United States Department of the Interior

BUREAU OF LAND MANAGEMENT
Medford District Office
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email address: Medford_Mail@blm.gov

IN REPLY REFER TO:

1792(M060)

JUL 09 2010

Dear Interested Public:

The attached *Environmental Assessment* (EA) for the Sampson Cove project is available for public review. The public review period ends on August 9, 2010.

The Bureau of Land Management (BLM), Ashland Resource Area, proposes to implement the 504-acre Sampson Cove Project, a forest management project that would thin trees in conifer forest stands on BLM-administered lands in the Walker Creek, and Upper and Lower Emigrant Creek drainages of the Upper Bear Creek Watershed. Forest management would be accomplished using a combination of timber sale and service contracts, and would also include unit-specific activity fuels treatments and pre-commercial thinning. About 500 feet of new road construction is proposed, in addition to an estimated 45 miles of existing roads that would be used as haul routes and improved as needed to meet BLM standards.

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; (3) BLM's determination that there are no significant impacts associated with the proposed action, and (4) alternatives to the Proposed Action that would respond to purpose and need. Specific comments are the most useful. **Comments are due by 4:30 PM, August 9, 2010.**

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.

All comments should be made in writing and mailed or delivered to Sampson Cove Project, Kristi Mastrofini, 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 Kristi Mastrofini, Ashland Resource Area Planning, at (541) 618-2384.

Sincerely,

Frank S Hoge for

John Gerritsma
Field Manager, Ashland Resource Area
Enclosure

ENVIRONMENTAL ASSESSMENT

for the

SAMPSON COVE FOREST MANAGEMENT PROJECT

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

(DOI-BLM-OR-M060-2010-0024-EA)

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

EA COVER SHEET

RESOURCE AREA: Ashland

ACTION/TITLE: Sampson Cove Forest Management Project

EA NUMBER: DOI-BLM-OR-M060-2010-0024

LOCATION: Upper Bear Creek Watershed; Sampson, Cove, Walker, and Schoolhouse Creek drainages

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CHAPTER 1 - PURPOSE AND NEED

A. INTRODUCTION

The Bureau of Land Management (BLM), Ashland Resource Area, proposes to implement the Sampson Cove Project, a forest management project. The Sampson Cove Forest Management Project is designed to implement specific Management Actions/Direction for Timber Resources, Wildlife Threatened and Endangered Species Management, Forest Health, and Roads Resource Programs described in the Bureau of Land Management's Medford District Resource Management Plan (RMP) (USDI 1995).

This Environmental Assessment (EA) documents the environmental analysis conducted to estimate the site-specific effects on the human environment that may result from the implementation of the Sampson Cove Forest Management Project on BLM-administered lands. The analysis documented in this EA will provide the BLM responsible official, the Ashland Resource Area Field Manager, with current information to aid in the decision-making process. This EA complies with the Council on Environmental Quality's (CEQ) Regulations for Implementing the Procedural Provisions of the National Environmental Policy Act (NEPA; 40 CFR Parts 1500-1508) and the Department of the Interior's regulations on Implementation of the National Environmental Policy Act of 1969 (43 CFR part 46).

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

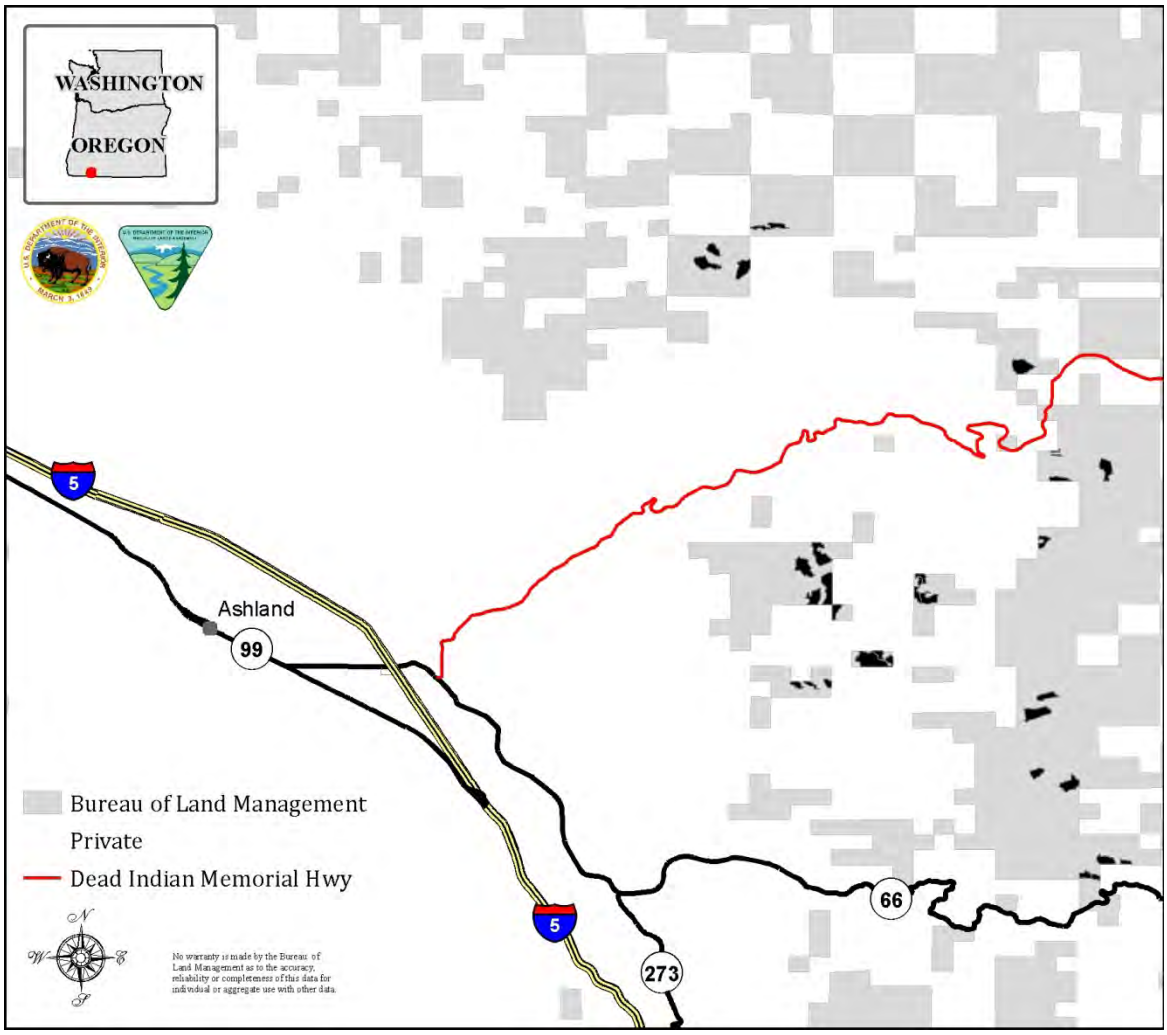
This section provides a brief summary of BLM's proposal for forest management. A more detailed description of BLM's Proposed Action is included in Chapter 2, Alternatives. The proposed 504-acre Sampson Cove Project would harvest trees in conifer forest stands on BLM-administered land in the Walker Creek, and Upper and Lower Emigrant Creek drainages of the Upper Bear Creek Watershed.

Forest management would be accomplished using a combination of timber sale and service contracts. Forest thinning (or other silvicultural) treatments, designed under the principles of sustained yield forestry, are tailored to forest and site conditions to meet the desired long term objectives for each forest stand type. Forest management would be designed to improve tree vigor and growth, reduce the impacts of forest disease, and promote the maintenance of fire resilient species such as pine and incense cedar.

The Proposed Action would include commercial harvest utilizing tractor and cable logging systems. The Proposed Action also includes unit-specific activity fuels treatments and pre-commercial thinning. About 500 feet of new road construction is proposed, in addition to an estimated 45 miles of existing roads that would be used as haul routes and improved as needed to meet BLM standards.

The Project Area is defined as the area where action is proposed, including connected actions. The Public Land Survey System description for the Sampson Cove Project Area is: T. 38 S., R. 2 E., Sections 3, 9 and 16; T. 38 S., R. 3 E., Sections 19, 29, 30, and 31; T. 39 S., R. 2 E., Sections 1, 3, 10, 11, and 15; and T. 39 S., R 3 E., Sections 6, 18, 19, 20, 30, 31, and 32; Willamette Meridian, Jackson County, Oregon (Map 1-1 and Maps 2-1, 2-2, 2-3 and 2-4).

Map 1-1. Vicinity Map - Sampson Cove Project



C. WHY IS THE BLM PROPOSING THIS FOREST MANAGEMENT PROJECT?

The Sampson Cove Project is designed to implement the Management Actions/Direction of the Medford District Record of Decision and Resource Management Plan (RMP) within the Upper Bear Creek Watershed primarily within the Walker Creek, and Upper and Lower Emigrant Creek drainages. This project proposal is designed to provide for long-term forest (timber) production in the Sampson Cove Project Area while providing for the maintenance of existing northern spotted owl habitat within the home ranges of spotted owl sites. Specifically, this forest management proposal is designed to:

- Ensure sustainable forest production, and the renewable resources they provide, by managing forests to improve conifer forest vigor and growth, and reduce the risk of stand loss from fires, animals, insects, and disease (USDI 1995, p. 72).;

- Provide forest products from Matrix land allocation in accordance with the direction in the Medford District's Resource Management Plan (USDI 1995, p. 72-73);

- Maintain stand structure for nesting, roosting, foraging, and dispersal habitat components within spotted owl habitat within a 1.2 mile radius of northern spotted owl activity centers; and

- Maintain a transportation system within the Project Area that serves the management of resource program areas including timber management.

1. Need for the Proposed Sampson Cove Project

The following discussion provides more detail concerning the need for forest and road management based on the RMP Management Actions/Direction that apply to the Matrix land allocation, current forest and road conditions, and their desired future conditions:

There is a need to maintain and promote vigorously growing conifer forests, reduce tree mortality, and provide timber resources, in accord with sustained yield principles, on BLM-Administered Matrix lands within the Sampson Cove Project Area.

One of the applicable laws governing the major portion of BLM-administered lands in the Sampson Cove Project Area is the Oregon and California Railroad and Coos Bay Wagon Road Grant Lands Act of 1937 (O&C Act), for which sustainable timber production is the primary purpose. Matrix lands (also described in the RMP as General Forest Management Area) within the Sampson Cove Project Area are to produce a sustainable supply of timber and other forest commodities on matrix lands to provide jobs and contribute to community stability (RMP, p. 38). Timber products produced from this area would be sold in support of the District's Allowable Sale Quantity declared in the RMP (RMP p. 73).

The Medford District RMP adopted a set of silvicultural treatments for managing conifer forests on Matrix lands (RMP Appendix E, Silvicultural Systems Utilized in the Design of the Resource Management Plan); the Sampson Cove Forest Management Project proposes commercial forest thinning and selection harvest prescriptions designed to direct future stand growth, initiate new forest development, reduce the impacts of insect and diseases and increase fire resiliency on forest stands to the extent possible, while maintaining northern spotted owl habitat.

There is a need to maintain existing nesting, roosting, foraging, and dispersal habitat conditions, in the Sampson Cove Project Area to contribute to the conservation and recovery of Federally listed species and their habitats in compliance of BLM's resource management plan (RMP p. 50-51) and the Endangered Species Act.

Based on the uncertainty surrounding the 2008 Recovery Plan for the northern spotted owl, the responsible official has decided to design the Sampson Cove Forest Management Project in a manner to maintain the current acreage and distribution of northern spotted owl habitat within the home range radius (1.2 miles) of northern spotted owl activity centers.

> **Nesting, roosting and foraging (NRF) habitat** is characterized by forested stands with older forest structure with characters such canopy closure of 60 percent or greater, trees with large crowns, multiple canopy layers, snags and down wood. However, southwest Oregon NRF habitat varies greatly and one or more of these habitat components might be lacking or even absent.
>
> **Dispersal-only habitat** for spotted owls is defined as stands that typically have a canopy closure of 40 percent or greater, and are open enough for flight and predator avoidance, but do not meet the habitat criteria of NRF habitat. Dispersal-only habitat is used throughout this document to refer to habitat that does not meet the criteria of NRF (nesting, roosting, or foraging) habitat, but has adequate cover to facilitate movement between blocks of suitable NRF habitat.

There is a need to provide a transportation (road) system within the Sampson Cove Project Area that provides access for the management of resource program areas (RMP p. 86) including timber resources and Rural Interface Areas, while reducing their effects on water, soils, fish, and wildlife.

The Medford District RMP provides direction for road management to "Develop and maintain a transportation system that serve the needs of users in an environmentally sound manner" (RMP p. 84). Roads throughout the Project Area are in need of maintenance to restore or improve road surfaces, cross drains, and roadside drainage ditches in order to reduce road related erosion and sedimentation to stream courses. Road construction and improvements are designed for the Sampson Cove Forest Management Project to reduce road related erosion and sedimentation to stream courses.

D. DECISION FRAMEWORK

This Environmental Assessment will provide the information needed for the responsible official, the Ashland Resource Area Field Manager, to select a course of action to be implemented for the Sampson Cove Forest Management Project. The Ashland Resource Area Field Manager must decide whether to implement the Proposed Action as designed or whether to select the No-Action alternative.

The decision will also include a determination 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 this EA 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.

The forthcoming decision record will document the authorized officer's rationale for selecting a course of action based on the needs/objectives described above, the effects documented in the EA, and the extent to which the decision:

Contributes toward the Districts Allowable Sale Quantity

The Sampson Cove Forest Management Project is located on BLM-administered lands allocated to produce a sustainable supply of timber. Timber products removed to meet Timber Resource Objectives (ROD/RMP p.17, 72-73) would contribute toward the District's Allowable Sale Quantity.

Addresses the costs for managing the lands in the Project Area (economically practical)

The RMP directs that all silvicultural systems (forest thinning strategies) applied to achieve forest stand objectives would be economically practical (RMP p. 180; RMP/EIS p. 2-62). Helicopter yarding was eliminated as a viable economic method due to the high cost associated with helicopter yarding, low volume associated with light thinning (60% canopy retention) in many units, and current economic conditions affecting the value of timber removed (see Chapter 2, Alternatives, Section E).

Meets the BLM's obligation to protect resources consistent with existing laws, policy, and the direction of the 1995 Medford District Resource Management Plan

The relevant issues listed below (Scoping and Issues) provide the necessary framework for assessing the merits and the consequences to the physical, biological, human environment of implementing the Sampson Cove Forest Management Project. The Section titled Land Use Conformance and Legal Requirements (below) provides the context for determining the project's consistency and conformance with land use plans, agency policy, and existing laws.

Considers the interests of adjacent land owners

Rural Interface Areas are BLM-administered lands within a ¼ mile of private lands zoned for less than 20 acre lots at the time the RMP was developed (RMP p. 88, RMP Map 13). The RMP provides guidance to the agency to determine how residential land owners might be affected by management activities on BLM-administered lands and to use Project Design Features or mitigation to avoid or minimize impacts to health, life, property, and the quality of life (RMP p. 88). A small portion of the Project Area (<40 acres) falls within or partially within areas designated by the 1995 RMP as Rural Interface Area.

E. LAND USE CONFORMANCE & LEGAL REQUIREMENTS

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*.

On July 25, 2007, the *Record of Decision To Remove the Survey and Manage Mitigation Measure Standards and Guidelines from Bureau of Land Management Resource Management Plans Within the Range of the Northern Spotted Owl* amended the 1995 Medford District Resource Management Plan by removing the Survey and Manage Mitigation Measure Standards and Guidelines.

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 BLM and USDA Forest Service 2007 Record of Decision eliminating the Survey and Manage mitigation measure. Judge Coughenour deferred issuing a remedy in his December 17, 2009 order until further proceedings, and did not enjoin the BLM from proceeding with projects (including timber sales).

This project may proceed even if the District Court sets aside or otherwise enjoins use of the 2007 Survey and Manage Record of Decision. This is because this the Sampson Cove Forest Management Project is designed to meet the provisions of the 2001 *Record of Decision and Standards and Guidelines for Amendments to the Survey and Manage, Protection Buffer, and other Mitigation Measures Standards and Guidelines* (not including subsequent Annual Species Reviews).

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.

- **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.

F. RELEVANT ASSESSMENTS AND PLANS

Watershed Analysis (USDI 2000)

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 Sampson Cove Project Area falls within the Upper Bear Creek 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 Sampson Cove Forest Management Project, has been collected and is considered along with existing information provided by the 2000 Upper Bear Creek Watershed Analysis. Management Objectives and Recommendations provided by the Watershed Analysis were considered and addressed as they applied to the Sampson Cove proposal.

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 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 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.

G. SCOPING AND ISSUES

Scoping is the process the BLM uses 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, and (3) potential environmental impacts of the Proposed Action.

A letter briefly describing the Proposed Action and inviting comments was mailed to adjacent landowners, interested individuals, organizations, and other agencies on March 25, 2010. Two field trips were led by the BLM to view and discuss the project proposal in the field with interested individuals and organizations. The first field trip was conducted on April 13, 2010 and the second on June 3, 2010. While snow limited access during the first field trip, the majority of the field trip participants attended the June 3 field trip which was not hampered by snow. Comments were originally requested to be received by April 16; the scoping period was later extended to June 4, 2010. The BLM continued to accept and consider comment letters received after June 4, 2010. Fifteen comment letters were received and 136 post cards were received requesting the Project Area to be included in the Cascade Siskiyou Monument (see sub-section 2).

1. Relevant Issues

An interdisciplinary (ID) team of resource specialists reviewed the proposal and all pertinent information, including public input received, and identified relevant issues to be addressed during the environmental analysis. Some issues identified as relevant to this project proposal were analyzed in association with broader level environmental analyses. Where appropriate, this EA will incorporate by reference the analysis from broader level NEPA documents (40 CFR § 1508.28), to be considered along with project specific analysis. The following issues related to the Proposed Action were identified by the interdisciplinary team based on internal and external scoping.

- Logging (particularly tractor yarding) and road construction could increase soil compaction, and alter hydrologic flow, including peak flow and low flow.
- There is potential for adverse effects to water quality from increased sediment produced from disturbance associated with timber harvest activities including road construction, timber yarding, and timber hauling.
- There could be short-term increases in sediment from roadbed and drainage ditch disturbance associated with road maintenance activities.
- Proposed tractor logging and road construction may cause soil compaction, displacement, and reduced site productivity.
- Some people expressed concerns that timber harvest activities could lead to increased access for off-highway vehicles (OHVs) potentially increasing impacts to soils, water quality, and aquatic and terrestrial habitat.
- The effects of timber harvest and road construction, when combined with other past, ongoing, and reasonably foreseeable future actions on public and private lands, could potentially contribute to adverse cumulative effects to soils, water quality, hydrologic function, and aquatic and terrestrial habitats.

- Increased sedimentation to streams from the implementation of the project proposal could potentially impact aquatic habitat and fish.
- Timber harvest and road construction has the potential to affect northern spotted owl nesting, roosting, foraging, and dispersal habitat.
- Timber harvest, including the treatment of Douglas-fir dwarf mistletoe infected trees, could reduce the complexity of forest structure including vertical and horizontal diversity, snags, and downed wood that provides habitat for variety of wildlife species.
- Thinning in forest stands with latent infections of Douglas-fir dwarf mistletoe can stimulate the growth of mistletoe and its adverse effects on growth and vigor forest stands.
- Some commenters expressed concern for maintenance of old-growth forest or individual trees.
- Lower volumes associated with light thinning in many project units could affect the overall economic feasibility of project implementation.
- Seasonal restrictions for resource and fire protection reduce operating time which can affect economic feasibility of project operations.
- Timber harvest and road construction activities have the potential to affect Bureau Special Status vascular plants, bryophytes, lichens, and fungi.
- Forest management and logging can increase the risk of introduction and spread of noxious weeds.
- Timber harvesting would increase surface fuels over the short-term (6 months to 2 years) in stands treated. Some people expressed concern that logging slash be treated in a timely manner to mitigate fire hazard.
- Fuels management activities generate particulate pollutants (smoke) 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 and surrounding areas.
- Some nearby landowners were concerned about the potential for increased traffic (including log trucks) on area roads and the potential for increased dust during operations.
- The Pacific Crest National Scenic Trail (PCNST) passes nearby several of the proposed thinning units. The area in the vicinity of the PCNST is designated by the Medford District RMP as Visual Resource Management (VRM) Area 2; project activities have the potential to impact landscape scenery as viewed from the PCNST.
- Some stated concern regarding the potential for the project to impact landscape scenery as viewed from homes and roads passing through the Project Area.
- Some stated concerns that reopening closed roads used for hiking, increased truck traffic, and increased access for off-highway vehicles could disturb dispersed recreational activities such as hiking, Frisbee golf, and wildlife and wildflower watching.
- The 2005 Report *Logging to Control Insects: The Science and Myths Behind Managing Forest Insect "Pests"*, also known as the Black Report, was submitted by several commenters who suggested that logging could exacerbate insect and disease problems.

2. Issues Considered but not Further Analyzed

The following comments or issues were discussed by the interdisciplinary team. It was determined these issues were beyond the scope of this project. These issues along with a rationale for their being "considered but not analyzed in detail" in this EA are listed below. Also see Chapter 2, Alternatives Considered but not Analyzed in Detail for options and alternatives considered but not further analyzed.

Manage the Project Area Consistent with the Cascade Siskiyou National Monument and Wilderness: Comments were received stating concerns that the implementation of the Sampson Cove Forest Management Project could disqualify the area for future inclusion in the Cascade Siskiyou National Monument and/or South Cascades Wilderness.

Rationale for Eliminating from Detailed Analysis: While there is a citizen's movement underway working to expand the boundaries of the CSNM and to create new wilderness areas, the Project Area is currently located on lands allocated by the 1995 Medford District RMP as Matrix lands with the primary objective of providing for long-term timber production. The BLM is obligated to managing the project area consistent with its current land use plan.

Additionally, portions of the project area that have been proposed as the Greensprings Mountain portion of the South Cascades Wilderness proposal have been previously analyzed for wilderness character by the BLM (Public Wilderness Proposal – Evaluation Form on file at Medford District BLM) and it has been determined that the area does not possess wilderness character. The BLM has retained authority to under Section 201 of FLPMA to inventory wilderness characteristics and to consider such information during land use planning.

Project units 19-2, 19-3, 32-1, 32-2, and 32-3 are within the Greensprings Mountain portion of the South Cascades Wilderness Proposal. On 6/19/2006 a BLM Ashland Resource Area interdisciplinary team led by the Medford District Outdoor Recreation Planner analyzed the Greensprings Mountain portion of the South Cascades Wilderness proposal for its wilderness characteristics. (Public Wilderness Proposal – Evaluation Form on file at Medford District BLM, Proposal ID number: OR11 43). The wilderness characteristics analyzed were; is the area of sufficient size, is the unit in a natural condition, does the unit have outstanding opportunities for solitude, and does the unit have outstanding opportunities for primitive and unconfined recreation?

The analysis showed that the area did not possess sufficient size (5,000 contiguous acres). The Greensprings Mountain portion was also determined to not be in a natural condition due to the presence of old harvest units throughout. Outstanding opportunities for solitude were found to be lacking because the unit is within the rural interface area. It was also determined that the Greensprings Mountain portion of the proposed South Cascades Wilderness does not possess outstanding opportunities for primitive and unconfined recreation due to its lack of outstanding features. It was determined that there are no wilderness characteristics present in the Greensprings Mountain portion of the South Cascades Wilderness proposal.

Potential for the project to affect Recovery Action #32 stands, as identified by the 2008 Northern Spotted Owl Recovery Plan: The Recovery Plan includes Recovery Actions, which are recommendations to guide activities that would help to further the recovery objectives for the northern spotted owl. Recovery Action 32 (RA 32) recommends maintaining "substantially all of the older and more structurally complex multi-layered conifer forests on Federal lands outside of Managed Owl Conservation Areas.

Rationale for Eliminating from Detailed Analysis: The Ashland Resource Area BLM decided to defer forest management in stands identified as RA 32 stands at this time, from the Sampson Cove Project Area. About 100 acres identified as RA 32 forest stands were removed from consideration for timber harvest; therefore this issue would not apply to this Proposed Action, and was not analyzed.

CHAPTER 2 - ALTERNATIVES

A. INTRODUCTION

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

B. ALTERNATIVES ANALYZED IN DETAIL

1. Alternative 1 – No-Action

The No-Action Alternative describes a baseline against which the effects of the Proposed Action can be compared. This alternative describes the existing conditions and the continuing trends, given the effects of other present actions and reasonably foreseeable actions identified. Under the No-Action Alternative, no vegetation management would be implemented; there would be no commercial cutting of trees, no roads would be constructed or improved, and there would be pre-commercial thinning or fuels reduction. 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?

Only normal programmed road maintenance would be performed. 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 decision process aborted. Future harvesting, other connected actions and road management in this area would not be precluded and could be analyzed under a subsequent NEPA document.

2. Alternative 2 - Proposed Action

This section describes the Proposed Action in detail. The Proposed Action is described in four sub-sections. First is a Summary of the Proposed Action, by treatment types, treatment methods (logging systems and fuels), and road related actions and restrictions. Second is a detailed description of silvicultural treatment prescriptions. Third is a description of commercial harvest methods, and forth is a description of fuels reduction treatments.

Section 3, Project Design Features, describes procedures included as part of the Proposed Action that are required by the RMP for protecting resources. Section 4 includes monitoring requirements.

a. Summary of the Proposed Action

Alternative 2, the Proposed Action, was developed to achieve the objectives described in Chapter 1, and the needs for the Sampson Cove Forest Management Project. The Proposed Action would treat 504 acres of vegetation using the various silvicultural prescriptions as described in sub-section b. of this section. An estimated 85 acres are proposed for pre-commercial thinning within the timber harvest units 1-4, 3-1, 9-2, 9-3, and 9-4. Post harvest fuels reduction would occur in commercial treatment units as identified.

Table 2-1 summarizes the project by silvicultural treatment prescriptions and timber harvest methods. Treatment prescriptions are described in more detail in Section J of Chapter 3. Unit specific information, including fuels reduction treatments are displayed in Table 2-2 and Maps 2-1, 2-2, 2-3 and 2-4.

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

Silvicultural Prescriptions	Est. Acres
Maintain NSO Nesting, Roosting, and Foraging Habitat	174
Maintain NSO Dispersal Habitat	123
Pine Series Thinning	11
Dry Douglas-fir Thinning	42
White Fir Thinning	30
Mixed Conifer Thinning	50
Disease Management (Mistletoe)	49
Regeneration Harvest	25
Total	504
Non-commercial Prescriptions	Est. Acres
Pre-commercial Thinning within Commercial Units	85
Timber Harvest Method	Est. Acres
Cable Yarding	105
Tractor Yarding	399

Table 2-2. Units by Silvicultural Prescription and Harvest Method

Unit No.	Acres	Silvicultural Prescription	Harvest Method	Associated Treatments (PCT, Fuels)
1-2A	9	Regeneration Harvest	Tractor	HPB, UB
1-2B	18	Disease Management	Tractor	HPB, UB
1-3	4	Disease Management	Tractor	HPB, UB
1-4	7	Disease Management	Cable	PCT, HPB, UB
3-1	16	Regeneration Harvest	Tractor	PCT, HPB, UB
3-2	31	Maintain NSO Nesting, Roosting, and Foraging	Tractor	HPB, UB
3-3	32	Maintain Dispersal	Tractor	HPB, UB
3-4	20	Maintain Dispersal	Tractor	HPB, UB
3-5	28	Maintain NSO Nesting, Roosting, and Foraging	Tractor	HPB, UB
9-2	13	Disease Management & Pre-commercial Thinning	Tractor	PCT, HPB, UB
9-3	25	Maintain Dispersal & Pre-commercial Thinning	Tractor	PCT, HPB, UB
9-4	24	Dry Douglas-fir Thinning & Pre-commercial Thinning	Tractor	PCT, HPB, UB
11-1	11	Maintain Dispersal	Tractor	HPB, UB
11-2A	6	Dry Douglas-fir Thinning	Cable	HPB, UB
11-2B	7	Dry Douglas-fir Thinning	Cable	HPB, UB
11-3	44	Mixed Conifer Thinning	Tractor	HPB, UB
15-2A	7	Disease Management	Tractor	HPB, UB
15-2B	5	Pine Series Thinning	Tractor	HPB, UB
15-3	6	Mixed Conifer Thinning	Cable	HPB, UB
18-3	13	Maintain Dispersal	Cable	HPB, UB
18-4	30	Maintain NSO Nesting, Roosting, and Foraging	Cable	HPB, UB
19-1	30	White fir site	Tractor	HPB, UB
19-2	12	Maintain NSO Nesting, Roosting, and Foraging	Cable	HPB, UB
19-3	23	Maintain NSO Nesting, Roosting, and Foraging	Tractor	HPB, UB
29-1	22	Maintain Dispersal	Tractor	HPB, UB

Unit No.	Acres	Silvicultural Prescription	Harvest Method	Associated Treatments (PCT, Fuels)
30-2	1	Maintain NSO Nesting, Roosting, and Foraging	Cable	HPB, UB
30-2	2	Maintain NSO Nesting, Roosting, and Foraging	Cable	HPB, UB
30-4	11	Maintain NSO Nesting, Roosting, and Foraging	Cable	HPB, UB
31-1	10	Maintain NSO Nesting, Roosting, and Foraging	Cable	HPB, UB
32-1	6	Pine Series Thinning	Tractor	HPB, UB
32-2	17	Maintain NSO Nesting, Roosting, and Foraging	Tractor	HPB, UB
32-3A	9	Maintain NSO Nesting, Roosting, and Foraging	Tractor	HPB, UB
32-3B	5	Dry Douglas-fir Thinning	Tractor	HPB, UB
	504			

Abbreviations:
HBP = Handpile and burn
NSO = Northern Spotted Owl
PCT = Pre-commercial thinning
UB = Underburn

The Proposed Action would construct approximately 500 feet of new road to provide access to proposed Unit 3-4. An estimated 45 miles of existing roads would be used as haul routes and improved as needed to meet BLM standards. Road improvements would include such items as spot rocking, cleaning road drainage ditches and culvert basins, repairing and installing water dips, one temporary draw crossing, grading and shaping road surfaces. Table 2-3 provides a detailed road-by-road listing of proposed road work.

Table 2-3. Summary of Road Needs and Restrictions

Road Number	Approx. Length (miles)	Existing Surface: Depth (inches) and Type[1]	Control[2]	Possible Road Stabilization & Drainage Improvements[3]	Seasonal Restriction[4] (for log hauling)
37-2E-7.2 H	0.33	8 ASC	BLM	0	2
38-2E-3.3	0.24	8 ASC	BLM	0	2
38-2E-3.4 A-C	1.36	6 ASC	BLM	0	1
38-2E-9.0	0.30	8 ASC	BLM	0	2
38-2E-9.1 A	0.25	8 ASC	BLM	0	2
38-2E-9.2 A	0.82	8 ASC	BLM	0	2
38-2E-9.3	0.20	NAT	BLM	0	1
38-2E-9.4 A1	0.30	8 ASC	BLM	0	2
38-2E-9.4 B	0.42	8 ASC	BLM	0	2
38-2E-9.6	0.30	4 ASC	BLM	0	1
38-2E-9.7	0.80	6 ASC	BLM	0	1
38-2E-9.10	0.24	6 ASC	BLM	0	1
38-2E-16.0	0.25	4 ASC	BLM	0	1
38-2E-27.0 A1-A2	2.30	BST	BLM	0	2
38-2E-27.0 A3	0.37	BST	PVT	0	2
38-2E-27.0 B1-C1	1.92	BST	BLM	0	2
38-2E-27.0 C2-D3	5.54	BST	BLM	0	2
38-2E-34.0 A1-A2	0.84	8 PRR	BLM	0	2
38-2E-34.0 B	2.01	4 ASC	BLM	0	1
38-2E-34.0 C	0.43	NAT	BLM	0	1
38-2E-34.1 A-B1	1.26	8 ASC	BLM	0	2
38-2E-34.1 B2	0.61	NAT	BLM	blade road (0.61 mile) Spot Rock	1

Road Number	Approx. Length (miles)	Existing Surface: Depth (inches) and Type[1]	Control[2]	Possible Road Stabilization & Drainage Improvements[3]	Seasonal Restriction[4] (for log hauling)
38-3E-19.0 A	0.95	BST	BLM	0	2
38-3E-29.3	1.00	6 PRR	BLM	0	1
38-3E-29.6	0.58	NAT	BLM	0	1
38-3E-30.0	0.80	6 PRR	BLM	0	1
39-2E-1.0	0.50	NAT	BLM	0	1
39-2E-3.1 C	0.27	NAT	BLM	0	1
39-2E-3.1 D	0.08	NAT	PVT	0	1
39-2E-3.2 A	0.50	8 ASC	BLM	0	2
39-2E-3.2 B	0.09	8 ASC	PVT	0	2
39-2E-3.2 C	0.30	NAT	PVT	Construct temp. draw crossing	1
39-2E-10.0 A-C	1.05	8 ASC	PVT	0	2
39-2E-10.0 D-E	1.07	8 ASC	BLM	0	2
39-2E-10.1 A-B	1.00	6 ASC	BLM	0	1
39-2E-10.2	0.09	NAT	BLM	New road construction	1
39-2E-11.0 B1	0.23	4 ASC	BLM	0	1
39-2E-11.1 A	0.06	4 ASC	BLM	0	1
39-2E-11.1 B	0.22	NAT	BLM	0	1
39-3E-17.0 A1-A2	1.50	6 ASC	BLM	Blade road (1.25 Miles)	1
39-3E-18.1	0.24	6 ASC	BLM	0	1
39-3E-18.3	0.90	6 PRR	BLM	0	1
39-3E-21.0 A-B2	7.53	8 ASC	BLM	0	2
39-3E-32.0 A-E	3.66	6 PRR	BLM	Blade road (1.50 miles) Construct 4 water dips Reconstruct 3 water dips Spot Rock	1
39-3E-32.1	0.40	NAT	BLM	0	1
39-3E-32.2	0.20	NAT	BLM	0	1
Spur A Existing	0.15	NAT	BLM	0	1
Spur B Existing	0.20	NAT	BLM	0	1
Total mileage	44.66				

Notations:

1 NAT = natural, GRR = Grid Rolled Rock, PRR = Pit Run Rock, ASC = Aggregate Surface Course

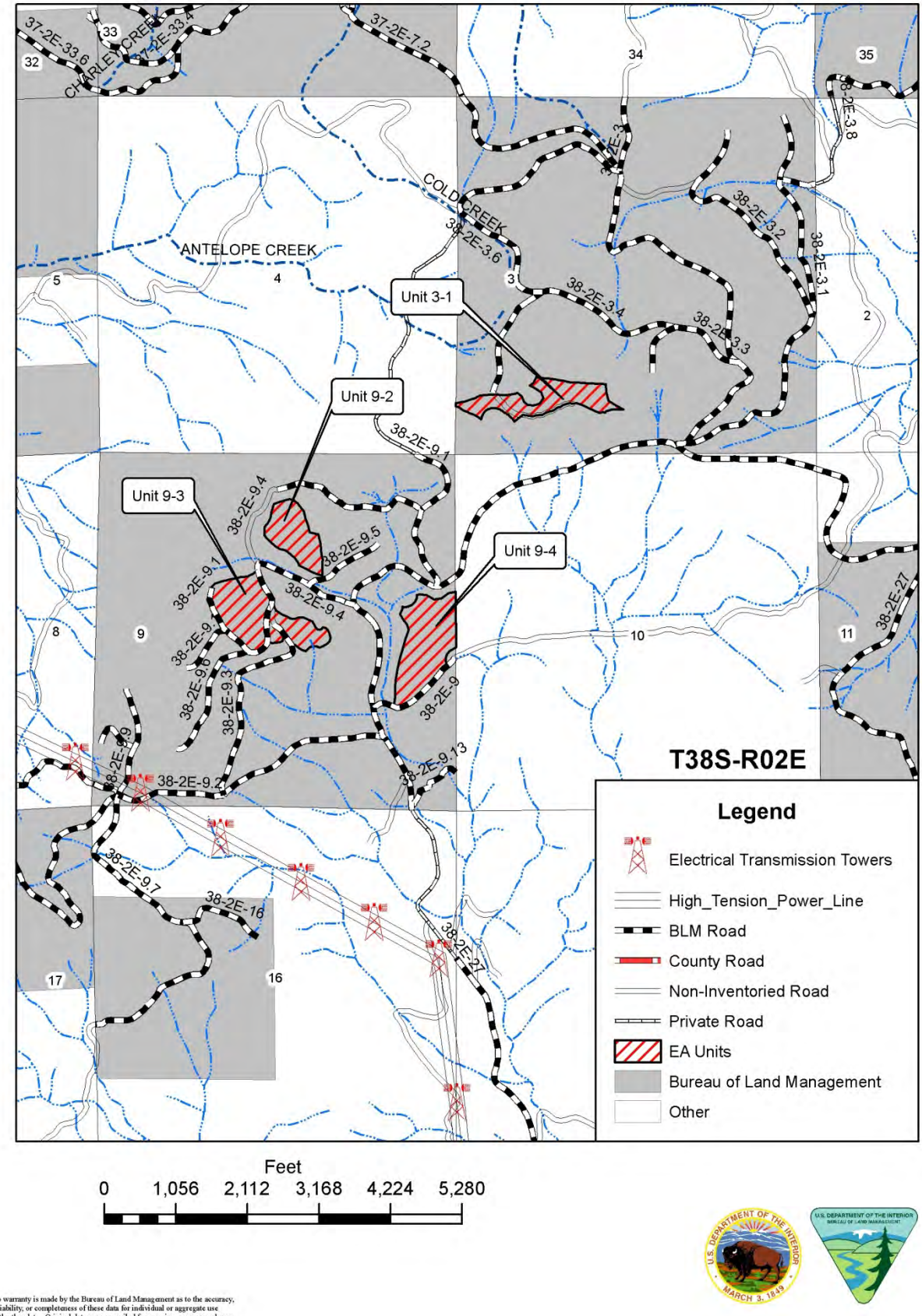
2 BLM = Bureau of Land Management, PVT = Private

3 0 = no road stabilization/drainage improvements (all BLM haul roads would be maintained as needed)

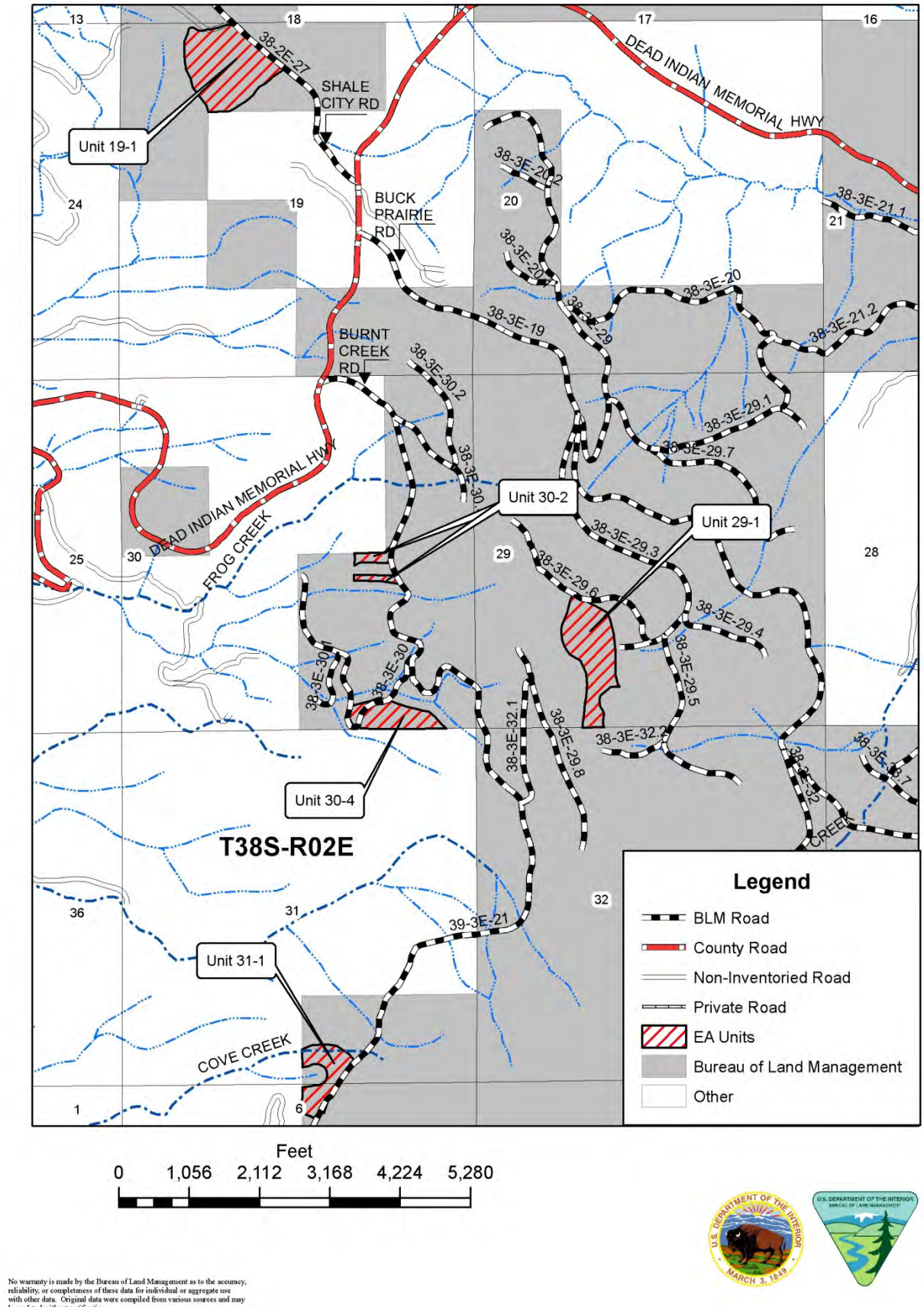
4 0 = no restrictions
1 = hauling restricted between 10/15 and 6/1
2 = hauling restricted between 11/15 and 5/15

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

Map 2-1. Sampson Cove Project

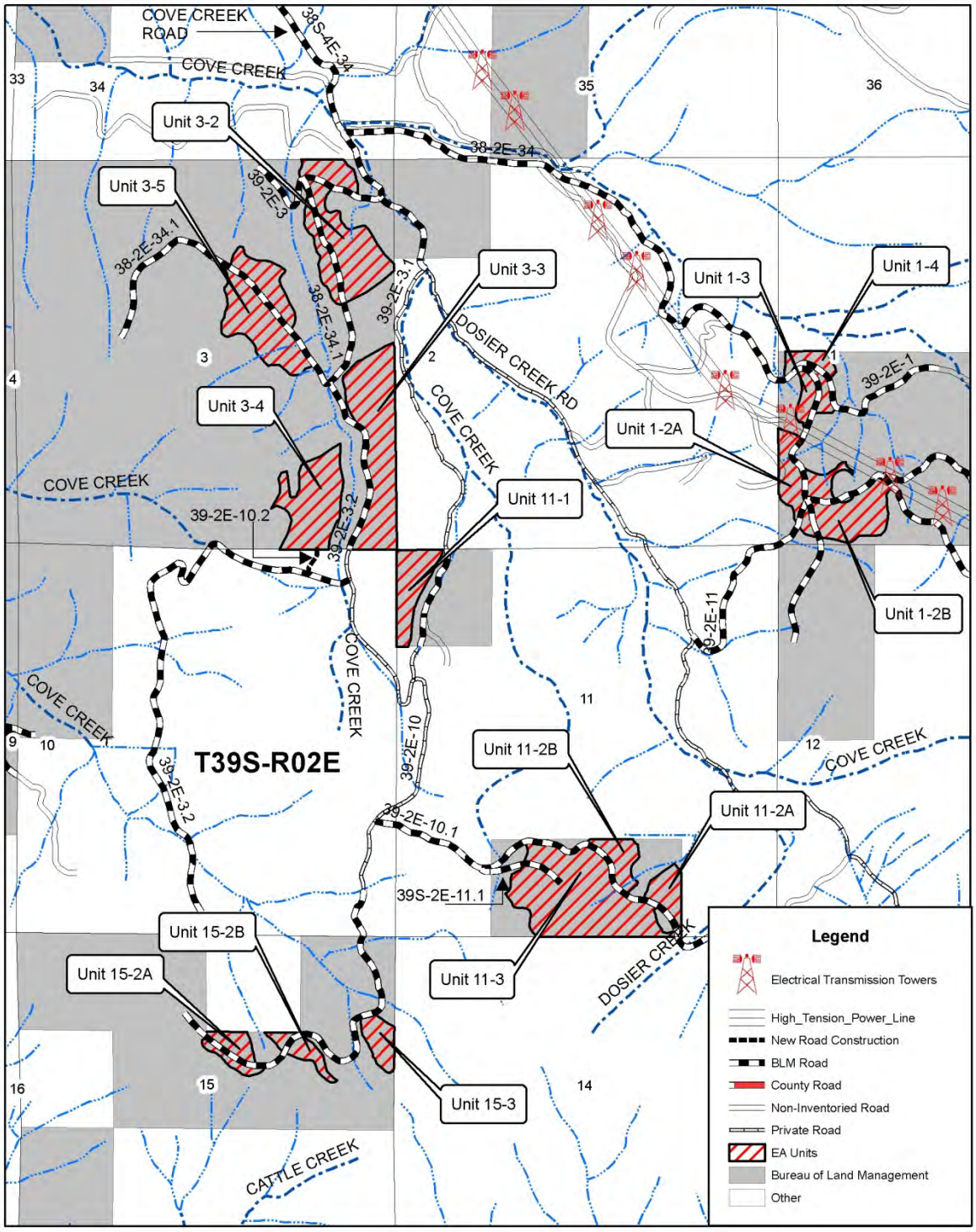


Map 2-2. Sampson Cove Project

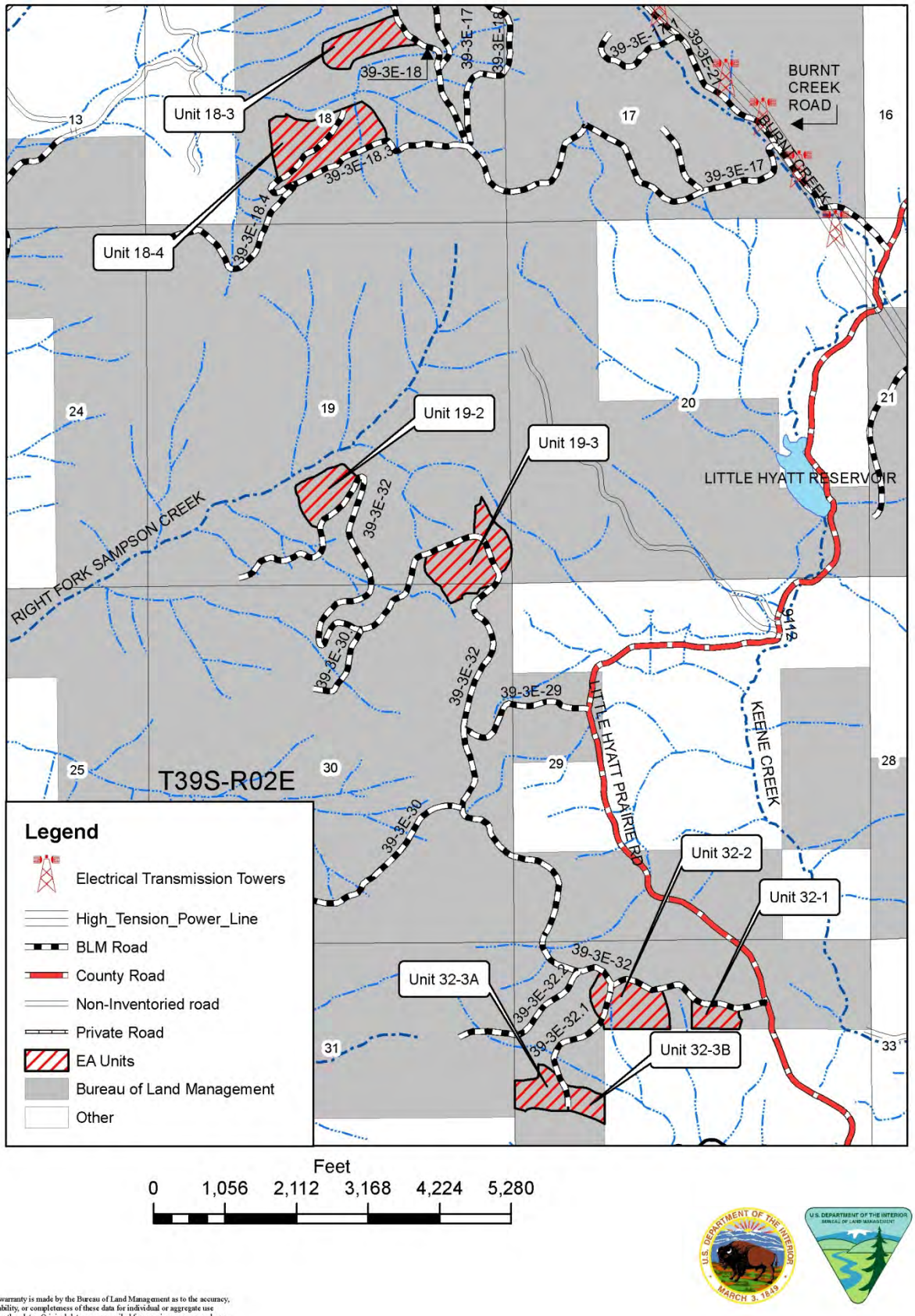


No warranty is made by the Bureau of Land Management as to the accuracy, reliability, or completeness of these data for individual or aggregate use with other data. Original data were compiled from various sources and may be updated without notification.

