreational activities. However, the BLM can only surmise that changes to the habitats associated with rare species would have affected them as well.

Present and foreseeable future actions in the Humbug Creek sixth field watershed under the No Action Alternative include continued forest management on private industrial lands. Some late-successional stands on BLM-managed lands in the project area would continue to provide suitable habitat for species associated with that habitat. Some mid-seral stands would continue developing toward later seral stages. Some of these late/mid-seral stands would continue to decline as competition for limited resources stress the stands and associated native vegetation. Hazardous fuels would increase in overstocked stands, rendering them less resilient to high severity fire and with less understory diversity. Fuels reduction treatments would likely occur near private property and strategic ridges and road systems. Implementing the No Action Alternative and not restoring more open conditions would not add cumulative effects to Special Status or S&M vascular or nonvascular plants or fungi.

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

Some of these human-caused activities and natural processes will continue to present risks of introducing new and spreading existing noxious weed populations in the watershed. While there is a potential for continuous influx of noxious weeds due to those activities, the BLM has an ongoing program of inventory and treatment of noxious weeds in the Pilot Joe planning area. Treatments in the past few years have focused on quarries and road systems in the upper areas of the watershed. Treatments in those areas and new areas discovered in 2011 are being treated. Future funding for treatments is uncertain.

Added to past, present, and foreseeable future actions, implementing Alternative 1 would not contribute additional cumulative effects to noxious weeds in the Pilot Joe project area beyond existing conditions because no new activities would occur that create risks of introducing or spreading them.

8.3.2 Alternative 2 – Proposed Action

Direct and Indirect Effects

<u>Special Status and S&M Vascular, Non-vascular plants and fungi</u>
On BLM-administered lands, the BLM shall: manage Bureau sensitive species and their habitats to minimize or eliminate threats affecting the status of the species or to improve the condition of the species habitat (BLM Manual 6840, 2008); manage known sites of survey and manage species to provide reasonable assurance of taxon‘s persistence and/or minimize inadvertent loss of undiscovered sites (FS/BLM, 2001).

Potential impacts to rare vascular or nonvascular plants from the proposed thinning, 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 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, silvicultural or fuels treatments, and post-harvest slash treatments. Buffer sizes would vary depending on the type of treatment proposed, the species affected, and current environmental and ecological conditions at the site.

Eight occurrences of four Bureau special status and two S&M plant species are present within units proposed for treatment under the Action alternatives. No *Fritillaria gentneri* populations occur within the project or analysis area. There will be no effect on *Fritillaria gentneri*. It is expected that the protection measures described in Table 3-23 will protect and benefit special status plants by not trending them towards listing, and will assure local persistence of survey and manage species and their habitat.

Table 3-23: Special Status and S&M plant species protection

Species name (followed by number of occurrences in proposed treatments)	Status	Protection
Callitriche marginata (1)	BSO	Long duration riparian reserve – no treatment
Cryptantha milo-bakeri (1)	BSO	Could not locate last several years – occurs in sparsely vegetated habitat that will receive minimal treatment – no buffer necessary
Cypripedium fasciculatum (3)	BSO	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 (1)	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
Dendriscocaulon intricatulum (1)	S&M B	25 foot buffer and large oak retention prescription
Zigadenus exaltatus (1)	BSO	25 foot no burn piles buffer – seasonal restriction April 1- July 15 to remove excess vegetation

Fungi

Under Alternative 2, tractor yarding would occur on 83 acres and skyline yarding on 216 acres. 1,573 acres of primarily older forest habitat is retained as Late Successional Emphasis Area, leaving 5,074 acres of mixed BLM and private land where future land management activities are unknown. 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. Under Alternative 2, conifers would be harvested on 299 acres.

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.

Burning post-treatment slash piles also poses potential impacts to rare fungi. After timber harvest, the remaining slash is piled and eventually burned. 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). In Alternative 2, the BLM could pile and burn or underburn post-treatment slash on up to 889 acres. The total area potentially impacted by burn piles would be up to 2.5 percent of the units for a total of 23 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 desiccation 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 Emphasis Area‘s, 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, and other special management areas) across the landscape would prevent Sensitive species from trending toward listing or threaten S&M species‘ persistence (Bureau of Land Management 2004, 5-2).

Noxious Weeds

Historic and recent inventories detected five species of Oregon State designated noxious weeds within the project area: Bull Thistle, Klamath Weed (St. Johnswort), Medusahead Rye, Armenian (Himalayan) Blackberry and Yellow Starthistle. Current weed infestations show that Bull Thistle and Yellow Starthistle have decreased due to weed control activities and from initially detecting infestations in unsuitable (shaded) habitat.

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 889 acres in the project area. Revegetating burn pile spots and hot burn areas with native plant materials would reduce the ability of weeds to spread into these areas.

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 21.60 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.

In the short term (approximately 1-5 years), proposed timber harvest activities within the project area could result in a moderate probability (see noxious weed risk assessment) 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 3-17. Implementing PDF‘s and continuing weed treatments on minority invaders (Starthistle, Bull Thistle, St. Johnswort) would mitigate the risk of overall spread and likely improve habitat in the watershed by eliminating these small infestations.

8.4 Cumulative Effects

Past, present, and future activities in the Humbug Creek sixth field watershed would be similar to those described in the No Action Alternative, except that the BLM would implement actions proposed in Alternative 2.

Because the BLM would survey 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, 180-plus year old stands, and would protect sites when discovered, the timber harvest and associated silvicultural, fuels and road maintenance work proposed in Alternative 2 would not add cumulative effects to these species.

The proposed timber management activities would occur on matrix lands, which are designated for timber production and harvest. Across the Northwest Forest Plan area, approximately 14 percent of the 8 million acres of late-successional forest are designated as matrix or AMA‘s and are available for harvest, while 86 percent are designated as Late-Successional Reserves, congressionally reserved areas, administratively withdrawn 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 (U.S. Forest Service and Bureau of Land Management 1994, C-44).

In the southern Humbug Creek sub-watershed analysis area, the BLM has set aside nearly twice as much late-successional emphasis area (LSEA), 1,573 acres, as is proposed for harvest/silvicultural/fuels reduction treatments – 889 acres. These stands contain old growth characteristics suitable for the Northern Spotted Owl and also provide suitable habitat for special status and S&M plants and fungi. Therefore, Alternative 2 would not add cumulative effects to these species.

Past, present, and anticipated future activities in Alternative 2 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 Humbug Creek watershed. Treatments in the past few years have focused on quarries and road systems. Treatment in those areas and new areas discovered in 2011 will be treated in 2011.

Added to past, current, and 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 low if weed treatments continue to be funded and moderate if not funded (Noxious Weed Risk Assessment Report for Pilot Joe EA). The application of PDFs and other mitigation measures would reduce the risks that activities in Alternative 2 would add cumulative effects to noxious weeds in the Humbug Creek sixth field watershed.

It is anticipated that ongoing activities on private lands and activities over which the BLM does not have control will continue to create situations in which noxious weeds could be introduced and spread. 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.

8.5 Noxious Weed Risk Assessment Report

BLM Manual 9015 - Integrated Weed Management (BLM, 1992) directs BLM botanists to conduct a weed risk assessment to determine the risk of introducing weeds into an area and/or spreading then throughout a project area. Surveys for all species on the Medford Weed list were conducted over several years starting in 1998. Noxious weed and non-native plant populations in the project area and on BLM land vary by location and species (see Affected Environment for weed species, locations).

Class A Weeds. Those noxious weeds that are exotic (not native) to the State or area, and are of limited distribution or are unrecorded in the State or area and pose a serious threat to agricultural crops and rangelands in the State. Class A weeds receive highest priority. Management emphasis is complete control. These weeds approximate the Oregon Department of Agriculture List A weeds. A records check and surveys of areas that may be affected by the proposed project resulted in zero sites of class A weeds.

Class B Weeds. Those noxious weeds that are non-native (exotic) plant species that are of limited distribution or unrecorded in a region of the State but are common in other regions of the State and have been identified by the BLM or State as potentially harmful. Class B-Weeds receive second highest priority. Management emphasis is to control the spread, decrease population size, and eventually eliminate the weed population when cost-effective technology is available. These weeds approximate the Oregon Department of Agriculture List B weeds. Note that percent cover of these species is less than the infestation area since most weeds, with the occasional exception of Blackberry, usually cover less than 100% of their infested area.

Table 3-24. Class B Weeds Located within or Adjacent to the Project Area.

Species	Count	Estimated size of infestation
Armenian Blackberry	2	Large - 40 acres
Bull Thistle	1	Small - <50m^2
Medusahead Rye	1	Medium - <500m^2
St. Johnswort (Klamath Weed)	1	Small - <200m^2
Yellow Starthistle	3	Small - <100m^2

Class C Weeds. Consists of any other noxious weeds (exotic or native) or undesirable plants. This classification receives the lowest priority. Management emphasis is to contain spread to present population size or decrease population to a manageable size. The following species are exotic, have a high frequency from recent survey lists in nearby stands, and have the potential to cause ecological damage.

Table 3-25. Class C Weeds Located within or Adjacent to the Project Area.

Species	Count	Estimated size of infestation
Downy Brome (Cheatgrass)	3	~1 acre
Hedgehog Dogtail grass	3	~3 acres
Cutleaf Blackberry	1	<1 acre
Orchard grass	1	<<1 acre

Table 3-26. Factor 1: Likelihood of Noxious Weed Species Spreading to Analysis Area

Level	Value	Description
None	0	Noxious weed species not located within or adjacent to the analysis area. Project activity is not likely to result in the establishment of noxious weed species in the analysis area.
Low	1	Noxious weed species present in areas adjacent to but not within the analysis area. Project activities can be implemented and prevent the spread of noxious weeds into the analysis area.
Moderate	5	Noxious weed species located immediately adjacent to or within the analysis area. Project activities are likely to result in some areas becoming infested with noxious weed species even when preventative management actions are followed. Control measures are essential to prevent the spread of Noxious weeds within the analysis area.
High	10	Heavy infestations of Noxious weeds are located within or immediately adjacent to the analysis area. Project activities, even with preventative management actions are likely to results in the establishment and spread of noxious weeds on disturbed sites throughout much of the analysis area.

The likelihood of class B and C weed species spreading into the project area is moderate (factor 5). There are Class B and C weed populations immediately adjacent to and within project. Forest management activities will create patchy, moderately intensive ground disturbance. Some weed seeds and plant material may spread from the road prism into units without aggressive treatment. Project Design Features (PDF) are included that will prevent the extensive spread of noxious weeds due to direct effects of the proposed project.

Yellow Starthistle, Bull Thistle and St. Johnswort within the affected area would be reduced, and perhaps locally eradicated in 1-3 years if the PDF‘s and treatments are implemented. The budget to treat and monitor noxious weeds is not fixed for this project. There is no budget to treat Class C weeds; also, it is not permitted to use herbicides on Class C weeds at this time. It is expected that the BLM will be able to treat class C weeds with new, more effective herbicides by 2013. If the weeds are not treated due to insufficient budget or workforce, the likelihood of noxious weed and non-native species spreading into and within the project area would be moderate. If the weeds are treated for the next one to three years, the likelihood of noxious weed and non-native species spreading into the project area remains moderate. However, one to three years of weed treatments would prevent additional spread of weeds and non-native species within the project area – except for the large infestation of Blackberry in unit 31-11NC. If budget and resources allow cutting or mowing of this infestation, persistent herbicide application would likely contain its spread and reduce the size of the infestation.