Map 2-3. Sampson Cove Project



Map 2-4. Sampson Cove Project



No warranty is made by the Bureau of Land Management as to the accuracy, reliability, or completeness of these data for individual or aggregate use with other data. Original data were compiled from various sources and may be updated without notification.

b. Silvicultural Objectives and Prescriptions

The silvicultural objectives for harvest are as follows: 1) Reduce stand basal area to increase tree growth, quality, and vigor of the remaining trees while maintaining existing owl habitat; 2) Create diversified stand structure (height, age, and diameter classes) and old-growth stand characteristics; 3) Enhance species diversity and promote early seral species; 4) Limit detrimental effects of dwarf mistletoe. Basal area is the cross sectional area of all stems (measured at diameter breast height [dbh]) per unit of measure.

Trees would be marked for thinning within proposed treatment units by BLM personnel, with oversight from the Ashland Resource Area's silviculturist and wildlife biologist, to ensure that treatment units are marked according to the silvicultural prescriptions.

General Guidance Applicable to all Treatment Types

Strive to create diverse vertical and horizontal stand structure by leaving trees of all crown classes with crown ratios of ≥ 30 percent. Strive for stand diversity in regard to diameter classes, species compostion, tree heights (crown classes), trees per acre, and the vigor of individual trees. Some diseased, forked-top trees, and dying and dead trees should remain. Favor leaving sugar pine, ponderosa pine, incense cedar, and Douglas-fir, respectively.

Avoid the harvest of old-growth trees. Old-growth trees are defined to have the following characteristics:

- Larger and older than the second growth trees in the current stand; an indication that the tree maybe one of the seed trees of the present day stand. These trees have a bottle-brush shape (non-symmetrical crown).
- Large diameter limbs indicating that the tree was once open grown and had a large crown. Limbs (live or dead) are usually heavy and gnarled, are covered with mosses and lichens, and are close to the ground.
- Douglas-fir will have thick bark with deep fissures and have a chocolate brown color. Second growth trees have more gray color in the bark. Ponderosa pines will have thick bark, plate-like and yellow orange in color.

Trees would be removed around singly spaced old-growth trees to create a ≤ 25-foot crown spacing. Trees that are associated with the old-growth trees and create a unique type of stand structure or wildlife habitat would not be removed.

Trees with bird nests, wildlife cavities, wide forks with flat nesting spots, or loose bark (bat roosts) would be not be removed.

In general, mark suppressed, intermediate, and some codominant crown class trees with live crown ratios of less than 30%, trees lacking branches on one or more sides of the bole that are not conical in shape, dying trees with pitch tubes, trees with fungus conks, and trees with broken or forked tops.

Along major ridge-tops where high winds can become prevalent, a closely spaced crown layer (10 to 15-foot crown spacing) for 2 tree lengths downhill or a maximum of 200-feet downhill from the ridge-top would be maintained to minimize blowdown.

Northern Spotted Owl Nesting, Roosting, Foraging Habitat Thinning

Forest stands that are currently providing for northern spotted owl nesting, roosting, and foraging (NRF) habitat would be thinned to maintain and in some cases promote NRF habitat function. The complex forest structure that forms NRF habitat consists of dead down wood, snags, dense canopy, multi-storied stands, or mid-canopy habitat. However, southwest Oregon NRF habitat varies greatly and one or more of these habitat components might be lacking or even absent. Vegetative features of NRF habitat in southwest Oregon are typified by mixed-conifer habitat, recurrent fire history, and patchy habitat components.

Silvicultural strategies include the use of selective thinning and group selection openings for the maintenance of early seral species such as pine and to reduce the impacts of Douglas-fir dwarf mistletoe (see Figure 2-1). To encourage the maintenance and establishment of fire resilient species, favor leaving sugar pine, ponderosa pine, incense cedar, and Douglas-fir, respectively.

Selective Thinning: Selective thinning is designed to thin from below to accelerate the growth of large trees while maintaining approximately 60 percent canopy cover. Selective thinning would remove excess trees that are either suppressed, contain interlocking crowns, and contribute least to the overstory canopy layer. Trees with crown ratios (the percent of tree with live crown) at or below 30 percent, exhibiting poor form, and poor vigor would be targeted for removal in accordance with the species preference criteria listed above.

Where mistletoe is encountered, target heavily infected trees for removal first, then, focus on leaving resistant species (sugar pine, ponderosa pine, incense cedar, and white fir), followed by uninfected or the least infected Douglas-fir trees with infections confined to the lower third of the tree (Douglas-fir Mistletoe Rating [DMR] Ratings 1-2, Figure 2-2).

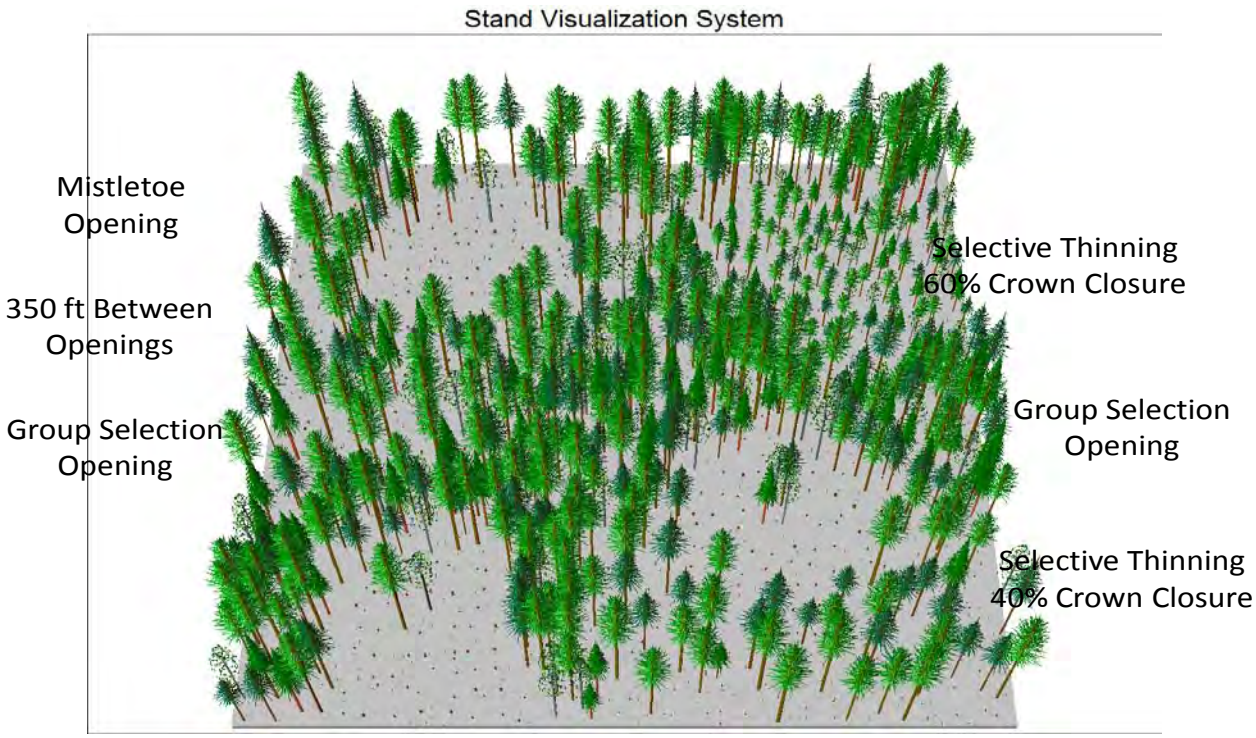
Group Selection Openings – Mistletoe Treatments: Areas that are heavily infected with Douglas-fir dwarf mistletoe DMR 3-6 (see Figure 2-2) would be treated with group selection openings. Target heavily infected tree groups for removal (DMR 3-6, Figure 2-2) not to exceed one acre (118 ft. radius) in size. Openings may be oblong or otherwise variable in size provided the opening does not exceed one acre. Because dwarf mistletoe seeds spread downhill, where high concentrations of mistletoe are found, create group openings beginning on the uphill edge of heavily infested areas then work downhill. Some trees within the heavily infected groups may not need to be removed.

Old-growth trees and pine, incense cedar, and unifected Douglas-fir trees would remain as leave trees within group selection openings. Uninfected Douglas-fir would be targets for removal if needed to release any legacy pine or incense cedar trees (18 inches diameter or greater). Leave no more than 60 ft^2 basal area per acre of leave trees within the group selection openings to encourage the establishment of pine and incense cedar regeneration, which would increase structural complexity of forest stands. Basal area is another measurement used to describe forest stand densities.

Group Selection Openings – Maintain Early Seral Species (pine and incense cedar): The objective of this prescription is to release and maintain large diameter early seral species, namely ponderosa pine, but can also include sugar pine and old-growth incense cedar, which are all in decline. Openings would further stimulate seedling regeneration of a new early seral conifer cohorts. Create 1/5 to 1 acre openings (53 ft. radius to 118 ft. radius) for ponderosa pine or sugar pine 18 inches diameter and larger. Create up to 1/4 acre openings around old-growth incense cedar. Ponderosa pine should be preferred over other species when selecting a target tree for a group selection opening. A group selection opening may be targeted around a group of large ($\geq$ 18 inches dbh) early seral species (pine and incense cedar) thinning the group to leave about 60 ft^2 basal area per acre of acceptable leave trees. Openings should be spaced no closer than 350 feet between the outer edges.

Single leave trees should be centered in circular openings, but openings can vary in shape; on steep slopes mark trees primarily on the downhill side, and on south facing aspects, mark trees primarily on the south facing side. In these cases the radius can be greater than 59 ft. on those sides of the opening to stimulate the best regeneration opportunity, provided the openings remain roughly circular and no greater than one acre.

Figure 2-1. Diagram of Selective Thinning and Group Selection Openings



Adapted from Rolf Gersonde, Silviculturist, Watershed Services Division, Seattle Public Utilities

Northern Spotted Owl Dispersal Habitat Thinning

Forest stands that are currently providing for northern spotted owl dispersal only habitat would be thinned to retain approximately 40 percent canopy cover to maintain the current distribution of dispersal habitat. Dispersal habitat is described as forested habitat greater than 40 years old with an average tree diameter of 11 inches, a canopy closure of about 40 percent or more, and flying space for owls in the understory.

Silvicultural strategies include the use of selective thinning and group selection openings for the maintenance of pine and to limit the effects of Douglas-fir dwarf mistletoe on forest stands. To encourage the maintenance and establishment of fire resilient species, favor leaving sugar pine, ponderosa pine, incense cedar, and Douglas-fir, respectively.

Selective Thinning: Leave an estimated canopy closure of 40 percent (including hardwoods). Mark excess trees that are either suppressed, contain interlocking crowns, exhibit crown decline, and contribute least to the overstory canopy layer. Trees with crown ratios ≤ 30%, exhibiting poor form and poor vigor would be targeted for removal in accordance with the species preference criteria for leave trees.

To meet crown spacing guidelines where mistletoe is encountered, target heavily infected trees for removal first. Then, focus on leaving species that are resistant, uninfected, then the least infected trees (DMR Ratings 1-2, figure 2-2) with infections confined to the lower third of the tree. Leave resistant species in following preference order: sugar pine, ponderosa pine, incense cedar, and white fir.

Group Selection Openings – Mistletoe Treatment and Maintenance of Early Seral Species: Create group selection openings as described above under *Northern Spotted Owl Nesting, Roosting, Foraging Habitat Thinning.*

Thinning in Non-Habitat or Outside of the 1.2 Mile Home Range Radius of NSO Sites

Outside of the 1.2 mile radius home range of northern spotted owl activity centers and forest stands that are not currently providing northern spotted owl NRF or dispersal habitat, the primary objective of thinning is to improve tree vigor and growth for long-term forest production and to reduce the impacts of forest disease. Silvicultural prescriptions are based on site conditions that dictate forest types such as pine, dry Douglas-fir, mixed conifer, and white fir.

Pine Series Thinning: These are areas with southerly or easterly aspects and shallow soils where pine species are best adapted. These stands may have developed a substantial component of Douglas-fir as a result of fire exclusion and stands have become overstocked with all condition classes of vegetation. 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 existing large ponderosa pine and the subsequent development of young pine. The treatments would leave the best, healthiest pine and remove the majority of Douglas-fir trees to allow the pine to once again dominate the site.

The objectives for harvest are as follows: 1) Reduce the stand basal area to increase tree growth, quality and vigor; 2) Create openings large enough for ponderosa pine to become established (preserve existing genotypes which are physiologically better adapted to droughty sites); and 3) Create diversified stand structure (height, age, and diameter classes).

- Leave trees with old-growth characteristics.
- Leave 60-80 ft² basal area per acre of the largest healthiest species.
- Reduce competing vegetation from around healthy pines 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 the most vigorous trees with the best live crown ratios ($\geq$ 30%), straight boles, and conical shaped crowns, although at least one forked tree/acre and one dead tree/acre should remain if available. Leave all codominant and dominant pine that meet the leave descriptions above; suppressed pine can be cut.
- Trees would be favored as leave trees in the following species preference order: sugar pine, ponderosa pine, incense cedar, and Douglas-fir respectively.

Dry Douglas-fir: 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 the stands. Treatments proposed for these sites would thin the trees to a 10 to 25-foot crown spacing while maintaining 80 to 120 ft^2 (average 100) basal area per acre. The larger healthier trees would be favored as leave trees.

Group selection areas on dry Douglas-fir sites can range in size up to 1 acre (118 foot radius). When suitable pine seed trees are found on ridge-tops deemed prone to wind damage, the size of the group selection areas would be reduced to 1/5 acre in size and about 100 ft^2 basal area per acre would be left around the opening (if available).

The position of pine seed trees in the group selection areas would be varied to provide shade for regeneration. About 80 ft^2 basal area per acre would be left around the group selection areas for a distance of the average tree height of the stand.

Clumps of trees would be thinned to a 10 to 25-foot crown spacing. On dry ridges and sites in the "Douglas-fir - Poison oak" plant association, especially where manzanita is found, trees would be thinned to retain no more than 80 ft^2 basal area per acre. Trees would be selected for leave in the following species preference order: sugar pine, ponderosa pine, incense cedar, and Douglas-fir respectively.

Mixed Conifer Forest Stands: These stands are comprised of a mix of tree species including Douglas fir, ponderosa pine, sugar pine, incense cedar, and white fir. Thinning objectives for mixed conifer stands are to improve tree vigor and growth, maintain a larger proportion of Douglas-fir species while maintaining the highest diversity of mixed conifer species for the stand. Treatments proposed for these sites would be thinned to a three (3) to 15 foot crown spacing, maintaining about 100 to160 ft^2 (average 120) basal area per acre. To release large diameter or old-growth Ponderosa or sugar pine legacy trees, create a group selection opening of up to 1 acre (118 ft. from bole).

Species composition of the forest must be considered as well as individual tree physiology. A minimum of 20 percent early seral species should be maintained in the mixed conifer forest stands as described by Franklin and Dyrness (1973). Therefore, selection of treatment trees would be based on 1) species; 2) tree dominance; 3) age class or diameter; and 4) individual tree characteristics. Suitable sugar pine, Douglas-fir, incense cedar, and ponderosa pine (disease free, non-chlorotic, sugar pine, Douglas-fir, incense cedar, and ponderosa pine with crown ratios $\geq$ 30%) would be favored for leave over white fir.

White Fir Thinning: White fir (*Abies concolor*) has a broad ecological range and is one of the most productive series in the Cascades. According to Atzet and Wheeler (1984) the white fir series exhibits good growth and survival for both sugar pine and Douglas-fir. Ponderosa pine, western white pine, sugar pine, incense-cedar, and Douglas-fir are the early seral species that pioneer after disturbances such as fire. The objective of managing these sites is to create a stand structure and species composition that mimics natural disturbances and to result in a higher proportion of early seral species than currently exists.

Unit #19-1 may look like some of the mixed conifer stands, but with a higher proportion of white fir. Besides increasing the species composition of shade intolerant species for biological diversity, stand density reduction is necessary to improve individual tree vigor. Basal area retention is relatively higher to prevent frost damage to conifer regeneration, to avoid basal scarring to residual white fir due to frost cracks, and to decrease the likelihood of gopher damage. Retention of coarse woody debris is important, therefore, trees that protect large downed wood would be selected as leave trees.

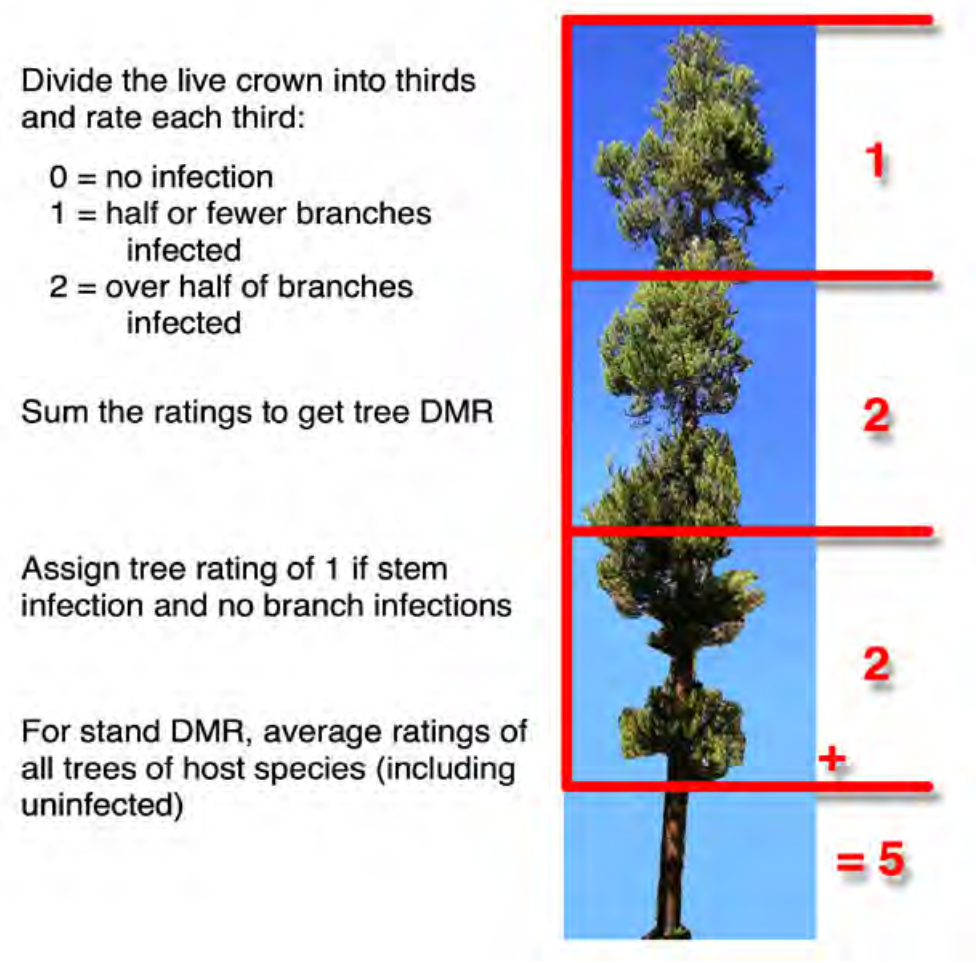
White fir stand(s) would retain 160 to 180 ft^2 basal area per acre of conifer species. Typical leave trees would be the healthiest dominant and codominant trees having the best live crown ratios ($\geq$ 30%), straight boles and healthy conical shaped crowns. A group selection opening of up to 1/4 acre (59 ft from bole) would be created around individual large diameter or old-growth ponderosa or sugar pine legacy trees. Trees with old-growth characteristics would be left uncut. Trees of varying crown classes (height) would be selected to leave to create diversity in stand structure. Trees would be selected as leave trees based on the following species preference order: sugar pine, Douglas fir, ponderosa pine, incense cedar, and white fir respectively.

Disease Management: This prescription applies to stands or parts of stands that already exhibit less than 40 percent canopy as a result of substantial tree mortality and are continuing to deteriorate due to disease. These would be harvested leaving a residual overstory of at least 6 to 8 trees per acre $\geq$ 20 inches diameter breast height or the largest available trees. These stands would vary in tree retention among and within some units, leaving between 6 to 25 trees per acre $\geq$ 20 inches dbh or the largest available diameters. Units with 6 to8 trees per acre (TPA) retention should see bole spacing of 74-85 ft. These stands would be planted with disease resistant species to restore the integrity of the stand.

Regeneration Harvest: The objective of this harvest prescription is to release the understory component for future forest production and to create multiple-canopied stands to provide for complex forest structure across the landscape by thinning overstory trees.

To achieve stand diversity, trees of all crown classes (suppressed to dominant), and those trees with the largest live crowns would be left. This treatment leaves an overstory structure of 16 to 25 trees per acre ≥ 20 inches dbh where available or the largest available trees. Maximum crown spacing (from branch end to branch end) should range from 20 to 45 feet. Trees would be selected to leave in the following species preference order: sugar pine, ponderosa pine, incense cedar, and Douglas-fir respectively. Typical leave trees would be the most vigorous dominant and codominant trees having the best live crown ratios (≥ 30%), straight boles, and healthy conical shaped crowns. Second growth trees may be left to meet crown spacing requirements when the older trees are widely spaced.

Figure 2-2. Douglas-fir Dwarf Mistletoe Rating (DMR) System



Source: The American Phytopathological Society, 2006.

c. Commercial Harvest Methods

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

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

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

d. Fuels Reduction Treatments

Although fuels reduction is not the primary purpose for stand treatments proposed, fuels reduction is an important component and fuels Project Design Features are incorporated into the Proposed Action. Small diameter slash (generally 3 inches diameter and less) created from forest thinning (activity slash) would be cut, handpiled, and covered with plastic following completion of timber harvest operations. Pile burning is usually completed within 6 months to 2 years of timber harvesting depending on the time of year the harvest occurred; slash needs a period of time to cure before burning can take place.

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

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

C. 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. 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.

a. Riparian Reserves

Northwest Forest Plan (NWFP) Riparian Reserves, as incorporated by the Medford District RMP, are located on federal lands throughout the Project Area. A BLM stream survey crew conducted surveys within areas associated with the Project Area in order to ensure that all areas needing Riparian Reserve protection were identified. The survey crew assessed stream conditions, documented the location of wetland and unstable areas, and determined whether stream channels were perennial, intermittent, or dry draws (USDA and USDI 1994:C30-C31). Stream maps were updated with the new information. Riparian Reserves would be excluded from commercial treatment units by clearly marking unit boundaries on the ground.

Riparian Reserve widths were determined using the NWFP Standards and Guidelines (USDA and USDI 1994: C-30-31) and the *Upper Bear Creek Watershed Analysis* (USDI 2000:146-147). Site specific widths for each Riparian Reserve have been mapped in GIS and would be implemented under the Proposed Action. Riparian Reserve widths in the Sampson Cove Project Area are as follows:

(1) Perennial fish-bearing streams: 300 feet slope distance on each side of the stream.
(2) Perennial nonfish-bearing streams: 150 feet slope distance on each side of the stream.
(3) Intermittent streams: 150 feet slope distance on each side of the stream. Intermittent streams have a defined channel, annual scour and deposition, and are further described as short duration or long duration.
(4) Unstable and potentially unstable ground: the extent of the unstable and potentially unstable ground.
(5) Springs, seeps and other non-stream wetlands less than one acre in size, the wetland and the area from the edges of the wetland to the outer edges of the riparian vegetation. For this project, a buffer of 100 feet is being implemented to meet this requirement.
(6) Constructed ponds and reservoirs, wetlands greater than one acre in size – Riparian Reserves consist of the body of water or wetland and: the area to the outer edges of the riparian vegetation, or the extent of the seasonally saturated soil, or the extent of unstable or potentially unstable areas, or 150 feet slope distance from the edge of the wetland greater than 1 acre or the maximum pool elevation of constructed ponds and reservoirs, whichever is the greatest.

b. Harvest and Yarding

Objective 1: Protect Riparian Reserves

(1) No commercial harvest or mechanized pre-commercial thinning in Riparian Reserves. *
(2) No use of skid trails in Riparian Reserves. *
(3) Trees would be directionally felled away from Riparian Reserves. *
(4) No logging slash would be piled within Riparian Reserves.
(5) Springs, seeps and other non-stream wetlands less than one acre in size, the wetland and the area from the edges of the wetland to the outer edges of the riparian vegetation. For this project, a buffer of 100' is being implemented to meet this requirement.
(6) No Commercial harvest, pre-commercial thinning, or fuels management would occur in Riparian Reserves.

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

(1) When operationally feasible, all units would be yarded in such a way that the coarse woody material remaining after logging would be maintained at or greater than current levels in order to protect the soil surface and maintain soil productivity. *
(2) Wherever trees are cut to be removed, directional felling away from dry draws and irrigation ditches would be practiced. Trees would be felled to the lead in relation to skid trails.
(3) All tractor skid trail locations would be approved by the BLM Contract Administrator. Maximum area in skid trails used would be less than 12% of the harvest unit. Existing skid trails would be utilized when possible. Yarding tractors would be less than 6½ feet wide as measured from the outer edges of the track shoes, equipped with integral arches to obtain one-end suspension, and equipped with a minimum of 75 feet of skidding line. Tractor yarding would occur on slopes less than 35% and would avoid areas with high water tables; however, tractor operations would be permissible on short pitches (< 300') greater than 35%. Skid trails are to be located by operators and approved by a BLM Contract Administrator prior to falling timber tributary to the skid trails. 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. *

(4) 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). *
(5) Tractor yarding on designated skid trails would occur between June 1st to October 15 or on approval by the Contract Administrator. Some variations in these dates would be permitted dependent upon weather and soil moisture conditions. The intent is to minimize compaction and off-site erosion and sedimentation to local waterways.
(6) Cable yarders would be required to maintain one-end suspension of logs during in-haul, and must be equipped with a locking carriage with of a minimum of 75 feet lateral capability. Yarding corridors would be kept to a minimum width (maximum 10 feet), would be kept generally perpendicular to the slopes, and would be limited to two per landing, as operationally feasible.
(7) The BLM would immediately shut down all timber harvest and yarding operations if excessive soil damage would occur due to weather or soil moisture conditions.

c. Manual Pre-Commercial Thinning

Objective 1: Prevent Offsite Soil Erosion and Soil Productivity Loss

(1) Vegetation would be thinned using manual techniques. Slash created by the project would be hand piled or lopped and scattered.
(2) Old skid trails would not be opened or driven on without the approval of the authorized officer. Cut material would be placed on the running surface of old skid trails or jeep roads that are authorized to be used. *
(3) Old skid roads would not be treated near the intersections with system roads in order to provide a visual screen and discourage vehicular access.
(4) Crossings through dry draws would be limited and approved by authorized officer; vehicles or equipment would not drive up the draw bottoms. *
(5) Where pre-commercial thinning occurs within Riparian Reserves (to address undesirable fuel characteristics such as loading and structure), no piles would be placed within 50 feet of the edge of the buffered feature. No riparian hardwoods would be cut.

d. Prescribed Fire

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

(1) Underburns would be conducted only when a light to moderate burn can be achieved consistent with RMP soil protection objectives (ROD/RMP page 168). Evaluate need for burning based on soils, plant community, and site preparation criteria. Burn only under conditions when a light burn can be achieved (see guidelines below) to protect soil productivity (see Chapter 3, Soils Section).

Category 1 Soils (highly sensitive): burn only in spring-like conditions when soil and duff are moist. Maximize retention of duff layer. Assure retention of minimum levels of coarse woody debris and recruitment snags as specified in the Standards and Guidelines on p. C-40 in the Northwest Forest Plan ROD.

Category 2 Soils (moderately sensitive): burn only in spring-like conditions when soil and duff are moist. Maximize retention of duff layer. Assure retention of minimum levels of coarse woody debris and recruitment snags as specified in the Standards and Guidelines on p. C-40 in the Northwest Forest Plan ROD. Develop fire prescriptions that reduce disturbance and duration and achieve low fire intensity.

Category 3 Soils (least sensitive): burn to avoid high intensity (severe) burns to protect a large percentage of the nutrient capital. Maximize retention of duff layer. Assure retention of minimum levels of coarse woody debris and recruitment snags as specified in the Standards and Guidelines on p. C-40 in the Northwest Forest Plan ROD.

(2) Firelines for underburns would be constructed manually on all slopes greater than 35 percent.
(3) Waterbars on tractor and hand firelines would be constructed according to District guidelines (USDI 1995:167).
(4) Piles would be dispersed across treatment areas. Piles would be burned when soil and duff moisture are high.
(5) Following burning activities, all constructed firelines would be covered in slash and other materials to provide ground cover and restrict use by off-highway vehicles (OHVs).

Objective 2: Prevent Chemical Water Pollution

(1) Foam retardant would not be used in Riparian Reserves.*

e. Roads and Landings

Objective 1: Protect Riparian Reserves

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

Objective 2: Prevent Off-site Soil Erosion

(1) Landing construction and road maintenance would not occur during the wet season (October 15th to June 1st) 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, waterbarring, 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 Contract Administrator 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. *
(2) Bare soil due to landing construction/renovation would be stabilized prior to fall rains by the application of approved mulch and native seed. *
(3) Fill slopes on all new landings and road 39-2E-10.02 would be scarified, seeded with native or approved seed, and mulched, except where rock occurs. *
(4) Slash would be windrowed at the base of newly-constructed fill slopes to catch sediment. *
(5) Temporary routes also referred to as short operator spurs (100 to 500 feet), are identified and analyzed for use. If constructed, temporary routes would be blocked and water-barred at the completion of log haul and within the same season as constructed/opened.* Blockage shall consist of placing logs, slash, boulders, berms, and other material so the entrance is camouflaged and vehicle use is precluded throughout its length. Work would be done between June 1st to October 15th.* Temporary routes extending beyond the project unit boundaries in undisturbed habitat (e.g., outside existing road prism) must be reviewed by a Resource Area Botanist prior to BLM approval of the temporary route location.

Objective 3: Protect Natural Discharge Patterns

(1) Where possible, rolling grades and outsloping 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.
(2) Cross drain structures (culverts, water dips, waterbars) would be installed at intervals not greater than the spacing distances identified in the RMP (USDI 1995: 177) for soil erosion class and road gradient.
(3) Armored splash pads (e.g., rock material) would serve as energy dissipaters at cross drain outlets or drain dips where water is discharged onto loose material, erodible soil.
(4) A temporary culvert or equivalent would be installed and removed during the same season as log haul (June 1st to October 15th) at ford crossings on road 39-2E-3.02.

f. Hauling

Objective 1: Prevent Off-site Soil Erosion

(1) No hauling would occur on natural surfaced roads during the wet season (October 15th to June 1st). This would protect the road from damage and decrease the potential for off-site sediment movement. Some variations in these dates would be permitted dependent upon weather and soil moisture conditions of the roads.
(2) Hauling would be allowed between May 15th and November 15th on roads surfaced with at least 6 inches of pit-run rock or 8 inches of crushed rock.
(3) Dust abatement would include water or lignin.

g. Quarries

Objective 1: Protect Riparian Reserves

(1) No quarry development or expansion would occur within Riparian Reserves.

Objective 2: Prevent Off-site Soil Erosion

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

h. Oil and Hazardous Materials Emergency Response

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

Notification, removal, transport, and disposal of oil, hazardous substances, and hazardous wastes would be accomplished in accordance with OAR 340-142, Oil and Hazardous Materials Emergency Response Requirements, contained in Oregon Department of Environmental Quality regulations.

i. Silviculture

Objective 1: Protect Residual Leave Trees

(1) White fir is extremely susceptible to fungal attacks and root rots. To reduce the probability of mechanical damage to white fir leave trees, avoid leaving white fir along haul routes, planned skid roads, or adjacent to major landings where heavy mechanical injury can occur during harvest operations.

(2) In pine series forests, where the single tree and group selection methods are used, logging slash should be handpiled outside of the driplines of individual pine trees and burned.
(3) 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.
(4) No more than 25% of the pine tree live crown should be scorched for trees 8 inches dbh and larger.
(5) 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.
(6) Treat cut stump surfaces with a registered borate fungicide (Sporax®) to reduce the potential for the spread of Annosus root disease in Unit #'s 1-2A, 1-2B, 11-3, 18-4, 19-3, 30-2, 30-4, 32-1, 32-2, and 32-3.

Objective 2: Create Growing Sites & Reduce Competing Vegetation for Natural & Planted Seedlings

(1) In pine site and group select treatment units, where the single tree and group selection methods are used, treat logging slash and fuel loading to prepare suitable seedbeds for reproduction.

Objective 3: Maintain Vigorously Growing Conifer Forest for Permanent Forest Production

(1) After timber harvest, pre-commercial thinning would take place in Unit #'s: 1-4, 3-1, 9-2, 9-3, and 9-4. When thinning understory conifers, select leave trees based on the following criteria to meet silvicultural objectives:
    (a) Demonstrates good form and vigor.
    (b) Generally free of visible disease and defect.
    (c) Exhibits a minimum of 30% crown ratio.
    (d) Leave conifers in the following species preference order: sugar pine, ponderosa pine, incense cedar, Douglas-fir, and white fir, respectively.
    (e) Conifers should be pre-commercially-thinned to a 20-foot spacing. Allow ±25% to accommodate for stand variability (e.g., portions of a stand with a dense mat of small diameters should be thinned to -25% of 20 feet, whereas areas of larger sub-merchantable trees should see +25% of 20 feet).
    (f) In the absence of conifers that meet the above definition for an acceptable crop tree, include any live conifer seedling that is at least three (3) feet tall that falls within the spacing guidelines.
    (g) Space hardwoods 40x40 feet apart (+/- 25% to allow for stand variation). To meet hardwood spacing criteria, leave all oaks > 6 inches dbh; leave all other hardwoods >8 inches dbh; cut multistem clumps >8 inches dbh to 2-3 of the largest stems per clump. Slash excess hardwoods preferring leave species in following species preference order: any oak species, bigleaf maple, Oregon ash, willow species, , and Pacific madrone, respectively.
(2) In areas outside of spotted owl NRF and dispersal habitat, all saplings through pole (7 inch dbh and smaller trees) should be slashed within the dripline of the old-growth trees that were released with the 15 to 25-foot crown space.

j. Terrestrial Wildlife

Objective 1: Protect Northern Spotted Owl Nest Reserves

(1) Reserve from harvest designated 100-acre core areas for northern spotted owl sites designated as known sites on January 1, 1994.

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

Work activities that produce loud noises above ambient levels would not occur within specified distances (Table 2-4) of any documented or generated owl site during the critical early nesting period, March 1 and June 30, or until two weeks after the fledging period. This seasonal restriction may be waived if protocol surveys have determined the activity center is not occupied, owls are non-nesting, or owls failed in their nesting attempt. The distances listed in Table 2-4 may be shortened with Level 1 concurrence if substantial-topographical breaks or blast blankets (or other devices) would muffle sound between the work location and nest sites.

(1) The Resource Area Biologist may extend the restricted season until September 30 during the year of harvest, based on site-specific knowledge (such as a late or 2nd nesting attempt).

(2) Burning would not take place within 0.25 miles of spotted owl sites (documented or projected) from March 1 through June 30, or until two weeks after the fledging period, unless substantial smoke would not drift into the nest patch.

Table 2-4. Mandatory Spotted Owl Restriction Distances

Activity	Zone of Restricted Operation
Heavy Equipment (including nonblasting quarry operations)	105 feet
Chain saws	195 feet
Impact pile driver, jackhammer, rock drill	195 feet
Small helicopter or plane	360 feet*
Type 1 or Type 2 helicopter	0.25 miles*
Blasting; 2 pounds of explosive or less	360 feet
Blasting; more than 2 pounds of explosives	1 mile
* If less than 1,500 feet above ground level.	

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

(1) Reserve from harvest a minimum of 3 snags per acre greater than 17 inches dbh, where available. Retention of snags greater than 17 inches dbh within the interior of the stands would mitigate impacts to cavity-dependent species.

(2) Do not mark large, broken-top trees and large snags with loose bark. Retain and protect these structures where possible.

Objective 4: Protect Special Status Wildlife Species

(1) Northern Goshawks are known to inhabit forested habitat of the type found within the Sampson Cove Project Area. No known nest sites occur within the Project Area. Any nest sites located prior to or during harvest activity would be protected with a 30 acre buffer.

Objective 5: Protect Survey and Manage Wildlife Species

(1) The great gray owl is a Survey and Manage Species under the Northwest Forest Plan. Known great gray owl reproductive areas are protected by a ¼ mile radius no treatment buffer (or its equivalent in area). Twelve (13) known great gray owl nests would be protected with buffers.

Objective 6. Minimize Disturbance to Wintering Deer

(1) Restrict activities on the Cove Creek Road System to avoid disturbance to designated Deer Winter Range from November 15 to April 1 as required by the RMP.

k. Botanical Resources

Objective 1: Minimize the Spread of Noxious Weeds

(1) Vehicle and equipment use off of existing roads in the Project Area is limited to the dry season.
(2) Mechanical equipment (e.g., skidders, yarders, etc.) would be power washed and cleaned of all soil and vegetative material before entering the Project Area. Equipment moving from a weed infested work site to or through a non-infested area would be field washed before moving. The field washing station would include a system to contain all weed waste for subsequent landfill disposal.
(3) Seeding of native grasses and/or an approved seed mix on highly disturbed soil (e.g., landings, new road cut and fill slopes, etc.) would occur.
(4) Roadside noxious weed populations would be treated prior to timber sale activity with subsequent treatments as necessary and as funding is available.
(5) Noxious weed populations in existing quarries and stockpiles would be treated prior to use.
(6) On roads with known weed populations, road grading and ditch-pulling would not occur during periods of weed seed production and dissemination, approximately from July 15 to September 1.

Objective 2: Protection of Special Status Plant Species

(1) Bureau Special Status Plant species (includes Federally listed, proposed, and candidate species, State listed species, and Bureau designated species). Populations would be protected by one, or a combination of, a) no treatment buffered areas, b) seasonal restrictions, c) method of treatment specification (e.g. ,manual treatment only), and d) other restrictions (e.g., slashing but no piling), as needed (see Table 2-5).
(2) Other timber sale associated operations are not allowed in "no treatment" buffers, unless specified. These operations include pre-commercial thinning, slash treatment, tailhold trees, intermediate lift trees, skyline corridors, etc.
(3) Trees would be directionally felled away from botany reserves.
(4) Some areas of restricted operations for botanical purposes may not be marked on the ground. These operations could include seasonal restrictions, areas of no hand-piling, etc.
(5) No landings within 100 feet of any known Special Status Plant sites would be used or constructed without approval of the Field Manager in consultation with a Resource Area Botanist. Landings extending beyond the project unit boundaries in undisturbed habitat (e.g., outside existing road prism) must have botany review prior to BLM approval of landing location.
(6) Fuels treatments are allowed in seasonally-restricted plant buffer areas only outside the seasonal restriction period (see Table 2-5). Woody debris is to be lopped and scattered, and no material removal, broadcast or maintenance burning, or building of handpiles is to occur within seasonally-restricted buffers. No activity is to take place in no-treatment buffers.

Table 2-5. Protection Measures for Special Status and Survey & Manage Plant Species

Township, Range, Section (T, R, S)	Species Code	Site No.	Proposed Treatment	Protection	Rationale for Protection
T39S R02E S01	PORH	3617	Disease Management, PCT (Unit 1-2B)	RX: 50' buffer, no activity. Fall trees directionally away from buffered area.	RX: Crown retention, avoidance of soil and associated vegetation disturbance.
T39S R02E S11	PORH	3622	Mixed conifer	RX: no buffer	RX: protected by distance from unit and project activity.
T39S R02E S03	PORH	3674	Road	Road: Limit dust abatement on road 38-2E-34.1; no magnesium chloride	Road: Effects of magnesium chloride unknown on species.