Table 3-27. Factor 2: Consequence of Noxious Weed Establishment in Analysis Area

Level of Consequence	Value	Description of Possible Effects
Low to Nonexistent	1	None. No cumulative effects expected.
Moderate	5	Possible adverse effects on site and possible expansion of infestation within analysis area. Cumulative effects on native plant community are likely but limited.
High	10	Obvious adverse effects within the analysis area and probable expansion of noxious weed infestations to areas outside the analysis area. Adverse cumulative effects on native plant community are probable.

The consequence of noxious weed establishment in the project area is moderate (factor 5). The noxious weed and non-native populations in the affected areas vary by species and are primarily located along roads, except Blackberry. The roadside species are primarily competitive when under an open canopy, i.e., roadside or disturbed, open gaps in canopy. Yellow Starthistle and Medusahead Rye could invade disturbed areas and out compete native herbs, forbs and graminoids. Blackberry can form dense thickets where nothing grows underneath its canopy. It is unlikely that the Blackberry infestations within unit 31-11NC would ever be extirpated. Without treatment it will continue to expand in riparian areas and roadsides crowding out native vegetation. Unrelated activities could transport weed seed (e.g. wind, water, wildlife, wildfire, hiking, OHV, etc.) into any newly disturbed areas.

Risk Rating

Step 1 - Identify level of likelihood and consequence of adverse effects and assign values according to the following:

- None = 0
- Low = 1
- Moderate = 5
- High = 10

Step 2 - Multiply the level of Likelihood value (Table 3-26) by the Consequence value (Table 3-27) to determine Value.

Step 3 - Use the value resulting from Step 2 to determine Risk Rating and Action in Table 3-28 below.

Table 3-28. Risk Rating and Action

Value	Risk Rating	Action
0	None	Proceed as planned.
1-10	Low	Proceed as planned. Initiate control treatment on noxious weed populations that get established in the area.
25	Moderate	Develop preventative management measures for the proposed project to reduce the risk of introduction or spread of noxious weeds into the area. Preventative management measures should include modifying the project to include seeding the area to occupy disturbed sites with desirable species. Monitor area for at least 3 consecutive years and provide for control of newly established populations of noxious weeds and follow-up treatment for previously treated infestations.
50-100	High	Project must be modified to reduce risk level through preventative management measures including seeding with desirable species to occupy disturbed sites and controlling existing infestations of noxious Weeds prior to project activity. Projects must also provide for control of newly established populations of Noxious weeds and follow-up treatment for previously treated infestations.
5x5=25. Moderate risk. Implement PDF's. Monitoring and control treatments shall occur.		

The Medford District BLM Resource Management Plan directs the use of integrated pest management actions to contain and reduce noxious weed infestations. The Pilot Joe project incorporates project design features (PDFs) as part of the proposed action to control noxious weeds and avoid new infestations. The PDFs include both preventive features and active control. The PDFs represent the most current and

widely employed methodology for weed control and prevention. The EA analyzes effects to resources in the context of a project design that includes PDFs prescribed for the Pilot Joe project; thus, the effects of project design features have been generally incorporated into the analysis of the proposed action. While ground disturbance associated with this project would create site conditions initially more favorable for noxious weeds and introduced plants, with the implementation of project design features, weed spread would be minimized and roadside weed populations would be controlled or reduced.

PDFs included in the Pilot Joe project to control noxious weeds are consistent with:

- Medford District BLM Resource Management Plan (USDI BLM, 1995, p. 92);
- Medford District BLM Integrated Weed Management Plan and Environmental Assessment (USDI BLM, 1998); and the
- Bureau's 2007 Final Programmatic Environmental Impact Statement, *Vegetation Treatments Using Herbicides*, Prevention of Weeds and Early Detection and Rapid Response strategy (USDI BLM, 2007, p. 2-23 to 2-25).

9.0 Off-Highway Vehicles, Recreation and Visual Resources, Cultural Resources

9.1 Issues/Concerns

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.

There is opposition to thinning timber stands because opening these stands may lead to OHV users pioneering new trails.

Timber harvest changes the look and character of the hillsides and the views that local residents and tourists have of the forest.

9.2 Off-Highway Vehicles (OHVs)

9.2.1 Affected Environment

The project area is currently open to OHV use except for riparian areas. The area receives use in limited areas primarily by motorcycles and ATV's. All the existing roads in the project area are open and available to OHVs as well as an unknown number of user created trails. BLM lands are open for OHV, walking, cycling and horseback riding unless expressly closed to those activities. OHV activity is a legal activity as long as users stay out of the restricted (riparian) areas.

OHV's can impact local residents with engine noise. Because of the patterns of land ownership and inclusions of private lands among BLM lands, boundaries are sometimes confusing and/or ignored. Consequently, trespassing is a common complaint among local residents. Dirt bikes meet county noise standards/ordinances simply by having mufflers. The majority of OHV use in the Pilot Joe area tends to be in the upper reaches of the watershed, far from the private lands.

9.2.2 Environmental Consequences

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

Alternative 1– No-Action

Actions which incrementally contribute to ongoing OHV activity or increased OHV activity include establishment of new residences on private land adjacent or near the project area, road construction within the project area on private lands, road construction in adjacent watersheds that would connect or closely connect to road systems in the project area, and the continued BLM policy of unrestricted OHV use unless designated closed.

Except for some localized development of private land, there are no reasonably foreseeable road construction projects. OHV activity will continue at least at the current pace with the associated effects to people and the environment. No timber would be removed and no contracts created for the local workforce.

Alternative 2 – Proposed Action

This alternative has a slight net decrease in the miles of roads within the planning area. While some roads are closed to highway vehicles, Off Highway Vehicles can still access the majority of the roads. The forest management which will reduce the density of the forest and create more open stand conditions may favor use by OHVs. However the majority of the area is very steep and limits some of the OHV use by that feature alone. The proposed treatments are not in an area that has historically received much OHV use. It is likely that OHV use will not increase much in this area because of the forest thinning.