Township, Range, Section (T, R, S)	Species Code	Site No.	Proposed Treatment	Protection	Rationale for Protection
T39S R03E S17 T39S R03E S18	HABE	8177	Road	Road: Limit dust abatement on road 39-3E-21; no magnesium chloride. Mechanized equipment stays within existing road prism 100' in any direction of population boundary.	Road: Effects of magnesium chloride unknown on species. Large population located outside of unit areas, but occurs on both sides of road proposed for hauling. Known to inhabit disturbed roadsides.
T39S R03E S27	HABE	8288	Road	Road: None	Located on road within Sampson Cove project area, but not proposed for project use.
T37S R03E S07	FRGE	12057	None	None	Analyzed as part of HUC6 roadside botanical sites, but not close to units or roads proposed for activity.
T39S R02E S09	CASE2	12159	None	None	Analyzed as part of HUC6 roadside botanical sites, but not close to units or roads proposed for activity.
T39S R03E S18	CASE2	12328	Road	Road: Limit dust abatement on road 39-3E-18.1; no magnesium chloride. Mechanized equipment stays within existing road prism 100' in any direction of population boundary.	Road: Effects of magnesium chloride unknown on species. Site also protected by location in Riparian Reserve.
T39S R03E S07 T39S R03E S08	HABE	12349	None	None	Analyzed as part of HUC6 roadside botanical sites, but not close to units or roads proposed for activity.
T39S R03E S19	CYMO2	12361	NRF (Unit 19-3) Road	RX: buffer. Road: Limit dust abatement: BLM road no. 39-3E-32 dust abatement limited to water or lignin.	RX: Maintenance of canopy closure in area surrounding site for moisture and habitat retention. Road: no use of magnesium chloride for dust abatement that can cause injury/death to plants.
T39S R03E S32	CYMO2	12389	NRF (Unit 32-2) Road	RX: buffer Road: Limit dust abatement: BLM road no. 39-3E-32.7 dust abatement limited to water or lignin.	RX: Maintenance of canopy closure in area surrounding site for moisture and habitat retention. Road: no use of magnesium chloride for dust abatement that can cause injury/death to plants.
T39S R02E S11	CASE2	12458	Road	Road: Limit dust abatement on road 39-2E-11.1; no magnesium chloride. Mechanized equipment stays within existing road prism 100' in any direction of population boundary.	Road: Site located in roadside ditch, and within Riparian Reserve. Within haul route, but outside of areas impacted by yarding/falling.
T39S R02E S03	LIFLB	12461	NRF (Unit 3-5)	RX: no buffer	RX: protected by distance from unit and project activity. Located within Riparian Reserve.
T39S R02E S13	RAAU	12519	None	None	Analyzed as part of HUC6 roadside botanical sites, but not close to units or roads proposed for activity.

Township, Range, Section (T, R, S)	Species Code	Site No.	Proposed Treatment	Protection	Rationale for Protection
T39S R03E S07	CASE2	12589	Road	Road: Limit dust abatement on road 39-3E-18.1; no magnesium chloride. Mechanized equipment stays within existing road prism 100' in any direction of population boundary.	Road: Effects of magnesium chloride unknown on species. Site also protected by location in Riparian Reserve.
T38S R02E S17	CIEL	12700	Road	Road: Limit dust abatement on road 38-2E-9.2; no magnesium chloride. Mechanized equipment stays within existing road prism 100' in any direction of population boundary.	Road: no use of magnesium chloride for dust abatement that can cause injury/death to plants.
T38S R02E S17	CIEL	12700	Road	Road: Limit dust abatement on road 38-2E-9.2; no magnesium chloride. Mechanized equipment stays within existing road prism 100' in any direction of population boundary.	Road: no use of magnesium chloride for dust abatement that can cause injury/death to plants. Site also protected by location in Riparian Reserve.
T38S R02E S17	CIEL	12702	Road	Road: Limit dust abatement on road 38-2E-9.2; no magnesium chloride. Mechanized equipment stays within existing road prism 100' in any direction of population boundary.	Road: no use of magnesium chloride for dust abatement that can cause injury/death to plants.
T39S R03E S26	HABE	13143	None	None	Analyzed as part of HUC6 roadside botanical sites, but not close to units or roads proposed for activity.
T38S R03E S27	CHSU14	13227	None	None	Analyzed as part of HUC6 roadside botanical sites, but not close to units or roads proposed for activity.
T38S R03E S27	CHSU14	13233	Road	Road: Limit dust abatement on road 38-3E-19; no magnesium chloride.	Road: no use of magnesium chloride for dust abatement that can cause injury/death to plants.
T39S R03E S18	CHSU14	TBD	RX: NRF (Unit 18-4) Road	RX: buffer Road: Limit dust abatement on road 39-3E 18.3; no magnesium chloride	RX: maintain moisture regime, canopy closure and microhabitat
T39S R03E S18	CHSU14	TBD	RX: NRF (Unit 18-4)	RX: buffer	RX: maintain moisture regime
T39S R03E S19	CHSU14	TBD	RX: NRF (Unit 19-2)	RX: buffer	RX: maintain moisture regime
T38S R02E S15	BOPU4	34987	None	None	Analyzed as part of HUC6 roadside botanical sites, but not close to units or roads proposed for activity.
T38S R03E S29	CIEL	8183/ 7013	Road	Road: Limit dust abatement on road 38-3E-19; no magnesium chloride.	Road: no use of magnesium chloride for dust abatement that can cause injury/death to plants.

Township, Range, Section (T, R, S)	Species Code	Site No.	Proposed Treatment	Protection	Rationale for Protection
T38S R03E S19	PIVU2	N1942	RX: White Fir site Road	RX: Seasonal restriction: disturbance activity may occur only from June-October. Fuels restriction: lop and scatter of debris will occur with larger debris. No underburn. Harvest restriction: retain large diameter ABCO within the population polygon. Yarding: Use existing skid trails/roads for soil-disturbing/compacting activities. Road: Limit dust abatement on road 38-2E-27; no magnesium chloride.	RX: Per Management Recommendations, maintain habitat at known sites (i.e. maintain dominance of specific overstory tree associates). Avoid disturbance at known sites (i.e. minimize loss, disruption or compaction of soil). IM OR 98-003 Road: no use of magnesium chloride for dust abatement that can cause injury/death to plants.
T38S R03E S21	PIVU2	N1959	None	None	Analyzed as part of HUC6 roadside botanical sites, but not close to units or roads proposed for activity.
T38S R03E S22	PIVU2	N1971	None	None	Analyzed as part of HUC6 roadside botanical sites, but not close to units or roads proposed for activity.
T38S R03E S27	PIVU2	N1996	None	None	Analyzed as part of HUC6 roadside botanical sites, but not close to units or roads proposed for activity.
T38S R03E S27	PIVU2	N1997	None	None	Analyzed as part of HUC6 roadside botanical sites, but not close to units or roads proposed for activity.
T38S R03E S29	PIVU2	N2016	None	None	Analyzed as part of HUC6 roadside botanical sites, but not close to units or roads proposed for activity.
T38S R03E S17	PIVU2	N2018	None	None	Analyzed as part of HUC6 roadside botanical sites, but not close to units or roads proposed for activity.
T38S R03E S21	BRTO2	N3265	None	None	Analyzed as part of HUC6 roadside botanical sites, but not close to units or roads proposed for activity.
T39S R03E S27	BOPU4	N3283	None	None	Analyzed as part of HUC6 roadside botanical sites, but not close to units or roads proposed for activity.
T38S R03E S30	PIVU2	OR110 _F0839	RX: NRF (Unit 30-4)	RX: no buffer	RX: protected by distance from unit and project activity. Located within Riparian Reserve.
T38S R02E S17	PIVU2	OR110 _F0840	Road	Road: Limit dust abatement on road 38-2E-9.2; no magnesium chloride. Mechanized equipment stays within existing road prism 100' in any direction of population boundary.	Road: no use of magnesium chloride for dust abatement that can cause injury/death to plants.
T39S R03E S28	PIVU2	OR110_ F0842-1	None	None	Analyzed as part of HUC6 roadside botanical sites, but not close to units or roads proposed for activity.

Township, Range, Section (T, R, S)	Species Code	Site No.	Proposed Treatment	Protection	Rationale for Protection
T39S R03E S32	PIVU2	OR110 _F0856	RX: Pine Site (Unit 32-1)	RX: Seasonal restriction: disturbance activity may occur only from June-October. Fuels restriction: lop and scatter of debris will occur with larger debris. No underburn. Harvest restriction: retain large diameter ABCO within the population polygon. Yarding: Use existing skid trails/roads for soil-disturbing/compacting activities.	RX: Per Management Recommendations, maintain habitat at known sites (i.e. maintain dominance of specific overstory tree associates). Avoid disturbance at known sites (i.e. minimize loss, disruption or compaction of soil). IM OR 98-003
T38S R03E S27	PIVU2	OR110 _F0861	None	None	Analyzed as part of HUC6 roadside botanical sites, but not close to units or roads proposed for activity.
T38S R03E S27	PIVU2	OR110 _F0865	None	None	Analyzed as part of HUC6 roadside botanical sites, but not close to units or roads proposed for activity.
T39S R03E S32	CYMO2	TBD	RX: NRF (Unit 32-2)	RX: buffer Road: Limit dust abatement: BLM road no. 39-3E-32.7 dust abatement limited to water or lignin.	RX: Maintenance of canopy closure in area surrounding site for moisture and habitat retention. Road: no use of magnesium chloride for dust abatement that can cause injury/death to plants.
T39S R03E S32	CYMO2	TBD	RX: NRF (Unit 32-2)	RX: buffer Road: Limit dust abatement: BLM road no. 39-3E-32.7 dust abatement limited to water or lignin.	RX: Maintenance of canopy closure in area surrounding site for moisture and habitat retention. Road: no use of magnesium chloride for dust abatement that can cause injury/death to plants.

l. Recreation

Objective 1. Maintain Public Safety

(1) Place signs on road 39-3E-32 alerting log truck drivers and others associated with the logging operations to hikers crossing the road on the Pacific Crest National Scenic Trail (PCNST). Signs should be placed approximately 50 ft. to 100 ft. from where the PCNST crosses the road and face both directions of travel of on road 39-3E-32 near unit 19-3 and unit 32.2. Signs should instruct log truck operators and those associated with the logging operation to slow down and be alert of the possibility of there being foot and stock traffic across the road. Based on the road conditions and expected vehicular travel speed, the letter size of any wording on the sign should be 3 in. and any symbol or emblem should be a minimum of 8 in.

(2) Place a sign at the intersection of Little Hyatt Prairie Rd. and 39-3E-32 alerting the public of possible interactions with logging trucks and associated equipment. Based on the road conditions and expected vehicular travel speed the letter size of any wording on the sign should be 3 in. and any symbol or emblem should be a minimum of 8 in.

(3) Place a sign at the intersection of Little Hyatt Prairie Rd. and 39-3E-29 alerting the public of possible interactions with logging trucks and associated equipment. Based on the road conditions and expected vehicular travel speed the letter size of any wording on the sign should be 3 in. and any symbol or emblem should be a minimum of 8 in.

(4) Mark trees for cutting (rather than leave tree marking) in units visible from the PCNST.

(5) BLM recreation staff would place signs on the PCNST where the trail crosses road 39-3E-32 alerting trail users to the logging operation.

Objective 2. Minimize Impact to Recreation Experience

(1) Cut stumps of trees visible from the PCNST as close to the ground as possible given site specific conditions and safety concerns in order to minimize the visual impact to the recreation experience.
(2) No project work would occur in unit 29-1 and no winter haul would occur on roads 39-3E-29.6 and 38-3E-32.2 from December 1st to April 1st to provide for winter recreation.

D. IMPLEMENTATION MONITORING

The majority of actions described under the Proposed Action are implemented through a timber sale, service, or stewardship contract. Implementation monitoring is accomplished through BLMs 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. Timber sale contract work could be shut down if infractions of the contract are severe. The contract violations would need to be corrected before the contractor would be able to continue work or timber harvest. If contract violations are blatant, restitution could be of a monetary value of up to triple the amount of damage.

E. ACTIONS AND ALTERNATIVES CONSIDERED BUT ELIMINATED FROM DETAILED ANALYSIS

NEPA requires that Federal agencies explore all reasonable alternatives and briefly discuss the reasons for eliminating any alternatives that were explored but not developed in detail (40 CFR 1502.14 (a)). The following alternatives or actions have been considered but eliminated from detailed study for the reasons stated and/or because they would not meet the objectives and Needs for this project.

Treatment of Forest Stands Identified as RA-32

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

Rationale for Elimination: The Ashland Resource Area BLM decided to defer forest management in stands identified as RA 32 stands at this time. Using the Draft RA 32 Habitat Evaluation Methodology (version 1.3) developed jointly by the Medford Bureau of Land Management, Rogue River-Siskiyou National Forest, and the Roseburg Office of the US Fish and Wildlife Service, BLM wildlife biologists identified areas within the Sampson Cove Forest Management Project that met the intent of Recovery Action 32. About 100 acres identified as RA 32 forest stands were removed from consideration for timber harvest and detailed analysis under the Proposed Action.

Helicopter Logging

This alternative action would have considered helicopter yarding as an option for moving trees from forest stands to landing areas.

Rationale for Elimination: This alternative action would have considered thinning in an additional 800 to 900 acres of forest stands that would have been yarded by helicopter. 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 lower per acre volumes associated with light thinning prescriptions.

No New Road Construction

This alternative would have eliminated all new road construction needed to improve vehicle access for the purpose of managing forest stands.

Rationale for Elimination: The RMP directs that all silvicultural systems (forest thinning strategies) applied to achieve forest stand objectives would be economically practical (ROD/RMP p. 180; PRMP/EIS p. 2-62). The economic feasibility of forest management actions is affected by the ease of access from the forest road system. An alternative that would eliminate all new road construction would have made it uneconomical to manage Unit 3-4. While road construction was not completely eliminated, new road construction was limited to about 500 feet (<0.1 mile).

Diameter Limitation

Imposing a 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 than 20 inches diameter breast height (dbh). This would mean no trees would be cut and removed if they were larger than the specified diameter limit.

Rationale for Elimination: Silvicultural systems prescribed for this project are based on the existing stand structure and species composition compared to the desired stand structure and species composition and the ability, based on site characteristics (soil characteristics, elevation, aspect, etc.) to achieve and maintain the desired conditions over time. There is no management basis for the use of a 20-inch diameter limit to meet the identified needs for the Sampson Cove Forest Management Project. The use of a diameter limit would arbitrarily limit the use of the silvicultural prescriptions to meet the prescribed objectives. Some examples of when the removal of trees greater than 20+ inches is necessary:

- ✓ When a reduction in stand density is needed to improve the growth and resiliency of the remaining trees and where insufficient smaller trees are available to decrease density to necessary levels. In other words, it may be necessary to harvest larger diameter classes, from below, to reach the level of density reduction required to induce the desired response.

- ✓ Where the removal of a particular species is desirable in order to enhance the growth and survival of more desirable species. For example, where Douglas-fir has encroached onto sites where ponderosa pine and sugar pine are more stable in their environment. An unrestricted ability to manipulate species composition is essential to meet silvicultural objectives for desired species composition.

- ✓ Where the management objective is to recruit regeneration into the stand. Openings, large enough to allow sunlight to reach the forest floor are required to promote a new generation of seedling establishment.

- ✓ Where forest pathogens and insects are creating undesirable stand conditions. Arbitrarily imposing a diameter limit could affect BLMs ability to meet treatment objectives designed to control, reduce, or inhibit the adverse impacts of forest insects and disease, such as dwarf mistletoe and bark beetle outbreaks.

- ✓ Where over-stocking has weakened trees causing imminent mortality among those trees considered large. Frequently, where density is high, drought and insects exacerbate forest decline in older stands, thus the removal of dead and dying trees is desirable. This also contributes to a reduction in surface fuel as dying limbs and tops are recruited onto the forest floor fuel bank.

- ✓ Where young tree growth or the growth of shade intolerant species is being compromised by adjacent larger trees. A reduction in stand density, that includes the harvesting of larger trees, is often necessary to promote growth of a younger stand cohort.

An alternative imposing a diameter limit on harvesting trees would not be supported by management objectives, is not required by law or regulation, and would cause the project to fail to meet one or more of the stated objectives and Needs for the Proposed Action. That being said, the Sampson Cove Forest Management Project, does primarily focus on the removal of small diameter trees to retain the larger healthier trees within a stand, although some larger trees may be removed as stated above to meet desired stand densities, species composition, and disease management objectives (see Silvicultural Objectives and Prescriptions (above).

Increased Intensity of Forest Thinning

An increased level of intensity of forest thinning was considered with the intent to reduce relative densities across the forest landscape, strengthen tree vigor, and enhance biological diversity and old-growth forest structure over time.

Rationale for Elimination: By lowering stand relative densities to an optimal growth and yield forest production level, this prescription would have also reduced crown closure to a lower percentage than needed to maintain spotted owl habitat within the home range radius of spotted owl sites. Therefore, an increased level of thinning was eliminated from detailed consideration in forest stands within the home range radius of northern spotted owl sites as it would not have met the project objectives identified in Chapter 1.

Thinning Additional Acreage of Forest Stands

About 1,100 to 1,200 additional acres of forest stands were originally identified for thinning to reduce relative densities across the landscape to strengthen tree vigor and growth, manage forest disease, and to enhance biological diversity and old-growth forest structure over time.

Rationale for Elimination: Some forest stands were already near the target canopy closure level prescribed for northern spotted owl habitat and the amount of thinning allowed would not have been economical. For some stands, additional road construction was needed for unit access that would have traversed northern spotted owl NRF habitat. Road construction through habitat would have lowered the canopy closure to below the desired 60% level. Therefore, some additional road construction and acreage of thinning was dropped from detailed analysis under the Proposed Action.

CHAPTER 3 - AFFECTED ENVIRONMENT AND ENVIRONMENTAL CONSEQUENCES

A. INTRODUCTION

This chapter describes the present conditions of each affected resource, followed by a comparison of the estimated environmental effects of implementing the No-Action Alternative and the 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 Sampson Cove 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 858,127 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 Sampson Cove project is located in the Cascade 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 areas** 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 construction or road improvements are proposed.
>
> **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. Consideration of Past, Ongoing, & Reasonably Foreseeable Actions in Effects Analysis

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

Instead of incurring these exorbitant costs in terms of time and money, it is possible to implement easier, more accurate, and less costly ways to obtain the information concerning the effects 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.)

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

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

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. A watershed analysis characterizes the human, aquatic, riparian and terrestrial features, conditions, processes, and interactions within a watershed including the effects of past and ongoing actions. Knowledge gained through watershed analysis enhances the agency's ability to estimate direct, indirect, and cumulative effects of management activities (Federal Agency Guide to Watershed Analysis p. 1).

The 2000 Upper Bear Creek Watershed Analysis is the result of a coarse filter analysis generally using existing data and information; however, it 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 local land use plans; the link from this site specific project to these broader analyses has been noted where applicable in this Environmental Assessment.

Effects analyses completed for resources potentially affected by the Sampson Cove 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[1]. As discussed above, the current condition assessed for each affected resource inherently includes the effects of past actions.

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

[1] The analyses look at all effects of the proposed action and alternative regardless of whether they are direct or indirect. Direct effects are the impacts caused by the action (activities) that occur at the same time and place; indirect impacts are those impacts caused by the action (activities) but occur later in time or farther removed in distance, but are still reasonably foreseeable. The term cumulative effects denotes the fact that the analyses of direct and indirect effects must not be done in isolation, but in the context of other actions whether from the past, present, or reasonably foreseeable future, and whether human-caused or natural.

B. SOILS

This section discloses potential impacts on soils and soil productivity resulting from ground disturbance associated with the Sampson Cove Forest Management Project proposal. The characteristics of the soils identified in this project and their location on the landscape is on file in the Medford District Office. While this section discloses disturbances resulting in the production of sediments, 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 appropriate scale for measuring soil productivity criteria (compaction, erosion, etc.) is site specific or on a unit by unit basis. The appropriate scale (the analysis area) for measuring erosion or compaction that may affect water quality or quantity would be the 7th level hydrologic unit. Short-term impacts (or effects) are those being ten years or less and long-term more than ten years.

1. Affected Environment

The proposed timber harvest is on the western flank of the Cascade Mountains. The soils in this location have formed in material weathered from igneous rock on plateaus and hillslopes. The topography in the project area consists of slopes between 8 and 55 percent slope at elevation between 3,500 and 5,800 feet above mean sea level. The mean annual precipitation is 30 to 55 inches, the mean annual temperature is 40 to 45 degrees F, and the average frost-free period is less than 100 days. A table of the predominant soils identified in proposed harvest units is listed below followed by a general description. See the soils map (Map 3-1) for location of the soils on the landscape.

Table 3-1. Predominant Soils Associated with Harvest Units

Map Unit #	Soil Series Name	Depth (in.)	Soil Texture	Soil Sensitivity Category
18C,19E,20E	Bybee	60+	Loam, clay loam, clay	3
52C	Dumont	60+	Gr. Loam, clay loam, clay	2
52C	Coyata	20 - 40	Gr. Loam, cobbly clay loam	2
56C, 57E, 57G, 58E	Farva	20 - 40	Very cobbly loam, extremely cobbly loam	2
114G, 116G	McNull	20 - 40	Loam, clay loam, cobbly clay	2
125F, 116G	Medco	20 - 40	Cobbly clay loam, clay	2
125F	McMullin	< 20	Gravelly loam, gravelly clay loam	2
142C	Pinehurst	60+	Loam, clay loam	3
159C	Rustlerpeak	20 - 40	Gravelly loam, stony loam, very cobbly clay	2
190E,191E,19E, 20E	Tatouche	60+	Gravelly loam, gravelly clay loam, clay	2

a. Description of Soils Series

Bybee Series

The Bybee soil is very deep and somewhat poorly drained. It formed in colluvium derived dominantly from andesite, tuff, and breccia. Typically, the surface is covered with a layer of needles and twigs about ½ inch thick. The surface layer is very dark grayish brown loam about 4 inches thick. The next layer is very dark grayish brown clay loam about 6 inches thick. The upper 4 inches of the subsoil is brown clay. The lower 24 inches is light yellowish brown clay. The substratum is light yellowish brown clay about 22 inches thick. The depth to bedrock is 60 inches or more. Permeability is very slow in the Bybee soil. Available water capacity is about 9 inches. The effective rooting depth is limited by a dense layer of clay at a depth of 10 to 20 inches. Runoff is medium, and the hazard of water erosion is moderate. The water table, which is perched above the layer of clay, is at a depth of 1 to 3 feet from December through May.

Dumont Series

The Dumont soil is very deep and well drained. It formed in residuum and colluvium derived dominantly from andesite. Typically, the surface is covered with a layer of needles, leaves, and twigs about 1½ inches thick. The surface layer is dark reddish brown gravelly loam about 9 inches thick. The next layer is dark reddish brown clay loam about 9 inches thick. The subsoil is dark reddish brown clay about 42 inches thick. 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 Dumont soil. Available water capacity is about 9 inches. The effective rooting depth is 60 inches or more. Runoff is slow, and the hazard of water erosion is slight.

Coyata Series

The Coyata soil is moderately deep and well drained. It formed in colluvium derived dominantly from andesite. Typically, the surface is covered with a layer of needles, leaves, and twigs about 1½ inches thick. The surface layer is dark reddish brown gravelly loam about 11 inches thick. The next layer is dark brown very cobbly clay loam about 10 inches thick. The subsoil is dark brown extremely cobbly clay loam about 10 inches thick. Bedrock is at a depth of about 31 inches. The depth to bedrock ranges from 20 to 40 inches. In some areas the surface layer is cobbly or stony. Permeability is moderate in the Coyata soil. Available water capacity is about 2 inches. The effective rooting depth is 20 to 40 inches. Runoff is slow, and the hazard of water erosion is slight.

Farva Series

The Farva soil series is moderately deep, well drained soil on hillslopes. It formed in colluvium derived from andesite, basalt, and volcanic ash. Typically, the surface is covered with a layer of needles, leaves, and twigs about ½ inch thick. The surface layer is dark brown very cobbly loam about 12 inches thick. The subsoil is brown extremely cobbly loam about 15 inches thick. The substratum also is brown extremely cobbly loam. It is about 8 inches thick. Weathered bedrock is at a depth of about 35 inches. The depth to bedrock ranges from 20 to 40 inches. In some areas the surface layer is stony. Permeability is moderately rapid in the Farva soil. Available water capacity is about 3 inches. The effective rooting depth is 20 to 40 inches. Runoff is medium, and the hazard of water erosion is moderate.

McNull Series

The McNull soil series is moderately deep, well drained soil on hillslopes. It formed in colluvium derived dominantly from andesite, tuff, and breccia. Typically, the surface is covered with a layer of needles, leaves, and twigs about 1 inch thick. The surface layer is dark reddish brown loam about 6 inches thick. The upper 6 inches of the subsoil is dark reddish brown clay loam. The lower 20 inches is dark reddish brown cobbly clay. Weathered bedrock is at a depth of about 32 inches. The depth to bedrock ranges from 20 to 40 inches. In some areas the surface layer is stony or cobbly. Permeability is slow in the McNull soil. Available water capacity is about 4 inches. The effective rooting depth is 20 to 40 inches. Runoff is rapid, and the hazard of water erosion is high.

Medco Series

The Medco soil is moderately deep and moderately well drained. It formed in colluvium derived dominantly from andesite, tuff, and breccia. Typically, the surface layer is very dark brown and very dark grayish brown cobbly clay loam about 7 inches thick. The next layer is very dark grayish brown cobbly clay loam about 5 inches thick. The subsoil is brown clay about 18 inches thick. Weathered bedrock is at a depth of about 30 inches. The depth to bedrock ranges from 20 to 40 inches. In some areas the surface layer is stony. Permeability is very slow in the Medco soil. Available water capacity is about 4 inches. The effective rooting depth is limited by a dense layer of clay at a depth of 6 to 18 inches. Runoff is slow, and the hazard of water erosion is slight. The water table, which is perched above the layer of clay, is at a depth of 0.5 foot to 1.5 feet from December through March.

McMullin Series

The McMullin soil is shallow and well drained. It formed in colluvium derived dominantly from andesite, tuff, and breccia. 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. In some areas the surface layer is stony. Permeability is moderate in the McMullin soil. Available water capacity is about 2 inches. The effective rooting depth is 12 to 20 inches. Runoff is slow, and the hazard of water erosion is slight.

Pinehurst Series

This very deep, well drained soil is on plateaus. It formed in colluvium derived from basalt and andesite. Typically, the surface is covered with a layer of needles and twigs about 1 inch thick. The surface layer is dark reddish brown loam about 15 inches thick. The subsoil to a depth of 60 inches is dark reddish brown clay loam. The depth to bedrock is 60 inches or more. In some areas the surface layer is stony. Permeability is moderately slow in the Pinehurst soil. Available water capacity is about 10 inches. The effective rooting depth is 60 inches or more. Runoff is low, and the hazard of water erosion is slight.

Rustlerpeak Series

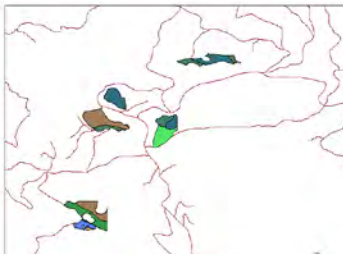
This moderately deep, well drained soil is on plateaus. It formed in colluvium derived from andesite and volcanic ash. Typically, the surface is covered with a layer of needles, leaves, and twigs about 1 inch thick. The surface layer is dark reddish brown gravelly loam about 12 inches thick. The subsoil is dark reddish brown very cobbly clay loam about 11 inches thick. Weathered bedrock is at a depth of about 23 inches. The depth to bedrock ranges from 20 to 40 inches. In some areas the surface layer is stony. Permeability is moderately slow in the Rustlerpeak soil. Available water capacity is about 5 inches. The effective rooting depth is 20 to 40 inches. Runoff is slow, and the hazard of water erosion is slight.

Tatouche Series

The Tatouche soil is very deep and well drained. It formed in colluvium derived dominantly from andesite, tuff, and breccia. Typically, the surface is covered with a layer of needles and twigs about 2 inches thick. The surface layer is very dark brown gravelly loam about 11 inches thick. The upper 8 inches of the subsoil is dark brown gravelly clay loam. The lower 41 inches is dark brown clay. The substratum to a depth of 73 inches is strong brown clay loam. The depth to bedrock is 60 inches or more. In some areas the surface layer is stony or cobbly. Permeability is moderately slow in the Tatouche soil. Available water capacity is about 8 inches. The effective rooting depth is 60 inches or more. Runoff is medium, and the hazard of water erosion is moderate.

Swanson and Dyrness juh1975) estimated the natural erosion rates for soils in the Western Cascade Range to be about 0.19 yd^3/ac/year and erosion rates increased in harvest areas to 0.7 yd^3/ac/yr (in Amaranthus, 1985, p.233). Erosion rates are highly dependent on the intensity and amount of rainfall that a particular site receives in a given time period. Other factors that affect erosion rates are steepness of slope, ground cover, soil particle cohesion and amount/degree of disturbance. The analysis area consists of stable slopes up to 55 percent with a slight potential for landslides. For this reason it is anticipated that erosion rates in the project area to be much less than those reported by Swanson and should not be of concern.

Map 3-1. Sampson Cove Project Area Soils



b. Roads

There are approximately 304 total miles of road in the analysis area of which 92 miles are on BLM. Approximately 88 miles (64 miles BLM) of the existing roads are paved or adequately surfaced with rock. The remaining roads are either natural surface, a jeep road, or information on the surface type is unknown (un-inventoried roads on private land). Many of the designed surfaced roads on private land appear to have been built over ten years ago and are in stable condition but surfacing is below optimum to minimize road related erosion particularly during winter use. Soil loss from a lightly graveled roadbed is about equivalent to loss from an un-graveled one. In contrast, soil loss from fully graveled roadbeds (6 to 8 inches thick) was only 3 to 8 percent of that from the bare soil roadbed of otherwise similar construction (Swift, 1988). In the Swift study, erosion rates from the natural surfaced and minimal surfaced roads were about 1.4 tons/acre/inch rain while the adequately rocked roads yielded less than 0.1 ton/acre/inch rain. Although erosion rates vary depending on site hydrology, soil type, topography, climate, and engineering treatments, these figures provide an example of the relative amount of erosion that may occur.

c. Soil Productivity

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

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

In the Project Area, organic matter is abundant on all sites that are planned for treatment. Most of the organic matter is in the form of trees, shrubs, grasses, and moss. Soil organic matter appears typical for the region with most of the sites having less than ½ inch of litter (leaf and needles). Some sites with a mature forest canopy have a litter layer about 1 inch thick. Except for areas disturbed by roads and trails and sites with gravels and cobbles surfaces, most of the soil in the proposed Project Area has at least a thin ground cover of organic material. On most sites, soil organic matter consumption appears normal with a very thin layer of decomposing matter at the soil and litter layer interface.

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

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

d. Past Actions

An inventory of past actions with harvest dates and units of treatments was made for the Project Area using past harvest records and photo interpretation. Timber harvest records in combination with the operations inventory data were used on land managed by the BLM. A nearly complete harvest data record was available from about 1975 to present. An inventory of harvest activities prior to 1975 on BLM-administered land was estimated using operation inventory records and aerial photo interpretation. The inventory of past harvest activities on private land was estimated using aerial photo interpretation. The aerial photos used were from 1966, 1975, 1980, 1985, 1991, 1996, 2001, and 2005. The past actions were digitized in Geographic Information Systems (GIS) layer and a corresponding database established.

The relevant part of analyzing past actions is determining what events or actions previously occurred, whether current proposals repeat those actions or events, and whether current proposals have similar or different anticipated effects. In addition, past events are manifested in current conditions, the starting point for the addition of cumulative effects. The lessons learned from past actions are that roads were historically poorly designed and located without regard to erosion and sedimentation impacts. Many of the roads have been poorly maintained and have been degraded as a result of use during the wet season. Clearcutting and broadcast burning in the 1980s created highly erosive conditions especially when ground-based yarding systems were used without much regard for the location and number of skid trails, and/or tractor-piling of slash was incorporated. These sites have been re-established with vegetation and, save for roads, erosion rates are near natural levels.

It is estimated that of the approximately 20,000 acres of forested land associated with the analysis area, more than 13,000 acres has had some type of timber harvest in the past. Approximately 80 percent of the past harvest in the analysis area was accomplished using ground-based tracked equipment. A lot of the harvesting before the 1970s was in the form of single tree selection or group selection taking out the biggest and most valuable trees. During the 1970s through the 1980s clearcutting was implemented which was often followed by broadcast burning of the logging slash on the site. Starting around 1980 on BLM-managed land, tractor harvesting was restricted to designated skid trails that would impact about twelve percent of the harvest area. There has been about 760 acres of tractor logging on designated skid trails in the past. It is estimated that unrestricted tractor logging resulted in about twenty-five percent of the area being compacted. It is estimated that most of BLM-administered land in the analysis area has been tractor logged in the past with 65 percent occurring before 1980. Save for random salvage harvest, there has not been any commercial trees harvested on BLM-administered land within the analysis area in the last 10 years. Timber harvest on non-federal land has been minimal in the last ten years in the analysis area with the last notable harvest being around 1994.

Many studies have shown that compacted soils often have characteristics that are generally considered unfavorable for plant growth. These characteristics include high bulk density and reduced porosity, aeration, and drainage. Root penetration and growth is often decreased in soils of high density, since the relatively high strength of these soils offers physical resistance to expanding root systems. Supplies of air, water, and nutrients that roots need can also be unfavorably changed when compaction decreases soil porosity and drainage (Adams and Froehlich, 1981, p.5). In studies comparing tree growth on compacted sites from the time they were seedlings, Powers1974) estimates a 40 percent reduction in volume growth on heavily compacted sites while Perry (1964) found approximately 50 percent less cubic volume in trees growing on compacted sites (Froehlich and Berglund, n.d., p.3). In western Oregon, ***p. menziesii*** growing in moderately compacted soil (10 to 40 percent of the rooting area compacted) were reduced an average 17 percent, whereas trees growing in heavily compacted soil (more than 40 percent of rooting area compacted) lost 27 percent (Froehlich 1979). Basal area growth for the entire stand was estimated to be reduced 5 to 13 percent, depending on the proportion of area compacted.

Persistence of compacted soil and, presumably, long-term consequences of compaction for tree growth depend on the severity of the initial compaction, the ability of the species to cope with compacted soils, and rates of processes that de-compact the soil. Recovery processes vary greatly with soil texture and clay type, and their interaction with climatic processes such as cycles of freezing-thawing and wetting-drying. When soil compaction occurs under western Oregon conditions it is likely to be a long-term impact. A study in Evans Creek (Jackson County, OR) suggests that the granitic soils will take from 35-40 years to recover from natural forces (Froehlich, n.d.).

Of the area proposed for harvest, about 164 acres were previously logged using a cable system and the rest was harvested using tracked equipment. It is estimated that about 12 acres of past tractor harvest was on designated skid roads and the rest was unrestricted.

2. Environmental Consequences

a. Alternative 1

The effect of the No-Action Alternative on the soil resource would be the continuance of existing erosion rates coming from the current conditions throughout the analysis area. Erosion rates are near natural levels throughout the analysis area except for areas where roads and trails exists. The units that were harvested in the past have stabilized with vegetation and erosion rates back to near natural levels. There is no way to be certain that possible future actions will occur on private land but it is presumed that all private lands having timber of commercial value would be harvested in the near future (<10 years). There is at least 5,700 acres of private land with trees that could be commercially harvested. These actions would increase the amount of compacted acres in the drainages possibly affecting peak flows. A discussion of the effects that future harvest, compacted acres and roads has on sedimentation in local waterways is included in the Water Resources section.

The risk of catastrophic fire in the drainage is projected to increase (see Fire/Fuels section) if no action is taken to reduce the fuel loading. An active fuels management program over the past five years has offset some risk but almost a century of fire exclusion has occurred in this area and, consequently, "natural" conditions no longer exist. Fuel loadings in some areas are 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, uncontrolled natural burn (wildfire) could be of such intensity as to severely increase erosion and sedimentation, and severely set back the community of microorganisms. Following wildfire, erosion susceptibility is increased in response to increased soil moisture from decreased evapo-transpiration (Silva et al., 2006), increased displacement of soil particles from decreased vegetative interception of rain (Anderson and Brooks, 1975), and formation of a hydrophobic soil layer in some instances that decreases water infiltration into soil (Brady 2001). When compared to the Proposed Action there would be no increase in erosion rates short-term but long-term erosion from roads would increase due to lack of road maintenance and the risk of a catastrophic wildfire would increase as a result of the no action alternative.

b. Alternative 2

There is about 0.1 miles of road construction proposed under the Proposed Action and the road would be natural surface, used during the dry season and mulched/seeded after use. Road construction would have the greatest impact on the soil resource as approximately 0.6 acres of land would be disturbed and taken out of vegetation production. There would be a noticeable increase in soil erosion the first few substantial rain events after construction. Erosion rates from roads and landings on the Cascade geomorphological unit (similar to that of the Project Area) were reported to be about 9.36 yd^3/ac/yr (Swanson and Dyrness (1975) in Amaranthus et al., 1985; p. 233). This total includes mass slope failures from roads and landings on unstable slopes in calculating the number. Because most of the newly proposed road construction would be located on stable slopes (20%) it is anticipated that, under average rainfall conditions, the erosion rates would be less than one-half of those reported by Swanson (<4 yd^3/ac/yr) the first few substantial storm events after construction and decrease down to about 3 times natural rates after 3 years. Typically, newly constructed roads lose the most soil primarily during the short period before grass becomes established and/or the roadbed is graveled or compacted.

Since the new construction is temporary road on fairly flat ground, it is anticipated that soil erosion increase would only be noticeable the first rainy season following construction. BLM road 39-3E-32.1 would be a reopened road that was previously built, closed and naturally decommissioned.

This previously closed road would have similar disturbance as that of a newly constructed road along the road prism (15' width). It is estimated that about 2 acres of disturbance would occur for every mile of road reopened, used and closed. Currently the erosion from this previously closed road is natural rates. Again, most of the noticeable soil erosion would occur during the first few rain events after reconstruction and use.

There are 43 landings proposed to be used during the timber harvest. All but two of the landing currently exists along roads. The two new landings would be constructed for units 3-4 and 15-3. The construction of one landing areas would disturb about one-quarter acre. The new landings would be surfaced with rock or seeded and mulched before the winter rains. Potential erosion from the proposed new landings would be less than twice the natural erosion rate immediately after construction and regress back to near natural rates within three to five years. This small increase in erosion rates is predicted due to the gentle topography of the landscape and that all landings would have some type of surfacing before or immediately after use.

Soil disturbance from timber harvesting may not be avoidable, but can be minimized. Preventative measures are more effective in minimizing impacts on soils than remedial mitigation because of the remedial expenses, loss of productivity until mitigation occurs, and the possibility that the original soil conditions may not be restored (Miller et al., 2004). The commercial timber harvest activities planned in the Proposed Action would disturb, on average, about 15 percent of the ground in the proposed harvest units. As a result of implementing designated skid trails, the units tractor logged would result in approximately twelve percent or less of the area compacted (USDI, 1995. p.156).

Designating skid trails would most likely reduce the area that would be deeply disturbed during tractor logging operations. In a study on partially cutting using designated skid trails conducted by Oregon State University (Bradshaw, 1979), designated skid trails occupied only four percent of the area compared to 22 percent for conventional logging. In a study of thinnings and partial cutting by yarding systems, skidding logs caused soil disturbance on about 21 percent of the site resulting in 13 percent displacement and 8 percent compaction (Landsberg, 2003; p.29). Observations of the units proposed for harvest reveal many old skid trails still apparent across the landscape. Tree and brush vegetation has been slow to re-establish in some of the skid trails as a result of the compaction from past harvesting.

Short-term erosion rate potential would increase moderately (15-50% over undisturbed rates) in the tractor units where slopes exceed 20 percent and where the skid trails are not on the contour. The decrease in soil pore space, as a result of the compacted skid roads, causes a slower infiltration rate and larger amounts of sediment laden 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. Although erosion rates would increase in the harvested units, most soil particles would not reach local waterways under normal rainfall conditions and return to near normal rates usually within 5 years as vegetative cover is re-established. In most operations, a major portion of the harvest area would remain essentially undisturbed. Even logging systems that cause the most disturbances seldom bare more than 30 percent of the soil surface. Since surface erosion depends primarily on extent and continuity of bare areas, soil loss is usually slight (Rice, 1972).

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 as such sites were screened through the Timber Productivity Capability Classification process (USDI, 1994, page 3-85) and taken out of the timber harvest base.

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 would generally only char the litter, leaving most of the mineral soil at least partially covered. A moderate burn would result in the duff, rotten wood, or other woody debris partially consumed; mineral soil under the ash not appreciably changed in color.

Most soil and ash movement occurs during the first rainy season after the slash is burned and quickly diminishes as vegetation cover re-establishes. A recent study concluded that prescribed restoration fires did not have a significant effect on soil solution and stream chemistry or stream sediment concentrations and that low-intensity, low-severity fires could be used effectively as a tool to restore vegetation structure and composition (Elliot, 2005. p.5).

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

Duff and woody debris represent a storehouse of minerals and protection for the soil surface. Since Nitrogen losses are roughly proportional to the amount of duff consumed, burn prescriptions that allow greater retention of woody debris benefit long-term site productivity. Burning volatizes organic Nitrogen or changes it into a readily available form (for plant use). Large proportions of the total Nitrogen budget can be lost through volatilization in the sites where pile burning occurs. Total foliar Nitrogen content 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 (<15%), negative decrease short-term effects but potential long-term positive effects would be realized from the proposed actions as the risk of catastrophic fire is diminished.

In summary, there would be a net increase in compacted area in the tractor harvest units averaging about 12 percent which would slightly decrease soil productivity long-term. Based on research and past monitoring of operational activities, it is assumed there would be a 5 percent loss of productivity on all lands that would be tractor harvested using designated skid trails. The loss is accounted for in the (Medford District) non-declining timber harvest calculations (PRMP/EIS 1994. p.4-13). Soil productivity would experience a slight (<15%), negative decrease short-term but potential long-term positive effects would be realized by thinning and prescribed fire. There would be a slight to moderate (15-50%) increase in erosion rates as a result of the combination of harvesting timber and fuel reduction activities (i.e., slashing, prescribed burning) which would last about three to five years. A slight cumulative long-term increase in erosion rates would occur as a result of road building.

Cumulatively, there is currently little direct evidence to indicate that harvest removals in themselves lead to soil depletion over several succeeding rotations (Beschta, n.d.). A crucial aspect that affects soil productivity is cutting intensity. Cutting intensity means the proportion of standing trees harvested, i.e., clearcutting vs. shelterwood vs. selection cutting. The less intense the cutting intensity results in lower effect on the soil. Another critical aspect of a silvicultural regime is the rotation or cycle length. Rotation length determines the intervals at which the site is entered and disturbed and nutrients are removed, redistributed or lost. Rotation length is especially significant from the point of view of cumulative effects since it determines the time periods allowed for recovery between harvests. Soil productivity decline should be least likely when low silvicultural intensity is combined with high inherent productivity and favorable conditions.

Soil erosion may prove cumulative through time if periodic disturbances occur (that result in soil leaving the site) at intervals too short for the site to stabilize to bring about recovery. This should not be the case as a result of the Sampson Cove Project as soil disturbance would not result in a significant amount of soil leaving the site and erosion rates would return to near normal within about five years. Most past harvest that had a substantial affect on soil erosion rates was over twenty years ago and most sites have recovered from those events. Therefore, cumulative effects to the soil resource as a result of the timber harvest would be minimal if the soil resource is allowed enough time to recover from the disturbance of this project.

C. WATER RESOURCES

A watershed analysis provides general water resources background information for the Project Area. This document is titled the *Upper Bear Creek Watershed Analysis* (USDI 2000).

1. Analysis Area Description

The Sampson Cove Forest Management Project proposal is located in the southeastern portion of the upper Bear Creek watershed, which is a tributary to the Rogue River. The Project Area is smaller than the analysis area and for purposes of analyzing the affected environment and the proposed project, specifically cumulative effects; the analysis area for water resources will consider Walker Creek and portions of Upper and Lower Emigrant Creeks.

These are called sub-watersheds and represent 6th field hydrologic unit codes or HUCs. The total size of the analysis area is 34,313 acres or 54 square miles. These sub-watersheds are further subdivided into 7th field HUC's called drainages which range in size from 729 to 4,724 acres (Table 3-2). 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 drainages, 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. In the case of the Walker Creek sub-watershed, some drainages not containing proposed harvest units will be analyzed.

Alternately, there are two 7th field HUCs where portions of two harvest units cross drainage boundaries. These drainages are located within Dead Indian Creek (0509) and Keene Creek (0512). There are approximately 16 acres proposed within Dead Indian Creek, which is a tributary to South Fork Little Butte Creek and eventually the Rogue River. Approximately 6 acres of harvest is proposed within Keene Creek, which is a tributary to Jenny Creek and eventually the Klamath River. Harvest within these two drainages is on relatively flat ridgetop topography, will not reduce canopy cover below 30 percent, and no new road construction or reconstruction is proposed. Therefore, this analysis does not include those drainages.