Because the direct and indirect effects are very minor, the cumulative impact of OHV effects of Alternative 2 related to increased access, when added to past and ongoing actions (which contribute the vast majority of the net effect of OHVs), is relatively unchanged.

9.3 Recreation and Visual Resources

9.3.1 Affected Environment

Recreational use of the public lands within the Middle Applegate planning area and in proximity to proposed treatment areas in the Pilot Joe Demonstration Project area mainly consists of dispersed types of recreation. The exception is Cantrall Buckley County Park, which located on the west side of the Applegate River just off of Hamilton Road approximately 2 miles southwest of the town of Ruch. The park itself is outside of the project area, but road access to the park is via 38-3-33 (Cantrall Road). Dispersed recreation in the project area includes hiking, horseback riding, OHV activities, fishing, driving for pleasure and sightseeing, wine tasting, hunting, dispersed camping, and vegetative gathering (i.e., mushrooms).

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) Inventory 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. BLM lands within the project area are identified as VRM Class III. 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. 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.

Changes should repeat the basic elements of form, line, color, and texture found in the predominant natural features of the characteristic landscape.

The current condition of the visual resources is one that is dominated by a mosaic of features that have been created and/or affected by human activities (agriculture, timber harvest, road building) both on public and private lands, and by a naturally occurring vegetative mosaic across the landscape affected by aspect, elevation, soil depth, and historical fire regimes.

Intermingled within the project area are large blocks of land owned by Meriwether Southern Oregon Land & Timber LLC which are zoned FR-Forest Resource. These lands have been (and likely will be into the future) intensively managed for forest products. Forestry activities on these lands are governed by the Oregon Forest Practices Act, and timber harvest on those lands may become dominant on the landscape.

9.3.2 Environmental Consequences

Alternative 1 – No-Action

In the no action alternative, recreation opportunities would remain unchanged. Dispersed recreational activities such as hiking, horseback riding, sightseeing, OHV activities, fishing, driving for sightseeing and pleasure, hunting, winetasting, dispersed camping, and mushroom gathering would continue without change.

Alternative 2 – Proposed Action

Dispersed types of recreation within the Pilot Joe Demonstration Project area would receive some negative short-term intermittent impacts as a result of implementation of Alternative 2. 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. However, some of the safety risks associated with project activities would be mitigated with appropriate signs.

It is anticipated that only short term negative impacts to the dispersed recreational user within the project planning area would occur during actual harvest or fuels management operations, when certain roads may be blocked by logging equipment or active falling operations. Logging and associated hauling would be restricted to between June 1 and October 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 treatments may occur before and after those dates, but the expected impact to the dispersed recreational user is minimal. However, there may be short periods of time when prescribed burning may preclude some recreational use due to safety concerns. Additionally, smoke from prescribed burning may adversely affect recreational use of the Middle Applegate watershed, 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. Long term, the recreational use is expected to return to the pre-project level.

The effects on the visual resources within the project area are expected to be within the range as described under VRM Class III guidelines, that activities may attract attention but would not dominate the view of the casual observer. The silvicultural system proposed in this action calls for an uneven-aged management approach 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 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 Highway 238 and Upper Applegate Road.

Cable yarding corridors following harvest would be visible to an observer from several of the key observation points and by motorists on portions of Highway 238, but are not expected to dominate the view. Corridors would be most apparent in Unit 31-3A and 26-2 because of their position on the landscape, and their proximity to Highway 238, but because of the variable density thinning prescriptions, there would be significant residual tree canopy to hide the corridors, except when an observer is looking straight up them. Units 32-3 and 32-4B would be visible from KOP 2 and 3, but it is anticipated that the rest of the units would be mostly obscured from casual view by topography and by foreground screening. And, 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. Because of middle ground ridges, harvest operations would not be visible from KOP 1, or by visitors to the wineries in the picturesque valley just southwest of Ruch, roughly bounded by Hamilton Road, Upper Applegate Road, and Highway 238.

It is also anticipated that harvest would be most apparent to casual observers in the first couple of months following treatment when slash is —red". Red slash quickly becomes less apparent as needles drop to the ground.

9.4 Cultural Resources

The Pilot Joe project area was surveyed for cultural resource concerns in FY 1997, under contract. All sites that were discovered were flagged and recorded The project area was also resurveyed by BLM in FY2011. The locations of any historic and prehistoric sites discovered, along with any artifacts found, are sensitive and are not revealed to the public.

No sites would be impacted by the proposed action. Any new sites that may be discovered during operations would be evaluated and given appropriate protection.

10.0 Carbon Storage

10.1 Background

The purpose of the 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, 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.

10.2 Definitions

Forest ecosystem carbon pools – live trees, standing dead trees, understory vegetation, coarse woody debris, forest floor organic layer, and soil organic carbon (Smith, Heath, & Birdsey, 2006).

Disposition of carbon in harvested wood – defines where the carbon from harvested wood is stored and how it may be emitted (Smith, Heath, & Birdsey, 2006).

Products in use - End use products that have not been discarded or otherwise destroyed, examples include residential and nonresidential construction, wooden containers, and paper products.

Landfills - Discarded wood and paper placed in landfills where most carbon is stored long-term and only a small portion of the material is assumed to degrade, at a slow rate.

Emitted with energy capture - Combustion of wood productions with concomitant energy capture as carbon is emitted to the atmosphere.

Emitted without energy capture - Carbon in harvested wood emitted to the atmosphere through combustion or decay without concomitant energy recapture.

Sawlog - A log meeting minimum standards of diameter, length, and defect that is used in the manufacture of lumber.

Project Area – where action is proposed, such as the actual forest stands where thinning is proposed.

Pulpwood - Roundwood, whole-tree chips, or wood residues that are used for the production of paper, orientated stand board, particleboard or biomass for energy production.

Metric tonne (MT) - a measurement of weight. A tonne is equal to 2200 pounds.

10.3 Methodology

On July 16, 2009, the U.S. Department of the Interior withdrew the Records of Decision for the Western Oregon Plan Revision. The information contained in the Final Environmental Impact Statement for the Revision of the Resource Management Plans of the Western Oregon Bureau of Land Management (USDI, 2008) is relevant since it examined recent and applicable science regarding climate change and carbon storage. That analysis concluded that effects of forest management on carbon storage could be analyzed by quantifying the change in carbon storage in live trees, storage in forests other than live trees, and storage in harvested wood. The discussion on Volume I, Pages 220-224; Volume II, Pages 537-543, and Volume III, Appendices, Pages 28-30 are relevant to the effects analysis for this project and are incorporated by reference.

The analysis of carbon stored in harvested wood in the *2008 FEIS* used a factor for converting board feet of harvest wood to mass of carbon from Smith et al. 2006, p. 35. Based on information developed after the *2008 FEIS*, this factor has been refined to better account for regionally-specific conditions and the fraction of harvested volume that is typically milled into solid wood products and into processed wood products. Harvest volumes were converted to cubic feet, converted to pounds of biomass, and then to carbon content, yielding an overall conversion factor of 1,000 board feet = 1.326 tonnes of carbon. Of this total amount of carbon in harvested wood, 36.2% of harvest volume is considered as sawlogs and 63.8% as pulpwood (USDA, 1999) for evaluation using the storage rates over time from Smith et al. 2006, p. 27. The improved conversion factor is used in this analysis to evaluate the amount of carbon stored in harvested wood. Information on the development of this conversion factor is on file in the BLM office and is available for review upon request and is incorporated here by reference (R. Hardt, personal communication, 11/6/09, on file in the Medford BLM Office). For the Pilot Joe Project Area the conversion factor has been adjusted further to reflect the mixed species composition of the stands to be treated. Rather than using the Douglas-fir factor of 35 pounds of biomass per cubic foot, 32.75 pounds

per cubic foot was used (mixed conifer and hardwood stands), with a conversion factor of 1,000 board feet = 1.098 tonnes of carbon.

10.4 Assumptions

- In the absence of large disturbance events (wildfire, severe blowdown or insect epidemics) carbon storage on about 70 percent of BLM-administered lands on the Medford District would increase. On the remaining 30 percent of BLM-administered lands designated as Matrix, the RMP/EIS assumes an annual timber harvest of 3000 acres. On those acres, timber harvesting would decrease carbon storage levels at varying rates and for varying lengths of time dependent upon the amount of vegetation removed and how quickly re-growth occurs. Because the vast majority of BLM-administered lands are not allocated to intensive or restricted forest management it is expected that continued vegetative growth on those lands would lead to more carbon capture and storage than the amount of carbon lost from timber harvesting, vegetative respiration or disturbance events.
- Douglas-fir is the dominant species that would be harvested. Ground based logging systems would be used with sawlogs the primary product.
- The carbon calculations are estimates based upon data from a representative stand of each silvicultural system proposed. The values are not absolute rather they are generalized estimates that allow a comparison between alternatives.
- Future management may occur within the next 20-30 years in the proposed thinning and density management stands.
- The carbon storage and emission analysis period is based upon current stand age. For this project, a 20 year analysis period was used for Variable Density Thinning (VDT) and Density Management (DM). Harvest operations (cutting, yarding and hauling) result in short term carbon emissions. For the Analysis Area for silviculture, an average harvest volume of 10000 board feet per acre was used to estimate a total emission of about 45 tonnes of carbon from harvest operations (Salem District, 2010). This value is common to alternative 2.

10.5 Affected Environment

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 EA therefore does not attempt to predict changes in the project area due to existing or potential future changes in regional climate.

In the Pilot Joe Project Area, Douglas-fir and ponderosa pine stands that are 30 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.

10.6 Environmental Consequences

10.6.1 Alternative 1 – No-Action

This alternative would not implement the Medford District RMP management direction for density management and understory reduction treatments. 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. The No Action alternative would result in 889 acres not being thinned. This would result in a net carbon storage increase of about 23,429 tonnes over the next 20 years.

Table 3-29. Alternative 1 – No-Action: Carbon Emissions and Storage – 20 year analysis period – No Treatment

Silvicultural Treatment	Acres	Emissions 2010-2030	Live Tree Storage Current Conditions 2010	Storage 20 Year Analysis Period	Net Change Live Trees	Harvested Wood Storage 2030	Total Storage Increase	Net Carbon (Storage or Emission)
VDT	299	0	21229	30498	9269	0	9269	9269
DM	590	0	14750	28910	14160	0	14160	14160
Total	889	0	35979	59408	23429	0	23429	23429

- The average thinning stand age is about 118 years old. RMP direction provides for another entry when the stand reaches culmination of mean annual increment (CMAI). A 20 year analysis provides the timeframe until CMAI is reached
- A representative Variable Density Thinning stand was modeled in Organon (Hann 2003) to derive decadal cubic foot volume growth rates. The calculated value is applied as an average for all thinning stands. The thinning unit selected for analysis is 22 acres and has a current volume of 30850 bdft/acre.
- A representative Density Management stand was modeled in Organon (Hann 2003) to derive decadal cubic foot volume growth rates. The calculated value is applied as an average for all thinning stands. The thinning unit selected for analysis is 35 acres and has a current volume of 11055 bdft/acre.

10.6.2 Alternative 2 - Proposed Action

This alternative implements the Medford District RMP management direction for density management and understory reduction treatments. This alternative applies silvicultural treatments that would increase landscape resiliency to environmental disturbances and increase stand structural diversity.