2. Affected Environment

The analysis area is within Jackson County and is a mix of public and private land (Table 3-2 and Map 3-2). Private lands make up the majority of the analysis area. BLM parcels are scattered throughout the foothills and along the crest of the mountains that define the boundary between the Rogue and Klamath basins in the southern Cascade Range. The affected sub-watersheds are Walker and Upper and Lower Emigrant Creeks. The headwaters originate southeast of Bear Creek are flow westward towards their confluence with Bear Creek. Elevations range between approximately 1,900 feet to over 5,900 feet at the top of Grizzly Peak. The headwater areas of these catchments are steep and forested. As they flow westward, the steep mountains abruptly transition to gentle foothills then lowland valleys where they eventually flow into Bear Creek.

a. Climate

The climate is characterized by mild wet winters and hot dry summers. Average annual precipitation ranges from approximately 22 inches in the lower elevations to 44 inches at Grizzly Peak. Winter precipitation in the higher elevations usually occurs as snow, which ordinarily melts during the spring runoff season from April through June. Rain predominates in the lower elevations with a mixture of rain and snow occurring between approximately 3,500 feet and 5,000 feet in what is referred to as the transient snow zone. Rain on snow runoff events originate in this zone and when they occur can trigger landscape altering responses such as floods, debris torrents and landslides.

Summer rainstorms occur occasionally and are usually of short duration and high intensity. These types of events are usually limited in coverage but can result in increased erosion and sediment deposition.

b. Land Ownership

Private lands within the analysis area are generally used for ranching and residential parcels. There are scattered lands in the upland areas that are owned by private timber companies and managed for timber production. Public lands are almost entirely managed by the BLM and are primarily used for timber harvest as well as recreation, which is a significant use on public lands in the analysis area. Regional public issues reflect the dominant uses of the analysis area and include concerns with recreational activities such as use of the Pacific Crest Trail (PCT) and off-highway vehicle (OHV) use; concerns with timber harvest and grazing on private and public lands; concerns about fish and water quality; concerns regarding Siskiyou/Cascade ecological linkages and diversity; and concerns over general degradation of the natural environment.

c. Hydrology

As a result, the hydrology of the analysis area has been altered through irrigation withdrawals, roads, grazing, stream alteration, and other actions. The effects are particularly evident in the lower more developed portions of the watershed where the stream channels are characterized as depositional. In the upper portion of the watersheds, the impacts and effects are primarily related to roads, timber harvest, and grazing. Streams in this area are considered transport channels, whereas sediment is routed through these reaches only to be deposited in lower gradient depositional reaches.

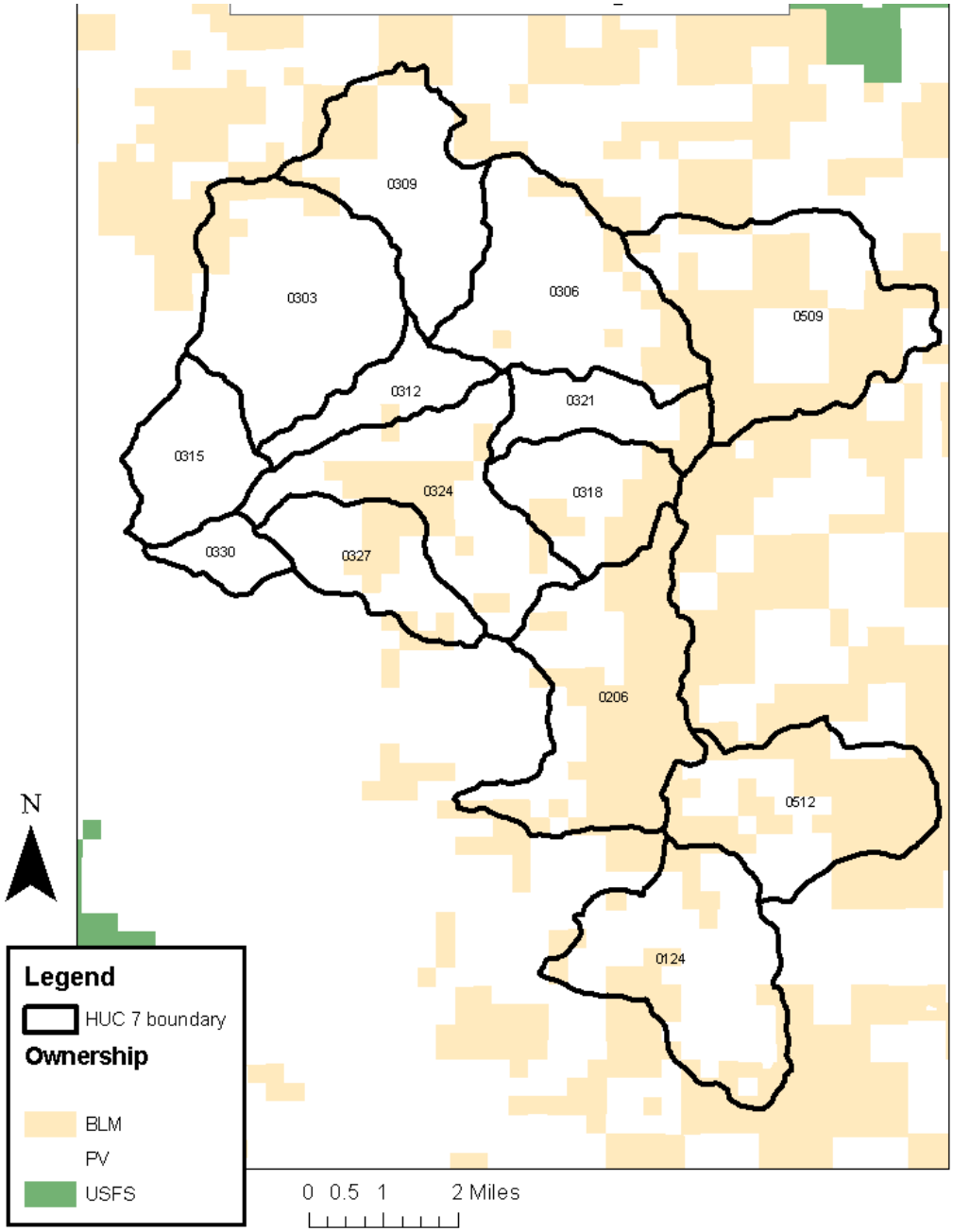
d. Water Quantity and Quality

The major factors currently influencing both water quantity and quality within the analysis area where harvest is to occur include canopy cover, roads, and riparian grazing impacts. Reduced canopy cover within the upper forested portion of the drainages that are less than historic can alter the amount and timing of streamflows. This may result in increased channel erosion and morphological changes to the stream channels. Roads, trails, and clearcut logging, can accelerate erosional processes and result in increased turbidity and sedimentation. This too can result in adverse impacts to aquatic habitat and organisms, including fish. Grazing along streams and within meadows can elevate stream temperatures and accelerate erosion by reducing streamside shade and altering channel form and process.

Table 3-2. Analysis Areas and Ownership Associated with Sampson Cove Project Area

Sub-Watershed	HUC 7 (drainage)	Acres	BLM (percent)	Private (percent)
Walker Creek	0303	4,614	12	88
	0306	4,165	19	81
	0309	3,246	20	80
	0312	1,309	3	97
	0315	1,928	0	100
	0318	2,112	35	65
	0321	1,534	20	80
	0324	3,692	29	71
	0327	2,053	29	71
	0330	729	0	100
	Total	25,382	16	84
Lower Emigrant	0206	4,724	67	33
Upper Emigrant	0124	4,207	30	70
	Total	34,313	22	78

Map 3-2. Analysis Area Displaying 7th Field HUC's and Ownership



Recent research (Reid and Dunne, 1984: Luce and Black, 1999) supported by local and regional field evaluations have consistently found roads to be the primary source of accelerated erosion in wildland watersheds. Roads impact aquatic systems through both chronic and episodic erosion. Chronic erosion is where material is detached and transported to streams via the road surface and drainage structures such as cross drains and inboard ditches. This occurs in response to precipitation events throughout the year. Episodic erosion usually occurs as a result of intense rainfall and rain-on-snow events within the transitional snow zone. Large failures often occur as a result of culvert plugging, stream diversion and fillslope landslides. In addition, where road densities are high, concentration and routing of stormwater may result in increased peakflows. Both road density and the number of stream crossings are gross indicators of the level of road impacts in watersheds. High road densities, greater than 4.0 miles per square mile, are found in the majority of drainages within the analysis area (Table 3-3).

Although road density is a useful indicator, it should be noted that not all roads impart similar effects. For instance, the magnitude of impacts from roads on steep slopes is different than those from roads located on flat terrain. Roads located near streams and road stream crossings are responsible for the majority of sediment delivered to channels. Within the analysis area, many roads are unsurfaced and located within Riparian Reserves. In addition, some native surface roads are open during the rainy season. This type of use can render drainage features ineffective and result in concentrated flow and increased erosion. Of the two drainages (0306 and 0330) with the highest road densities, BLM managed lands account for 19 and 0 percent of total ownership, and of the total number of road/stream crossings, 216 or 28 percent are located on BLM managed land.

e. Sedimentation

Currently, in the upper portions of the analysis area, roads and grazing have been the largest source of sediment delivery to streams and subsequent negative impacts to aquatic habitat. Although some road work has been accomplished, many crossings are susceptible to failure through culvert plugging and stream diversion. Other road segments are unsurfaced, steep, lack adequate drainage, or are located within close proximity to streams. Lack of road maintenance or improper road maintenance by all jurisdictions within the analysis area has increased sediment production or the potential for sediment production. There is also an expanding network of OHV trails. These features often utilize old road beds or are established through repeated off-road travel, or illegally constructed by proponents. They exist on the landscape irrespective of sensitive soils, adequate drainage, or proximity to watercourses and are also responsible for increased sediment production.

Table 3-3. 7th Field Road Densities and Crossings for All Roads within the Analysis Area

Catchments	HUC 7 (drainage)	Road Density (miles/square mile) [1]	Road/Stream Crossings (perennial, intermittent, ephemeral)
Walker Creek	0303	1.9	49
	0306	5.8	127
	0309	4.3	69
	0312	4.5	19
	0315	5.2	27
	0318	5.0	73
	0321	4.0	21
	0324	4.5	92
	0327	4.3	33
	0330	5.6	23
Lower Emigrant	0206	3.3	134
Upper Emigrant	0124	4.8	109

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

The major tributaries in the Emigrant and Walker Creek sub-watersheds, which comprise the 7th field HUCs analyzed, have steep gradients, usually greater than 10 percent. The channels are entrenched with steep sideslopes. Material is quickly moved through these reaches and deposited within the lower reaches as the gradient flattens. In the case of Upper and Lower Emigrant Creek, what is not deposited along its limited floodplain ends up in Emigrant Reservoir. Evidence of relatively high levels of sediment has been observed in some stream reaches within the analysis area. Substrate measurements of Sampson and Upper Emigrant Creek indicate a high percentage of fine sediment (20-40 percent). This is likely higher than historic conditions and is a result of the level of disturbance in the watershed above this point. Not all streams have been surveyed for all parameters and based on recent field observations, conditions are highly variable and site specific throughout the analysis area.

f. Transient Snow Zone/Peak Flow

Historically, geomorphic processes that shape landscape and channel geometry are triggered by large, infrequent storm events. In recent times, these events can be characterized by warm moist storms that result in high intensity, long duration rainfall. The results can be intensified when rainfall occurs on an established snowpack. The percent of a watershed in the transient snow zone (TSZ), roughly an elevation band between 3,500 and 5,000 feet, can indicate elevated risk of adverse impacts. These impacts can be accelerated by modifications to forest canopy cover and as discussed, roads and other disturbance features. Drainages where TSZ compromises greater than 25% of the drainage area are of hydrologic concern, particularly where large openings such as clearcuts exist. The transient snow zone occupies 51 percent of the Walker Creek subwatershed, 71 percent of the Sampson Creek drainage (0206), and 75 percent of the Tyler Creek drainage (0124). Large areas of vegetation removal in the transient snow zone are of particular concern due to alterations of the streamflow regime and resultant increased peak flow magnitudes (Christner and Harr, 1982). There are areas of private timberlands within both catchments, including some clearcuts. In addition, large areas of the analysis area both within and outside of the TSZ are comprised of other open areas such as meadows and grasslands. Considering these factors, drainages and subwatersheds within the analysis may be at an elevated risk for increased peak flows.

Table 3-4. 7th Field HUCs Less Than 30% Canopy Cover and Percent within the TSZ

Subwatershed	HUC 7 (drainage)	Percent Forested Area Less Than 30% Canopy Cover [1]	Percent Within The Transient Snow Zone
Walker Creek	0303	8.2	53
	0306	12.1	73
	0309	4.4	88
	0312	0.0	18
	0315	0.0	6
	0318	12.9	80
	0321	16.1	71
	0324	16.3	71
	0327	19.5	54
	0330	0.0	0
	Total	9.0	51
Lower Emigrant	0206	12.1	71
Upper Emigrant	0124	20.0	75
	Total	10.1	55

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

Modifications of canopy cover that result in less than historic conditions either through fire or timber harvest, also may affect the timing and volume of streamflow. An assessment of percent canopy cover is also useful in determining potential cumulative effects of the proposed activities. In the analysis area, the Ecoregion Description (Watershed Professionals Network 1999: Appendix A) lists historic canopy closure as greater than 30 percent, with the exception of the oak woodland/ lowest elevations which historically had less than 30 percent canopy closure. An analysis of percent canopy cover of forested land at the 7th field HUC was conducted. This scale is where detectable changes in peakflows would likely occur. The previous table summarizes percent of the drainages that are below 30 percent canopy cover and percent in the TSZ.

Different levels of harvest in watersheds have demonstrated variable effects on peak flows (Jones and Grant 1996; Harr 1979). When less than 25% of a watershed is harvested, no detectible change in peak flows have been observed (Stednick 1996). It should be noted the majority of literature available regarding the relationship between harvest and flow have focused on clearcut harvesting, many in areas that removed close to 100% of the overstory canopy.

For this analysis, any area that is less than the historic 30 percent canopy cover is assumed to be hydrologically altered and responds similar to a clearcut. In contrast, any drainage that is above 25 percent harvested may be at an elevated risk of increased peakflows. This is particularly true if a large percentage of the drainage is located within the TSZ. Although large areas of non-forested grasslands and other open areas exist within the analysis area and many of the drainages in Table 3-4 above have large percentages within the TSZ, none are approaching the 25 percent harvested threshold that may alter timing and increase the potential for peakflows.

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

g. Surface Water

Surface water in the Sampson Cove analysis area includes streams, ditches, springs, wetlands, and reservoirs. Streams in the analysis 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 requirements for streams needing Riparian Reserves because they lack the combination of a defined channel and annual scour and deposition (USDI 1995:27). Streams on private forest lands are managed according to the Oregon Forest Practices Act. Stream types on BLM-managed lands were identified through site visits; Forest Service and non-federal land stream types were estimated using aerial photo interpretation and extrapolation from information on adjacent BLM-managed lands. Table 3-5 summarizes stream miles within each HUC. Mileages include perennial, intermittent, and ephemeral (or short duration intermittent).

Stream channels in the analysis area have been heavily influenced since the arrival of Euro-American settlers. This is particularly true in the lower, more developed portions of the watersheds, especially where dams and water transfers have altered flow regimes. The most significant change which occurred downstream of the analysis area was the construction of Emigrant Dam and Reservoir. Within the analysis area, the interbasin transfer of water from Jenny Creek (Klamath Basin) to Emigrant Creek (Rogue Basin) directly impacts Schoolhouse Creek, a tributary to Tyler Creek. Schoolhouse Creek has experienced severe channel erosion as a result of its use as a diversion channel for water transported from Howard Prairie Reservoir.

Table 3-5. 7th Field HUC Stream Miles, BLM and Other

Subwatershed	HUC 7 (drainage)	Stream Miles		Total Miles
		BLM	Private	
Walker Creek	0303	5.8	43.1	48.9
	0306	7.7	39.6	47.3
	0309	5.4	26.5	31.9
	0312	0.1	10.9	11.0
	0315	0.0	11.9	11.9
	0318	8.6	14.9	23.5
	0321	2.5	12.1	14.6
	0324	7.5	24.5	32.0
	0327	6.8	9.9	16.7
	0330	0.0	5.5	5.5
	Total	44.4	198.9	243.3
Lower Emigrant	0206	40.1	19.1	59.2
Upper Emigrant	0124	12.1	32.4	44.5
	Total	96.6	250.4	347.0

Large numbers of cattle and sheep were introduced in the area in the mid 1800s and heavy livestock use continued until the early 1900s. They tended to concentrate along stream courses and likely caused streambank deterioration as they moved in and out of channels. Livestock grazing is currently occurring on both public and private lands in the analysis area. Beginning in 1851, mining scoured out and re-deposited gravels on some channels. As mining tapered off, logging and land clearing for agricultural use resulted in the removal of large woody material from stream channels in addition to removal of streamside trees. In some reaches, there continues to be an apparent lack of large wood available today. As a result, floods can be more destructive without sufficient instream structure to reduce stream energy. As more streambank erosion occurs and streams downcut, the channels become more entrenched. This also reduces channel diversity necessary for sustaining aquatic species.

Within the upper watersheds where harvest is proposed, the primary concerns are lack of riparian shade and large wood recruitment from grazing and past harvest activities. Also, as discussed previously, elevated sediment and turbidity levels are occurring as a result of an extensive road network and other disturbances such as OHV use. Summer water temperatures for Emigrant and Tyler Creeks exceed the State temperature criteria and it is currently designated as water quality limited and on the 1998 and 2002 Oregon 303(d) list. Walker Creek is designated as water quality limited for temperature for the period of 10/1-5/31.

Most of the warming can be attributed to channel alterations, loss of riparian shade, water withdrawals, and irrigation return flows in the lower watershed. Within the upper watershed, impacts affecting temperature are from past logging and grazing. Stream temperatures on Federal lands are expected to improve as Riparian Reserves promote the maintenance and improvement of streamside vegetation on BLM administered lands.

h. Fuel Loading

Within the forested portions of the watersheds, fuel loading beyond historic conditions has increased the potential for high intensity wildfire. Although humidity's are generally higher, given the right conditions some riparian areas are susceptible as well. High intensity fires can burn off the canopy and duff layers that protect soils from erosive and gravitational forces. A high intensity wildfire along the steep, stream-adjacent sideslopes would increase the potential for debris torrents and surface erosion. These impacts are often severe and may persist for long periods of time.

i. Ground Water

Groundwater supplies in the analysis area are primarily found in valley bottom alluvium of the Bear Creek corridor. 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 Medford District PRMP/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). None of the proposed Sampson Cove Project Area has been identified as a critical groundwater area by the Oregon Water Resources Department (OWRD 1989).

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 Sampson Cove Project proposal. Discussion for Alternative 2 reflects the direct and indirect impacts of the proposed actions. Effects discussion also includes cumulative impacts of those direct/indirect actions when added incrementally to actions past, present, and reasonably foreseeable. Short-term effects are defined as those lasting ten years or less and long-term effects last more than ten years (USDI 1994:4-4).

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

Future timber harvest on private lands would likely occur within the analysis area and it is assumed that it will continue at a similar rate as has occurred in the past. Private lands are governed under state forestry regulations, and as such receive a different level of protection than federal lands. Analysis of effects from private timber harvest generally considers the worst case scenario (i.e., all suitable forested lands would be logged at ~ 60 year tree-growing rotations) with regeneration harvest and road building as the predominate effects.

Currently, approximately 7,654 acres of private timberland within the analysis area is predominantly 60 years old or older and available for harvest. The drainages with the highest number of those acres are 0306 and 0309 which contain 1,688 and 1,462 acres respectively. A small amount of timber harvest on Federal land (BLM) is planned within these drainages. The Shale City Salvage project proposes to harvest dead and dying trees on 8 acres. Approximately 0.6 acres of harvest would occur within drainage 0303, while another 3.3 acres would occur within drainage 0309. New ground disturbance would be limited, and no new road construction or reconstruction is proposed. The Proposed Action includes approximately 35 acres of harvest within drainage 0306, and 67 acres within 0309.

a. Alternative 1

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

On BLM managed lands, over time, vegetation recovery within Riparian Reserves would moderate steam temperatures and provide for increased wood recruitment to stream channels. There would be no changes in percent of area in non-recovered (less than 30 percent canopy cover) openings, areas of compacted soil, road densities, percent of area in roads, or number of stream crossings. There would therefore be no changes to the magnitude and frequency of peak flows beyond those which may already be occurring.

In the long term, a high intensity wildfire over part or all of the analysis area may occur. Should this happen, it could drastically alter the surface water and groundwater regime. Immediately after a severe fire, the loss of vegetation would make more groundwater available for streamflow and low summer flows would likely increase. However, the absence of vegetation may also result in an increased risk of higher peak flows and increased erosion.

b. Alternative 2

Direct and Indirect Effects

This alternative proposes various prescriptions of commercial timber harvest, a small amount of new road construction, and the use of 41 existing landings and the construction of 2 new landings. In addition, depending on post harvest conditions, activities may be followed up by fuels treatments that would entail hand thinning, piling and burning.

A new road segment proposed on private land totaling 0.09 miles in length would be located in the Walker Creek sub-watershed (0324 Cove Ck). This road would be located on relatively gentle terrain, and would require little ground disturbance. A culvert with clean rock fill would be installed at an intermittent stream crossing and removed following operations.

All vegetation treatments would maintain an overstory and mosaic of understory vegetation. At least 40-60% canopy cover would be maintained in harvest units, except those units where mistletoe treatments occur. These would resemble clearcuts or regeneration harvest creating canopy openings with between 6 and 25 trees per acre. Because of the limited size (74 acres) and number of these treatments, there would be no appreciable increase (0.4 percent) of percent canopy cover less than 30 percent within the analysis area, specifically the TSZ, which may result in an increase in peak flows. Baseflows would likely remain unaffected as the magnitude of vegetation removal would not significantly reduce transpiration. Since there is no harvest proposed or burning within Riparian Reserves, stream temperatures would not be affected by the proposal and the project would be in compliance with the Aquatic Conservation Strategy (ACS).

Where fuel treatments occur, tree thinning and low intensity under burning and pile burning would retain a mix of hardwoods and conifers, organic duff layer, leaf litter, and coarse wood debris. Collectively these forest components provide nutrients, bacteria and fungi decomposers, and mycorrhizae to maintain long term site productivity. Additionally, fuel treatments would likely occur over a period of years, distributing activity over time.

As described in the affected environment section, sediment levels due to roads, past harvest, grazing and other disturbances is the primary focus of concern. In addition to the small amount of road and landing construction, this proposal includes log hauling and associated road maintenance. This includes ditch cleaning, road blading, and maintenance of drainage features. Log truck traffic, especially on unsurfaced roads, loosens the road surface and makes that material available for transport to channels. When road maintenance is performed improperly or best management practices (BMPs) are not implemented, the potential for sediment delivery to streams increases dramatically. Examples include sidecasting material, undercutting cutslopes, improper disposal of material, and unnecessary disturbance within Riparian Reserves. Luce and Black (1999) found no significant increase in erosion when only the road surface was treated; however statistically significant erosion occurred when road ditches were bladed.

Luce and Black (2001) observed an 87% decrease in erosion and sediment transport from roads in years one and two following road maintenance activities. With this proposal, hauling and road maintenance activities are expected to result in a short term increases in sediment and turbidity. If BMPs are implemented and maintenance activities are properly conducted, these increases are expected to be minor. If transport occurs during high flows, which is likely, the introduced sediment would become an immeasurable fraction of the total sediment load and would not be detectable at downstream locations.

Road construction has the potential to increase sediment production as well. Compared to the existing road system, the amount proposed is minor in extent. New road construction would not measurably increase road density and the compacted area attributed to roads. An indirect affect that is difficult to quantify is OHV use following harvest. In areas not already closed by gates or other measures, OHV use of skid trails and other features such as previously closed roads has been observed. The result is a potential increase of unmanaged OHV trails leading to elevated sediment rates and adverse impacts to soils and other resources. These effects may persist over time.

Within the analysis area, specifically Cove Creek, a locked gate restricts access during most of the year. Elsewhere, light to moderate use is occurring and may increase if project design features (PDFs) specific to road closures are not adhered to.

Actions included in this proposal that have a higher probability of sediment delivery include road use and maintenance, cable and tractor yarding, and road and landing construction. If project design features (PDFs) and BMPs contained in Chapter 2 are implemented properly, there would be little to no additional sediment routed to stream channels. Also, given the small amount of additional compacted area and the small increases in canopy cover less than 30 percent (Table 3-4), there is little probability the proposal would modify the magnitude or timing of peak or base flows.

Cumulative Effects

As described in the affected environment, impacts from roads, recreation, grazing, OHVs, and primarily clearcut logging has altered watershed processes in the upper drainages. In the lower drainages, grazing, roads, and water diversions are responsible for degraded aquatic processes and conditions. This mix of impacts is typical of many of the catchments draining into Bear Creek.

It is expected that reasonably foreseeable future actions including rotational harvest on commercial timberlands that maintain forest conditions in an early to mid seral condition (USDI 1995) and land disturbance attributed to development of private lands will continue. Activities on BLM lands will likely continue to focus on commercial thinning for forest health and fuels reduction projects. Some recovery is expected to occur as previously harvested areas within Riparian Reserves improve shade and large wood recruitment. Grazing impacts on private lands will likely continue to occur at near present levels. On BLM managed lands, environmental analysis is or will be occurring on both the Grizzly and Cove allotments. It is expected that livestock numbers and/or season of use will be modified to reduce grazing impacts in the long term.

Overall, the Proposed Action does not reduce canopy cover below critical thresholds or result in appreciable increases in ground disturbance. These would be the primary catalysts that may trigger synergistic responses. Although the affected drainages and subwatersheds have a relatively high percentage located within the TSZ, the proposal does not appreciably decrease canopy cover that may result in peak flow increases. Additionally, road densities would not increase and there is a low potential for increased erosion and sediment delivery to streams. There would be little to no change from the existing conditions. The proposal maintains watershed, sediment, and water runoff processes and riparian function. In many cases riparian vegetation vigor would improve and any short term sedimentation from road maintenance and haul would become immeasurable in downstream stream reaches.

Although there are both natural and human induced risk factors for cumulative effects, the proposed action is not expected to increase these. Therefore, there are no anticipated cumulative effects to either the Project Area drainages, or the larger subwatersheds.

D. FISH AND AQUATIC HABITAT

1. Introduction

The proposed Sampson Cove Forest Management Project proposal would be located in the eastern-most, upstream portion of the Bear Creek Level 5 Watershed, in the Rogue River Basin. The analysis area for fish and aquatic habitat, from north to south, circles around the uppermost headwater drainages of Walker, Cove, Sampson, and Tyler Creeks. For the fisheries analysis, areas will be discussed by major catchment, defined by areas that drain to distinct fish bearing streams. In the Sampson Cove Project, these catchments consist of Walker Creek, which includes the named channels of Cove and Frog Creeks, and the mainstem and tributaries of Walker Creek itself.

Walker Creek is a direct tributary to Emigrant Creek whose confluence is downstream of Emigrant Reservoir, and as such, the only analysis stream which supports populations of anadromous fish. Other analysis catchments include Sampson Creek, which flows into Emigrant Reservoir, and Tyler Creek, an Emigrant Creek tributary upstream of Emigrant Reservoir. In addition to these analysis catchments, several small units slop over the drainage divide to include the headwaters of Dead Indian Creek, itself a large catchment in the Little Butte Creek Watershed, and in Keene Creek, a Jenny Creek tributary in the Klamath River Basin. The proposed units in each of these catchments would be small (~ 6 acres in Keene Creek, and 16 in Dead Indian), on ridge tops, and would not include any stream channels or dry draws. Because they would not include any channels, these portions of the units would not be hydrologically connected to aquatic habitats, and hence the Sampson Cove Project would have no potential to influence aquatic or fisheries habitats in these streams; as such, Dead Indian and Keene Creeks will not be discussed further in the following analysis.

The mainstems of Bear and Emigrant Creeks are not included within the analysis area, but the Bear Creek Watershed as a whole will be discussed in this analysis, as the Northwest Forest Plan requires that Aquatic Conservation Strategy objectives (see Section E) will be analyzed at the site, drainage, and fifth field watershed scales. However, the primary focus of this analysis will be on the afore mentioned analysis catchments (the site and drainage scales), as it is in these particular streams that potential effects to fisheries resources from this project would be discernable.

Key Fisheries and Aquatic Resources Issues in the Watershed

Scoping (external and internal) generated the following key issues for fish and fish habitat both existing and anticipated under implementation of the Proposed Action:

Riparian areas and instream aquatic habitats in the watershed are currently degraded from a host of past and ongoing activities within the watershed, particularly but not limited to: 1) extensive urbanization and development, especially along the main channel of Bear Creek, has resulted in a high percentage of the watershed now being covered by non-porous surfaces. This has altered run off patterns, which in turn has led to reduced water quality, and physical alterations of aquatic habitat. 2) Extensive road construction has created high road densities and led to increased sediment inputs to aquatic habitat. 3) Demands for water use have led to: construction of dams which may obstruct fish passage; some streams in the watershed being over allocated; diversions and transfer of water into and out of drainage basins; and altered stream flow regimes. 4) Historic and ongoing grazing has resulted in increased erosion and sediment transport to many stream reaches, including those within the analysis catchments. 5) Past timber harvest has reduced riparian canopy cover and the potential for large wood inputs.

Although little quantitative data is available specifically for the Bear Creek Watershed, native fish populations appear to be on a long term declining trend in the Rogue Basin. This trend is likely exacerbated in the Bear Creek Watershed, as it is among the most altered watersheds in the Rogue River basin.

Sediment levels in certain stream reaches within the analysis catchments are currently high enough to be compromising the function and health of both the stream system and populations of aquatic organisms. The Oregon Department of Fish and Wildlife (ODFW) considers fine sediment levels of greater than 20% to be "undesirable" for salmonids. Furthermore, several streams are listed for other water quality deficiencies, including exceeding water temperature standards. Sedimentation from use of roads, and other ground disturbing activities associated with timber harvest has potential to increase sediment levels in stream channels, which could further degrade habitat, as a result of implementing the Proposed Action.

Off Highway Vehicle (OHV) use, particularly in the north western portion of the watershed, is high, with many miles of trails bisecting the watershed. Some OHV trails have been identified as directly contributing to instream habitat degradation. Openings and new roads created by timber harvest operations may encourage increased use by OHVs, potentially further increasing sediment delivery levels to aquatic habitats.

Endangered Species Act

In 1997, the Southern Oregon/Northern California (SONC) Evolutionary Significant Unit (ESU) of coho salmon (*Onchorynchus 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 have been observed in the mainstem of Bear Creek and several of its larger tributaries, and they likely were historically present in lower reaches of Walker, Sampson, and Emigrant Creeks.

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, which includes reaches of Walker, Cove, and Frog Creeks.

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 160' on BLM lands in the Bear Creek Watershed. 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 Proposed Action are presented in Section E of this Chapter.

2. Consideration of Foreseeable Future Actions

Cumulative effects are 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). This section will present other reasonably foreseeable future actions in the analysis area for fish and aquatic resources. 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 Sampson Cove Project will be discussed at the end of this analysis.

Federal Timber Harvest
A small road-side salvage sale, Shale City Roadside Salvage, is currently being reviewed by the BLM. No direct or indirect effects to aquatic habitat are anticipated to occur as a result of this small sale, and hence its implementation would not add to cumulative effects.

Private Timber Harvest
Future timber harvest on private lands would likely occur within the analysis area. The water resources analysis of this EA addresses future timber harvest on private lands, and assumes that it will continue to occur at a similar rate as has occurred in the past, with similar affects to aquatic habitats. 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.

Grazing
Cattle grazing is widespread throughout the analysis catchments, both on private and BLM managed lands. Several allotments on BLM managed lands are up for renewal. The lease renewal process utilizes standards and guidelines which consider effects to aquatic habitat, so at a minimum it is anticipated that no additional degradation to aquatic habitat would result from renewal of the allotments which overlap with the Sampson Cove analysis catchments. A more likely result of the renewal process would be a reduction of impacts, which could be accomplished by such measures as reducing the number or duration of livestock grazing, riparian exclusion, providing off site water, etc.

At present, the management plan for the Cove Creek allotment has largely been developed, and it proposes to split the allotment into two fenced pastures and reduce the season of use. However, the EA prepared for this allotment identified that current erosion rates are unlikely to appreciably change, given that riparian areas would still be subject to disturbances by cattle which target these areas annually. Specific management plans for other area allotments have not been as fully developed at this time, so this analysis will assume that cattle grazing will continue across all ownerships as at present. Cattle grazing in sensitive riparian areas will continue to impact water quality, with chronic episodic inputs of sediment and turbidity occurring to stream reaches adjacent to destabilized and trampled banks. Small springs and seeps are particularly vulnerable to degradation, as these areas often contain suitable browse along with a reliable water source, which both attracts and concentrates cattle to these areas. In areas lacking a large overstory component, cattle browse of riparian vegetation will also add to stream temperature warming.

Future Fuels Treatments
Fuel treatments are tentatively planned within the analysis area. Fuels treatments would leave riparian buffers, require minimal ground disturbance, and would not treat large trees. All check lines would be waterbarred and rehabilitated after ignition operations were completed. Because stream side shade producing vegetation would be buffered, treatments would not lead to increases in water temperature or sediment inputs to channels. Canopy levels would not be reduced by treatments, nor would ground compaction increase; hence peak flows would not be affected. The only effect fuels treatments may have to fisheries resources is a possible increase in ground water storage and subsequent release to streams throughout the dry season. However, any extra water available is likely to be utilized by remaining vegetation before entering stream channels. For these reasons, fuels treatments are not expected to impact fisheries resources, and hence they would not contribute to cumulative impacts.

3. Affected Environment

This section will present baseline conditions in the Bear Creek Watershed and within the analysis area specifically, as well as anticipated effects resulting from this project. The effects of past actions manifest themselves in the current conditions. Effects added on top of these past actions as a result of the Sampson Cove Project, coupled with foreseeable effects from future projects as described above, are the cumulative effects of this project to fisheries resources in the watershed and specific analysis catchments.

a. Fish and Designated Habitat Current Conditions

Bear Creek Watershed
SONC coho salmon, fall Chinook salmon (*O. tshawytscha)*, summer and winter steelhead (*O. mykiss*), and Pacific lamprey (*Lampetra tridentata)* are native migratory fish species present in the watershed. Their potential distribution includes the mainstem of Bear Creek from its mouth to Bounds dam, located roughly 1 mile below Emigrant Dam. The dams are complete upstream passage barriers, though certain fish species may be present above the dam through occasional hatchery plantings conducted by the Oregon Dept. of Fish and Wildlife. There may be a self sustaining population of "landlocked" steelhead in Emigrant Reservoir, as spawning fish have been observed on redds in the larger Emigrant Lake tributaries. It is unknown if these populations originated from descendants of wild or hatchery fish, as the Oregon Dept. of Fish and Wildlife does recycle excess hatchery steelhead into Emigrant Lake to provide recreational fishing opportunities.

In streams draining the Project Area, anadromous fish are currently present only in the Walker Creek catchment, which supports steelhead. They have been found to river mile 4.4 in the mainstem of Walker Creek, to river mile 4.8 in Cove Creek, and to river mile 3 in Frog Creek (ODFW 1999, USDI 2000). Coho have not been described in any of these streams.

Cutthroat trout (*O. clarkii*), sculpin (*Cottus spp.*), Klamath small-scale sucker (*Catostomus rimiculus*), and rainbow trout (*O. mykiss*) are native fish species present in the watershed that do not migrate to the ocean. Distribution of these species extends upstream of Emigrant Lake. Cutthroat and rainbow trout are typically found the farthest upstream, and their distribution in streams draining the Sampson Cove timber sale includes: to river mile 5 in Sampson Creek, and 0.55 in Tyler Creek. They are likely also present in the reaches of the Walker catchment which support steelhead, and rainbow have been described farther upstream (to river mile 5.8) in Cove Creek (USDI 2000). Cutthroat and rainbow trout are present throughout Emigrant Creek high up into its headwater tributaries, including Porcupine and Baldy Creeks.

A host of introduced fish species are also present in the watershed, including redside shiners (*Richardsonius balteus*), large and smallmouth bass (*Micropterus dolomieui* and *M. salmoides*), bluegill (*Lepomis macrochirus*), black crappie (*Pomoxis nigromaculatus*), yellow perch (*Perca flavescens*), and common carp (*Cyprinus carpio)*. These species are primarily found in Emigrant Lake and other impoundments and slower and warmer water areas in lower reaches of Bear Creek.

Bear Creek is used as a migratory corridor for adult and juvenile coho and steelhead to access their primary spawning and rearing habitats located in the larger tributaries. Fall Chinook salmon are mainstem spawners and utilize suitable spawning locations in Bear Creek. Some steelhead and coho likely also spawn in Bear Creek, especially during periods of low flow when access into spawning tributaries is difficult. The mainstem, particularly above the city of Talent, does provides some juvenile salmonid rearing habitat, though poor water quality limits both the quality and quantity of suitable rearing habitat during the summer months in Bear Creek proper.

Bear Creek is considered occupied CCH up to the confluence of Emigrant and Walker Creeks (http://www.streamnet.org/), approximately 4.0 miles downstream of the Bounds Reservoir Dam. NMFS included Emigrant dam on their list of impassible manmade structures when they designated SONC CCH, and they consider reaches upstream of the dam as "…not currently essential to the recovery of…" the SONC ESU, and therefore not CCH (F.R. vol. 64, no. 86, 24049). The reach between Bounds Dam and Emigrant Dam is not specifically mentioned, so this document will consider Emigrant Creek from Emigrant Dam downstream to occupied CCH in Bear Creek as unoccupied CCH. Additionally, as sections of Walker, Cove, and Frog Creeks support anadromous fish, this document will consider these reaches as unoccupied CCH. Table 3-6 (below) and Map 3-3 display fish and fish habitat distribution within the Sampson Cove analysis area.

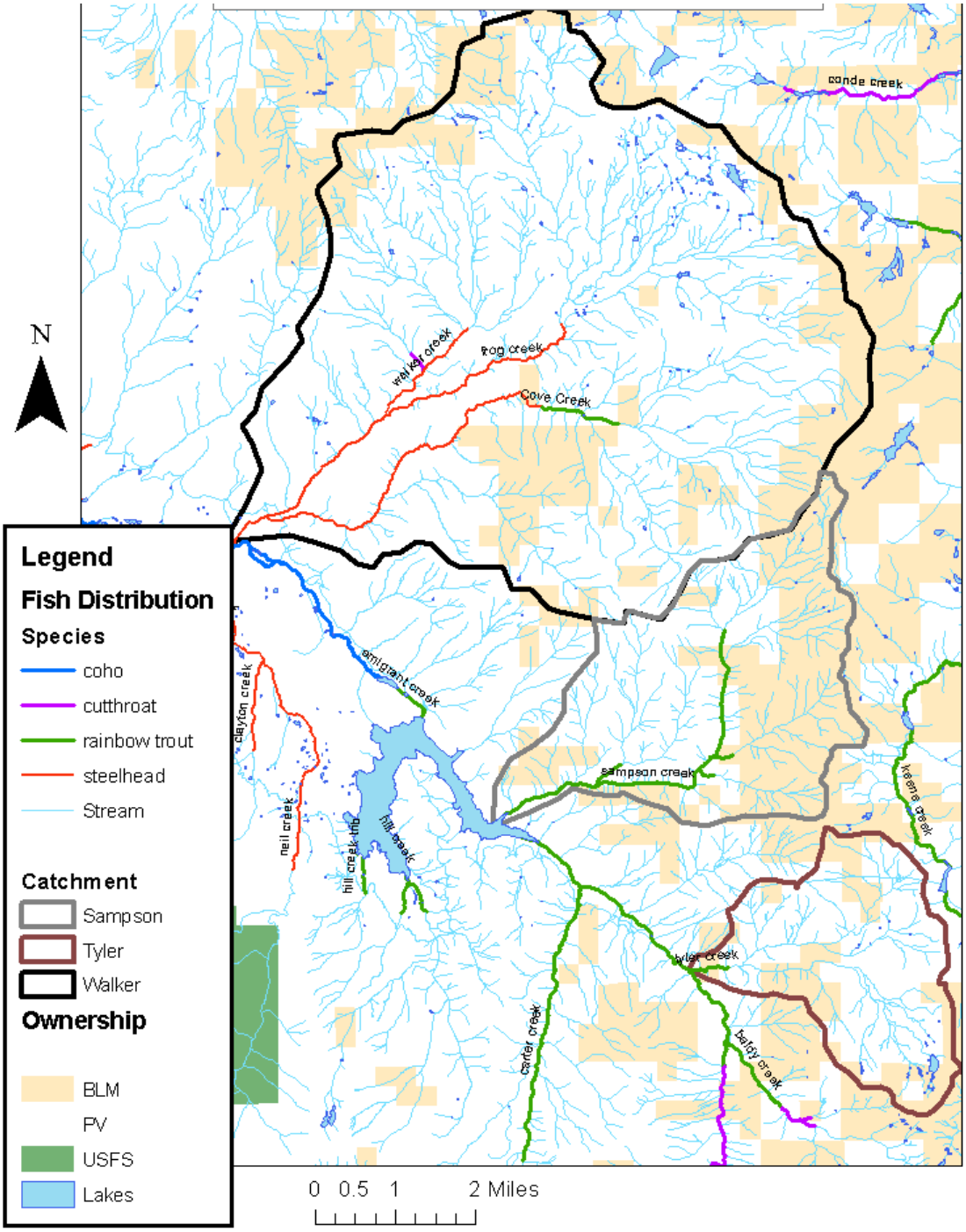
Table 3-6. Known and Assumed Historic Salmonid &Habitat Distribution, by River Mile

Stream drainage	Coho[1]	CCH/EFH[2]	Steelhead[1]	Cutthroat and/or Rainbow Trout[1]
Walker/Cove/Frog	0	12.2	12.2	13.2
Sampson	0	0	0	5.9
Tyler	0	0	0	0.6
Total Fish/habitat Miles	0	12.2	12.2	19.5

1 Observed/recorded distributions. Includes only anadromous populations not blocked by Emigrant Dam.
2 Assumed historic distribution, based on best available information.

Miles have been round to nearest tenth. Data from ODFW (1999) and USDI (2000).

Map 3-3. Fish Distribution in the Sampson Cove Analysis Area



b. Aquatic Habitat Current Conditions

Bear Creek Watershed

Instream habitats in the Bear Creek Watershed as a whole can be described as degraded as compared to pre-European settlement. A host of past and ongoing activities have contributed to this degradation, beginning with the discovery of gold in the area in the middle 1800s. Historic gold mining activities included dredging and placer mining; operations that have left a legacy of disturbed aquatic habitats still apparent in many areas today.

Historic mining practices typically removed large wood from stream channels to facilitate mining operations. Large wood is a key component to healthy stream ecosystems that encourages formation of pools (rearing habitat), helps promote accumulation and storage of gravel (spawning habitat), helps slow stream velocities (reducing bank erosion), and helps capture and store mobilized fine sediment (a harmful component to aquatic organisms in excessive amounts). The result of these operations to aquatic organisms is negatively modified habitats such as less pool and off channel habitats (a critical rearing habitat element) and an increase in riffle and other fast water habitats, an increase in fine sedimentation levels beyond historic levels, and stream reaches prone to subsurface flow due to aggradations of worked tailings. Mining activities were focused in the western half (the Siskiyou Mountains side) of the watershed.

Timber harvest in the watershed began during this same period, as mining operations cleared areas for roads to access mine sites, and to establish structures on. The majority of this early harvest would have been concentrated in the riparian areas, as they were easily accessible, and were the areas of interest to early miners and settlers. As settlement of the area continued, agriculture became the dominant land use of the area, with intense livestock grazing occurring in riparian areas. Forested areas were cleared for livestock, resulting in further reductions of riparian vegetation. Livestock grazing continues to present day, and is a dominant land use in much of the analysis area catchments.

As the population in the Rogue Valley increased, the cities of Ashland, Talent, Phoenix, Medford, Jacksonville, and Central Point were established. These cities, all within the Bear Creek Watershed, represent the highest concentration of people in the entire Rogue Basin. The majority of the stream corridors and lowland areas in the Bear Creek Watershed have largely been settled, and urban/residential/agricultural use has become the dominant land use for the valley bottoms in the Watershed. Roads, businesses, and residences parallel the majority of the fish bearing streams, resulting in many instances to confinement of stream channels. The high amount of paved surfaces and buildings has resulted in reduced infiltration and storage of water, and increased run-off rates.