Table 3-30. Proposed Silvicultural Treatments in Alternative 2

Pilot Joe Silvicultural Treatment	atment Acres
Variable Density Management	299
Density Management	590
Total	**889**

No on the ground estimates of volume to be removed from the Pilot Joe project have been completed at the time of this writing. For modeling purposes, a high end estimate of 10,697 board feet per acre of harvested wood would be removed by Variable Density Thinning; 10,697 board feet contains approximately 13 tonnes of carbon. The amount of live tree carbon in Variable Density Thinning stands would be reduced from approximately 71 tonnes per acre to 46 tonnes per acre, resulting in the transfer of 25 tonnes of live tree carbon to other pools (on-site dead woody debris, lumber, wood products discarded to landfills, biomass, pulpwood). A carbon analysis period of 20 years is used.

It is estimated that about 3,790 board feet per acre of harvested wood would be removed by Density Management; 3790 board feet contains approximately 5 tonnes of carbon. The amount of live tree carbon in Density Management stands would be reduced from approximately 25 tonnes per acre to 16 tonnes per acre, resulting in the transfer of 9 tonnes of live tree carbon to other pools (on-site dead woody debris, lumber, wood products discarded to landfills, biomass, pulpwood). A carbon analysis period of 20 years is used.

Harvested Wood Carbon Emissions

Variable Density Thinning, 20 year analysis period:

Wood harvested from this treatment would have a short term (post harvest to 10 years) carbon emission of 3.2 tonnes/acre. In the long-term (11-20 years), the carbon emitted is .48 tonnes/acre. For the 20 year analysis period, carbon emissions from the harvested wood are about 3.7 tonnes/acre. The balance of the carbon, 9 tonnes/acre would remain stored in products still in use or in landfills, or emitted with energy capture.

Density Management, 20 year analysis period:

Wood harvested from this treatment would have a short-term (post harvest to 10 years) carbon emission of about 1.3 tonnes/acre. In the long-term (11-20 years), the carbon emitted is 1.8 tonnes/acre. For the 20 year analysis period, carbon emissions from the harvested wood are about 3.1 tonnes/acre. The balance of the carbon, 4 tonnes/acre would remain stored in products still in use or in landfills, or emitted with energy capture.

Carbon Dioxide Emission

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).

Variable Density Thinning in this alternative would result in the emission of about 3.7 tonnes of carbon per acre or about 13 tonnes of carbon dioxide per acre[3] during the 20 year analysis period. Thinning 299 acres would result in the emission of 3887 tonnes of carbon dioxide. The carbon dioxide emission represents .0000006 percent of current U.S. emissions.

Density Management in this alternative would result in the emission of about 3.1 tonnes of carbon per acre or about 5 tonnes of carbon dioxide per acre2[4] during the 20 year analysis period. Thinning 590

[3] To convert carbon to carbon dioxide multiply carbon by 44/12 (the ratio of the molecular weight of carbon dioxide to carbon).

[4] To convert carbon to carbon dioxide multiply carbon by 44/12 (the ratio of the molecular weight of carbon dioxide to carbon).

acres would result in the emission of 2950 tonnes of carbon dioxide. The carbon dioxide emission represents .0000005 percent of current U.S. emissions.

Live Tree Carbon Storage

Continued forest growth following Variable Density Thinning would increase carbon storage approximately 582 cubic feet per acre per decade (Hann, 2003) which is equal to about 7.1 tonnes of stored carbon per acre per decade or .71 tonnes per year. Within 6 years after thinning the carbon emission level (3.7 tonnes/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.

Continued forest growth following Density Management would increase carbon storage approximately 605 cubic feet per acre per decade (Hann, 2003) which is equal to about 7.4 tonnes of stored carbon per acre per decade or .74 tonnes per year. Within 5 years after thinning the carbon emission level (3.1 tonnes/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.

Table 3-31. Alternative 2: Carbon Emissions and Storage – 20 year analysis period - Thinning

Silvicultural Treatment	Acres	Emissions 2010-2030	Live Tree Storage Current Conditions 2010	Storage 20 Year Analysis Period	Net Change Live Trees	Harvested Wood Storage 2030	Total Storage Increase	Net Carbon (Storage or Emission)
VDT	299	1106	21229	30498	-2093	2691	598	-508
DM	590	1829	14750	28910	6490	2360	8850	7021
Total	889	2935	35979	59408	4397	5051	9448	6513

10.6.3 Summary – Comparison of Alternatives

Table 3-32 Comparison of Alternatives for Carbon Emissions and Storage -20 year analysis period

Alternative	Acres	Emissions 2010-2030	Live Tree Storage Current Conditions 2010	Storage 20 Year Analysis Period	Net Change Live Trees	Harvested Wood Storage 2030	Total Storage Increase	Net Carbon (Storage or Emission)
1	889	0	35979	59408	23429	0	23429	23429
2	889	2935	35979	59408	4397	5051	9448	6513

The no action alternative (Alternative 1) would result in greater net carbon storage over the 20 year analysis period than Alternative 2 by approximately 16,916 tonnes.

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CHAPTER 4 - PUBLIC INVOLVEMENT AND NOTIFICATION

As described in detail in Chapter 1, numerous public meetings, field trips and discussion took place during the development of the Pilot Joe Demonstration Project. Initial public outreach concerning a possible 'pilot' project started in October, 2010, during a three day conference devoted to biology, ecology, community values, economics and the restoration of federal forest in SW Oregon. Drs. Franklin and Johnson made a presentation to introduce their concept of restoration principles. Additional public meetings and field tours occurred on the months after that. A website was established in March, 2011 to document and make readily available ongoing information concerning the project.

A scoping letter requesting comments concerning the development of the Pilot Joe Demonstration Project was sent to approximately 475 adjacent landowners and interested individuals, groups, and organizations on April 6th, 2011. Comments received have been posted to the BLM Pilot website. Comments were reviewed by BLM's Ashland Resource Area Field Manager, the project's interdisciplinary team, as well as by Drs. Johnson and Franklin. Comments received at all stages of the project influenced the creation of the project proposal and the EA analysis.