Water demands have resulted in the development of numerous water works, including Emigrant, Hosler, and Oak St. dams, and many smaller storage and diversion dams on the mainstem and tributaries of Bear Creek. The demand for water in the watershed is so great, that water from other basins and subbasins (Klamath and Applegate) are diverted into Bear Creek. Increased population in the watershed has led to increased pollution as well. Inputs of petrochemicals, pesticides, fertilizers, waste water, etc. impact water quality in the watershed on a chronic basis. These activities have highly modified the hydrology in the watershed, created physical barriers, reduced water quality, and overall have led to significant degradation of instream habitats. Urbanization and development in the watershed is still continuing at present day.

Upland areas, generally much more sparsely settled, vary greatly dependent upon aspect and elevation. Generally, low lands in the east half of the watershed are drier, dominated by oak woodlands and grasslands, and grazing is the predominant land use, while the western side is cooler and damper, dominated by conifer stands, and timber production has and continues to be the emphasis in these areas. Upper elevation areas in the east half are similar to the western side, but generally a little more open and with meadow type habitats more common.

Many miles of road have been constructed in the watershed. Roads have contributed to sedimentation of instream habitat (see Water Resources and Soils Sections). The effects of fine sediment on aquatic organisms have been well documented; fine sediment (such as decomposed granitic sand or silt) in excessive amounts degrades stream and aquatic organism health. This sediment can fill in pools, cover spawning gravels, and smother eggs (Meehan et al., 1991). Reduced substrate availability and complexity may decrease the diversity and quantity of aquatic organisms, upsetting the ecological balance of the stream system. Increased turbidity, which occurs when fine sediment becomes entrained in the water column, can disrupt feeding and territorial behavior of juvenile salmonids. This can lead to decreased growth rates and increased mortality. These effects may be far-reaching, and stream reaches many miles downstream of point-sources of sediment input (including downstream areas designated as CCH and EFH) have the potential to be negatively impacted (Meehan et al., 1991).

OHV use has been documented as contributing to fine sediment deposition in the watershed as well, particularly in the western half of the watershed, as many streams in the vicinity of the Timber Mountain OHV Management Area are being negatively impacted by trail related erosion (USDI 2001; USDI 2005).

While other activities have occurred in the watershed that have directly or indirectly altered aquatic habitats, the above discussed activities have and continue to have the greatest impacts to fish and fish habitat.

Walker Creek

At ~ 25,754 acres in size and composed of eleven 7th field drainages, the Walker Creek subwatershed is a major tributary to Emigrant Creek, which becomes Bear Creek one mile downstream at the Neil Creek confluence. BLM managed lands account for only 19% of the drainage, and all but 0.3 miles (on Cove Creek) of the fish bearing channels are located on private lands.

As most of Walker Creek and its main tributaries are on private lands, very little quantitative data regarding instream habitat conditions exist. ODFW has not conducted aquatic inventories in the Walker Creek subwatershed, so specific data is unavailable for most fish bearing reaches within the catchment. The Upper Bear Creek Watershed Analysis (USDI 2000) does generalize lower reaches as being composed of entrenched channels, with fine sediment, cobbles, and bedrock dominating the substrate. The Dead Indian Memorial Highway closely parallels Walker Creek from its confluence upstream for over 3 miles. This section of the stream is bordered by a very narrow riparian corridor, likely a contributing factor for Walker Creek being identified as water quality limited for exceeding water temperature criteria (see Water Resources Section). The stream channel has been constrained by both the highway and residences, and appears to have downcut in several locations. Stream gradient increases dramatically above the Frog Creek confluence, as the creek flows through a narrow canyon over multiple falls and rocky chutes, visible from the highway. Quantitative substrate data is unavailable for the mainstem channel, but numerous casual observations during the rainy season suggest that Walker Creek is prone to high turbidity.

BLM lands do include two short (total less than 0.3 miles) fish bearing reaches on the mainstem of Cove Creek. Fine sediment levels were document to be high, comprising from 20-50% of all substrate. Large wood was abundant in one reach but absent in the other. Riparian corridors were intact and found to be proving abundant shade in both reaches. No quantitative data is available for Frog Creek, which is entirely on private lands.

Sampson Creek

Composed of three 7th field drainages, the 7,087 acre Sampson Creek catchment is adjacent and to the south of upper portions of the Walker subwatershed. BLM managed lands account for 50% of the basin area, which are concentrated in the eastern half. The majority (~ 90%) of fish bearing channels within the Sampson catchment are within private lands. BLM lands contain roughly 0.7 miles of streams that support rainbow and cutthroat trout, and includes approximately ½ mile of the mainstem of Sampson Creek.

Aquatic habitat inventories were conducted on one private reach of the mainstem of Sampson Creek, located ~ 1.5 miles upstream from its mouth, in 1997. Surveyors noted that rapids and scour pools were the dominant instream habitat types, and that cobbles and sand comprised the majority of substrates. They also noted that large wood densities were very low, and that 99.5% of stream banks were found to be actively eroding, due to lack of stream side bank stabilizing vegetation throughout the surveyed reach. Fine sediment levels were high, comprising over 30% of the substrate. During presence-absence surveys conducted in 1999, ODFW surveyors noted that stream side grazing had removed much of the riparian vegetation, and that fine sediment made up 75% of substrates in pools in the Right Fork of Sampson Creek, but that in upper reaches of the mainstem of Sampson Creek the percentage of fines lessened. They also identified that deep plunge pools provided good habitat for fish.

BLM has conducted inventories on all stream reaches on BLM lands (USDI 2007), and documented moderately high (20-25%) percentages of fine sediment in the fish bearing reaches of Sampson Creek. Fines were found to be abundant in other surveyed perennial tributaries in the catchment as well. In general, large wood was lacking throughout the surveyed reaches.

Tyler Creek

The Tyler Creek catchment consists of a solo 4,202 acre 7th field drainage located south of the Sampson catchment. BLM managed lands account for only 30% of the basin area, but include a little over half of the fish bearing channels.

Aquatic habitat throughout the fish bearing reach on BLM lands can be characterized as a bedrock dominated stream channel flowing through an open oak woodland. Shade and large wood are both generally lacking in this reach, though this appears to be the natural condition and indicative of the inherit nature of the site (i.e., oak woodland and not a conifer stand). Upstream perennial reaches of Tyler Creek were found to be in Proper Functioning Condition, and can be characterized as having a high amount of bedrock with steep plunges and falls, and intact riparian corridors. Surveyors noted numerous debris jams.

Water diverted from the Klamath Basin (Keene Creek) is sent into the Bear Creek Watershed through an elaborate system of water works, and is used to power a small electricity generator and to augment the amount of water stored in Emigrant Reservoir. The water works include a wasteway which on occasion diverts excess water through Schoolhouse Creek, a large tributary to Tyler Creek. Use of this wasteway has led to accelerated channel and bank erosion throughout the reach of Schoolhouse Creek below the wasteway input. Surveyors noted that the channel of Schoolhouse Creek had been scoured down to bedrock in spots as a result of past water releases, and that as the stream banks are currently so unstable, future releases would likely result in the mobilization and transport of unconsolidated fine sediment to downstream aquatic habitats (USDI 2000).

c. Riparian Reserves Current Conditions

Riparian corridors along fish bearing stream reaches in the Bear Creek Watershed (including the mainstem of Bear Creek) 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. This has increased penetration of solar radiation to stream channels, resulting in elevated summer stream temperatures. Though a greenway corridor does parallel much of Bear Creek, riparian corridors are narrow around most reaches as roads, businesses, and homes now exist in the historic flood plain. Generally, riparian corridors are likewise very narrow or absent throughout the majority of the lower, fish bearing reaches of the tributary streams in the watershed, as residences, roads, and agriculture lands now parallel these lower stream reaches. Invasions of introduced species (especially Himalayan blackberry) have also reduced the quality of riparian vegetation in the watershed. The result in many areas are riparian corridors that do not provide desirable levels of shade to stream channels to prevent solar penetration to, and heating of, the water. 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. Bear Creek is listed as water quality limited for exceeding summer stream temperature criteria by the Oregon Dept. of Environmental Quality (DEQ).

Within the analysis area, Walker Creek and Tyler Creek have also been identified by the DEQ as water quality limited for temperature (see water resources, this document). Elevated water temperatures can affect spawning and incubation time, feeding, growth, and survival of salmonids (Meehan 1991). Walker Creek has been found to exceed winter time temperature standards from its mouth to river mile 6.7. Tyler Creek has been found to exceed the state temperature limit from its mouth upstream to river mile 4.0, with a 7 day average maximum high temperature of 68.6^0 F recorded. Sampson Creek has not been identified as water quality limited for water temperatures.

Within the analysis area catchments, there are an estimated 2,181 acres of Riparian Reserves (calculated from GIS) on BLM managed lands. There are many more acres of riparian areas located on private lands that do not receive the same level of protection as that provided by RRs. 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 Sampson Cove analysis area is presented by catchment in Table 3-7, below.

Table 3-7. Riparian Reserve Acres by Vegetation Type

	Seral Stages						
Catchment	Grass and shrubs	Hardwoods	Early Seral (seedlings/saplings)	Poles (5-11" DBH)	Mid Seral (11-21" DBH)	Mature (>21" DBH)	Total Acres of RRs
Walker Creek	121	137	156	31	408	195	1048
Sampson Creek	93	328	93	11	153	187	865
Tyler Creek	28	45	21	11	56	107	268
Total	242	510	270	53	617	489	2181

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. Table three 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 3-8. Percent of Reserves in Mid Seral or Greater, and Mature Seral Stages

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]
Walker Creek	58%	19%
Sampson Creek	39%	22%
Tyler Creek	61%	40%
Project Total	51%	22%

[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 Sampson Cove Project Area, Riparian Reserves capable of providing both maximum shade and inputs of large wood are lacking. However, it should be noted that within the Project Area catchments, there are many areas, particularly in the head water drainages, which are natural meadows or naturally contain a large hardwood (e.g., willow, aspen) component. In these areas, the lack of mid seral and/or mature conifers is a natural condition, and exclusion of them in this type of analysis tends to overstate past disturbances to RRs.

In any event, 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.

4. Environmental Consequences to Fish and Designated Habitat

a. Alternative 1

The No-Action Alternative would have "*No Effect*" to fish populations or distribution, SONC coho salmon, CCH, or EFH, as no ground disturbing activities would occur under this alternative. Effects already occurring to fish habitat as a result of past and ongoing activities are presented in the Aquatic Habitat and Riparian Reserve section.

b. Alternative 2

Alternative 2 has been determined to have "*No Effect*" to SONC coho salmon, CCH, or EFH. This determination was made based on analysis to fish and aquatic habitat documented in this EA. Effects to aquatic habitat were determined to be of insufficient magnitude and of a nature to not meaningfully impact aquatic habitats in fish bearing channels (see Aquatic Habitat discussion, below), and hence implementation of the Proposed Action would not affect fish populations or fish habitat (including listed SONC coho salmon, CCH, and EFH) in the analysis area streams or in the Bear Creek watershed.

5. Environmental Consequences to Aquatic Habitat

a. Alternative 1

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 degraded state. As no new road construction or renovation of old roads would occur, road densities would remain at the current level within the analysis 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 Bear Creek Watershed as described. It is unknown at this time what additional development may occur on private lands, but increased development of the area would likely 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 (no slashbuster units are proposed), 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 rehabilitated after ignition operations, minimizing the risk of erosion and transport of sediment down the lines toward aquatic habitats.

b. Alternative 2

The Proposed Action proposes various prescriptions of commercial timber harvest, pre-commercial thinning, follow up fuels treatments, new road and landing construction, and log haul, as described in Chapter 2of this document. Ninety percent of the commercial harvest acres would be located in the Walker and Sampson catchments. No new road or landing construction would cross or parallel any stream channels, nor occur within riparian areas. Disturbances proposed in the Sampson Cove Project with proximity and/or connectivity to aquatic habitats include construction of a small temporary crossing over an intermittent stream, and an estimated 43 miles of log haul, which would include multiple stream crossings.

Ground disturbing activities in or near stream channels and roads have the greatest potential to impact fish habitat; it is these activities that could increase erosion and sediment transport to, and storage in, stream channels. The new road construction, the temporary crossing, and log haul are the project elements proposed which have been identified as having the greatest potential to contribute sediment to streams.

Commercial Timber Harvest

There are three primary mechanisms by which timber harvest may influence aquatic habitat: 1) Removal of stream side vegetation reduces shade, which can increase water temperature, and reduce recruitment potential of large wood, a key habitat feature of aquatic systems. 2) Reduction of canopy (particularly in the transient snow and snow zones) if applied to large areas of watersheds has been shown to alter hydrological processes, such as increasing peak and base flows, or altering the timing of these flows, which in turn may impact channel and habitat features. 3) Ground disturbance and compaction from yarding corridors or skid trails can bare soils, reduce infiltration, channel overland flow, and route eroded particulates (fine sediment) to downslope stream channels.

In the Sampson Cove Project, all harvest would occur outside of Riparian Reserves, at a minimum distance of one site potential tree height from the edge of the stream channel. Because existing large wood densities and shade would be maintained within the Riparian Reserves, harvest and yarding operations would have no impact to stream temperatures, or future large wood recruitment potential. The Water Resources analysis of the Sampson Cove Project documented that harvest operations would not reduce canopy cover within any of the analysis area catchments enough to measurably affect or alter the timing of peak or base flows. Because harvest and yarding operations would not take place in Riparian Reserves, no hydrological connectivity would exist between harvest units and stream channels. Fine sediment mobilized from units or skid trails would be filtered by remaining vegetation within the Riparian Reserves, and deposited on the forest floor before reaching aquatic habitat. In summary, no connectivity, and hence no causal mechanism, would exist for commercial timber harvest to input sediment through the RR buffers and into stream channels.

Because harvest and yarding operations would not decrease stream shade, reduce future wood inputs, increase peak flows, negatively modify summer base flows or input sediment into aquatic habitats, they would not directly or indirectly affect the aquatic environment, and hence would not impact fisheries resources, and would not add a cumulative effect.

Pre-commercial Thinning/Follow-Up Fuels Treatments

These activities would treat non-commercial vegetation remaining in the commercial harvest units, following harvest operations. Though the intent of both treatments is different, they are similar in that they both treat only small diameter vegetation and accumulated understory fuels. Pre-commercial thin (PCT) and fuel treatment activities would involve only hand crews with saws, thinning small diameter vegetation. Very little ground disturbance would occur. Any check lines would be rehabilitated following ignition operations, reducing the risk of the fire-lines contributing sediment downslope. Ground cover, such as forbs and grasses, trees greater than 8" diameter and all riparian plant species would remain after PCT/fuels activities. Neither activity would impact aquatic habitat. The treatments would leave no-treatment buffers, as outlined in the Project Design Features, around stream channels, and hence would not reduce shade afforded to stream channels. The vegetative buffers remaining adjacent to channels would trap any off-site sediment or ash movement (very unlikely) mobilized as a result of PCT or fuels treatment activities. There is no probability that aquatic habitat would be affected, as no avenue would exist for sediment or ash to enter the channels from PCT/fuels treatments. In summary, PCT/fuels treatments as proposed in the Sampson Cove Project would have no causal mechanism to affect any aquatic habitats, and hence would not contribute to cumulative effects.

Roads and Landings

The primary mechanism by which new road construction in upslope areas may impact water quality is the potential to intercept, concentrate, and route flow down the road prism, which disrupts natural flow paths, while at the same time increasing erosion of the road surface and subsequent transport of sediment towards downslope aquatic habitat. New landings would increase the disturbance area associated with the road, and because they are directly connected to the road, eroded sediment resulting from construction/use of the landing is easily mobilized down the road.

In the Sampson Cove Project, only one short (500' long) new road is proposed for construction in the Cove Creek catchment. A new landing, which would be approximately ¼ acre in size, would be incorporated into the design at the end of the road. The proposed new road and landing locations are on relatively flat ground near a ridge top. Project Design Features, such as limiting construction and use of the road and landing to the dry season would minimize the erosive potential of the road. The gentle grade at the site, coupled with seeding/mulching of the road bed and landing after use would hinder any chance off-site movement of displaced sediment. In the unlikely event fine sediment was mobilized from the work area downslope, the road would not cross any stream channels, and hence would have no direct hydrological connectivity with the aquatic system. Any sediment generated from construction, use, or maintenance of the short new road segment and associated landing mobilized during a precipitation event would be shed into downslope vegetation, where it would be filtered and stored on the forest floor before reaching any stream channels.

Although the construction of the new road would increase road densities in a catchment and watershed that already has high road densities, given the location, grade, and small amount of road construction proposed, and coupled with the lack of hydrological connectivity between the road and aquatic systems, construction of this road and its associated landing would not directly impact fisheries or aquatic resources. Cumulatively, the new road would increase road densities in the Walker Creek catchment by less than $1/10^{th}$ of one percent, though as described above; it would not impact aquatic resources.

Downslope of the proposed new road, a temporary crossing would be constructed across an existing ford on a private road. The crossing is over a long duration intermittent stream, a tributary to Cove Creek. Construction, use, and dismantling of the crossing would occur only during the dry season. The purpose of the temporary crossing is to avoid bank disturbance caused by repeated heavy truck traffic, which would be inevitable if the natural ford is used rather than a temporary crossing. Clean rock would be used for the crossing, and if sufficient stream flow were present at the time of use, a small pipe would be placed in the channel to allow unobstructed flow through the crossing. After harvest and hauling operations were completed, the crossing would be dismantled and the ford returned to its current condition. The majority of the clean fill and the pipe (if needed), would be removed. It is possible that not all of the fill could easily be removed without disturbing the natural stream bottom. As such, the only potential effect this proposed crossing may contribute to aquatic habitat would be the addition of a layer of clean substrate (rock) to the channel. The addition of a small amount of substrate to the intermittent channel would not negatively impact aquatic habitat in the vicinity of the crossing, and hence this crossing would not contribute a negative cumulative effect.

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. 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 an estimated (from GIS) 45 miles of private and BLM managed roads within the analysis catchments. Of this, roughly 19 miles would occur on paved roads (includes Dead Indian Memorial Highway and Highway 66), 21 miles would use gravel or rocked roads, and 3 miles would be natural surfaced roads. The large majority (36 miles) of haul would occur in the Walker catchment. Most of the routes would stem from the Dead Indian Memorial Highway, which is the only route that closely parallels a fish bearing stream, Walker Creek. As the highway is paved, use of this portion of the haul route would have no potential to contribute sediment to fish habitat. Only one non-paved route would cross fish habitat; the Cove Creek road (rocked surface) crosses Cove Creek, which is habitat for cutthroat trout at this point. There are many more non-paved stream crossings upstream of fish habitat, particularly in the Walker Creek catchment, where haul routes would cross an estimated 47 channels, including 18 perennial streams. Far fewer non-paved crossings would be utilized in the Sampson (2 intermittent crossings) and Tyler (1 intermittent) catchments.

Log hauling would likely input small amounts of fine sediment into aquatic habitat in the Walker Creek catchment, particularly in the Cove Creek drainage basin, because the amount of haul would be moderate (roughly 50% of the harvest unit acres would be accessed via Cove Creek), the main haul route directly crosses Cove Creek, and there would be numerous non-paved crossings over perennial stream channels. Potential sediment sources from log hauling 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 (40 of 45 miles) are rocked 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. Dust abatement measures would help to reduce the probability of dust migrating from the road to the streams, but it is probable that some small amount would settle out into stream channels below the rocked and natural surface crossings.

The magnitude of the dust/sediment inputs would be small because dry season haul restrictions would reduce impacts to the road surfaces, and haul routes would be spread over a relatively large spatial scale. It is not anticipated that the amount of sediment input into aquatic habitats in the Walker catchment resulting from use of the haul routes 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.

Haul would not contribute measurable amounts of sediment to aquatic habitats in either the Sampson or Tyler Creek catchments, as no routes would be in the vicinity of the main channels, haul would only occur during the dry season, the amount of haul would be relatively light and spread over a large spatial scale and there would be no non-paved crossings over perennial channels.

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 Cove Creek drainage (Walker Creek catchment). Any sediment increases would be minor relative to existing sediment levels. The construction of 500' of new road and one new landing is not anticipated to contribute sediment to aquatic habitat, as it would not be hydrologically connected to the stream system. Construction and use of one temporary crossing over an intermittent stream would not affect fine sediment levels, but could input a shallow layer of clean rock substrate in the vicinity of the crossing, which would not negatively impact aquatic habitat.

Upland work, including timber harvest, PCT, 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 (see Riparian Reserves discussion, below).

Future private timber harvest is assumed to continue at present levels, and cumulative effects to water resources have been assessed (see Water Resources, this Chapter). Future private harvest, coupled with anticipated increasing OHV use (assuming no change in management), and ongoing erosion issues stemming from grazing, is expected to continue the declining trends in streambank stability, sedimentation potential, and health of riparian areas currently present in the analysis area. The Sampson Cove Forest Management Project would, in the short term contribute a small amount of sediment to channels in the Walker Creek catchment, 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. In summary, though this project would not benefit aquatic resources (i.e., no road decommissioning or closures), no measurable changes in the declining aquatic habitat conditions are anticipated to result from implementation of the Proposed Action.

c. Effects to Riparian Reserves

Alternative 1

The No-Action action Alternative would have no direct or indirect effects to RRs within the Bear Creek 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 would slowly increase over time. Benefits would be limited in RRs 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

The only activities proposed in riparian areas (RRs on BLM lands and riparian areas on private lands) under this project are construction and use of the temporary crossing, and log haul. All other activities would occur outside of riparian areas. The location of the temporary crossing would be in a meadow, and disturbance would be limited to an existing road prism. As such, activities associated with this crossing would not disturb any riparian vegetation, and hence would not affect shade or rates of large wood recruitment. Haul would be limited to existing roads as well, and hence also would not affect shade or rates of large wood input as this activity would not require the removal of large trees or shade producing vegetation. For these reasons, the Sampson Cove Forest Management Project would have no effects to Riparian Reserves, and would not add to cumulative impacts.

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 analysis 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).

E. CONSISTENCY WITH AQUATIC CONSERVATION STRATEGY

1. Introduction

The Northwest Forest Plan's (NWFP) Aquatic Conservation Strategy (ACS) has four components: Riparian Reserves, Key Watersheds, Watershed Analysis, and Watershed Restoration. It is guided by nine objectives which are meant to focus agency actions to protect ecological processes at the 5th-field hydrologic scale, or watershed, at the 6th and or 7th fields (subwatershed and or drainage), and at the site level.

In this case, Walker Creek is a sixth field subwatershed and is composed of 11 smaller 7th field drainages. These 7th field drainages combine to form the tributaries to Walker Creek, such as Cove and Frog Creeks, which are themselves made up of several 7th fields. The Sampson Creek catchment, composed of only two 7th field drainages, is part of another 6th field subwatershed. Tyler Creek is a single 7th field drainage. All of the subwatersheds and catchments are within the larger Bear Creek 5th field watershed. How the four components of ACS relate to the Sampson Cove timber sale is explained below:

1) Riparian Reserves: Riparian Reserve widths for streams, springs, wetlands, and unstable soils have been determined according to the protocol outlined in the NWFPs Aquatic Conservation Strategy and are listed in the PDFs for the Sampson Cove Sampson Cove Forest Management 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 Bear Creek Fifth Field Watershed is ***not*** a Key Watershed.

3) Watershed Analysis: BLM completed the Upper Bear Creek Watershed Analysis in 2000. The Watershed Analysis covers the upper third of the watershed only, which encompasses this 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, dam removal, road decommissioning, and irrigation ditch fish screens and siphoning.

2. Consistency Review

The following documents the BLMs review of the consistency of the Sampson Cove Forest Management Project with the nine Aquatic Conservation Strategy Objectives. Consistency review/analysis is conducted at the 5th field hydrologic scale, or watershed, at the 6th and or 7th fields (subwatersheds and or drainage), and at the site level.

Objective #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 Bear Creek Watershed. One of the treatment objectives of the project 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.

Objective #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 Bear Creek Watershed, BLM-managed land is concentrated in the steeper slopes of the tributary streams of Bear Creek. Here, longitudinal connectivity and road densities are the primary issues for aquatic species. No activities planned under the Sampson Cove Forest Management Project would affect spatial and/or temporal connectivity, as no culverts are proposed for addition, replacement, or removal on perennial channels.

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

The only proposed action in the Sampson Cove Forest Management Project that would affect the physical integrity of the aquatic system is the placing of a temporary crossing over a small intermittent channel. Though this could potentially alter the bottom configuration at the crossing point (site level), as a small amount of additional clean substrate is likely to remain in the channel, this action would also reduce the likelihood of erosion and subsequent deposition of sediment to downstream habitats from use of the crossing, as the banks would be protected. This would not impact the physical integrity of the aquatic system at larger spatial scales.

Objective #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 from this project on water temperature, because shade would not be reduced along any stream channels. Short term (one to three years) there would likely be a small amount of fine sediment entering stream channels in the Walker Creek catchment 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.

Objective #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 elements of this project which could affect the sediment regime are the construction, use, and dismantling of one temporary crossing, and log haul. At the crossing site, a small quantity of coarse sediment (clean rock) would likely remain after the crossing was dismantled. The nature of the substrate would not be detrimental to the overall sediment regime of the small intermittent stream. 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 plagued by high sediment and turbidity from a myriad of other sources.

Also see ACS Objective #4. In general, high road densities, past and ongoing intense harvest of industrial and federal timber lands, extensive agricultural and urban development, increasing OHV use, and cattle grazing in the planning area catchments will continue to impact the sediment regime.

Objective #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 Sampson Cove Project See the Water Resources Section 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 within the watershed.

Objective #7

Maintain and restore the timing, variability, and duration of floodplain inundation and water table elevation in **meadows and wetlands**.

Only timber 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, canopy cover would be left 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.

Objective #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.

No elements proposed under the Sampson Cove Project would have any mechanism to impact this objective. No activities would remove any riparian vegetation, and hence thermal regulation would not be affected. Nutrient filtering, surface erosion, bank erosion, and channel migration would not be affected at any spatial scale; Riparian Reserves would remain as buffers between all stream channels and any ground disturbing activities, except for the temporary crossing. Construction and use of the temporary crossing would eliminate the potential for bank erosion at the site level, and activities associated with the crossing would not disturb any riparian vegetation.

Objective #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.

F. BOTANY

1. Introduction

Analysis regarding botanical resources within the Sampson Cove Forest Management Project has been conducted at the 6th Field subwatershed level, and includes the following subwatersheds in their entirety: Lower Emigrant Creek, Upper Emigrant Creek, Middle South Fork Little Butte Creek, Keene Creek and Walker Creek. All references to the "Sampson Cove analysis area" refer to the combined area of these subwatersheds.

Bureau Special Status Plants, Lichens, and Fungi (SSP) include species that are listed as threatened or endangered under the Endangered Species Act (ESA), proposed or candidates for listing, State listed, and Bureau designated Sensitive species. For these species, the BLM implements recovery plans, conservation strategies, and approved project design criteria of biological opinions, and ensures that actions authorized, funded, or carried out by the BLM promotes their conservation and reduces the likelihood and need for their future listing under the ESA.

On July 25, 2007, the Oregon State Office Instruction Memorandum No. OR-2007-072 updated the State Director's Special Status Species List to incorporate the *Record of Decision To Remove the Survey and Manage Mitigation Measure Standards and Guidelines from Bureau of Land Management Resource Management Plans Within the Range of the Northern Spotted Owl* and to include species additions and deletions from the application of the most recent scientific data. This list was finalized with the February 7, 2008 Instruction Memorandum No. OR-2008-038.

This project will meet the provisions of the 2001 Record of Decision and Standards and Guidelines for Amendments to the Survey and Manage, Protection Buffer, and other Mitigation Measures Standards and Guidelines (not including subsequent Annual Species Reviews). Details of the project surveys are described below.

2. Affected Environment

The Sampson Cove analysis area is within the range of *Fritillaria gentneri*, a species listed under the Endangered Species Act with ranges on the Medford District. The Sampson Cove analysis area is entirely outside the ranges of other Federally Endangered species found on the Medford District (*Arabis macdonaldiana*, *Limnanthes floccosa* ssp. *grandiflora*, *Lomatium cookii*). Range maps were updated with the Biological Assessment/Letter of Concurrence for the Effects of Proposed FY 2009-2013 Forest Management Activities on Federally Listed Species and Designated Critical Habitat on September 25, 2008 (USDI BLM 2008) (USDI FWS 2008). Any sites of listed, proposed, or candidate plants found outside their defined range would have been reported. Table 3-9 lists the SSP found within the Sampson Cove analysis area, including those sites that are located within or bordering proposed treatment units or haul routes.

Surveys for all species on the Medford SSP list (current at the time of survey) were conducted over the course of multiple years, from 2007 through 2010. Surveys were conducted using the intuitive controlled survey method. This method includes a complete survey in habitats with the highest potential for locating Sensitive species. The surveyor traverses through the Project Area enough to see a representative cross section of all the major habitats and topographic features, looking for the target species while en route between different areas. Most of the Project Area will have been surveyed. When the surveyor arrives at an area of high potential habitat (that was defined in the pre-field review or encountered during the field visit), a complete survey for the target species should be made.

a. Vascular and Non-Vascular Plants

Surveys have documented 26 occurrences of 10 Bureau Special Status and 2001 Survey and Manage plant species within the Sampson Cove analysis area that occur within 100 feet of roadsides within the analysis area and/or within 100 meters of proposed units.

Table 3-9. Sensitive Status Plant Species In or Adjacent to Analysis Roads or Units

Scientific Name	Common Name	Lifeform	2001 Survey & Manage Status*	2007 Heritage Rank**	ORHNIC List***	ODA Status+	2008 BLM Status	Sites
Grimmia anomala		Bryophyte					STR	1
Bryoria tortuosa	tortured horsehair lichen	Lichen	A					1
Chaenotheca subroscida	pin lichen	Lichen	E				SEN	5
Carex serratodens	twotooth sedge	Vascular		G5/S3	2		SEN	4
Cimicifuga elata	mountain tall bugbane	Vascular		G3/S3	1	C	SEN	4
Cypripedium montanum	mountain lady's slipper	Vascular	C	G4/S3S4	2			6
Fritillaria gentneri	Gentner's missionbells	Vascular		G1/S1	1		SEN	1
Hackelia bella	greater showy stickseed	Vascular		G3?/S1	2		SEN	4
Poa rhizomata	rhizome bluegrass	Vascular		G3G4/S1 ?	2		SEN	2
Ranunculus austrooreganus	Southern Oregon buttercup	Vascular		G2/S2	1		SEN	1

***Survey and Manage: as determined by the 2001 amendment to the 1994 Northwest Forest Plan Record of Decision for Survey and Manage, Protection Buffers and related mitigation measures.**

A= Rare, and all known sites are managed. Current and future known sites will be managed according to the Management Recommendation for the species. Minimize inadvertent loss of undiscovered sites. Pre-disturbance surveys are practical.
B= Rare, and all known sites are managed. Pre-disturbance surveys are not practical.
C = Uncommon, and not all known sites or populations are likely to be necessary for reasonable assurance of persistence, as indicated by several factors. Pre-disturbance surveys are practical.
D= Uncommon. Manage all known sites until high-priority sites can be determined. Pre-disturbance surveys are not practical or not necessary.
E=Rare, status undetermined. Manage all known sites while category assignment is being determined.
F= Uncommon, or Concern for Persistence Unknown. Management of known sites NOT required because species are uncommon, not rare. Until reassignment of species to a new category or removal from list occurs, inadvertent loss of some sites is not likely to change the level of rarity.

SEN = Sensitive (USDI Oregon State Director's List)
STR = Strategic (USDI Oregon State Director's List)

****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.

*****ORNHIC List: Oregon Natural Heritage 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.

+ODA Status: Oregon Department of Agriculture

C=Candidate for (State) listing as Threatened or Endangered by the ODA.

b. Special Status Species Plants Within or Adjacent to Treatment Units and Haul Roads

Bryoria tortuosa is a native macro-lichen typically found on bark or wood of conifers and hardwoods. It achieves greatest biomass in low-elevation coniferous stands considered to be semi-open and transitional between wetter coastal forests and drier inland forests. Because of this species' preference for transitional areas at the edge of mountain ranges, its habitat is subject to repeated human disturbance and encroachment by development. Habitat at many historic locations has been destroyed (McCune and Geiser 2009). There is 1 known site within the Sampson Cove analysis area, representing 100% of the known populations in the Sampson Cove analysis area and < 1% of the known sites on the Medford District.

Chaenotheca subroscida, a type of pin lichen, is widely distributed in cool temperate and temperate areas of western North America and western Eurasia, occurring in the Pacific Northwest north to British Columbia. Typically, this species is found on the bark of late-seral conifers and occasionally wood, typically on sheltered locations protected from direct rainfall. Data shows that most occurrences are found on conifers older than 200 years. Its association with late-seral stands and a shady, humid microclimate indicates that the principle threat to this species is loss of habitat due to timber harvest or stand replacement fire (Interagency Special Status/Sensitive Species Program 2010). There are two known sites occurring within 100 feet of roads or 100 meters of project units, and three sites located within project units. These 5 sites account for 71% of the total sites in the Sampson Cove analysis area, and 9% of the known sites on the Medford District.

Carex serratodens is a native perennial that is found in California, Oregon and Arizona. Considered to be relatively rare in southwest Oregon, it reaches the northernmost extension of its range in Jackson, Josephine, and Douglas Counties. It usually occurs in moist meadows, hillsides, and seeps, in sun or more often in partial shade, often on serpentine substrates, at low to moderate elevations (Wilson et al. 2008). There are 4 documented sites of the species in the Sampson Cove analysis area occurring within 100 feet of roads or 100 meters of project units, accounting for 57% of the total sites in the Sampson Cove analysis area, and 7% of the known sites on the Medford District.

Cimicifuga elata is a native perennial bugbane that is found in mixed conifer forest and forest openings at elevations 1100-5500 feet. It is a candidate for listing by the State of Oregon. Currently, the morphological and DNA traits are being examined to determine the appropriateness of splitting this species into two varieties. A report completed in 2008 determined that *C. elata var. alpestris* (in comparison with a second variety, *var. elata*) is the variety found in Jackson County, and more specifically, in the Sampson Cove analysis area. Type localities used in the study's research design include the large populations in section T38S R02E S17 (Kaye 2008). Differences in management recommendations or protection status of the two *Cimicifuga elata* varieties have yet to be determined; all known population of *C. elata* continue to be managed as a single species. In the Sampson Cove analysis area, some populations occur in previously managed conifer stands. There are 4 known sites adjacent to (within 100 feet of) roads within the Sampson Cove analysis area representing 50% of the known populations in the Sampson Cove analysis area and 3.3% of documented sites on the Medford District. Two of the sites occur in an area selectively harvested prior to 1975, and the other two smaller sites occur in an area that has no known record of previous harvest.

Cypripedium montanum is an orchid known from Washington, Oregon and California. It has small and scattered populations that are declining. Effects of logging, collection for horticultural use, loss of habitat on private land, and lack of fire have reduced populations and habitat. The loss of small, isolated populations due to activities such as timber harvest, road and trail construction, soil and litter disturbance, and a decrease of canopy closure to less than 60 percent have been identified as threats to this species (DOI/USFS 2004). There are 4 known sites occurring within 100 feet of roads or 100 meters of project units, representing 40% of the known populations in the Sampson Cove analysis area and <1% of all sites on the Medford District.

Fritillaria gentneri is a native perennial found in Jackson and Josephine Counties of southern Oregon and in Siskiyou County, California. This lily is listed as endangered under the federal ESA and through the Oregon Revised Statute 564 and the Oregon Administrative Rule 603-730. Under these laws, plants on Federal and State (including other non-Federal public) lands are provided protection. However, no protection or conservation requirements are provided for on private lands. This plant occupies a wide range of habitats; most commonly, it is found in or on the edges of dry, open, mixed-species woodlands at elevations below 5064 feet. There are 151 known sites on the Medford District (all Oregon sites) of which 91% consist of 20 or fewer flowering plants. Population size on the District ranges from one to 290 flowering individuals. There is one population within the Sampson Cove analysis area; occurring, within 100 feet of a road. There are no known sites adjacent to or within project units. The U.S. Fish and Wildlife Service Recovery Plan for *Fritillaria gentneri* was approved on July 21, 2003. The Sampson Cove analysis area is partially within the Dutch Oven recovery unit. The Recovery Plan requires 1000 flowering plants in each of four recovery units (in a minimum of two *Fritillaria* management areas per unit) for delisting. *Fritillaria* management areas have not yet been established. The known roadside site accounts for 100% of total sites in the Sampson Cove analysis area, and <1% of total sites on Medford District.

Hackelia bella is a perennial forget-me-not that typically grows on stream banks, roadsides, open slopes, or in forest openings at elevations ranging from 3000-6000 feet. Sites in Southwest Oregon represent the northernmost extent of this species' range, which also extends into northern California. The 4 documented sites occurring within 100 feet of roads or 100 meters of project units represent 9% of the total sites in the Sampson Cove analysis area, and 8% of the known sites on the Medford District.

Poa rhizomata is a graminoid that grows in dry Douglas Fir/ponderosa pine forest at elevations ranging from approximately 1500-3000 feet. There are 2 known sites within the Sampson Cove analysis area that occur within 100 feet of roads or 100 meters of project units. These sites represent 50% of the known populations in the Sampson Cove analysis area and 13% of all sites on the Medford District.

Ranunculus austrooreganus is a perennial buttercup that grows on damp or dry grassy loam slopes, often with scattered oaks, at elevations ranging from 1500-2000 feet. The Oregon Department of Agriculture has determined that it is a Candidate for Listing as Threatened or Endangered at the state level. This species is endemic to central Jackson County in Oregon. There is one known site occurring within 100 feet of roads or 100 meters of project units, representing 4% of the known populations in the Sampson Cove analysis area and 2% of all sites on the Medford District.

c. Fungi

Of the 20 species of fungi that are on the Medford District Sensitive Species list, 19 are Survey and Manage species whose status determines that pre-disturbance surveys are impractical and not required; one species is a hypogeous (underground) fungus, as are other of the previously referenced fungi, where pre-disturbance surveys would be impractical. Oregon State Office Information Bulletin No. OR-2004-145 reaffirmed this, stating that Bureau policy (BLM Manual Section 6840) would be met by known site protection and large-scale inventory work (strategic surveys) through fiscal year 2004.

Surveys have documented fungi sites located 100 feet from roads in the analysis area, or 100 meters from proposed units: two sites of Sensitive fungi species and 12 sites of a fungus species previously addressed under the Northwest Forest Plan and the provisions for Survey and Manage species within the Sampson Cove analysis area (Table 3-10). Suitable habitat is present for other species on the Medford District Sensitive Species list (Table 3-11).

Table 3-10. Sensitive Fungi Located In or Adjacent to Project Roads or Units

Scientific Name	Lifeform	2001 S&M Status*	2007 Heritage Rank**	ORHNIC List***	2008 BLM Status	Sites
Boletus pulcherrimus	Fungus	B	G3/S2	1	SEN	2
Pithya vulgaris	Fungus	D				12

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C = Uncommon, and not all known sites or populations are likely to be necessary for reasonable assurance of persistence, as indicated by several factors. Pre-disturbance surveys are practical.
D= Uncommon. Manage all known sites until high-priority sites can be determined. Pre-disturbance surveys are not practical or not necessary.
E=Rare, status undetermined. Manage all known sites while category assignment is being determined.
F= Uncommon, or Concern for Persistence Unknown. Management of known sites NOT required because species are uncommon, not rare. Until reassignment of species to a new category or removal from list occurs, inadvertent loss of some sites is not likely to change the level of rarity.

****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 occurrences.
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.

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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.

SEN = Sensitive (USDI Oregon State Director's List)

Table 3-11. Medford District Sensitive Fungi Species with Habitat in the Analysis Area

Scientific Name	2001 S&M Status*	2007 Heritage Rank**	ORHNIC List***	NWFP Sites
Boletus pulcherrimus	B	G2G3/S2	1	23
Dermocybe humboldtensis	D	G1G2/S1	1	4
Gastroboletus vividus	B	G2?/S1	1	5
Gomphus kauffmanii	B	G2G4/S3?	1	74
Gymnomyces fragrans		G2G3/S1S3	3	2
Helvella crassitunicata	B	G3/S2	1	29
Leucogaster citrinus	B	G3G4/S3S4	2	48
Otidea smithii	B	G2/S2	3	10
Phaeocollybia californica	B	G2?/S2?	3	44
Phaeocollybia olivacea	B	n/a	1	115
Phaeocollybia oregonensis	B	G2?/S2?	n/a	15
Phaeocollybia pseudofestiva	B	G3/S3?	1	49
Pseudorhizina californica		G4/S2	3	42
Ramaria largentii	B	G3/S2?	2	20
Ramaria spinulosa var. *diminutiva*	B	GUT2/S1?	3	1
Rhizopogon chamalelotinus	B	G2G3/S1S2	1	1
Rhizopogon clavitisporus		G2G3/S1S2	2	3
Rhizopogon ellipsosporus	B	G2G3/S1S2	2	5
Rhizopogon exiguus	B	G2G3/S1S2	2	3
Sowerbyella rhenana	B	G3G4/S3	2	66

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B= Rare, and all known sites are managed. Pre-disturbance surveys are not practical.

C = Uncommon, and not all known sites or populations are likely to be necessary for reasonable assurance of persistence, as indicated by several factors. Pre-disturbance surveys are practical.

D= Uncommon. Manage all known sites until high-priority sites can be determined. Pre-disturbance surveys are not practical or not necessary.

E=Rare, status undetermined. Manage all known sites while category assignment is being determined.

F= Uncommon, or Concern for Persistence Unknown. Management of known sites NOT required because species are uncommon, not rare. Until reassignment of species to a new category or removal from list occurs, inadvertent loss of some sites is not likely to change the level of rarity.

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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.

d. Sensitive Fungi Known to Occur within Analysis Area

Boletus pulcherrimus is the red-pored bolete mushroom. It is listed as endemic to the Pacific Northwest, including northern California, but has also been reported from New Mexico. In the range of the Northwest forest Plan (NWFP), there are 23 known sites. Four sites are on the Medford District, all of which are located within the Sampson Cove analysis area, and two are on the Rogue River-Siskiyou National Forest (NF). NWFP habitat data is available for only the Medford BLM and Winema NF sites. This plant community data shows this species occurs on White fir/Douglas-fir early mature forests, Douglas-fir/White fir/Ponderosa pine young forest, White fir/chinquapin communities, and Shasta red fir/chinquapin communities. Elevation ranges from 4,620' to 5,640'. Habitat data for other NWFP sites is in humus in association with roots of mixed conifers (Grand fir, Douglas-fir) and hardwoods (tanoak) in coastal forests. There are two roadside populations occurring within 100 feet of roads or 100 meters of project units, representing 50% of the known populations in the Sampson Cove analysis area.

Pithya vulgaris is a saprophytic or needle endophyte that fruits on wet and dead (usually detached) branch tips and twigs of fir species, in montane areas often within several yards of snow banks or within a few weeks of snow melt. It typically fruits from March through May, and in November. There are 12 documented sites occurring within 100 feet of roads or 100 meters of project units, representing 13% of the known populations in the Sampson Cove analysis area and 8% of all sites on the Medford District.

3. Environmental Effects

This section discusses the direct and indirect effects of implementing each of the alternatives and the impacts it would have on botanical resources. This section also discusses any cumulative effects considering the range of alternatives plus the effects of other actions that are currently happening or will be happening in the foreseeable future.

a. Alternative 1

Special Status Plants and Sensitive Fungi

The analysis area includes areas of varying stand density understory density, due to a history of previous land management activity. Stands with a prior harvest history have low- to-moderate shrub cover and tree seedling and sapling cover, resulting in relatively open understories, light ground cover, and filtered light. Under Alternative 1, there would be no increase in fire risk or fire hazard in those areas with previous management activity. Habitat for SSP in these areas would continue to be in good standing for the reasonably foreseeable future.

Without vegetation treatment, Special Status Plants, Mosses, Lichens, and Fungi populations in Section T39S R03E S32 would continue to decline over time due to the slow degradation of suitable habitat through increase of low-growing shrub cover, increased seedling and sapling cover, and increased canopy cover. Through fire suppression, the plant communities will continue to become overly dense, decadent thickets with increased competition for resources. Fire risk and fire hazard would remain higher in those areas with unnaturally high fuel loading and fuels structure. A resulting high-intensity fire in this area would destroy the habitat and directly kill existing SSP populations.

b. Alternative 2

The following documents the analysis of effects to botanical resources resulting from the implementation of Alternative 2 (see Chapter 2 for details).

The greatest threats to plant community health resulting from project activity would be soil disturbance that could result in nonnative/noxious weed introduction into areas previously not infested, and the potential loss of canopy cover for those species dependent on filtered light and/or higher moisture levels for survival. Soil compaction would also be a mechanism for habitat loss and degradation for SSP.

Special Status/Survey &Manage Plants and Fungi

Commercial Timber Harvest, Pre-Commercial Thinning and Follow-Up Fuels Treatments

Known SSP sites in units would be protected either by no-treatment buffers or seasonal restrictions, or a combination of both. Trees proposed for cutting outside of the buffer areas would be directionally felled away from the buffers to prevent unintended soil disturbance or damage to plant populations. No-treatment buffers would be large enough to suit the individual needs of species to ensure that changes in moisture regime, canopy cover, light filtration and population continuity would be appropriate to meet SSP protection objectives. However, while no-treatment buffers would provide the maximum protection from site disturbance related to project activity, habitat conditions within the buffer would deteriorate over time as a result of increased forest density without some form of management. Risk for long-term fire hazard would also increase over time.