On June 13th, 2011, a letter and e-mail was sent to a list of approximately 125, who had attended the workshops, meetings, field trips, or otherwise requested to be on the BLM mailing list, announcing the Pilot Joe Demonstration Project EA would be forthcoming near the end of June, 2011. That letter stated the EA would be primarily delivered in electronic format via the web but hardcopies could be sent to those who requested.

This Environmental Assessment was posted to the Medford BLM website on June 24, 2011. A 30 day comment period began June 27, 2011. Comments are due to the BLM by July 27th, 2011.

Notification of this Environmental Assessment availability was sent to individuals and the following organizations:

Organizations and Agencies

American Forest Resource Council
Applegate Fire Plan
Applegate Partnership & Watershed Council
Association of O&C Counties
Bear Creek Watershed Council
Hannon Library Southern Oregon University
Jackson County Advisory Committee
Jackson County Interagency Fire Plan
Jackson Soil and Water Conservation District
John Muir Project
Josephine County Stewardship Group
Klamath Bird Observatory
Klamath Siskiyou Wildlands Center
Legacy Lands Project
Lomakatsi
National Oceanic and Atmospheric Administration
Natural Resources Conservation Service
Oregon Department of Forestry
Oregon State University
Oregon State University Extension Service
Oregon Wild
Rogue River- Siskiyou National Forest
Siskiyou Project
Society of American Foresters
Southern Oregon Small Diameter Collaborative
The Conservation Fund
The Nature Conservancy
University of Washington
US Fish and Wildlife Service

Pilot Joe Demonstration Project

Appendix A

Photographs of Forest Conditions within the Pilot Joe Project Area

Commercial Unit 32 -3

Unit 32-3 – March 19 Field Trip

Commercial Unit 31-4A

Commercial Unit 31-3A

Commercial Unit in Section 35

Noncommercial Density Management Unit 31-14NC

Noncommercial Density Management Unit 31-14NC

Commercial Unit 32-3

Example of an intermittent stream course that will receive a 30 foot no treatment buffer in Unit 31-11-NC

Commercial Unit in Section 26

Pilot Joe Demonstration Project

Appendix B

Common Plant Associations of the Middle Applegate

OREGON WHITE OAK—DOUGLAS-FIR/ POISON OAK

- Wetter White Oak association
- All aspects (*southerly)
- All slope positions (*upper to middle 1/3)

OREGON WHITE OAK/HEDGEHOG DOGTAIL

-Driest White Oak association
- All aspects (southerly)
- All slope positions (*flats)

PONDEROSA PINE—CALIFORNIA BLACK OAK

- Cooler & drier Ponderosa association
- South/Southwest aspects
- Occurs from bottoms to upper 1/3 slope

PONDEROSA PINE-DOUGLAS-FIR

- Warmer & wetter Ponderosa association
- Variable aspects (*generally not north)
- Mid-slope to ridgetops

DOUGLAS-FIR—CANYON LIVE OAK / POISON OAK

- Drier & warmer Douglas-fir association
- Variable aspects
- All slope positions (*mid)

DOUGLAS-FIR-PONDEROSA PINE/POISON OAK

- Drier & cooler Douglas-fir association
- Aspects variable, generally not northeast
- Lower 1/3 slope position to ridgetop

DOUGLAS-FIR-BLACK OAK/POISON OAK

- Warmest & driest Douglas-fir association
- Southerly aspects
- Lower 1/3 to upper 1/3 slope position

DOUGLAS-FIR/ DRY SHRUB

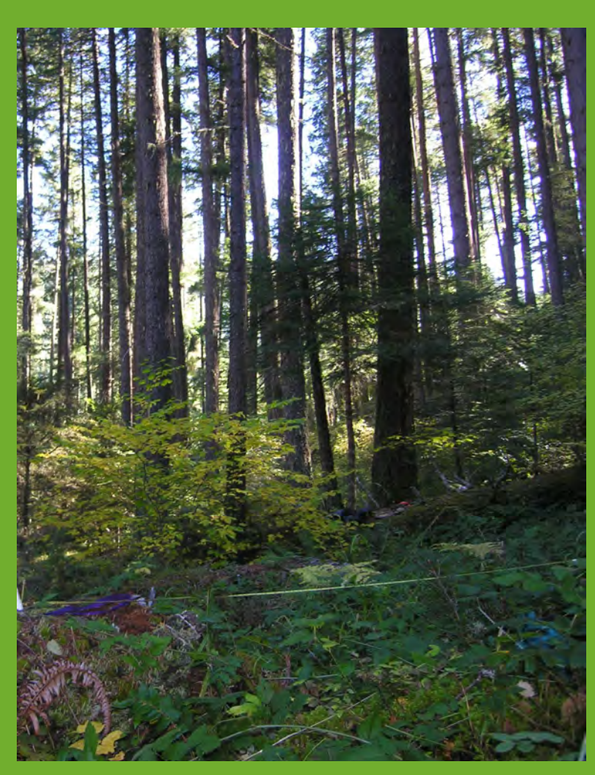
- Warm & dry
- All aspects (*southwest)
- All slope positions (*mid)

DOUGLAS-FIR/ WHITE FIR

- Higher elevation, cool
- Variable aspects
- All slope positions

DOUGLAS-FIR—CANYON LIVE OAK / DWARF OREGON GRAPE

- Cooler & drier Douglas-fir association
- Variable (*northerly aspects)
- Lower 1/3 slope position to ridgetops (*lower 1/3)



DOUGLAS-FIR/OCEAN-SPRAY/WHIPPLEVINE

- Dry , with more mesic species represented
- All aspects
- Mid-slope position

COMMON PLANT ASSOCIATIONS OF THE MIDDLE APPLEGATE

- DRY FORESTS -

*Indicates a more common occurrence.