Pre-disturbance surveys for the 20 Sensitive Medford District fungi species (or fungi of related type) are impractical and not required, as determined by the Northwest Forest Plan. Pre-disturbance surveys are impractical because these species are difficult to identify and/or their occurrence is sporadic or unpredictable. All 20 species are associated with a forest component found in the analysis area; i.e., habitat exists in the analysis area to support these species. Most fungi on this list are mycorrhizal (associated with specific host trees) and depend on wind and/or animals to spread the spores. For these 20 fungi, species specific information on connectivity and habitat requirements, range (including occurrences within the analysis area), and disturbance effects is incomplete. Therefore, there is no information that would lead to a finding that the Proposed Action would have any effect on any of these 20 species.

Seasonal restrictions and restrictions on post-harvest activities would provide some protection for the Survey and Manage SSP fungi species *Pithya vulgaris* during fruiting season (March-May and November). Restricted operations through some sites may result in some initial loss of individuals from physical disturbance caused by harvest methods. With 98 documented sites in the Sampson Cove analysis area, this species is secure.

Under Alternative 2, there would be no effect on documented sites of SSP located in Riparian Reserves due to implementation of PDFs described in Chapter 2 which prohibit activity from taking place within the established reserves.

Roads and Landings

In the Sampson Cove analysis area, construction of one new road is proposed, with a proposed length of 500 feet. One new landing, with an estimated size of ¼ acre, would be incorporated into the design at the end of this road. The proposed road segment would be obliterated and seeded with an approved seed mixture upon completion of harvest activities, and is located behind a locked gate when not in use for operations.

The area proposed for the new road construction and landing is on private land and is dominated by nonnative annual grasses and coniferous forest, and exhibits a history of prior disturbance as evidenced by the plant community in the meadow, the terraced landscape, and the presence of an old homestead. There are no sites of SSP that would be affected by the construction of the road or landing, and therefore, no effect with the implementation of Alternative 2.

Roads used as haul routes would be maintained as needed (ditch cleaning, spot rocking, etc.) to ensure adequate protection. In addition to minor maintenance, road improvements are proposed on about 3.4 miles of roads in the analysis area in order to bring specified haul route roads to standard (see Chapter 2). These roads are existing and need treatments that would enable large equipment to travel through (i.e, blading to shape the surface, rocking, repair and installation of drain dips). All disturbance activity would occur in the existing road prism, and there would be no effect on known SSP sites. Prior to disturbance activity, all known noxious weed sites located on haul routes or road proposed for improvements would be treated to prevent further spread of plant material and/or weed seed.

Cumulative Effects

Land ownership in the Sampson Cove analysis area is approximately 43.7% BLM and 56.3% private. The condition of the local landscape and its associated subwatersheds relies heavily on privately-owned land and activities that affect its habitat condition.

Grazing

The Sampson Cove analysis area includes 5 active BLM grazing allotments (Grizzly, Cove Ranch, Cove Creek, North Cove Creek and Buck Point). Of those 5 allotments, 3 leases (Cove Ranch, North Cove Creek, Buck Point) were renewed in 2009 with existing terms and conditions due to compliance in previous years, one lease (Grizzly) expired in 2010, and one lease (Cove Creek) is being evaluated for a final decision due to noncompliance with terms and conditions. Cumulative effects within the Sampson Cove analysis area due to the Cove Creek grazing allotment will be addressed here due the finding in the Rangeland Health Determination that implicates livestock grazing as a contributing factor for not meeting Standard 5 (Native, T&E and Locally Important Species). The Cove Creek Lease Renewal Proposed Action seeks to remedy the identified problems within the allotment through adjusted terms and conditions and mitigation measures. As documented in the Cove Creek Lease Renewal Environmental Assessment, the implementation of the renewed lease could reduce impacts of grazing on the environment and their contribution to adverse cumulative effects within the Sampson Cove analysis area (USDI 2009).

The Cove Creek allotment is comprised of 2,985 acres and is centrally located within the Sampson Cove analysis area. The BLM-managed portion of this allotment is 1,207 acres, less than 2% of BLM-managed lands within the analysis area, while the remaining lands are a combination of private timber lands and other private holdings. There are 8 units (176 acres total) proposed for treatment within this allotment area, varying in treatment and stand type. The effects the livestock may be having on the landscape within the allotment are primarily focused in areas with perennial streams and forage species. Livestock typically actively disperse throughout forest stands, rather than congregate in single locations for extensive periods of time. Due to lack of perennial water sources and open forage areas, timber harvest in units located in the northern portion of the allotment (3-2, 3-3, 3-4 and 3-5) would not contribute to adverse cumulative impacts when combined with the effects of grazing livestock. Units11-2A, 11-2B and 11-3 in the southern portion of the allotment are areas of known livestock congregation due to the presence of annual, early summer water that is readily accessible due to proximity to roads 39-2E-10.1 and -11.1. Two sites of SSP adjacent to unit 11-1 are both graminoid species, which are preferable to livestock for use as forage (Holecheck et al. 1982). Although livestock grazing may potentially impact these sites (trampling, grazing, soil disturbance); timber harvest planned under Alternative 2 is not likely to contribute to an increased risk of impacts to these sites. The SSP sites (*Poa rhizomata*, *Carex serrotodens*) are located outside of the unit, and/or are protected by designated Riparian Reserves and are otherwise protected by project design features that limit equipment from operating outside of designated units or roads.

Livestock grazing is also expected to continue to contribute to the movement and introduction of noxious weed and nonnative plant species. Noxious weed control treatments are expected to be very limited in these areas managed by private holders, i.e., restricted to residential areas and federal projects conducted on private lands.

Private Land-Use Operations

Past or proposed timber harvest and other vegetation treatments on private are not known. It is assumed that most timber harvest projects and other vegetation treatments on private land will have adverse effects on native plant communities (including SSP) due to timber removal prescriptions, logging methods, and less resource protection measures. Federal laws protecting endangered and special status plans do not apply to private land without a federal nexus.

Recreational Operations

Slope throughout the Sampson Cove analysis area varies, but approximately 35% of the land in the analysis area has a slope of 40% or less. Areas with mild-to-moderate hillslopes are susceptible to unauthorized recreational uses (i.e., trail building, OHV use) due to fewer natural barriers on the landscape, which can lead to weed and nonnative species infestations and SSP habitat degradation. Areas of new road construction and re-opened roads are particularly vulnerable to increased OHV use.

The proposed new road and associated landing off of road 39-2E-32 is not likely to receive an increase in unauthorized use because the construction would occur on private land in an area behind a locked gate with no authorization of use for the public from private landowners. Therefore, no effects from increased OHV use are anticipated with the implementation of Alternative 2.

Temporary routes (short operator spurs) and roads that are proposed for re-opening to allow for harvest and hauling, and will be closed at the completion of the project as addressed in Chapter 2. The project area is not likely to receive an increase in unauthorized use as a result of project activity. Areas currently prone to unauthorized use could continue to be problematic due to the lack of natural barriers and/or the destruction of barriers installed to prevent vehicles on closed roads. For the roads re-opened for use during this project, BLM would work to improve barriers at the time of closure to prevent vehicle entry where past problems existed. Those roads (to be re-opened for the project) currently receiving little to no unauthorized OHV use would not likely receive increased use as these roads would be closed following project activities in a similar fashion as is currently in place.

Past and Proposed Actions

Recent past and proposed federal timber sales and commercial/non-commercial vegetation projects in the Sampson Cove analysis area considered under cumulative effects have mostly been for forest health and fuels reduction. These treatments attempt to remedy the effects of long-term fire suppression and, as such, are generally beneficial to native plant communities (including SSP). If left untreated, the chances for a stand-replacement, catastrophic fire are increased.

G. NOXIOUS WEEDS AND INTRODUCED PLANTS

1. Affected Environment

a. Noxious Weeds

Analysis regarding noxious weed populations within the Sampson Cove Project Area has been conducted at the 6th Field subwatershed level, and includes the following subwatersheds: Lower Emigrant Creek, Upper Emigrant Creek, Middle South Fork Little Butte Creek, Keene Creek and Walker Creek. All references to the "Sampson Cove analysis area" refer to the combined area of these subwatersheds.

Noxious weeds are generally nonnative plants that cause or are likely to cause economic or environmental harm or harm to human health. Introduced plants are species that are nonnative to the ecosystem under consideration. Introduced plants may adversely affect the proper functioning condition of the ecosystem. "Noxious Weed" describes any plant classified by the Oregon State Weed Board that is injurious to public health, agriculture, recreation, wildlife, or any public or private property.

There are a total of 712 documented noxious weed sites, comprised of 13 species, within the Sampson Cove analysis area (Table 3-12)**.** All of the documented species are considered to be "B-Designated Weeds", as determined by the Oregon Department of Agriculture. Four of these species are also considered to be "T" species. There are no species from the federal noxious weed list in the analysis area.

Table 3-12. Noxious Weed Species and Occurrences in Sampson Cove Analysis Area

Scientific Name	Common Name	Documented Occurrences in HUC6	ODA Designation*
Centaurea biebersteinii (syn. *C. stoebe, C. maculosa*)	spotted knapweed	5	B, T
Centaurea pratensis	meadow knapweed	4	B
Centaurea diffusa	diffuse knapweed	2	B
Centaurea solstitialis	yellow star-thistle	178	B, T
Chondrilla juncea	rush skeletonweed	1	B, T
Circium arvense	Canada thistle	507	B
Circium vulgare	Bull thistle	2	B
Cynoglossum officinale	Hound's tongue	1	B
Cytisus scoparius	Scotch broom	1	B
Hypericum perforatum	St. Johnswort	unknown**	B
Isatis tinctoria	Dyer's woad	3	B
Linaria dalmatica	dalmatian toadflax	2	B, T
Rubus armeniacus (syn. *R. discolor*)	Armenian (Himalayan) blackberry	6	B
Taeniatherum caput-medusae	Medusahead rye	unknown**	B

***Oregon Department of Agriculture (ODA) Noxious Weed Control Program: provides a statewide leadership role for coordination and management of state listed noxious weeds.**

A= a weed of known economic importance which occurs in the state in small enough infestations to make eradication or containment possible; or is not known to occur, but its presence in neighboring states make future occurrence in Oregon seem imminent.
B= a weed of economic importance which is regionally abundant, but which may have limited distribution in some counties.
T= a priority noxious weed designated by the Oregon State Weed Board as a target for which the ODA will develop and implement a statewide management plan. "T" designated noxious weeds are species selected from either the "A" or "B" list.

****The exact number of documented occurrences is unknown, due to under-reporting and a lower treatment priority.**

Oregon Department of Agriculture List B Noxious Weeds

Spotted knapweed (*Centaurea biebersteinii*, syn. *C. stoebe, C. maculosa*) is a native of Eurasia that easily invades areas with disturbance and causes a reduction in desirable plant communities. It can easily out-compete native plants for soil moisture and nutrients, and there is some evidence that knapweeds release chemical substances that can inhibit the growth and reproductive cycles of surrounding vegetation. The flowering period of this species can extend from June to October (Whitson et al 1999). There are 79 documented sites of spotted knapweed on the Medford District BLM and 5 documented sites in the Sampson Cove analysis area.

Meadow knapweed (*Centaurea pratensis*) is a European native with a wide distribution throughout the Pacific Northwest. First recorded in Oregon in 1918, meadow knapweed out-competes grasses and other pasture species, causing productivity to decline by forming monocultures. It prefers moist roadsides, sand or gravel bars, river banks, irrigated pastures, moist meadows, and forest openings. It also can invade industrial sites, tree farms and grasslands. There are 474 documented sites of meadow knapweed on the Medford District BLM. The 4 documented sites in the Sampson Cove analysis area represent <1% if the total District sites.

Diffuse knapweed (*Centaurea diffusa*) is a European native, first introduced to the Pacific Northwest in the early 1900s as a contaminant in alfalfa seed imported from Turkmenistan and/or Germany. A biennial, it flowers midsummer to fall. It will form dense stands on any open ground, easily out-competing more desirable forage species. The cost to treat established populations are often more expensive than the income potential of the land. It grows under a wide range of conditions, such as riparian areas, sand river shores, gravel banks, outcrops, rangelands and roadsides. There are 27 documented sites of diffuse knapweed on the Medford District, and two documented sites within the Sampson Cove analysis area.

Yellow star-thistle (*Centaurea solstitialis*) is an annual or biennial with a deep taproot. The yellow flower heads have spines, producing 35-80+ seeds. Large plants can produce over 100,000 seeds. Seed dispersal is mainly via gravity with longer distances by birds, animals, humans, vehicles, and commercial crops. Seeds can remain viable in the soil seedbank for six to 10 years. Non-native honeybees are the main pollinator of yellow star-thistle, accounting for 50% of seed set. This weed is a native of Eurasia. It lowers forage value, increases farming and ranching costs, depletes soil moisture, displaces native plants, decreases plant diversity, and is toxic to horses. Successful control methods include chemical, biological, cultural, and mechanical (including pulling and mowing). There are 2,483 sites reported for the Medford District and 178 documented sites in the Sampson Cove analysis area.

First documented in Douglas County in 1974, rush skeletonweed (*Chondrilla juncea*) is a perennial that grows 1 to 4 feet tall, and blooms from July to September. The yellow flowers grow on mostly leafless stems, and a single plant can produce 1,500 flower heads and up to 20,000 wind-dispersed seeds. Rush skeletonweed also asexually reproduces via lateral roots that produce daughter rosettes, as well as producing buds on cut root fragments. Stems and leaves produce a milky latex sap when broken. A native of Eurasia, rush skeletonweed now infests several million acres in the Pacific Northwest, and into California and Idaho. It is considered to be an aggressive plant, particularly in rangelands and croplands, impacting yields due to competition. It also displaces native species and reduces forage for livestock and wildlife. There are 100 documented sites of rush skeletonweed on the Medford District, and one known population occurring in the Sampson Cove analysis area. The 10-plant population is located outside of any foreseeable activity in relation to the Sampson Cove project.

Canada thistle (*Circium arvense*) is a colony-forming (primarily by asexual reproduction) perennial that is a native of Eurasia. This prickly rose-purple flowered plant can produce up to 1500 wind transported seed per flowering shoot. Seed can remain viable in the soil for 20 years. Vegetative reproduction contributes to local spread and persistence. The large fibrous taproot can send out lateral roots as deep as three feet below the ground, from which shoots sprout up at frequent intervals. It also regenerates from root fragments less than one inch in length. Considered to be an aggressive weed, it thrives in areas with soil disturbance and is difficult to control. Flowering typically occurs during July and August (Whitson et al. 1999). There are 1,180 documented sites reported on the Medford District, and 507 documented sites within the Sampson Cove analysis area. Of these sites, 36 occur within 100 feet of roads in the analysis area, and three documented sites are located within 100 meters of project units. Detrimental effects attributed to the establishment of Canada thistle include displacement of native species, decrease of plant diversity, reduced forage, and it serves as an alternate host for insects and pathogenic microorganisms that attack various crops. Successful control methods include biological, chemical, cultural, and some limited success with mechanical methods.

Bull thistle (*Cirsium vulgare*) is a taprooted biennial with spiny stems, leaves, and inflorescences. Each flower head can produce up to 250 seeds. Most seed falls within six feet of the parent plant but is capable of long distance transport by wind and animals. Seed survival is very low, as is seedling and rosette survival. It is estimated to take 200 seeds to produce one flowering plant. Bull thistle seedlings are poor competitors and require bare mineral soil to survive. This weed is a native of Eurasia. There are 1,551 sites reported on the Medford District and two documented sites in the Sampson Cove analysis area. However, this weed is under-documented within the GeoBOB weed database, as active control methods are not usually employed. Personal knowledge of the Botanist and recent records verify sites within the analysis area. Detrimental effects include displacement of native species, decrease of plant diversity, limits wildlife movement, and reduced forage. Bull thistle is eventually outcompeted by other vegetation for light, moisture, and nutrients.

Hound's tongue (*Cynoglossum officinale*) was introduced to North America in the late 1800s as a cereal seed contaminant. A biennial, it blooms June to August, and can be a serious problem in areas used for range and pasturelands. It is considered to be highly invasive and can significantly reduce forage, dispersing easily once established via barbed seeds that readily adhere to hair, wool, and fur. It also is known to contain large quantities of pyrrolizidine alkaloids, which are toxic to cattle and horses. There are three documented sites on the Medford District, and one site known to occur within the Sampson Cove analysis area.

Scotch broom (*Cytisus scoparius*) is a perennial shrub native to Europe and Africa. It was introduced into the United States as an ornamental and later used to stabilize roadcuts. Scotch broom invades roadsides, pastures, and other disturbed places. It produces a large amount of long-lasting seed (up to 80 years). It can form dense fields that displace native plants and degrade habitat for wildlife. There are 756 documented sites on the Medford District, and one documented site within the Sampson Cove analysis area. Successful control methods include manually pulling the entire plant, chemical, controlled burning, and a combination of cutting and herbicide treatment.

Common St. Johnswort (*Hypericum perforatum*) is a perennial forb with extensive creeping rhizomes introduced from Eurasia as an ornamental plant. It is both a toxic and invasive weed. It can form dense stands in meadows, pastures, rangelands, disturbed sites, and along roads. It is toxic to livestock but also has human medicinal value. This weed is dramatically under-reported on the Medford District and active control methods, other than the release and monitoring of biological control agents, are not usually employed. Personal knowledge of the Botanist and recent records verify numerous sites within the Sampson Cove analysis area, on both federal and privately-owned lands. Detrimental effects include displacement of native species, decrease of plant diversity, and reduced forage. Successful control methods include biological and chemical.

Dyer's woad (*Isatis tinctoria*) is a European native that was introduced to the United States as a source of blue dye, with its original establishment occurring in Virginia during colonial times. It is known to invade rangeland, grain fields, pastures, waste areas, roadsides and fencerows, and will form dense stands that readily crowd out native vegetation. Allelopathic properties enable this species to easily form monocultures. Its resurgence as a popular dye plant may greatly extend its range throughout the United States. There are 67 sites of dyer's woad on the Medford District, and three documented sites in the Sampson Cove analysis area.

Dalmatian toadflax (*Linaria dalmatica*) is a deep-rooted perennial that was introduced in the mid-1800s as an ornamental. It is a native of the Dalmatian Coast of Croatia in the Mediterranean region. It blooms from summer to fall, and out-competes desirable forage plants for moisture and nutrients. It thrives in arid rangelands, pastures, railways and roadsides. It spreads both by seeds and creeping lateral roots (asexually). There are 18 documented sites on the Medford District, and two sites within the Sampson Cove analysis area.

Himalayan (Armenian) blackberry (*Rubus armeniacus,* syn. *R. discolor*) is a perennial that blooms June to August. It is considered by the Oregon Department of Agriculture to be the most widespread and economically disruptive of all the noxious weeds in Western Oregon. An aggressive competitor, it effectively displaces native plant species, dominates riparian habitats upon introduction, and has a significant economic impact on right-of-way maintenance, agriculture, park maintenance and forest production. Capable of both sexual and asexual reproduction, it is able to quickly spread across landscapes or to jump great distances and create new infestations. Often, as plants reach an appropriate height, stem tips will bend down to the ground and establish a root system. Rhizomes also utilize adventitious rootstalks to enable the plant to spread from a single nutrient source. Long-term control methods are required for effective eradication. There are 676 documented sites of Himalayan blackberry on the Medford District; however, this species is under-reported due to the magnitude of occurrences and improbability of eradication in this area. There are 6 documented sites of Himalayan blackberry in the Sampson Cove analysis area. Of these documented sites, two occur within 100 feet of mapped roads..

Medusahead rye (*Taeniatherum caput-medusae*) is a grass that is native to the Mediterranean region of Eurasia, and was introduced to the United States in the late 1800s. The first recorded occurrence of the medusahead rye in Oregon was in Douglas County in 1887, and it can now be found throughout the West. An annual, it usually blooms May to June. Known for its ability to out-compete other grasses by extracting the majority of soil moisture before native perennial grasses have begun their growing season, it is also rich in silica and quickly becomes unpalatable as early as late spring. The stiff awns and hard florets can injure eyes and mouths of grazing animals. Medusahead rye also changes the temperature and moisture dynamics of the soil, which can greatly reduce seed germination of other species, and can create increased fuel for wildfires. Control methods usually involve chemical treatment; currently, there is no known biological control that can effectively manage for this species. There are 11 documented sites on the Medford District; however, medusahead rye is underreported District-wide and active control methods are not currently being used for management. Medusahead rye is documented in multiple areas throughout the Sampson Cove analysis area, on both BLM and adjacent private lands in semi-wet and dry meadows.

b. Introduced Species

Introduced plants are species that are nonnative to the ecosystem under consideration. Introduced plants may adversely affect the proper functioning condition of the ecosystem. Although not listed on the ODA Noxious Weed list, introduced species pose a threat to natural plant communities in the Sampson Cove analysis area. Recorded surveys indicate that there are many non-native species located within the analysis area (USDI 2007-2010) (Table 3-13).

Table 3-13. Noxious Weeds and Introduced Plants within Sampson Cove Analysis Area

Scientific Name	Common Name	Lifeform	ODA List*	Frequency %
Agrostis tenuis	colonial bentgrass	graminoid		5.6
Aira caryophylla	silver hairgrass	graminoid		50
Arrhenatherum elatius	tall oatgrass	graminoid		22.2
Avena fatua	wild oat	graminoid		16.7
Bromus diandrus	ripgut brome	graminoid		33.3
Bromus hordeaceus	soft brome	graminoid		66.7
Bromus laevipes	woodland brome	graminoid		5.6
Bromus tectorum	cheatgrass	graminoid		88.9
Centaurea cyanus	bachelor's buttons	forb		5.6
Centaurea solstitialis	yellow star-thistle	forb	B, T	11.1
Centaurea stoebe var. *micrantha*	spotted knapweed	forb	B, T	5.6
Cerastium fontanum ssp *vulgare*	big chickweed	forb		5.6
Cerastium glomeratum	sticky chickweed	forb		5.6
Circium arvense	Canada thistle	graminoid	B	33.3
Circium vulgare	bull thistle	forb	B	83.3
Crepis capillaris	smooth hawksbeard	forb		27.8
Cynosurus echinatus	bristly dogstail	graminoid		83.3
Daucus carota	Queen Anne's lace	forb		11.1
Dipsacus fullonum	Fuller's teasel	forb		11.1
Elytrigia intermedia	intermediate wheatgrass	graminoid		27.8
Holcus lanatus	common velvetgrass	graminoid		5.6
Hypericum perforatum	St. Johnswort	forb	B	44.4
Lactuca serriola	prickly lettuce	forb		44.4
Lepidium campestre	field pepperweed	forb		61.1
Matricaria discoidea	disc mayweed	forb		22.2
Phleum pratense	timothy	graminoid		61.1
Plantago lanceolata	narrowleaf plantain	forb		11.1
Poa bulbosa	bulbous bluegrass	graminoid		66.7
*Poa pratensis**	Kentucky bluegrass	graminoid		83.3
Polygonum arenastrum	oval-leaf knotweed	forb		5.6
Ranunculs repens	creeping buttercup	forb		50
Rubus discolor	Himalayan blackberry	forb	B	16.7
Rumex acetocella	common sheep sorrel	forb		55.6
Rumex crispus	curly dock	forb		50
Taeniatherum caput-medusae	medusahead	graminoid	B	61.1
Taraxacum officinale	dandelion	forb		72.2
Torilis arvensis	spreading hedgeparsley	forb		38.9
Tragapogon dubius	yellow salsify	forb		72.2
Tragapogon porrifolius	salsify	forb		5.6
Trifolium repens	white lawn clover	forb		5.6
Verbascum blattaria	moth mullein	forb		5.6
Verbascum thapsus	wooly mullein	forb		55.6
Vulpia myuros	rattail fescue	graminoid		22.2

***Naturalized Introduced**
Frequency=percentage that species occurs on reported survey species lists

2. Environmental Effects

a. Alternative 1

Noxious Weeds and Introduced Plants

Without vegetation treatment, there would be no increase in disturbed ground and no increase in forest and woodlands with lessened canopy cover. Both are conditions that would enhance the opportunities for weed establishment. Weed populations would be limited to existing weed sites and spread would be limited to adjacent areas. New weed establishments would be limited to existing disturbed areas and areas of open canopy.

Noxious weed inventory and treatment would continue to occur. Treatments are scheduled by priority and occur based on the potential of the weed population to cause economic or environmental harm or harm to human health and as funding is available.

The potential remains for a stand replacement fire that would produce early seral habitat conditions that are favorable for weed and invasive nonnative plant establishment.

b. Alternative 2

Noxious Weeds and Introduced Plants

Vegetation treatment would increase the amount of disturbed ground and areas of less canopy cover. Both of these conditions favor noxious weeds and invasive introduced plant establishment.

Project Design Features as described in Chapter 2 are incorporated into the Proposed Action to minimize the spread of noxious weeds and invasive introduced plant species. Noxious weeds would not be spread as a direct result of executing the Proposed Action with the implementation of the Project Design Features. However, weed seed can be transported into the analysis area by human actions not associated with the project and also by wind, water, and animals.

Weed Risk Assessment Field Review and Field Reconnaissance Results

Surveys for all species on the Medford Weed list were conducted in 2007 through 2010. Surveys were not conducted on private land but general occurrences were noted as casual observations. Noxious weeds are found throughout the analysis area on BLM and adjacent private lands. Noxious weed populations in the analysis area and on BLM are mostly associated with roads.

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 record check and surveys of areas that may be affected by the proposed project resulted in zero sites.

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. A record check and surveys of areas that may be affected by the proposed project resulted in at least 712 sites of 14 species (Table 3-14) below. Bull thistle, Himalayan blackberry, Medusahead rye, and common St. Johnswort are underreported on the Medford District.

Class "C" Weeds
Those noxious weed species (exotic or native) or undesirable plants not categorized in the previous categories. 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 located within the Sampson Cove analysis area, and fill the following criteria: they are exotic, have a high frequency from recent survey lists, and have the potential to cause ecological damage.

Table 3-14. Weeds Occurrences in Sampson Cove Analysis Area

Scientific Name	Common Name	Weed Class	# Sites Counted	Frequency %
Centaurea solstitialis	yellow star-thistle	B	178	
Centaurea biebersteinii (syn. *C. stoebe, C. maculosa*)	spotted knapweed	B	5	
Centaurea diffusa	diffuse knapweed	B	2	
Centaurea pratensis	meadow knapweed	B	4	
Chondrilla juncea	rush skeletonweed	B	1	
Circium arvense	Canada thistle	B	507	
Circium vulgare	bull thistle	B	2	
Cynoglossum officinale	hound's tongue	B	1	
Cytisus scoparius	Scotch broom	B	1	
Hypericum perforatum	St. Johnswort	B	unknown*	
Isatis tinctoria	Dyer's woad	B	3	
Linaria dalmatica	dalmatian toadflax	B	2	
Rubus discolor	Himalayan blackberry	B	6	
Taeniatherum caput-medusae	medusahead	B	unknown*	
Bromus hordeaceus	soft brome	C		66.7
Bromus tectorum	cheatgrass	C		88.9
Cynosurus echinatus	bristly dogstail	C		83.3
Poa bulbosa	bulbous bluegrass	C		66.7
*Poa pratensis**	Kentucky bluegrass	C		83.3
Ranunculs repens	creeping buttercup	C		50

***Species are typically underreported and/or not cataloged accurately in the District weed database. Exact population numbers are not available.**

Risk Assessment Factors
The likelihood of noxious weed species spreading into and within the analysis (Table 3-15) area is low-moderate; the project includes elements of both low and moderate risk factors. There are small but numerous Class B and C weed populations immediately adjacent to and within project roads and units. Project Design Features (PDFs) are included that would prevent the spread of noxious weeds due to direct effects of the proposed project. Weed populations within the affected area would be reduced for five years, per PDF and BLM Manual 9015. Weed spread and new establishments after five years are expected from unrelated seed transport mechanisms and relic populations. 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. If the weeds are not treated due to insufficient budget or workforce, the likelihood of noxious weed species spreading into and within the analysis area would be high.

Table 3-15. 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 consequence of noxious weed establishment in the analysis area (Table 3-16) is moderate. The majority of the noxious weed populations in the affected areas are small and mostly associated with roads. With additional ground disturbing activities (road construction/re-construction, road renovation, logging, burning) and operations that transport weed seed (log hauling, other road use), there is the potential to spread weeds into, within, and out of the analysis area. Also, unrelated activities can transport weed seed (e.g., wind, water, wildlife, hiking, OHV, etc.) into the newly disturbed areas. Weed infestations adversely affect a healthy functioning ecosystem.

Table 3-16. 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.

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 3-15) by the Consequence value (Table 3-16) to determine Value.

Step 3 - Use the value resulting from Step 2 to determine Risk Rating and Action in Table 3-17 below.

Table 3-17. 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.

If weed work is funded, the **weed risk rating under Alternative 2 would be Low to Moderate**.

With suitable weed habitat increasing initially as a consequence of the Proposed Action, total exclusion of new weed establishments is unattainable due to indirect effects. Particularly vulnerable areas would be new road construction (0.1 miles), landings (less than ¼ acre each), road renovation/maintenance sites (approximately 3.7 miles) as listed in Chapter 2 (Table 2-3), yarding corridors, and openings created for mistletoe and pine areas (less than ¼ acre each). With adequate funding for vegetation inventory and weed treatment, existing noxious weed population sizes are expected to decrease and new establishments are expected to be minimized.

H. TERRESTRIAL WILDLIFE

The Sampson Cove Project is located within the Bear Creek 5th field watershed. The Upper Bear Creek Watershed Analysis (USDI 2000) provides a general overview and background information for the habitats and wildlife species present within the Upper Bear Creek Watershed, which can be generalized to the smaller Sampson Cove Project Area.

1. Introduction

a. Vegetation Conditions & Terrestrial Wildlife Habitats (General)

The Sampson Cove Forest Management Project proposal is located in the southeastern portion of the upper Bear Creek watershed, which is a tributary to the Rogue River. The Project Area is smaller than the analysis area and for purposes of analyzing the affected environment and the proposed project; the analysis area for terrestrial wildlife considers Walker Creek and portions of Upper and Lower Emigrant Creeks called sub-watersheds and represent 6th field hydrologic unit codes. The total size of the analysis area is 34,313 acres or 54 square miles. BLM administered lands comprise 11, 202 acres within this area.

The vegetation condition classes presented in the table below provide habitat for the terrestrial wildlife species found in the proposed Sampson Cove analysis area. Acreage of each vegetation condition class and several wildlife species that are representative of the various habitats are also displayed. Approximately 260 vertebrate terrestrial wildlife species are known or suspected (based on known range and habitat associations) to occur in the analysis area. This includes species that migrate through the area.

Table 3-18. Vegetation Communities and Condition Classes - Sampson Cove Analysis Area

Vegetation Condition Class	Acres (BLM Administered Lands)	Representative Species (from Brown 1985)
Grassland	1,569	Gopher snake, California ground squirrel, western meadowlark
Brushland/Shrubland	322	Western fence lizard, wrentit, dusky-footed woodrat
Hardwood/Woodland	2,901	Acorn woodpecker, western gray squirrel, ringneck snake
Seedling/Sapling >10 ft height; <60% crown canopy	1,031	Northwestern garter snake, mountain quail, pocket gopher
Small Conifer >60% canopy; ~40-100 years old	191	Golden-crowned kinglet, porcupine, Southern alligator lizard
Large Conifer >21 " dbh	2,598	Ensatina, Stellar's jay, mountain lion
Mature Conifer Old-growth, >200 years, multiple layers w/decadence	2,590	Northern spotted owl, northern flying squirrel, pileated woodpecker,

b. Threatened, Endangered, Survey and Manage, and Bureau Sensitive Terrestrial Wildlife

Special Status Species are those species that are federally listed as threatened or endangered; proposed or candidates for federal listing as threatened or endangered; are BLM designated sensitive species; or are listed as Survey and Manage species under the Northwest Forest Plan. The table below lists the special status species that are known or suspected to be present in the analysis area. Only those species that could reasonably be present are included – not species that would be considered as "accidental" in the analysis area.

Table 3-19. Threatened, Endangered, Bureau Sensitive, and Survey and Manage Terrestrial Wildlife

Species	Scientific Name	Status
Bald Eagle	*Haliaeetus leucocephalus*	BS - Suspected
Chase Sideband Snail	*Monadenia chaceana*	BS and S&M- Suspected
Fisher	*Martes pennanti*	FC - Suspected
Foothill Yellow-legged Frog	*Rana boylii*	BS - Known
Franklin's Bumblebee	*Bombus franklini*	BS – Suspected
Fringed Myotis	*Myotis thysanodes*	BS - Suspected
Great Gray Owl	*Strix nebulosa*	S&M – Known
Johnson's Hairstreak Butterfly	*Callophrys johnsoni*	BS--Suspected
Mardon Skipper Butterfly	*Polites mardon*	FC - Suspected
Northern Spotted Owl	*Strix occidentalis caurina*	FT -Known
Northwestern Pond Turtle	*Actinemys marmorata marmorata*	BS - Known
Oregon Shoulderband Snail	*Helmithoglypta hertleini*	BS and S&M – Known
Oregon Spotted Frog	*Rana pretiosa*	FC – Suspected
Peregrine Falcon	*Falco peregrinus anatum*	BS - Suspected
Pallid Bat	*Antrozous pallidus*	BS - Suspected
Siskiyou Hesperian Snail	*Vespericola sierranus*	BS - Suspected
Siskiyou Short-horned Grasshopper	*Chloealtis aspasma*	BS – Suspected
Travelling Sideband Snail	*Monadenia fidelis celeuthia*	BS - Suspected

FT - Federal Threatened
FC – Federal Candidate
BS - Bureau Sensitive
S&M - Northwest Forest Plan Survey and Manage

2. Affected Environment - Northern Spotted Owl (NSO)

The Northern spotted owl (*Strix occidentalis caurina*) is a federally listed threatened species. This species is closely associated with older forests for nesting, roosting, and foraging 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).

The Bureau of Land Management (BLM), Forest Service (FS), and US Fish and Wildlife Service (USFWS) have conducted a coordinated review of four recently completed reports containing information on the northern spotted owl. The reviewed reports include the following:

- Scientific Evaluation of the Status of the Northern Spotted Owl (Sustainable Ecosystems Institute, Courtney et al. 2004);
- Status and Trends in Demography of Northern Spotted Owls, 1985-2003 (Anthony et al. 2004);
- Northern Spotted Owl Five Year Review: Summary and Evaluation (USFWS 2004); and
- Northwest Forest Plan – The First Ten Years (1994-2003): Status and trend of northern spotted owl populations and habitat, PNW Station Edit Draft (Lint 2005).

Anthony et al. (2004, 2006) is the most recent meta-analysis of owl demographic data collected in 14 demographic study areas across the range of the northern spotted owl. Four of the study areas are in western Washington, six are in western Oregon, and four are in northwestern California. Although the agencies anticipated a decline of NSO populations under land and resource management plans during the past decade, the reports identified greater than expected NSO population declines in Washington and northern portions of Oregon, and more stationary populations in southern Oregon and northern California.

Summarizing Anthony et al., between 1985-2003:

- The northern spotted owl population declined over its entire range, and varied from the most pronounced in Washington (7.3% year per) to the least pronounced in California (2.2%)
- Within Oregon, the northern demographic study areas averaged 4.9% population decline, and the southern study areas decline averaged less than 1% per year and were statistically stable, with a western Oregon average of 2.8% decline per year.
- Range-wide, adult survival rates declined in 5 of 14 study areas (western Washington and northwestern California) and western Oregon was stable in all six study areas.

The reports did not find a direct correlation between habitat conditions and changes in NSO populations, and they were inconclusive as to the cause of the declines. Even though some risk factors had declined (such as habitat loss due to harvesting) other factors had continued such as habitat loss due to wildfire, potential competition with the barred owl, West Nile virus, and sudden oak death (USFWS 2004, Lint 2005). The barred owl is present throughout the range of the spotted owl, so the likelihood of competitive interactions between the species raises concerns as to the future of the spotted owl (Lint 2005). Lint (2005) also found that between 1994-2003, federal lands in the Klamath Province lost 6.6% of spotted owl nesting habitat to stand-replacement fire, mainly to the Biscuit Fire (almost 500,000 acres).

There are 9 northern spotted owl sites with some portion of their provincial home range on BLM administered land within the analysis area. A limited number of surveys have been conducted at these sites over the past 10 years. For purposes of this analysis, all sites are assumed to be occupied.

a. Northern Spotted Owl Habitat

Within the Upper Bear Creek Watershed, wildlife habitat was typed into habitat categories pertinent to the Northern Spotted Owl (NSO). 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 habitat (NRF),
- Dispersal-only habitat, and
- Unsuitable habitat.

Nesting, roosting and foraging (NRF) habitat is characterized by forested stands with older forest structure with characters such canopy closure of 60 percent or greater, trees with large crowns, multiple canopy layers, snags and down wood. The best quality NRF habitat has forest stands with large old trees with cavities, broken tops, mistletoe platforms, large branches, dead standing and fallen decayed trees, and multiple canopies of shade tolerant hardwoods and conifers that support prey base. NRF habitat also functions as dispersal habitat.

Dispersal-only habitat for spotted owls is defined as stands that typically have a canopy closure of 40 percent or greater, and are open enough for flight and predator avoidance, but do not meet the habitat criteria of NRF habitat. Dispersal-only habitat is used throughout this document to refer to habitat that does not meet the criteria of NRF (nesting, roosting, or foraging) habitat, but has adequate cover to facilitate movement between blocks of suitable NRF habitat. Unsuitable habitat does not currently meet the NRF or dispersal-only habitat criteria. This habitat typing system was designed specifically for spotted owls, but can be used to assess habitat availability for other species 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 (see KS Wild v. US BLM, Case No. 06-3076-PA, Order and Judgment 9/10/2007).

Approximately 7,390 acres of the BLM lands within the Upper Bear Creek Watershed are classified as NRF (late-successional) habitat, or approximately 45% of the BLM administered lands in the watershed. There are approximately 4300 acres of NRF habitat and 550 acres of dispersal-only habitat on BLM administered land within the Sampson Cove analysis area. Not all lands in the analysis area are capable of becoming NRF habitat due to the natural limitations of some soil types, and agricultural and rural development.

b. Northern Spotted Owl Critical Habitat

241 acres of proposed treatment units are located in designated Critical Habitat (1992 designated) for the northern spotted owl. Critical Habitat is designated under the auspices of the Endangered Species Act of 1973. The designated critical habitat in the analysis area was established to provide for nesting, roosting, and foraging habitat in an area of high habitat fragmentation and to help in providing a habitat link between the Western Cascade and Klamath Mountains physiographic provinces (USDI, FWS 1994).

3. 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 (68 Federal Register, No. 132, 41169-41174) 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 (Federal Register Vol. 69, No. 68, April 8, 2004, 18769-18792). The species remains a USFWS candidate species (USDI, USFWS 2004, 71 Fed. Reg. 53777, Sept. 12, 2006). 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." (71 Fed. Reg. 53777 (Sept. 12, 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." (Id.)

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 (KS Wild v. US BLM, Case No. 06-3076-PA, Order and Judgment 9/10/2007).

Based on the NSO habitat analysis, approximately 7,390 acres of suitable fisher denning and resting habitat exists within the Upper Bear Creek Watershed. 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 and USDI 1994b). This checkerboard ownership pattern was created by the Congressional acts that provided land grants, and is outside of BLM's control.

The 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.

Forest carnivore surveys using bait stations with motion and infrared detection cameras have been conducted throughout the Ashland Resource Area and have detected fishers within approximately 5 miles to the east of the Project Area, in the vicinity of Howard Prairie Reservoir. Limited surveys have been conducted within the Project Area. Due to the proximity of the Project Area to known fisher detections, it is reasonable to assume the area is used by fisher. The extent (dispersal, foraging, or breeding) to which the Sampson Cove Project Area is used by fisher is not fully known.

4. Affected Environment - Survey and Manage Species

a. Red Tree Vole

The red tree vole (RTV) is an arboreal rodent species with very low dispersal capabilities. Red tree voles 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 2000a). 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. The Sampson Cove Project is outside the known range of this species. Surveys east of Interstate 5 in the Rogue Valley have never located RTVs. The nearest known location of RTVs is nearly 20 miles to the west in the Applegate River Drainage.

b. Great Gray Owl

The great gray owl is a NWFP Survey and Manage species. Great gray owls (*Strix nebulosa*) nest in open forests adjacent to meadows. Broken top trees, abandoned raptor nests, mistletoe clumps, and other platforms provide suitable nest structures (USDA USDI 2004b); suitable nesting habitat is defined in the "Survey Protocol For The Great Gray Owl " (USDI, USDA 2004b) 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 2004b). Large amounts of habitat suitable for great gray owl reproduction exist in and around the Sampson Cove analysis area. Protocol surveys were conducted for great gray owls in the Sampson Cove analysis area in 2007 and 2008. Eleven (11) reproductive sites were located. Each reproductive site would be protected with a ¼ mile (or equivalent area polygon) no harvest buffer.

c. Mollusks

Potential habitat exists throughout the Project Area for four Survey and Manage mollusks, *Helminthoglypta hertleini, Monadenia fidelis celeuthia, Monadenia chaceana,* and *Vespericola sierranus* (USDI USDA 2001 Survey and Manage ROD). *Helminthoglypta hertleini* (Bureau Sensitive species) 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* (Bureau Sensitive species) is associated with rocky areas, talus deposits, associated riparian areas, and coarse woody material (USDA, USDI 2003). *Vespericola sierranus* is primarily a riparian associate found in perennially moist habitat, including spring seeps and deep leaf litter along stream banks and under debris and rocks. *Monadenia fidelis celeuthia* is associated with deciduous, mixed or coniferous forests generally, but also sometimes in open woods and grassy places, such as Garry Oak (*Quercus garryana*) meadows.

Protocol Surveys for terrestrial mollusks were conducted throughout the Sampson Cove Project Area and were completed in the spring of 2008. These surveys did not detect any target mollusk species (*Helminthoglypta hertleini, Monadenia fidelis celeuthia, Monadenia chaceana,* and *Vespericola sierranus).* Potential habitat that occurs within treated units would remain suitable after treatments due to retention of forest canopy and woody debris.

d. Golden Eagle

In Oregon, the Golden Eagle inhabits a wide range of habitats, including shrub steppe, grasslands, juniper, open ponderosa pine, and mixed conifer / deciduous habitats. The preferred foraging habitat is generally open areas with a shrub component that provides food and cover for prey (primarily black-tailed jackrabbit). Nests are typically large (3-10' tall and 3' wide), and often built in large live ponderosa pines (>30" dbh) or on ledges along rims and cliffs (Marshall et al., 2003).

Currently, the Golden Eagle is not recognized as a federally or state listed species (under the Endangered Species Act) or under the Bureau's Special Status Sensitive Species program. However, protection is afforded under the Bald and Golden Eagle Protection Act and under the Medford District RMP.

During the summer of 1990, a Golden Eagle nest was discovered by a surveyor while conducting northern spotted owl surveys. The nest was documented to have fallen from the tree by the late 1990s and has never been reconstructed. Golden Eagle are still observed in the Upper Bear Creek Watershed on a regular basis. Large tracts of suitable habitat exist in this area.

5. Affected Environment - Land Birds (Neotropical Migrants)

All neotropical migrants go to Central or South America each year. They are addressed here due to widespread concern regarding downward population trends and habitat declines. BLM has interim guidance for meeting federal responsibilities under the Migratory Bird Treaty Act and Executive Order 13186 (EO). Both the Act and the EO promote the conservation of migratory bird populations. The interim guidance was transmitted through Instruction Memorandum No. 2008-050. The Instruction Memorandum relies on two lists prepared by the US Fish and Wildlife Service in determining which species are to receive special attention in land management activities; the lists are *Bird Species of Conservation Concern* (BCC) found in various Bird Conservation Regions (Project Area is in BCR 5) and *Game Birds Below Desired Condition* (GBBDC). The following table displays those species that are known or likely to be present in the analysis area.

Table 3-20. Land Bird Species Known or Likely to be Present – Sampson Cove Analysis Area

Species	Status
Band-tailed Pigeon (*Patagioenas fasciata*)	GBBDC
Flammulated Owl (*Otus flammeolus*)	BCC
Lewis' Woodpecker (*Melanerpes lewis*)	BCC
Mallard (*Anas platyrhynchos*)	GBBDC
Mourning Dove (*Zenaida macroura*)	GBBDC
Olive-sided Flycatcher (*Contopus cooperi*)	BCC
Rufous Hummingbird (*Selasphorus rufus*)	BCC
Wood Duck (*Aix sponsa*)	GBBDC

Land birds use a wide variety of habitats, including late-successional forests, riparian areas, brush in recovering clearcuts, and small trees in developing stands. Some birds, such as the Olive-sided Flycatcher, use residual canopy trees for perching, and forage over adjacent clearcuts. Many land birds are associated with deciduous shrubs and trees in early successional habitats (e.g., Orange Crowned Warblers and Rufous Hummingbirds). Some of the recovering clearcuts and pine savannahs in the analysis area with lower tree and shrub heights would provide these optimal foraging conditions.

Resident birds remain in the same general area or migrate to lower elevations in the winter. Total numbers of late-successional dependent migratory or resident birds within the Sampson Cove analysis area are unknown. However, knowledge of specific numbers is not necessary to assess effects of land management activities on migratory or resident birds. Current research indicates the most appropriate scale to study impacts to migratory birds is at the eco-regional scale (California Partners in Flight 2002). Breeding bird surveys in the Southern Pacific Rainforest Physiographic Region (which includes western Oregon) indicate that songbirds are declining. The exact cause of these declines is still unclear, but issues associated with their winter grounds (Central and South America) are suspected to be an important factor (Sauer et al., 2004).

6. Affected Environment - Deer and Elk

Deer Winter Range and Elk Management Area

Approximately 3,828 acres of the Sampson Cove analysis area are in the Emigrant Creek Deer Winter Range and 1,113 acres are in the Grizzly Peak Elk Management Area as identified in the Medford District RMP. A substantial portion of these areas is located behind locked gates. The inaccessibility of much of the winter range/ management area to vehicles provides seclusion for deer and elk at a time when they are under physiological stress. This is a benefit because nutritional reserves are not depleted on avoidance behavior.

Within the greater project area, approximately 5,507 acres serve as primary foraging areas (grass, brush, woodland, and early seral vegetation condition classes), and approximately 5188 acres serve as thermal cover (mid-seral and mature forest with a high degree of canopy closure). Generally, brushland/shrubland and mature conifer forest vegetation condition classes also provide hiding cover.

Management for deer and elk in these areas is focused primarily on improving forage and cover conditions and decreasing the density of roads that area open to vehicular traffic, particularly in the winter period. Winter range is located at lower to mid-elevations in the analysis area, and generally on south to west facing slopes where solar radiation is most intense. Concentrating foraging and other life functions on these aspects allows the animals to maintain normal body temperature with less energy expenditure. Elk winter range is located at higher elevations than deer winter range.

Note: In the sections that follow regarding environmental consequences, only those wildlife species that are present within the analysis area and/or are anticipated to be affected by the Sampson Cove Proposed Action are discussed.

7. Environmental Consequences - Northern Spotted Owl

a. Alternative 1

The current habitat conditions within the Sampson Cove analysis 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 watersheds today.

Under Alternative 1, the No-Action alternative, none of the proposed BLM activities 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 analysis area would eventually contain tree densities two to three times that of historic levels (Hardy and Arno, 1996). The majority of the lower elevation stand conditions reflect past fire exclusion efforts. As discussed in further detail in Sections J. (Silviculture) and I.(Fire and Fuels), high stocking levels, competition mortality, fuel loading and ladder fuel conditions work to increase the susceptibility of the existing late-successional and NRF habitat to high severity fire.

The No-Action Alternative would not alter the current habitat conditions across the analysis area, and the NSOs that inhabit and utilize the analysis 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 analysis 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.

Under the No-Action Alternative, the development of future late-successional forest habitat within the Project Area would be delayed or potentially at risk, although they may be reviewed for harvesting under RMP guidelines. As discussed in further detail in the Silviculture section of this EA (Section J.) future stand development into late-successional forest habitat would be retarded under the No-Action Alternative.

This is because current stand conditions are too dense and trees are not developing the diameter to height ratio required to develop this structure (Davis et al., 2007). This ratio was historically created through frequent fire events that reduced stem densities and competition that created open grown conditions. Under the No-Action Alternative, the current stand conditions would likely develop into less complex stand structures and species compositions than that of old-growth stands (Sensenig 2002), or at the very least, would require a much longer time scale to develop (Tappeiner et al., 1997).

b. Alternative 2

Forest management treatments result in one of the following categories: habitat removal, habitat downgrade, or a maintenance treatment (treat and maintain). Forest management treatments include thinning but maintaining NSO nesting, roosting, foraging, and dispersal habitat, pine series thinning, dry Douglas-fir thinning, white fir thinning, mixed conifer thinning, disease management (mistletoe), and regeneration harvest. A description of these silvicultural prescriptions is included in Chapter 2, Silvicultural Objectives and Descriptions.

Harvest Treatments

There are approximately 4,271 acres of suitable spotted owl habitat, and 547 acres of dispersal-only habitat in the analysis area. It is estimated that Alternative 2 would remove or downgrade approximately 76 acres of suitable habitat (approximately 34 acres would be removed and 42 acres would be downgraded to dispersal-only habitat). Additionally, 25 acres of dispersal-only habitat would be removed. The table below displays the estimated pre and post-project spotted owl habitat conditions in the analysis area.

Table 3-21. Estimated Effects on Spotted Owl

NRF Habitat (Acres)		Dispersal-only Habitat	
Pre-project	Post-project	Pre-project	Post-project
4,271	4,195	547	564

Portions of the Sampson Cove Project would take place within the provincial home range radius (1.2 miles) of 7 historic northern spotted owl sites. All treatments within the provincial home range of a northern spotted owl site would be treated and maintain in outcome (i.e., habitat suitable for northern spotted owls prior to this action would remain suitable for northern spotted owls following this action.). The removal and downgrading of approximately 76 acres of suitable habitat outside of northern spotted owl provincial home ranges in the analysis area (approximately 2 percent of the suitable habitat currently available) may impair the ability of the owls to breed, feed, and shelter on those 76 acres. Across the larger landscape, more than 98% of existing suitable northern spotted owl habitat would remain untreated.

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. Researchers have found that the habitat quality within 300 meters of a nest site (known as the nest patch) is critically important to determining nest positioning across the landscape (Perkins et al., 2000), and is further recognized as an important area under the Incidental Take Statement Methodology used to estimate the number of NSOs affected by federal actions (USDI 2008). Therefore, two similar treatments in very similar habitat types could have differing impacts to NSOs depending on if the treatment would occur within proximity to NSO nest locations (i.e., the nest patch).

The removal of selected dwarf mistletoe infected trees outside of NSO nest patches would remove some trees with potential nest structure formed by the mistletoe. Large diameter trees (>34") with low mistletoe infection ratings would be retained. Treatment of mistletoe is prioritized to treat areas of heaviest infection. Suitable nesting structure is retained within units through retention of large dominant trees and some trees infected with mistletoe.

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 would 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). Thus, the treatments as proposed under Alternative 2 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.

Northern spotted owls would likely be adversely affected (LAA) by the proposed project; therefore formal consultation with the U.S. Fish and Wildlife Service is required. The consultation was initiated through a programmatic consultation with the Service for timber sales and other projects in the MEDFORD Summer 2010 LAA BA. The Biological Assessment, MEDFORD Summer 2010 LAA BA, is available for review at the Medford District Office**.**

Effects to Spotted Owl Prey

Timber harvest and associated fuels reduction projects may impact foraging by changing habitat conditions for prey. Sakai and Noon (1993) stated that dusky-footed woodrats, the primary prey of owls in our area, may benefit from some thinning or harvest which would increase shrub and pole stands. Bushy-tailed woodrat presence is more dependent on cover and food availability than on seral stage and they often use areas previously disturbed by fire (Carey 1991).

Regeneration harvest on 25 acres would remove habitat for arboreal prey species (flying squirrels, woodrats, and red tree voles), but may improve habitat for non-arboreal species (western red backed voles and deer mice). A dispersal stand which resulted from the downgrade of NRF habitat would begin to develop the pretreatment habitat within 25 to 40 years, depending on treatment type, plant association, and location. Residual trees, snags, and down wood that are retained in the thinned stands would provide some cover for prey species over time, and would help minimize harvest impacts to some prey species. Lemkuhl et al. (2006) found that fuels projects in eastern Washington could have impacts on bushy-tailed woodrats, but confirmed the importance of maintaining snags, down wood, and mistletoe.

Some disturbance of habitat may improve forage conditions, provided understory structure and cover are retained. Removal of some tree canopy, provided it is not too extreme, would bring more light and resources into the stand, stimulating forbs, shrubs and other prey food. Once the initial impact of disturbance recovers (6 months to 2 years), the understory habitat conditions for prey forage would improve over the next few years, until shrubs and residual trees respond to again close in the stand.

Edges created from harvest can be areas of good prey availability and potentially increased prey vulnerability (i.e., better hunting for owls) (Zabel 1995). Prey animals may be more exposed in the disturbed area or may move away from the disturbed area for the short-term. Some minor changes in prey availability may occur as cover is disturbed and animals move around in the understory. They may become more vulnerable and exposed. The disturbance might attract other predators such as hawks, other owls, and mammalian predators. This may increase foraging competition for owls in the treatment area, but the exposure of prey may also improve prey availability for northern spotted owls.

Bingham and Noon (1997) reported that a spotted owl core area is the area that provides the important habitat elements of nest sites, roost sites, and access to prey, benefiting spotted owl survival and reproduction. Rosenberg and McKelvey (1999) reported that spotted owls are "central place" animals with the core area (the area closest to the nest) being the focal area. Several studies (Wagner and Anthony 1998, Dugger et al. 2005; Zabel et al. 2003;, Bingham and Noon 1997) indicate the core area size for the Klamath and South Cascades provinces is 0.5 miles (or 500 acres) within the nest site.

Therefore, effects to prey species are most critical at the nest patch and core areas. Within the Sampson Cove Project, there would be no treatment within nest patches and all treatment within core areas would be "treat and maintain".

Overall, the spacing, timing and the retention of key habitat features as called for under the Proposed Action and PDFs for this project (EA Chapter 2) are likely to avoid adverse impacts to spotted owls with respect to prey availability, although 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, moderate to high canopy cover residual 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.

PDFs and normal operating procedures applied by the Medford BLM reduce the impacts to the extent possible, while still facilitating tree harvest and other projects. Treatment areas are small enough and dispersed enough that many resident prey species could move to adjacent patches until the stand recovers.

Effects of Disturbance to Northern Spotted Owls

Mandatory PDFs would be incorporated into all Proposed Action activities. Applying the Mandatory PDFs should avoid harm to nesting owls and their young that might occur from noise or activity. Nesting owls are confined to an area close to the nest, but once the young fledge, they can move away from noise and activities that might cause them harm. Since all projects would follow mandatory PDFs, that restrict activities to outside of the breeding season and beyond recommended disturbance distance thresholds, no harm to nesting owls, or their young, is expected from project related noise or activities.

Fuels Reduction Treatments

Alternative 2 proposes to treat slash created from forest thinning. Approximately 250 acres of NRF habitat and 148 acres of dispersal-only habitat would be treated. This equates to approximately 5.8% and 27% of the available NRF and Dispersal-only habitat available within the Sampson Cove analysis area, respectively.

The fuels reduction treatments as proposed in Chapter 2 would not alter the overstory forest structure or remove key habitat components related to spotted owl habitat. In very dense stands, these treatments reduce understory density and improve flight paths within stands, in turn, increasing the accessibility of owls to the forest floor and prey abundance or availability (Sakai and Noon 1993, 1997).

In some instances, mechanical fuels treatments can reduce the habitat quality for owls because these treatments simplify the forest structure, which can in turn have negative effects to prey species. Conversely, results from other studies on small mammals and fuel reduction treatments have demonstrated that the total amount of small mammal biomass increases as a result of mechanical fuel reduction treatments (Converse et al., 2006).

Large down woody debris, patches of unburned vegetation in draws and cooler aspects, and some unburned slash piles would continue to provide ground cover habitat during and after treatments. These untreated areas and residual habitat features, along with the spatial and temporal staggering of treatments across the landscape should ameliorate the potential negative effects of these fuels treatments on prey species at the landscape level.

Underburning treatments have the greatest potential to impact spotted owl prey because these treatments can fully or partially consume the snags or coarse woody material (CWM) that many prey species are associated with during underburn operations (Stephens and Moghaddas, 2005). However, these effects to prey species are expected to be highly limited and localized because very few acres would be underburned during a given year and not all the existing snags or CWM within an underburn is lost during underburn treatments (Pers. Comm. Mitchell, 2009). In addition, while some prey species may be adversely affected from mechanical and underburn treatments, a good proportion of the prey are primarily arboreal in habit, and would remain largely unaffected by these treatments.

Road Construction

Under Alternative 2, the BLM proposes to maintain about 44.6 miles of roads (i.e., road grading, rock surfacing, and water drainage improvements). About 0.7 miles of existing routes would be reopened and closed immediately following completion of operations. There are a number of ways roads affect wildlife in addition to habitat removal. Some of the more common ones are vehicular noise disturbance which affects behavior patterns, increased potential for poaching, increased potential for over hunting along roads due to easy access, and microclimatic changes to the habitat adjacent to roads. Road maintenance has the potential to influence wildlife species through noise, but would be of short duration and subject to wildlife seasonal PDFs. The proposed new road (500 feet) passes through grassland and woodland which is not suitable habitat for any special status wildlife species. The closure of this new road segment and its location behind a locked gate would limit any impacts that might otherwise arise from increased vehicular access or hunting/poaching.

In summary, the Proposed Action would have minimal impacts to the NSOs found within the analysis area given that:

- 4.1% of the total NRF habitat located within the analysis area would receive treatments
- The treatments would not downgrade or remove any existing habitat within owl home ranges
- None of the proposed treatments would occur within a NSO nest patch
- Negative impacts to NSO prey are anticipated to only occur in the short term (<5 years) and would spatially separated and well distributed across the owl analysis area.

8. Environmental Consequences – Pacific Fisher

a. Alternative 1

Under Alternative 1, the No-Action Alternative, none of the proposed BLM activities 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 analysis area. Fishers would be expected to behave and utilize the habitat 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.

b. Alternative 2

Harvest Treatments

No known denning sites would be impacted and proposed activities 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 analysis 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.

Thinning treatments 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 analysis 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.

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 (approximately 20 square miles for an adult male). 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.

Fuels Reduction Treatments

Alternative 2 proposes to treat 504 acres for fuels reduction. Approximately 250 acres of NRF habitat and 148 acres of dispersal-only habitat would be treated. These proposed treatments would have minimal impacts to the habitat located across the analysis area, as the vast majority of the existing habitat would not be treated.

The fuels reduction treatments as proposed in Chapter 2 do not typically 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.

Underburning treatments have the greatest potential to impact fisher habitat because these underburning treatments can partially or fully consume the snags or coarse woody material (CWM) that fishers often utilize for denning or rest sites (Stephens and Moghaddas, 2005). However the potential loss of these snags or CWM is expected to be highly limited and localized because very few acres would be underburned during a given year, and not all the existing snags or CWM within an underburn is lost during underburn treatments (Pers. Comm. Mitchell, 2009).

Road Construction

Under Alternative 2, the BLM proposes to maintain about 44.6 miles of roads (i.e., road grading, rock surfacing, and water drainage improvements). About 0.7 miles of existing routes would be reopened and closed immediately following completion of operations. This road construction would take place in non-forest land which does not presently serve as suitable habitat for fisher.

Effects Summary for Fisher

Alternative 2 would not contribute to the need to federally list the fisher as threatened or endangered because habitat features, such as large snags and coarse wood, would be retained throughout the Project Area, which would provide habitat for denning and resting. The majority of suitable habitat located within the Upper Bear Creek Watershed would not receive any treatments.

9. Environmental Consequences – Great Gray Owl

a. Alternative 1

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

Specific to great gray owls the No-Action Alternative would not affect use of the analysis 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 analysis area. Stand replacement fire would remain the greatest risk to the nesting habitat found within the analysis area.

b. Alternative 2

Alternative 2 would treat 504 acres of forest habitat. 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 potential nest trees found throughout the analysis area. Protocol surveys were conducted for great gray owls for the Sampson Cove analysis area in 2007 and 2008. Eleven (11) reproductive sites were located. Each reproductive site would be protected with a ¼ mile (or equivalent area polygon) no harvest buffer. Any additional reproductive sites located prior to harvest activities would also receive this protection.

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 great gray owls nesting and improved potential foraging habitat as understories respond from increased light penetrating to the forest floor .

The fuels reduction treatments proposed under Alternative 2 would remove vegetation from the understory or the smaller components of the midstory. This would have minimal effects on great gray owl habitat, as the trees removed by this type of treatment do not provide nesting habitat. These treatments have the potential to improve foraging conditions in treated stands by opening the understory and increasing access to prey species. The small amount of road construction associated with Alternative 2 would not occur in suitable great gray owl habitat, and thus would not directly affect any nesting habitat.

10. Environmental Consequences - Golden Eagle

a. Alternative 1

Under the No-Action Alternative, management activities would not remove or alter suitable habitat within the Project Area and habitat would continue to develop along current successional pathways. Particularly to Golden Eagles, the greatest risk of No-Action is the potential wildfire related loss of large live remnant conifers needed to support Golden Eagle nesting structures, and the loss of suitable foraging habitat due to conifer encroachment.

b. Alternative 2

Due to the extensive amounts of habitat available within this watershed suitable for use by Golden Eagles, any impact to the species from the Sampson Cove Project is expected to be slight. Most large suitable nest trees would be retained post harvest. Grasslands suitable for foraging would not be treated and would remain usable by Golden Eagles to their present extent.

11. Environmental Consequences - Bureau Sensitive Species

The Bureau Special Status Species list, updated February 7, 2008, is divided into Sensitive and Strategic species (IM No. OR-2008-038). As mentioned above, only federally listed or Bureau Sensitive species known or suspected to be present within the analysis area and impacted by the proposed actions are addressed in this EA. Table 3-22 below documents the basic conclusions of this assessment by species. A description of the table's headings and letter codes are located at the bottom of Table.

Table 3-22. Special Status Wildlife Species – Sampson Cove Analysis Area

SPECIES	7/7/10 STATUS	RANGE (Y/N)	PRESENCE	PROJECT SPECIFIC COMMENTS/ BASIC CONCLUSIONS
Birds Bureau Sensitive & Bureau Strategic				
Peregrine falcon	BSEN	Y	S	No known nest sites within the planning area. Some potential nesting cliffs are present. Suitable habitat will remain suitable post harvest.
Bald eagle	BSEN	Y	S	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	S	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. Pine restoration treatments could potentially benefit this species in the long-term by promoting development of the historic open pine forests.
Northern spotted owl	FT	Y	P	Seasonal Restrictions would protect known sites from project activity disturbance. Adequate potential habitat exists within and adjacent to the project area. Proposed activities impacts have been addressed in detail in the subsection 7.
Amphibians Bureau Sensitive & Bureau Strategic				
Foothill yellow-legged Frog	BSEN	Y	P	A slight decrease in sedimentation from road maintenance and construction, and one temporary draw crossing could have negative short term impacts on foothill yellow-legged frog habitat. However, sediment delivery to streams due to project activities would be highly localized, immeasurable, and of short duration. Soil and hydrology PDFs would minimize potential impacts from sedimentation to water quality and no loss of frogs would be expected to occur.
Oregon Spotted frog	FC	Y	U	No known sites within the project area. Habitat will be protected by riparian buffers within the Sampson Cove project area.
Reptiles Bureau Sensitive & Bureau Strategic				
Northwestern pond turtle	BSEN	Y	P	Females lay eggs in upland areas up to ½ mile from the nearest water source. Riparian zone buffers will protect aquatic habitats used by this species. Upland sites utilized for nesting are not usually forested and would not likely be impacted by the proposed action. Some individual turtles may overwinter in duff in forested locations and could be subject to incidental impacts.

SPECIES	7/7/10 STATUS	RANGE (Y/N)	PRESENCE	PROJECT SPECIFIC COMMENTS/ BASIC CONCLUSIONS
Mammals Bureau Sensitive & Bureau Strategic				
Fisher	FC	Y	S	Adequate potential habitat exists within and adjacent to the project area. Temporary human disturbance, both temporally and spatially would be inconsequential. No known sites located within project units. Proposed activities impacts have been addressed in detail in the subsection 8.
Fringed myotis	BSEN	Y	S	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.
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.
Invertebrates Bureau Sensitive & Bureau Strategic				
Chase sideband snail	BSEN	Y	S	Adequate potential habitat exists within and adjacent to the project area. Protocol surveys did not detect any individuals within the project area. Impacts from proposed activities would not affect the species and/or habitat.
Coronis Fritillary	BSEN	Y	U	No known sites in project area.
Evening fieldslug	BSEN	Y	U	No known sites in project area. Habitat will be protected by riparian buffers within the Sampson Cove project area.
Franklin's Bumblebee	BSEN	Y	S	This bee is associated with open areas with flowering plants and abandoned small mammal burrows suitable for nesting. The Franklin's bumblebee is unlikely to be impacted by the proposed action as its preferred habitat is open moist meadows which support adequate flower and shrub species from which this bumblebee can collect nectar and pollen. This type of habitat will not be treated as part of the Sampson Cove project.
Johnson's Hairstreak	BSEN	Y	S	This butterfly species has not been documented in the project area. Surveys for the species have been determined to be impractical as it spends the majority of its lifecycle high in the canopy of older conifers with mistletoe infection. This butterfly is likely to be impacted through removal of conifer trees and the mistletoe which they host. As mistletoe will not be eradicated from the project area, this butterfly will likely continue to persist.
Mardon skipper butterfly	FC	Y	S	No known sites within the project area. This species is associated with wet meadows. There will be no treatment of this type of habitat under the provisions of this project.
Oregon shoulderband snail	BSEN	Y	S	Adequate potential habitat exists within and adjacent to the project area. Protocol surveys did not detect any individuals within the project area. Impacts from proposed activities would not affect the species and/or habitat.
Siskiyou hesperian snail	BSEN	Y	S	Adequate potential habitat exists within and adjacent to the project area. Protocol surveys did not detect any individuals within the project area. Impacts from proposed activities would not affect the species and/or habitat.
Siskiyou short-horned grasshopper	BSEN	Y	S	The Siskiyou short-horned grasshopper is associated with open grassland with an elderberry shrub component. No activities are proposed for this habitat type in the Plateau Thin project area. They are unlikely to be impacted by the proposed action.
Travelling sideband snail	BSEN	Y	S	Adequate potential habitat exists within and adjacent to the project area. Protocol surveys did not detect any individuals within the project area. Impacts from proposed activities would not affect the species and/or habitat.

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.

12. Environmental Consequences - Land Birds (Neotropical Migrants)

a. Alternative 1

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.

b. Alternative 2

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). Harvest treatments would remove hiding cover and nesting habitat for neotropical birds that use older forests. However, untreated riparian buffers, untreated late-successional forest habitat, and 100-acre spotted owl activity centers would continue to provide adequate hiding cover, foraging, and nesting habitat within the analysis 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 the treatment areas would provide refuge and nesting habitat, minimizing short term loss of habitat. Some nests may be lost 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 analysis area. That is because sufficient habitat of all types remains to support the wide diversity of bird species in the area. As >95% of the lands found within the Upper Bear Creek Watershed would remain untreated, impacts to these species are anticipated to be negligible at the landscape scale. The loss 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).

13. Environmental Consequences - Deer and Elk

Deer Winter Range and Elk Management Area

The Emigrant Creek Deer Winter Range is almost entirely (approximately 90%) within the Sampson Cove analysis area. The primary impact of the proposed timber harvest in deer winter range would be the reduction in thermal cover effectiveness due to a reduction in canopy closure in the commercial-sized conifer stands. The Medford District RMP ROD recommends maintaining at least 20 percent of designated deer winter range in thermal cover (i.e., conifer/evergreen canopy closure >70%).

Approximately 3,828 acres of the Emigrant Creek Deer Winter Range are on BLM managed land. Of this total, approximately 1,912 acres currently provide optimal thermal cover (>70% canopy closure). Approximately 44 acres are scheduled for treatment in the Emigrant Creek Deer Winter Range, and none of these acres would provide the optimal thermal cover effectiveness post-harvest. Post-harvest, this would reduce optimal thermal cover on BLM-managed land to 1,868 acres which is approximately 49 percent of deer winter range on BLM-managed land. This exceeds the current RMP guidance.

Approximately 25% of the Grizzly Peak Elk Management Area also falls within the Sampson Cove Analysis Area. Approximately 1,113 acres of the Grizzly Peak Elk Management Area are on BLM managed land. Of this total, approximately 509 acres currently provide optimal thermal cover (>70% canopy closure). Approximately 101 acres are scheduled for treatment in the Grizzly Peak Elk Management Area, and none of these acres would provide the optimal thermal cover effectiveness post-harvest. Post-harvest, this would reduce optimal thermal cover on BLM-managed land to 408 acres, which is approximately 37 percent of the elk management area on BLM-managed land. While there is no specific RMP requirement for thermal cover in Elk Management Areas, thermal cover is an important consideration for elk management.

Several other factors would mitigate this reduction in thermal cover effectiveness:

(1) Post-harvest most project units (except about 74 acres of disease management and regeneration harvest) will have canopy closures of 40-60 percent. Although not optimal, the thermal cover effectiveness of the stands would still be about 50 percent based on data in Thomas et al. (1979).

(2) The loss in thermal cover effectiveness would not be compounded by vehicular traffic. Most of the deer winter range and elk management area is in a portion of the Project Area located behind locked gates. The deer and elk in these areas do not have to waste an inordinate amount of energy in avoidance behavior.

(3) The harvest would probably improve forage conditions in the stands by stimulating the growth and abundance of shrub and herbaceous species. The improved forage conditions could offset and even exceed the theoretical energetic cost of reduced thermal cover effectiveness.

Additionally, the concept that thermal cover moderated weather conditions, and thus, was important to survival and reproduction in ungulates has recently been challenged (Cook et al., 2004). Cook et al. (2004) conclude that "the primary benefit attributed to cover is probably not operative across a considerable range of climate, including those in boreal ecosystems of the northeastern U.S., maritime ecosystems of the inland Pacific Northwest, and cold, dry ecosystems of the central Rocky Mountains". This finding indicates that the reduction in thermal cover effectiveness would be of little consequence to wintering deer.

14. Cumulative Effects

Cumulative effects under ESA are "those effects of future State or private activities, not involving Federal activities, that are reasonably certain to occur within the action area of the Federal action subject to consultation" (50 CFR 402.02). The effects of future Federal actions will be evaluated during future section 7 consultations and are not included in cumulative effects under ESA.

Cumulative effects analysis of foreseeable state and private actions provide the Service and the Medford BLM an accurate environmental baseline to assess impacts of Federal actions.

The land base in the action area has a checker board pattern of ownership of private land interspersed with BLM lands. A range of management practices occur on private lands from residential home site development to intensive industrial timber management.

In the Biological Opinion for the NWFP (USDA and USDI 1994b, Appendix G, 44-45), the Service concluded,

> "Non-Federal landowner compliance with the take prohibition of the [Endangered Species] Act does not assure the maintenance of spotted owl dispersal habitat within Areas of Concern and checkerboard ownership nor provide for improvement of existing populations. Consequently, it is likely that a reduction in dispersal habitat would occur on non-Federal lands in certain areas."

The majority of state and private forests in Washington, Oregon, and Northern California are managed for timber production. Non-Federal lands are not expected to provide demographic support for spotted owls across and between physiographic provinces (Thomas et al. 1990; USDA and USDI 1994a). Historically, non-Federal landowners practiced even-aged management (clear-cutting) of timber over extensive acreages. Private industrial forest lands are managed for timber production and will typically be harvested between 40 and 60 years of age, in accordance with State Forest Practices Act standards. In 2008, during the development of the District Analysis and Biological Assessment of Forest Habitat, data was requested from Oregon Department of Forestry and the Pacific Northwest Inventory and Analysis team to help determine harvest rates in the past decade on private lands within the Medford district. These records indicated private harvest rates in Jackson and Josephine Counties have never exceeded 1.08 percent of the total private lands per year since 1998. These records did not provide information of pre-treatment habitat conditions. We anticipate some loss of owl habitat on private lands, but cannot predict the rate of loss, or the specific location of harvest.

The Medford BLM assumes these past management practices will continue and reduce the amount of NRF habitat for spotted owl on non-Federal lands over time. Harvest activities on state and private lands can be expected to impact spotted owls located within adjacent Federal lands by removing and fragmenting habitat and through disturbance activities adjacent to occupied sites during sensitive periods. Under Oregon Forest Practice Rules (629-665-0210), owl nest sites (70-acre core areas) are protected for at least three years following the last year of occupation.

Past harvest activities on Federal land are reflected in current condition discussions in this document. Acres of habitat have been adjusted to reflect these activities. The only planned activity on BLM land in the Upper Bear Watershed planned in the reasonably foreseeable future is the Shale City Roadside salvage. This harvest action would remove select trees within proximity to existing roadways and would not be expected to affect any special status wildlife species.

I. FIRE AND FUELS

This section discloses effects of forest management activities such as prescribed fire, thinning, logging, and fuels reduction treatments, and from activities associated with the construction and use of roads. Smoke impacts, as a result of prescribed fire, are discussed in "Air Quality".

1. Affected Environment

The landscapes that comprise the fire analysis 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.

a. Background

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.

b. Fire Regimes

Climate and topography combine to create the fire regime found throughout the fire analysis 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 Sampson Cove fire analysis 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, correlates 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 fire analysis area (Schmidt et al., In press):

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.

Approximately 504 acres proposed for treatment with the Sampson Cove Project are classified as Fire Regime 3. Mixed-severity fire regimes are characterized by mosaics of frequent, low severity and infrequent but high severity, and therefore are more difficult to describe due to complexities that result in a mosaics of fire effects.

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.

c. 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 with the Sampson Cove Project are primarily Douglas-fir, pine, and mixed conifer stands (Fire Regime 3), and are in condition class 2 and 3. There are small portions of these stands that are in condition class 1. Stand densities are very dense in some areas due to the absence of fire.

d. Past Actions and Events Affecting the Fire Environment

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.

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

Ponderosa pine trees that thrive in fire prone environments are being shaded out by the more shade tolerant Douglas-fir or white fir species in the absence of fire. As a result, more fire resilient pine species are declining across the landscape (see Section J., Silviculture). 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.

Logging

Commercial timber harvesting has occurred in the Sampson Cove fire 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 Sampson Cove 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.

e. 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 fire analysis 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 fire analysis area is from July through September.

Information from the Oregon Department of Forestry database from 1967 to 2006 show a total of 136 fires occurred throughout the fire analysis area. Lightning accounted for 21 percent of the total fires and human caused fires accounted for 79%. Only 38% or 52 fires started on BLM managed lands. All the fires that started on BLM land were human caused. Arson was the cause of 83% of these fires.

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

Table 3-23. Fire Hazard Rating Category for the Sampson Cove Fire Analysis Area

Fire Hazard Rating	Percentage by Hazard Category
Low hazard	19%
Moderate hazard	21%
High hazard	60%

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 fire analysis 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 would 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 would be used as a starting point for burn-out or backfire operations designed to stop fire spread. Backfires would be designed to minimize fire effects on habitat. Natural barriers would be used whenever possible and fires would be allowed to burn to them.
- In the construction of fire lines, minimum width and depth would be used to stop the spread of fire. The use of dozers should be minimized and resource advisors would be consulted when appropriate. Live fuels would be cut or limbed only to the extent needed to stop fire spread. Rehabilitation of fire lines would be considered.
- The felling of snags and live trees would only occur when they pose a safety hazard or would 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 would not be constructed within Riparian Reserves, or areas of special concern.
- Retardant or foam would not be dropped on surface waters or on occupied spotted owl nests.
- Resource advisors would determine rehabilitation needs and standards in order to reduce the impacts associated with fire suppression efforts.

2. Environmental Effects

a. Alternative 1

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 Sampson Cove Project described under the Affected Environment. This section highlights key findings related to the question "What would it mean to not meet the objective of fire hazard reduction.

The current trend of increasing stand density which results in increased mortality to the timbered stands would continue. The transition from ponderosa pine stands to dense fir stands would also continue at the lower elevations within the fire analysis 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 504 acres of forest thinning units, which are in condition classes 2 and 3, would not be treated and 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.

With no forest management actions, there would be no temporary increase in surface fuels from timber harvest activities. Although there would be no harvest created slash, the existing surface, ladder, and canopy fuels would remain untreated. Ponderosa pine, mixed conifer and dry Douglas-fir forests in the lower to mid elevations of the Project Area would have a higher potential for large scale stand replacing fires in comparison to the Proposed Action. These forest types are experiencing fires today that are uncharacteristic of historic fires (Agee and Skinner, 2005).

The majority of the BLM managed land in the fire analysis area would 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. Under the No-Action Alternative, high fire hazard would remain, with a higher potential than the Proposed Action for increased fire behavior if predicted climate changes (discussed above) do occur.

With no forest management, changes in canopy closure would occur only as a result of natural events such as insect infestation, windstorms, mortality from competition/drought, and wildfire. Where natural disturbances create more open stand conditions, there would be more wind and solar radiation resulting in a drier microclimate compared to closed canopy stands. A drier microclimate generally contributes to more severe fire behavior. Under the No-Action alternative, there would be no treatment of existing surface, ladder or crown fuels to help mitigate the effects of microclimate changes caused by natural disturbances. 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.. Fire fighter safety would continue to be an issue as well as the potential of resource damage.

Fire suppression would continue because there are no policies in place or being proposed that would allow fires to burn naturally within the fire analysis area. The entire area is within the Wildland Urban Interface (WUI) and is a priority for fire suppression, especially in 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, although, there are no private industrial lands that are known to be scheduled for timber harvest at this time. Any private land timber harvest would meet Oregon Department of Forestry standards for post harvest fuels reduction. The Shale City Roadside Salvage is being planned by the BLM off of the Grizzly Peak Road system. Fuels treatments (lop and scatter or handpile and burn) would occur in areas where activity fuels may be concentrated from the Shale City Roadside Salvage to reduce hazardous fuels. 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.

Eighty-one percent of the fire analysis area would remain in moderate to high fire hazard resulting in a continued high chance that when a wildfire occurs, a large portion of the fire would exhibit high severity fire effects. As fire is continually excluded and stand densities continue to increase, coupled with predicted climatological changes, the chance for higher proportions of high severity fire effects increases.

Based on trends in the last 35 years, humans would continue to be responsible for the majority of wildfires (79%). Most of the human-caused fires would continue to be associated within about 300 feet of roads.

b. Alternative 2

Discussions for the direct and indirect impacts reflect the activities associated with the Proposed Action. Effects discussion also includes cumulative impacts of those direct/indirect actions when added incrementally to actions past, present, and reasonably foreseeable.

Fire Severity

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

Weather and topographic effects on fire behavior and severity are interrelated with the amount and distribution of fuels on a site with respect to the aspect, steepness of slope, and position on slope, along with atmospheric elements of temperature, relative humidity, in relation to fuel moisture, and windspeed and direction. When the environmental and atmospheric conditions are conducive to drying fuels and/or heating them to the ignition point during a fire, they are referred to as available fuels. The interrelationship between slope and wind in relation to the amount and arrangement of available fuel is critical in terms of allowing a fire to spread and increase in intensity.

Without fuel loading becoming available to burn in a fire due to the effects of extreme weather there is no adverse effect to the vegetation or other site qualities. For example in some desert areas where vegetation is sparse and extreme fire weather is the norm (high temps, low RH, windy unstable atmospheric conditions), fires often don't spread except under unusual wind conditions, due to the lack of continuous fuels. Thinning treatments proposed under this alternative are based not on restoring historic conditions, but on meeting the objectives of Matrix land allocation.

Activity Fuels / Surface Fuels

Timber harvest can increase fire severity, if not accompanied by adequate reduction of fuels, by increasing dead surface fuels (Sierra Nevada Ecosystem Project report, 1996; pp 61-72). Treatments designed to reduce canopy fuels through density management, increase and decrease fire hazard simultaneously. Slash generated from the commercial thinning of timber stands, if not treated, would create surface fuels that would be greater than current levels. The existing surface fire behavior fuel model in the majority of stands proposed for commercial thinning 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 per acre prior to the scheduled fuel disposal activities to be completed. This would change the existing fuel model of most of the timbered stands to a Logging Slash Group which in turn would create higher rates of spread and greater flame lengths in the event of a wildfire. However, despite the temporary increase in ground fuels, research indicates that a reduction in crown fuels outweighs any increase in surface fire hazard (Omi and Martinson, 2002). This temporary increase in surface fuels is usually less than one year (but can be up to 2years) for that is the time period that it takes to implement the fuel treatments to dispose of the surface and ladder fuels in these stands.

Fuels treatments for stands that are commercially harvested are proposed for treatment within two years after a unit is harvested. Treatments would take place where slash three inches in size and less exceeds 5 to 6 tons per acre. Treatments should ensure that under most climate conditions, flame lengths would be less than three feet allowing for direct attack of a wildfire. The reduction of this material, along with reduced fire ladders and canopy fuels from forest thinning, would reduce fire behavior such as flame length, rate of spread and fire duration. With the reduction of flame length and fire duration the chance of a crown fire initiating in treated stands would be greatly reduced. Also, mortality of the smaller diameter conifers would be reduced. Thinning treatments may be followed with prescribed burns. The reduction in stand density would make it possible to use prescribed fire as a tool to further reduce fire hazard in these stands. The reduction of flame length in treated stands would also increase the chance that direct attack of a wildfire could occur which would reduce acres burned in the event of a wildfire.

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, followed by periodic prescribed burning, are effective (Omi and Martinson, 2002; Pollet and Omi, 2002; Agee, 1993; Graham, 1999; VanWagtendonk, 1996). Treatments that result in forests with a lower density and larger trees show lower potential for crown fire initiation and propagation and for less severe fire effects (Pollet and Omi, 2002).

Anecdotal observations should not be applied the same as rigorously tested scientific study, but they can be use to report and interpret trends. Anecdotal evidence on the Squires PeakFire in Southern Oregon show that treatments to reduce fire behavior may have merit. Fire weather conditions during the Squires Peak Fire, as measured by the Energy Release Component Indices, was in the 89th to 90th percentile during the Squires fire event as measured by the Star and Provolt RAWS stations.

This percentile is recognized as high but not extreme fire weather conditions. Even though winds were reported the evening the fire reached the treated area in the Kin's Wood project area, fire behavior decreased when it reached the treated area.

Fire Resiliency

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

The implementation of the Proposed Action would promote fire resilient forest stands by thinning from below, removing suppressed, diseased, and/or over crowded intermediate and co-dominant trees while retaining the larger co-dominant and dominant trees within treated stands. This action would conduct forest management on approximately 504 acres of timbered stands that are in condition class 2 and 3. Forest thinning prescriptions would result in a reduction in ladder fuels, an increase in the height to the base of tree crowns, and the reduction of crown bulk density (canopy fuels). All of these are important factors in reducing the potential for initiating and sustaining a crown fire in these stands (Omi and Martinson, 2002) (Agee, 1996) (Agee and Skinner, 2005) (Agee et al., 2000).

Thinning from below, removing the smaller diameter trees within a stand, would increase the average tree diameters as soon as treatments are completed. Over time, tree diameters would continue to increase with the growth of the residual stand. Larger diameter trees are more tolerant to surface fires so there would be less tree mortality in the event of a surface fire. Commercial thinning would also favor more fire tolerant species such as pine. Lowering basal area through thinning and prescribed fire can increase the long term vigor in the residual trees within a stand (Huff and Agee, 2000).

While the silvicultural prescriptions and objectives vary by prescription type (i.e., Dry Douglas fir, pine site, mistletoe treatment, regeneration harvest), they are all designed to retain healthy large trees (see Chapter 2). The maintenance of pine species on dry Douglas-fir and pine sites contributes to the fire resiliency of forest stands. The larger the ponderosa pine, the greater its resilience to fire due to increased bark thickness (Agee 1993; Agee 1996). Its bark is one of the key defense mechanisms against mortality from low intensity fire. Thus, removal of larger non-pine species, in this context, actually improves the ecological role of fire and subsequent fire resiliency of the stand. Although, some large trees would be removed due to insect attacks, to improve the survival of large fire resistant pine species (by reducing competition for moisture and growing spaces), to encourage the regeneration of fire resilient pine species, and for logging operations (landings and cable corridors) the fire resilience of the fire analysis area as a whole is improved due to the overall reduction in fire hazard within treatment units.

Regeneration harvesting and disease management is prescribed for about 74 acres to provide renewal of forest conditions that would grow the next stand of trees for timber harvest (Medford District RMP, p. 181, 194) and to control Douglas-fir dwarf mistletoe. In the short-term (about 10 years) these stands would be more fire resilient since harvest prescriptions call for leaving the larger healthier trees (20 inches diameter or greater), thinning existing understory trees (which reduces ladder fuels), removing the fire hazard associated with Douglas-fir that are heavily infected with dwarf mistletoe, and treating post harvest activity fuels. In the long-term (after about 10 years), these stands would begin to increase in flammability and decrease in fire resiliency as young trees begin to establish and grow beneath the overstory. This is not significant for the Sampson Cove Project Area because these treatment types represent only 14 percent of the total project acres and less than one percent of the fire analysis area.

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).

Fall Versus Spring Underburning

Future maintenance of all areas treated with the project 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 would be 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 keeps 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 would occur in the spring if fall burning conditions might result in unwanted intensities, damage from prescribed fire would be minimal due to higher moisture levels, and benefits from prescribed fire would be maximized.

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

Cumulative Effects

The commercial harvest of about 504 acres would increase the fire resiliency of stands treated. As large wildfires burn in mosaic patterns of stand replacement to mild underburns, the net effect of the fuels reduction treatments in wildfire situations are determined by numerous complex factors. Activities outside the scope of this project and future planned activities that alter fire risk or hazard within the fire analysis area potentially include timber harvesting logging on private lands, fuels reduction, road construction, and private land development. The treatment of 504 acres represents less than 2 percent of the analysis area and would not contribute significantly to adverse or beneficial effects on potential fire behavior at the landscape scale.

There are no other vegetation projects anticipated (timber sales, fuels reduction, etc.) except thinning of brush and small trees for fuels reduction on private lands, minor fuels reduction on BLM lands in the Tyler Creek drainage, and a small roadside salvage project on BLM-managed lands. Road construction is limited to the potential development of private lands, but is considered to be minor because roads are for private, limited use, and generally very short. Thus, foreseeable actions are very narrow in scope and potential cumulative impacts as a result of the Proposed Action are equally narrow and minor.

J. SILVICULTURE

1. Affected Environment

a. Landscape Pattern

The Sampson Cove Forest Management Project proposal is located in the southeastern portion of the upper Bear Creek watershed, which is a tributary to the Rogue River. The Project Area is smaller than the analysis area and for purposes of analyzing the affected environment and the proposed project; the analysis area for silviculture considers Walker Creek and portions of Upper and Lower Emigrant Creeks called sub-watersheds and represent 6th field hydrologic unit codes. The total size of the analysis area is 34,313 acres or 54 square miles. BLM administered lands comprise 11, 202 acres within this area (Table 3-24).

The current landscape pattern of the vegetation in the Sampson Cove analysis area is a result of topography, fires, wind events, timber harvesting, and forest pathogens. There is a natural diversity of vegetation condition classes[2] within stands and between stands whose patterns and boundaries are generally dictated by soils, aspect, past disturbance, and fire suppression. Since the turn of the century, the main processes responsible for the current landscape design have been fire suppression, plant succession, logging, road building, agricultural practices, grazing, and non-native plant introduction (USDI 2000). These influences have resulted in increased forest stand density exhibiting low vigor and growth, increased susceptibility of forest stands to damaging agents, species and structural composition changes to forestland, grass and shrubland, and oak woodlands which have increased fire hazard and intensity (USDI 2000).

Table 3-24. Vegetation Condition Classes – Sampson Cove Analysis Area; BLM Lands

Vegetation Condition Class	Acres
Grass, Forbs, Herbaceous	1,569
Shrubs, Non-forest Land	322
Hardwood/Woodland	2,585
Suitable/Non-Suitable Woodland	316
Early (0-5 years) and Seedlings/Saplings (0-4.9 inches DBH)	1,031
Poles (5-11 inches DBH)	191
Mid (11-21 inches DBH)	2,598
Mature (21+ inches DBH)	2,590
TOTAL ACRES	11,202
TOTAL FOREST LAND ACRES	6,410

At the stand level, the landscape pattern can be considered coarse-grained. Subtle changes in species composition and stand structure are occurring over the landscape. Many trees with old-growth characteristics are dying as a result of increased competition for limited resources with second growth trees. Douglas-fir (DF) and white fir are replacing ponderosa pine (PP), sugar pine (SP), and incense cedar (IC) because of their more shade-tolerant nature. Douglas-fir and white fir are encroaching upon the edges of meadows and oak woodlands (Figure 3-1). Mortality of these trees along the edges is also evidence of their non-suitability to the site. Suppressed shrubs and hardwood trees beneath dominant undisturbed tree canopy layers are dying. White oak and black oak have dropped out of some conifer stands where light and water have become limiting.