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Pilot Joe Demonstration Project

Appendix C

Wildlife Special Status Species in the Ashland Resource Area

SPECIAL STATUS SPECIES IN THE ASHLAND RESOURCE AREA				
SPECIES	**2/07/08 STATUS**	**RANGE (Y/N)**	**PRESENCE**	**PROJECT SPECIFIC COMMENTS/ BASIC CONCLUSIONS**
Birds: Bureau Sensitive & Bureau Strategic				
American peregrine falcon	BSEN	Y	A	No nesting habitat within the planning area, but they could forage within the planning area. Project activities would not affect this species at the landscape scale.
Bald eagle	BSEN	Y	A	No known nest sites within the planning area, no foraging habitat present in the Planning area. Project activities would not adversely affect individuals.
Lewis' woodpecker	BSEN	Y	P	Potential habitat exists within and adjacent to the project area. Project activities would not adversely affect this species at the landscape scale as adequate levels of snags would be retained (PDF Ch. 2) post treatment.
Marbled Murrelet	FT	N	N/A	N/A
Northern spotted owl	FT	Y	P	Proposed activities impacts have been addressed in detail in Chapter 3, Wildlife
Purple martin	BSEN	Y	A	No habitat within the project area.
Streaked Horned Lark	BSEN	N	N/A	N/A
Tri-colored Blackbird	BSEN	Y	A	No habitat within the project area.
White-headed woodpecker	BSEN	Y	U	Potential habitat exists within and adjacent to the project area. Project activities would not adversely affect this species at the landscape scale as adequate levels of snags would be retained (PDF Ch. 2) post treatment.
White-tailed kite	BSEN	Y	A	No habitat within the project area.
Amphibians: Bureau Sensitive & Bureau Strategic				
Black salamander	BSEN	Y	S	Potential habitat exists within and adjacent to the project area. No known sites located within project units. Primary habitat (rocky talus in open oak meadows) would remain untreated (PDF Ch. 2).
Foothill yellow-legged Frog	BSEN	Y	P	Project activities would not affect this species if present in the project area. No actions in primary habitat (PDF Ch. 2).
Oregon Spotted frog	BSEN	N	N/A	Project is outside of range. No known sites.
Siskiyou Mt. salamander	BSEN	Y	P	Potential habitat exists within and adjacent to the project area. No known sites located within project units. Primary habitat (rocky talus slopes) would remain untreated (PDF Ch. 2).

Reptiles: Bureau Sensitive & Bureau Strategic				
SPECIES	**2/07/08 STATUS**	**RANGE (Y/N)**	**PRESENCE**	**PROJECT SPECIFIC COMMENTS/ BASIC CONCLUSIONS**
Northwestern pond turtle	BSEN	Y	S	Suspected within the watershed at large water sources, but not expected to occur in any areas proposed for treatment.
Mammals: Bureau Sensitive & Bureau Strategic; Federal Candidate				
Fisher	FC	Y	P	Proposed activities impacts have been addressed in detail in Chapter 3, Wildlife.
Fringed myotis	BSEN	Y	S	Potential habitat exists within and adjacent to the project area. Project activities would not adversely affect this species at the landscape scale as adequate levels of snags would be retained (PDF Ch. 2) post treatment.
Pacific pallid bat	BSEN	Y	U	Adequate potential habitat exists within and adjacent to the project area. Project activities would not adversely affect this species at the landscape scale as adequate levels of snags would be retained (PDF Ch. 2) post treatment.
Townsend's big-eared bat	BSEN	Y	S	Project activities should not affect maternity or hibernacula areas.
Invertebrates: Bureau Sensitive & Bureau Strategic				
Chase sideband snail	BSEN	N	A	No known sites in project area
Coronis Fritillary	BSEN	Y	A	No known sites in project area. No habitat present in the project area.
Evening fieldslug	BSEN	N	A	No known sites in project area.
Franklin's Bumblebee	BSEN	Y	A	No known sites in project area. Project activities would not affect this species habitat.
Johnson's Hairstreak	BSEN	Y	U	No known sites in project area. Project activities would not adversely affect this species at the landscape scale
Mardon skipper butterfly	FC	N	N/A	Project is outside of range. No known sites in project area.
Oregon shoulderband snail	BSEN	Y	A	No known sites in project area
Scale lanx snail	BSEN	N	N/A	Project is outside of range. No known sites in project area.
Siskiyou hesperian snail	BSEN	N	N/A	Project is outside of range. No known sites in project area.
Siskiyou short-horned grasshopper	BSEN	N	N/A	Project is outside of range. No known sites in project area.
Travelling sideband snail	BSEN	N	N/A	Project is outside of range. No known sites in project area.
Vernal pool fairy shrimp	FT	N	N/A	Project is outside of range. No known sites in project area.

Table Headings and Letter Code Definitions

Species: Grouped alphabetically by taxon.
Status: lists the Oregon BLM Program codes as follows:.
Oregon BLM Codes:

FT - USFW Threatened - likely to become endangered species within the foreseeable future
FC - USFW Candidate - proposed and being reviewed for listing as threatened or endangered
BSEN - Bureau Sensitive (BLM) - eligible for addition to Federal Notice of Review, and known in advance of official publication. Generally these species are restricted in range and have natural or human caused threats to their survival.
BSTR - Bureau Strategic Species (BLM) - not presently eligible for official federal or state status, but of concern which may at a minimum need protection or mitigation in BLM activities.

Range: indicates yes or no, if the breeding range overlaps with the Ashland Resource Area. If not within the range, both presence and basic conclusion are not applicable (N/A). For invertebrates in which there is inadequate data to determine ranges, 'U' is used for unknown.

Presence: indicates 'P' if a species is known to occur in the project area, 'S' suspected to occur based on known sites adjacent to the project area, or suitable breeding habitat exists, 'U' uncertain that the species occurs within the project area based on insufficient data, 'A' absent from the project area based on no known sites and/or no suitable breeding habitat within the project area, and 'T' possibly transitory species utilizing habitats within the project area during migration.

Basic Conclusion: describes the facts, context and intensity to provide the rationale for the conclusion of the proposed action(s) on the species and its habitat.