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. With or without silvicultural management, the vegetation will continually change because of natural succession. Nature is dynamic, constantly changing, developing, and growing and dying. 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. What species once occupied the early seral stage of development in a landscape gap will give way to other species as the landscape further develops. There is no single state of a forest that is the only natural state.

[2] 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).

b. Series and Plant Associations

There are four tree series in the Sampson Cove Analysis Area: Douglas-fir, ponderosa pine, white fir, and white oak (Table 3-25). 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 Preliminary Plant Associations of the Siskiyou Mountain Province (Atzet & Wheeler, 1984) and the Field Guide to the Forested Plant Associations of Southwestern Oregon (USDA 1996). The Preliminary Plant Associations of the Siskiyou Mountain Province can also be applied to segregate other landscapes that exhibit similar recognizable vegetation patterns (Atzet, 2008) as encountered on the landscape in the Southwestern Oregon Cascades.

Table 3-25. Tree Series and Plant Associations Common to Sampson Cove Analysis Area

Douglas-fir Series / Plant Associations	Ponderosa Pine Series / Plant Associations	White Fir Series / Plant Associations	White Oak Series/Plant Associations
PSME (Douglas-fir)-ABCO (White Fir)	PIPO–PSME	ABCO-BENE	QUGA (Oregon White Oak)/FRVEB (Woods Strawberry)
PSME-PIPO (Ponderosa Pine)	PIPO-QUKE (California Black Oak)	ABCO/Herb	QUGA–CEMO (Birchleaf Mountain Mahogany)
PSME-ABCO/HODI (Pacific Ocean Spray)		ABCO-PSME/Depauperate	QUGA-PSME/RHDI
PSME-ABCO-PIPO		ABCO-PSME/HODI	
PSME-ABCO/SYMO (Creeping Snowberry)		ABCO-PIPO	
PSME/RHDI (Poison Oak)-BEPI (Piper's Oregongrape)		ABCO-PSME	
PSME-Depauperate		ABCO-CADE (Incense Cedar)/TRLA (Western Starflower)	
PSME-BENE (Dwarf Oregongrape)		ABCO/SYMO	
		ABCO/ACGL (Douglas Maple)	

The Douglas-fir plant associations comprise 63% of forestland in the Analysis Area. These associations are cool and dry. White fir is prevalent in the forest understory, but Douglas-fir should be preferred. Drier forest sites make up 16% of the forestland in the Analysis Area and are composed of the Ponderosa Pine Series. Of the total acreage from each plant series, half of the Douglas-fir Series (49%) are in the stem exclusion stage of forest development, as well as half of the Ponderosa Pine Series (50%). 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 shade tolerant white fir as this species persists under increasingly lessening light conditions. Pine and other sun loving species become suppressed and eventually excluded from the stand giving way to a pure or nearly pure white fir forests. Without disturbances to release growing space, shade intolerant species such as pine continue to decline in number, reducing stand-level species diversity. This is evident in the core samples taken from ponderosa pine in the Analysis Area.

In acreage PSME-ABCO/HODI plant association is the largest represented plant association in the Analysis Area at 26%. According to Atzet and Wheeler (1984) this Association is moderately dry with a high percentage of total herb cover; Douglas-fir performs better while white fir exhibits transpirational stress and reduced growth; ponderosa pine and sugar pine perform well. The highest showing in acreage in the White Fir Series is the ABCO/Herb plant association group. This association is characterized by high forage and timber production. Deep soils help contribute to substantial natural regeneration of Douglas-fir, white fir, and incense cedar, which are all good performers (Atzet and Wheeler, 1984).

c. Forest Stand Condition and Fire Hazard

Approximately 3,126 acres of forestland were initially recommended for commercial thinning. Grasslands, shrublands, and woodlands comprise 43 percent of the total Analysis Area. Some of the forest lands within the Analysis Area have been previously harvested and most commercial forest stands originated between 1800 and 1900. The historic fire cycle in southwest Oregon's low elevation mixed conifer forests occurred every 20 years or less. As a result of fire suppression, the Analysis Area has missed about five fire cycles over the last 100 years (USDI 2000). The absence of fire has converted open savannahs and grasslands to hardwood woodlands and a mix of hardwood/conifer woodlands. As hardwoods 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 (see Figure 3-1). As a result, Oregon white oak is now a declining species largely due to fire suppression and encroachment by Douglas-fir and white fir on most sites (USDI 2000). However, these sites generally do not support shade tolerant conifers in terms of stocking densities, soil composition, moisture, and aspect. Douglas-fir and white fir, therefore, do 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.

Figure 3-1. Sampson Cove Analysis Area 39-2E-3

Background: Unit #3-2 – Ponderosa Pine Site exhibiting encroachment of shade tolerant Douglas-fir. Foreground: Seedling encroachment of Douglas-fir within oak woodland.

Competition in a stand has been directly correlated with stand density. The more stems (i.e., plants) 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 thin 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 unleashed 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. Nearly 75% of the stands inventoried have relative density indices between 0.55 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 Sampson Cove Analysis Area is 0.622 indicating that physiologically the trees have entered the zone of imminent competition induced suppression and mortality.

Higher tree densities and increased ground fuels in stands have escalated the threat of stand replacing crown fires, which were historically rare (USDI 2000). 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 as it now creates major shifts in forest structure and function.

The current fire regime has transitioned from low to high severity (USDI 2000). The low severity fire regime historically prevalent in the Analysis Area was one of frequent (1-25 years) and widespread fires resulting from the hot, dry summers (USDI 2000). These frequent fires favored ponderosa pine as a dominant species and white fire as the least dominant. Without disturbance, Douglas-fir now dominates most sites with a 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 acreage of conifer vegetation series exhibited in the Analysis Area, stands in the Douglas-fir Series comprised 40% compared to stands in the Ponderosa Pine Series at 16% (5% in the White Fir Series). 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.

Most burned areas in the Analysis Area have regenerated. Most of the forest stands became established within 10 years after a fire, although some sites may have taken 30 to 40 years to become forested. The vegetation condition within the total project comprises 27% hardwoods, 17% grassland, 2% shrubland, and 2% hardwood/conifer woodland. Plantations comprise 10 percent of the Analysis Area (649 acres). Plantations are not considered commercial or natural stands and are not targeted for treatment with this proposal. The oldest trees sampled in the Analysis Area were 280 (PP) and 283 (DF) years-old. Overall, commercial stand age for the Analysis Area averaged 119 years old. Individual sample trees greater than 150 years old made up 15 percent of the total 306 tree sample. Older stands or patches of older trees are in the understory reinitiation stage of forest development and vertical stand structure is diverse.

Natural mortality has also created openings in the canopy layer. Natural mortality is a result of openings in the forest canopy caused by Douglas-fir dwarf mistletoe, root diseases, branch abrasion, and windthrow. The understory of these stands consists of dense pockets of conifer regeneration and shrubs. Regeneration ranges from seedling to small pole size trees, with many of these suppressed. These stands would benefit from precommercial thinning.

The average canopy closure for sampled stands in the Sampson Cove Analysis Area is 82 percent and ranges from 62 to 100 percent (ORGANON). Some forested stands have been selectively logged, underburned by fire, commercially thinned, or have suffered mortality from natural processes. These stands tend to be more diverse in species composition and vertical structure as a result of disturbance.

The silvicultural activities proposed resemble natural disturbances that are inherent to forests in which the forest canopy is reduced. Such a modification is similar to a moderate forest ecosystem disturbance regime (Oliver & Larson 1996, Waring & Schlesinger 1985) such as moderate and frequent fires and moderate insect and disease-induced mortality pockets. 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). Trees should develop larger crowns, larger 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 are characteristic of large diameter Douglas-fir trees in old growth stands.

d. Tree Vigor

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, Waring 2007). 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 stemwood growth. Vigorous trees can also fight off beetle attacks with greater success. Waring and Pitman (1980) 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).

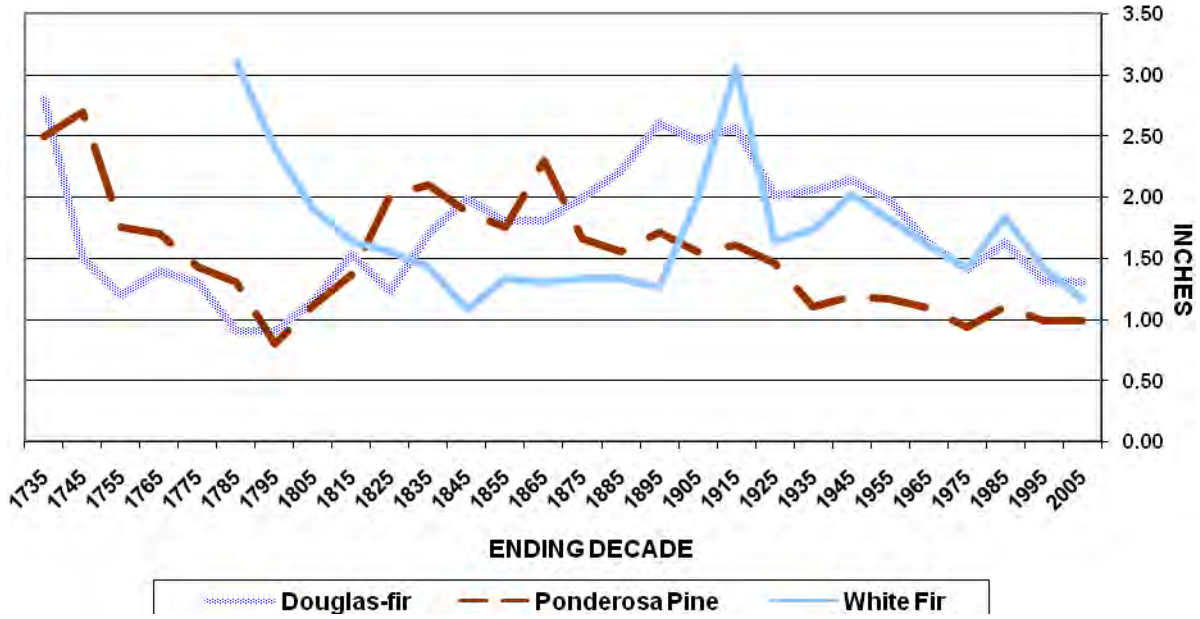
For all inventory stands, sample cores were taken from 325 trees representing all vegetation condition classes, major conifer species, and plant association groups across the Analysis Area. Each core was measured to determine individual tree age and growth rates. Individual tree vigor of Douglas-fir and ponderosa pine were also determined from these measurements. Vigor ratings were derived using the Waring Tree Vigor Index and growth rates were tabulated by decade. Figure 3-2 illustrates the 10-year growth rate of all 325 sample trees, combining Douglas-fir, white fir, and ponderosa pine, spanning a period from the year 1735 to 2005.

Pine species in the Analysis Area are becoming scarce. In pine stands and in mixed conifer stands, where pine are naturally encountered, shade tolerant white fir are encroaching and successfully competing against the pine for soil nutrients, water, and growing space. White fir and Douglas-fir continually advance into the shaded forest floor, occupying the growing space in the understory, and excluding the shade intolerant pine from naturally regenerating. Pine species currently exhibit poor vigor and their individual tree growth rates are declining.

Core measurements were taken from 48 ponderosa pine sample trees representing all vegetation condition classes. The current average relative density index for ponderosa pine stands is 0.674. At this density, pine stands exhibit reduced growth, crown decline, and competition-induced mortality. The current average ponderosa pine tree vigor rating is 19.65 g of annual wood production per square meter of foliage. The 10-year incremental growth data for ponderosa pine reveals a current rate of 1.01 inches per decade (Figure 3-2). The current average relative density index for ponderosa pine stands was 0.674.

The data indicates that, based on Waring's vigor rating indices, last decade's growth rate, and relative density indices, ponderosa pine survival in the Analysis Area is threatened. Ponderosa pine species in the Analysis Area are growing at a rate that leaves them prone to and at increased risk of bark beetle attack. Regarding tree vigor in general, a vigor index of 19.53 grams of stem growth per meter squared per year ($g/m^2/yr$) is very low.

Figure 3-2. Species Relationship of 10-Year Incremental Diameter Growth



e. Pathogens and Insects

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[3] per acre are less prone to pine bark beetle attack. Stands on south and east aspects below 3,500 foot elevations are particularly vulnerable when their densities are high (USDA 1998).

[3] 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.

Western pine beetle (*Dendroctonus brevicomis)* are attacking ponderosa pine in the Analysis Area, particularly in Unit #11-3. 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 apparently vigorous host trees from 6 inches in diameter and larger. Group mortality can occur in dense overstocked stands or in dense pockets within a stand. Extensive mortality adversely affects distribution of trees and stocking level, depletes timber supplies, and increases fuel loading which can lead to catastrophic fires. DeMars and Roettgering describe tree resistance as one of the biotic conditions affecting outbreaks and beetle caused mortality. Vigorous trees produce sufficient oleoresins to expel beetles from their boring chambers inhibiting larval and fungal development. They suggest that prevention is the preferred method of control. "By maintaining thrifty, vigorous trees or stands that do not afford a suitable food supply for the beetle", land managers can prevent susceptibility of hosts to insect damage.

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

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; Edwards 1975). 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.

Since stands are dynamic, conditions will change over time as individual trees continue to compete for growing space. In the last decade the average diameter growth in the Sampson Cove Analysis Area for all combined species was 1.24 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). By species, the average diameter growth for ponderosa pine was 1.01 in the last decade. This growth rate falls short of the 1.5 inches of diameter growth per decade required to withstand bark beetle attack. In addition, the growth trend over the last 20 years for all sampled species (Figure 3-2) exhibit a declining curve. Since 1985, all three species (Douglas-fir, ponderosa pine, and white fir) in the Analysis Area have been declining. 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.

Douglas-fir tree core samples were taken from 247 trees representing all vegetation condition classes in the Douglas-fir Series and all plant association groups. The average tree vigor index, as measured by leaf area index (g of annual wood production per square meter of foliage) is 53.87 for Douglas-fir (compared to 19.53 for ponderosa pine) and the average growth last decade was 1.29 inches. 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).

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 1.29 average inches in the last decade indicates that Douglas-fir is predisposed to bark beetle attack.

White fir samples (28), taken primarily from white fir sites across the Analysis Area, exhibited 1.16 inches of diameter growth between 1995 and 2005 (Figure 3-2). The average relative density index for white fir stands was 0.55. Fir engraver beetle (*Scolytus ventralis)* are attacking white fir in the Analysis Area. According to Ferrell (1986), "silvicultural practices aimed at maintaining healthy stand conditions appear to offer the best chance for minimizing engraver-caused losses. Diseased, injured, or decadent trees should be removed, and overly dense stands should be thinned to reduce tree competition."

Western dwarf mistletoe (*Arceuthobium campylopodum*) and Douglas-fir dwarf mistletoe (*Arceuthobium douglasii*) infections is widespread throughout the Analysis Area. Infections are usually systemic and form bunched globose growths of branches called "witches' brooms". These brooms, occurring mostly in the lower third of the tree canopy, are produced by local physiological changes induced by the parasite to get the tree to transport food to the mistletoe. Heavy infections result in growth loss, wood quality reduction, top-killing, and mortality. Food needed for healthy tree growth becomes diverted to the brooms significantly draining the host (Hull and Leonard, 1964). Although the spread of the infection is slow, infected trees lose vigor and become increasingly susceptible to other infectious diseases and insect attack. Weakened trees emit a different chemical signature than a healthy tree. Bark beetles consequently are drawn to trees in a weakened state and eventually finish off the infected tree (Figure 3-3).

Figure 3-3. Sampson Cove Unit #3-5

Left: Dwarf mistletoe witches' brooms significantly drain the host tree of nutrients. **Right:** Dwarf mistletoe infection weakens and predisposes trees to subsequent bark beetle attack as captured here.

Forest pathogens and subsequent beetle kill contribute to changing the forest stand structure and forest development pattern by creating openings of varied sizes and allowing light to reach the forest floor and the understory reinitiation stage to begin. If disease susceptible trees continue to recolonize infected sites, they too will become infected. The likelihood of infected trees to attain large sizes will be low and the pathogen will survive on the site unless immune species occupy the mortality gaps – an unlikely scenario without management intervention.

In the Analysis Area, Armillaria (*Armillaria ostoyae*) and annosus (*Heterobasidion annosum*) root diseases are readily infecting and killing white fir. These diseases expand radially at a rate of about 1 ft per year and can remain viable in large stumps for at least 50 to 60 years. Most root pathogens spread when the roots of susceptible uninfected trees directly contact the roots of diseased trees as in the cases with *A. ostoyae*. *A. ostoyae* is most common in stressed trees and often associated with compacted soils, in poorly planted areas, and where trees have been wounded. This disease can create large openings where highly susceptible tree species never attain large sizes. In the Analysis Area, white fir are the most susceptible and are readily infected and killed. However, Unit #31-1 is so dense that incense cedar trees, seldom damaged by root diseases, are dying as a result of the combined effects of stress from overstocking coupled with Armillaria.

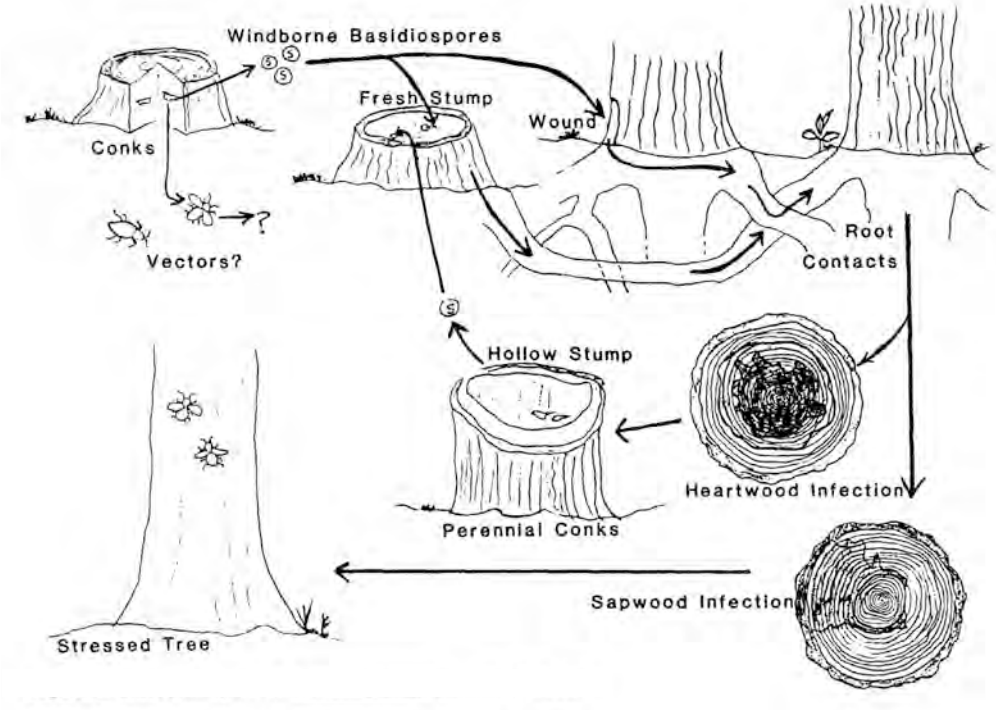
Treatments are intended to target infection foci that have expanded to form a disease center which expands at an average radial rate of 1 ft. per year. The centers eventually fill in with hardwoods, shrubs, and resistant conifers. Symptomatic trees will occur around the margins of these centers and exhibit various stages of decline. White fir may regenerate and occupy the newly available growing space in the centers, but will probably contact inoculum and die at an early age, thereby perpetuating the cycle of mortality and keeping the source inoculum alive.

The objective of harvest is to curtail the spread of the root rot into the uninfected areas, regenerate the moderate and severe severity root rot centers with resistant species, and protect the integrity of the remaining stand from wind damage. Intermediate crown class trees with the largest crowns should be left when possible for structural diversity. True fir stumps across the entire unit would then be treated with Sporax® to prevent the windblown spores of *Heterobasidion assosum* from entering fresh stumps.

In *H. annosum*, the fungus infects its host by both mycelial growth across root contacts of adjacent trees and windblown spores contacting tree wounds, stumps, etc. (Figure 3-4). The primary spread of new infection centers starts by spore-caused infection of freshly cut stumps. Two strains of *H. annosum* exist: the P-group which affects pine and the S-group, affecting firs, hemlocks, and spruce. The S-group is the form recognized in the Analysis Area.

The root diseases in the Analysis Area kill host cambium, decay root wood, plug water conducting tissue, or cause some combination of these effects. Tree mortality from root disease occurs when trees with decayed roots are windthrown or by bark beetle attack on root disease-weakened trees.

Figure 3-4. Infection Cycle of *Heterobasidion annosum* in White Fir



Source: Otrosina and Cobb, USDA Forest Service Gen. Tech. Rep. PSW-116, 1989

f. Coarse Woody Material

Measurements of coarse woody material totaled 25,200 feet of transect line. The average amount of coarse woody material (CWM) equaled 11.4 tons per acre. CWM ranged from 3.6 to 125.2 tons per acre. The coarse woody material stems were mostly concentrated in the 4-7 and 8-11 inch classes at the large end, although some sites contained pieces between 44 and 60+ inches large end diameter. The average total length per acre equaled 1,762.6 feet. Coarse woody material was distributed across all decay classes, although decomposition classes 3 (twigs and branches gone but bole is still round, hard and in large pieces) and 4 (losing form) were most common.

2. Environmental Consequences

a. Alternative 1

Alternative 1 (No-Action) would allow forest stands to remain at the overall average of 0.622 relative density index, allow three major root disease inoculums to perpetuate within infection centers, and continue declining in species and biological diversity. Stand densities would continue on their current trajectory and remain overpopulated. A relative density index rating of 0.55 for any given stand marks the point of imminent mortality and suppression; crown closure occurs at a RDI of 0.15 (Drew and Flewelling, 1979). 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. Tree mortality represents a reduction in stand volume production, a loss of revenue, and poor forest health.

Douglas-fir dwarf mistletoe is found throughout the analysis area and cases of true fir dwarf mistletoe occur in the northwest portion of the Project Area. Its presence contributed greatly to the stand replacing extreme fire behavior still evident in the East Antelope Fire of 2002. No action would allow the unchecked spread of disease to continue on the sites. Diseases such as true fir mistletoe, Douglas-fir dwarf mistletoe, Armillaria and annosus root rot (*Heterobasidion annosum* would persist and perpetuate the infection cycle on sites currently infected.

These forest pathogens create openings of varied sizes allowing light to reach the forest floor and the understory reinitiation stage to begin. However, in the Analysis Area, disease-susceptible trees continue to recolonize these sites. The regeneration becomes infected and their likelihood of attaining large sizes would be low. The pathogen would survive on the site unless immune species occupy the gaps.

Without action, forest structure and species composition could not be controlled. On pine sites, that require at least 25% full sunlight, shade tolerant white fir and Douglas-fir would continue to encroach and stands would remain in the stem exclusion stage of development in the absence of disturbance. Out of all 48 ponderosa pine sampled, the current average ponderosa pine tree vigor rating is 19.65 grams of annual wood production per square meter of foliage. Trees with vigor ratings below 30 ($g/m^2/yr$) would succumb to attack from bark beetles of relatively low intensity (Christiansen et al., 1987; Waring and Pitman, 1985). The 10-year incremental growth data for ponderosa pine reveals a current rate of 1.01 inches per decade. As a general rule, stands where growth rates are greater than or equal to 1.5 inches of diameter growth per decade are less prone to pine bark beetle attack (USDA 1998). The current average relative density index for ponderosa pine stands is .674. Relative density indices between 0.55 and 1.00, bounds the zone of imminent competition-mortality (Drew and Flewelling, 1979). The data indicates that, based on Waring's vigor rating indices, last decade's growth rate, and relative density indices, ponderosa pine survival in the Analysis Area is threatened.

Because shade tolerant species (Douglas-fir and white fir) are growing on sites better suited to early seral species (ponderosa pine, oaks), the shade tolerant species exhibit poor vigor and requiring more moisture than the site can deliver, become easily stressed and succumb to density mortality or beetle kill. The average vigor rating index for Douglas-fir was 53.61 indicating that Douglas-fir are in danger of mortality from a beetle attack. A relative density index of 0.641 in Douglas-fir stands further indicates that Douglas-fir stands are exhibiting tree to tree competition and, rating above 0.55, are within the zone of competition induced mortality.

Without management action, individual trees including old-growth ponderosa pine, old-growth sugar pine, and old-growth Douglas-fir trees, with seedlings through poles within their dripline, would continue to die from competition for water. 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). 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 are characteristic of large diameter Douglas-fir trees in old growth stands.

Shade intolerant pine and oak species would continue to decline in number from competition with encroaching shade tolerant white fir and 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 the 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.

The relative densities also present a high fuel hazard across the landscape. The Medford District RMP describes the Forest condition (Forest Health) Resource Condition 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 1994). No action contradicts the Medford District Resource Management Plan forest condition objectives in regard to forest health.

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.

The amount of Douglas-fir dwarf mistletoe present in Southwest Oregon is at unprecedented levels (Goheen 2010). This is due to a century of fire suppression on forestlands. Wildfires have functioned as a natural tool for thinning out the understories and removing dense pockets of forest. Without this tool, Douglas-fir has seen a sharp increase in numbers. The increase of Douglas-fir in southern Oregon coincides with the increased levels of dwarf mistletoe seen today. Without the cleansing effect of fire to densities of Douglas-fir seedlings, the pathogen is consequently perpetuating on the infected sites and spreading into previously uninfected stands.

Figure 3-5. Sampson Cove Unit #3-3

Heavily dwarf mistletoe infected patches such as these would be removed and planted with ponderosa pine and incense cedar. This would provide the variable density that characterizes complex forest structure.

Dense stands heighten tree to tree competition. 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. In severe cases, entire stands are completely decimated by dwarf mistletoe, insects, and/or fire. Future silvicultural options diminish when severe stand mortality results. On the other hand, hardwoods, shrubs, and forbs species would become more abundant and provide forage and hiding cover for big game animals and habitat for species preferring these habitat types.

Pine species would continue to decrease in number if openings are not created for these shade intolerant species. The more shade tolerant Douglas-fir and white fir would continue to encroach into the forest and species diversity would decline.

Where dense forest stands persist overtime, canopy closure would remain at 80 to 100 percent. When tree mortality is singular or in small patches, canopy closure may approach 40 to 70 percent. In pockets of mortality, canopy closure would range from 0 to 40 percent. Without controlling the relative densities, some forest stands would naturally fall below 60 percent canopy closure.

Fire hazard would increase with the abundance of dead vegetation and ladder fuels, and would be at maximum levels.

b. Alternative 2

The objectives for harvest are as follows: 1) Reduce stand basal area to increase long term tree growth, quality, and vigor of the remaining trees while maintaining existing northern spotted owl habitat and 2) Create diversified stand structure (height, age, and diameter classes) and old-growth stand characteristics. Silviculture treatments may have a long-term benefit because they reduce the high tree densities resulting in forest stands that are more ecologically sustainable for high fire return interval ecosystems."

The Sampson Cove Project would thin trees in conifer forest stands on BLM-administered lands in the Upper Bear Creek Watershed. The following summarizes forest stand response based on variations in prescriptions and stand types.

Nesting, Roosting, and Foraging (NRF) Habitat

Complex forest structure that typifies southwest Oregon NRF habitat is the result of variability. Prescriptions for NRF habitat were formulated with the assistance of the BLM Resource Area Wildlife Biologist. The following discusses how treatments in NRF habitat would benefit forest stands while maintaining and enhancing attributes of NRF habitat. Mixed conifer habitat, multistoried stands, and patchy habitat components would be created or enhanced with the use of selective thinning and small group selections.

Selective thinning would thin from below to accelerate the growth of large trees. Thinning from below means to remove smaller suppressed, intermediate, and some codominant crown class trees, leaving the larger more vigorous trees to grow. Thinning would result in improved growth and vigor for the trees retained, accelerating the growth of larger tree structure. Thinning and removing the lower growing trees would result in open space below the canopy for owls to fly, while retaining an average of 60% canopy cover at the forest stand level, as well as the other functional attributes of NRF habitat typical in southwest Oregon. All trees with old-growth characteristics would be retained, trees with unique characteristics providing wildlife habitat would be retained (see Chapter 2, Silicultural Objectives and Prescriptions), and prescriptions would not target the removal of snags or downed large coarse woody material.

Small group selection (1/4 to 1 acre at most in size or 59 to 118 foot radius) openings created around large diameter pine seed trees would release (reduce competition from other trees) large pines improving their survival rate, stimulating seed production, and favoring the regeneration of pine in the stand. Small group selections would retain both a patchy component and a biologically diverse mixed-conifer habitat component typical in southwest Oregon NRF. This treatment would further mimic low intensity fire recurrence and the development of multi-storied canopy by initiating the establishment and growth of smaller sized trees.

Another typical feature of southwest Oregon NRF includes a multistoried component. These are typified by patchy habitat attributes. Mistletoe is occasionally used as a nesting substrate in southwest Oregon. Heavy mistletoe infection, on the other hand, negatively affects the long term production of large live and dead woody structure in a stand required by the northern spotted owl. Because mistletoe also provides short term benefits to wildlife, only the most severely infected trees would be treated to reduce the long term negative impacts heavy infection have on producing large live and dead woody structure. In addition to retaining 60% canopy cover within the stand, openings in only heavily infected mistletoe pockets would allow the relatively healthier trees in the stand to produce large woody structure over the long term, mimic low intensity fire recurrence, and initiate smaller sized trees for multistory canopies. All openings would be spaced approximately 350 feet apart from edge to edge. These gaps would provide the patchy habitat, multistoried canopy, and species mix that would provide the functional components of southwest Oregon NRF habitat and the complex forest structure that results from variability.

Mistletoe treatments would be limited in size to remove infected pockets up to 1 acre at most, or 118 foot radius. Any aforementioned openings would be limited to approximately 350 feet between their edges.

Dispersal Habitat

Forested habitat usually 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 without the components found in NRF habitat, describes Dispersal Habitat. Dispersal Habitat treatment areas would retain a minimum of 40 percent canopy while applying the above group opening treatments for improved stand integrity, and species and structural diversity.

Selection harvest would be designed using the basal area retention levels below and adopting the group opening treatments outlined above. Selective thinning retains basal area per acre as follows:

Pine SeriesThinning

These are areas with southerly or easterly aspects and shallow soils where pine species are best adapted. These stands may have developed a substantial component of Douglas-fir as a result of fire exclusion. 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 existing large ponderosa pine and the subsequent development of young pine. The treatments would leave the best, healthiest pine and remove the majority of Douglas-fir trees to allow the pine to once again dominate the site. Older Douglas-fir trees that developed as open grown trees along with older pine trees would be favored as leave trees. To restore natural pine site conditions such as an open overstory, units in the pine series would retain lower levels than stands in the true fir or Douglas-fir series. Stands in the pine series would be thinned across diameter classes to release pine leaving 60-80 sq. ft. BA/AC, with crowns spaced 10 to 25 feet apart. Group selection openings around legacy ponderosa or sugar pine of up to 1 acre in size (118 foot radius from leave tree) would be created to stimulate pine regeneration and enhance the long term mixed conifer component. Leave trees would be preferred in the following order: SP, PP, IC, and DF.

Dry Douglas-fir Thinning

Dry Douglas-fir stands are typically found on west, southwest, east, and southeast aspects in Douglas-fir plant series. Douglas-fir is the predominant conifer species with ponderosa pine often present. Treatments proposed for these sites would thin the trees to a 3 to 15 foot crown spacing while maintaining 80 to 120, average 100 basal area per acre. The larger healthier trees would be favored as leave trees. Group selections up to 1 acre at most in size (or at most 118-foot radius) would be used to create openings around pine or incense cedar seed trees $\geq$ 18 inches dbh to favor the regeneration of mixed conifer species.

White Fir Thinning

White fir (*Abies concolor*) has a broad ecological range and is one of the most productive series in the Cascades. According to Atzet and Wheeler (1984) the white fir series exhibits good growth and survival for both sugar pine and Douglas-fir. Ponderosa pine, western white pine, sugar pine, incense-cedar, and Douglas-fir are the early seral species that pioneer after disturbances such as fire. Objectives of managing these sites are to create a stand structure and species composition that mimic natural disturbances and result in a higher proportion of early seral species than currently existing. The plant associations occurring in the white fir series are relatively dry with ABCO-PIPO being the hottest, driest association with moisture being the limiting factor. Sugar pine can store water in its bole and survive and grow well on these sites. These trees would be released whenever encountered.

Atzet and McCrimmon (1990) point out that white fir is extremely susceptible to fungal attacks and root rots. An objective for managing stand density is to remove white fir during initial entries while avoiding mechanical damage to white fir leave trees. To reduce the probability of mechanical damage to white fir crop trees, leaving white fir along haul routes, planned skid roads, or adjacent to major landings should be avoided where heavy mechanical injury can occur during harvest operations.

These stands would be thinned to a 3 to 15-foot crown spacing leaving 160 to 180 (average 160) sq. ft. basal area per acre in the following species preference: SP, PP, IC, DF, and WF. Small group selections (up to 1/4 acre in size or 59-foot radius) would be used to create openings around pine and incense cedar ≥ 18 inches dbh to favor biological diversity.

Mixed Conifer Thinning

These stands are comprised of a mix of tree species including Douglas fir, ponderosa pine, sugar pine, incense cedar, and white fir. Thinning objectives for mixed conifer stands are to improve tree vigor and growth, maintain a larger proportion of Douglas-fir species while maintaining the highest diversity of mixed conifer species for the stand. Treatments proposed for these sites would include thinning to a 3 to 15 foot crown spacing, maintaining 100-160, average 120 basal area per acre. Group selections up to 1 acre at most in size (or at most 118-foot radius) would be used to create openings around pine or incense cedar seed trees ≥ 18 inches dbh to favor the regeneration of mixed conifer species.

Disease Management

The Medford District RMP (USDI 1994) instructs "design silvicultural treatments so that within-stand endemic levels do not increase". The presence of mistletoe requires a variation in prescriptions with stand conditions in these areas requiring lower than 40% canopy cover (USDI 1994). This prescription applies to stands or parts of stands that already exhibit less than 40% canopy due to disease mortality. These stands exhibiting a deteriorating stand condition due to disease would be harvested leaving a residual overstory of 6-8 overstory TPA ≥ 20 inches dbh or the largest available diameters. Trees less than 8 inches dbh would not be harvested.

Regeneration Harvest

Select areas would be harvested to release the understory component and to create multiple-canopied stands and complex forest structure. Retention of 16-25 overstory TPA ≥ 20 inches dbh should provide overstory cover for frost protection. Trees less than 8 inches DBH would not be harvested.

Typical leave trees would be the most vigorous dominant and codominant trees having the best live crown ratios (≥ 30%), straight boles, and healthy conical shaped crowns. Second growth trees may be left to meet crown spacing requirements when the older trees are widely spaced. Enough trees would remain to prevent more than 45 feet between crowns. Favor leaving SP, PP, IC, and DF, respectively.

Consequences of Density Management on Stand Growth and Vigor

Stands were modeled in a growth and yield modeling system called ORGANON. 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 Sampson Cove Analysis Area. Results of predicted outputs can be viewed in Table 3-26. 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.

Tables 3-26 shows the growth of a mid size conifer stand (11 to 21 inches dbh) and a mature conifer stand (21+ inches dbh) with and without management intervention. Table 3-27 displays the difference between no action and a treatment that maintains on average 60% Crown Closure. No action exhibits tree loss through competition mortality versus trees removed and utilized through timber harvesting under a science-based silvicultural prescription.

Table 3-26. ORGANON Modeled Stands; Thinned vs. Un-thinned and 20 Year Growth

UNIT # POLES MID MATURE	STAND AGE	CURRENT BA/AC (FT^2)	CURRENT TREES PER ACRE	CURRENT 10-YEAR INCREMENT (INCHES)	CURRENT RDI	PROJECTED RDI AFTER INITIAL HARVEST	PROJECTED RDI IN 20 YEARS UNTHINNED	PROJECTED RDI IN 20 YEARS THINNED
POLES								
1-3/4*	120	165	705	2.26	0.565	0.303	0.655	0.402
MID								
3-2✙	122	235	367	0.87	0.787	0.512	0.823	0.573
30-4✙	105	261	320	1.92	0.589	0.448	0.586	0.468
1-2A†	124	228	197	1.08	0.679	0.264	0.727	0.302
3-3✠	128	229	261	1.12	0.720	0.322	0.738	0.368
11-2A/B+	127	256	341	0.95	0.832	0.382	0.787	0.411
11-3‡	104	225	128	1.53	0.617	0.341	0.673	0.404
15-2B**	201	187	245	0.72	0.605	0.245	0.691	0.326
11-1✠	117	217	409	1.22	0.754	0.329	0.801	0.379
31-1✙	98	328	174	1.50	0.627	0.471	0.661	0.522
MATURE								
3-5✙	138	212	129	1.02	0.590	0.447	0.639	0.507
1-2B*	136	175	91	0.83	0.471	0.122	0.562	0.151
15-3‡	192	207	163	0.73	0.607	0.349	0.649	0.389
15-2A*	150	261	122	.72	.688	.184	.720	.219
16-2✙	106	213	397	2.03	.523	.401	.626	.513
32-1**	156	228	141	.89	.635	.276	.622	.307
32-2✙	156	228	141	.89	.635	.483	.622	.520
29-1✠	112	215	122	.85	.417	.312	.479	.362

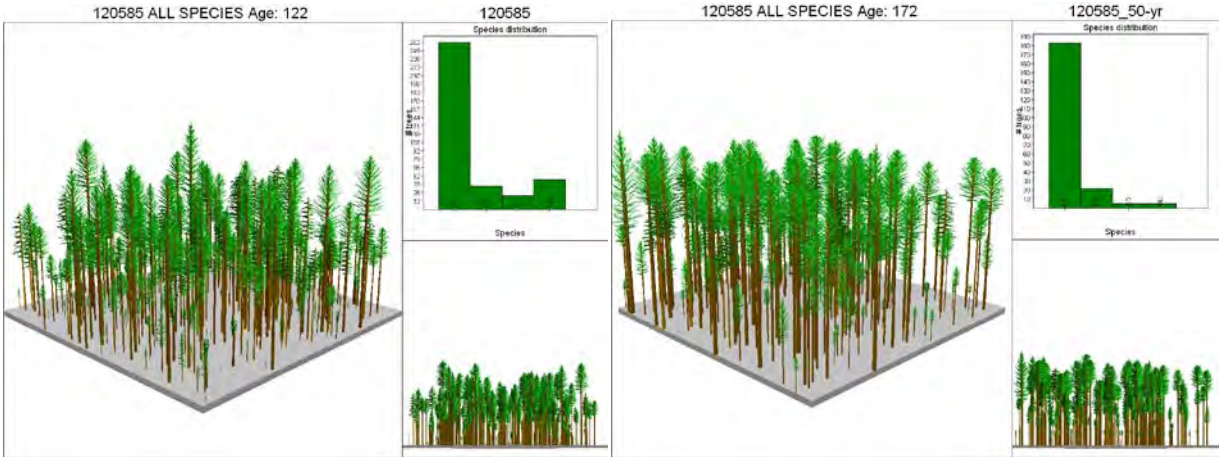
* Disease Management Prescription
† SGFMA 16-25 TPA Prescription
✙ NRF Prescription
✠ Dispersal Prescription
** Pine Series Thinning Prescription
+ Dry DF Prescription
‡ Mixed Conifer Prescription

Table 3-27. Description of Unit No. 3-2 with and without Treatment of Maintain NRF Habitat

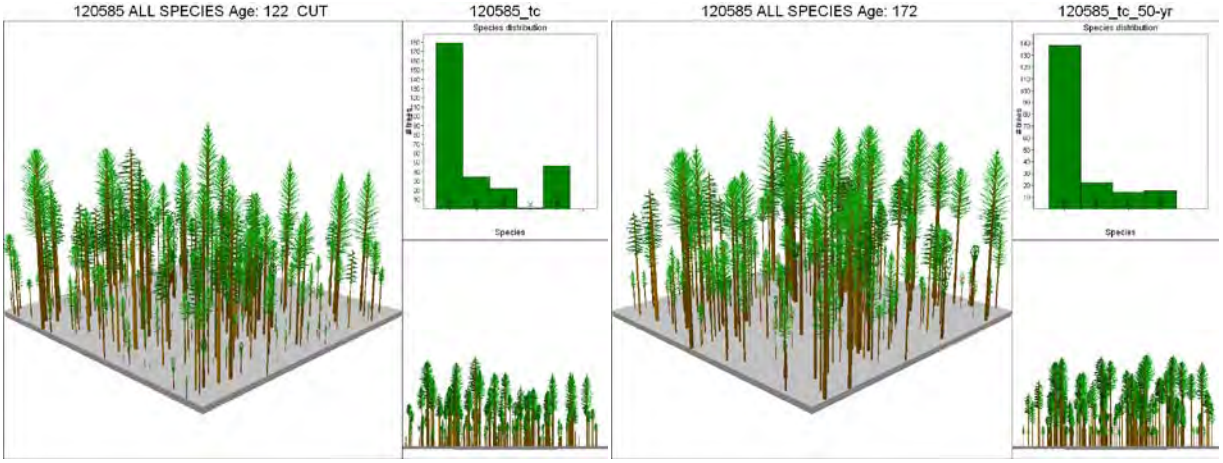
Existing Stand: 3-2 (Mid Stand)												
Stand Age	Trees Per Acre	Basal Area	Relative Density Index	Crown Closure	Quadratic Mean Diameter						Scribner Volume*	
122	367	235	.787	98.8	10.8						32,706	
Growth of Stand if Not Treated (note the decline in trees / acre from natural mortality							Growth of Stand if Thinned to Maintain 60% Crown Closure					
Stand Age	TPA	BA	RDI	Crown Closure	QMD	Scribner Volume	TPA	BA	RDI	Crown Closure	QMD	Scribner Volume
132	327	250	.809	100	11.8	37,573	252	160	.536	83	10.8	22,980
142	292	263	.823	100	12.9	42,226	236	176	.573	100	11.7	27,447
152	262	274	.833	100	13.9	47,033	219	192	.605	103	12.7	31,037
162	236	284	.839	100	14.8	51,129	204	206	.631	105	13.6	34,536
172	215	292	.843	100	15.8	55,193	189	219	.652	106	14.6	37,916
* Scribner Volume of Commercial Size Conifer Species **≥ 8 inches DBH**												

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 Unit #3-2 (Figure 3-6).

Figure 3-6. Sampson Cove Unit 3-2



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



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

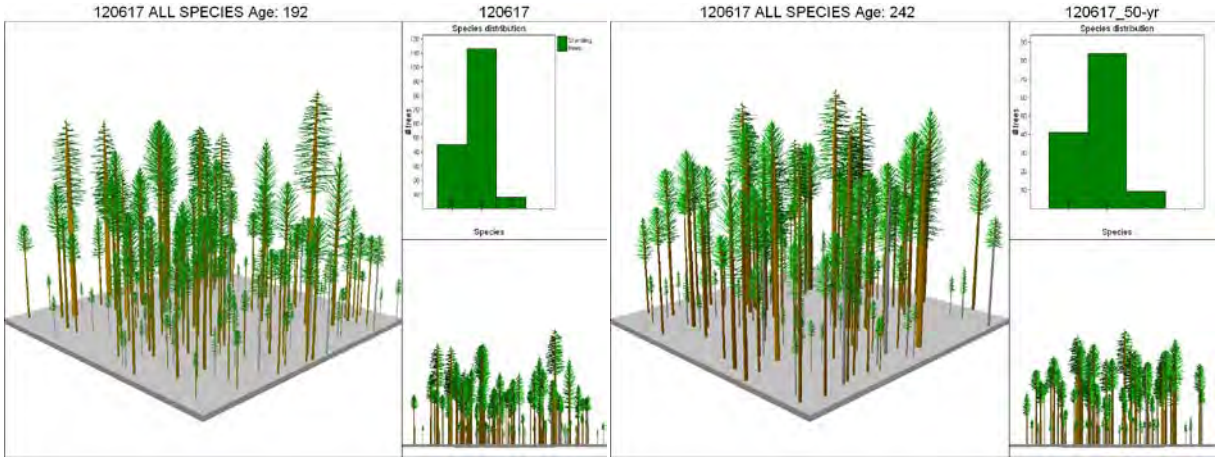
Table 3-28 compares the difference between the treated and untreated stand composed of Unit #15-3 with a Mixed Conifer Prescription of retain 100-160 average 120 ft² basal area per acre. The original stand exhibited a RDI of 0.607 (a RDI from 0.55 to 1.00 bounds the zone of imminent mortality and suppression) a RDI of 0.550 marks the threshold for competition mortality. 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 a prescription that lowers the RDI from 0.607 to 0.349. After 50 years, the untreated stand holds 130 TPA at a stand RDI of 0.699. In contrast, the 50 year treated stand holds 84 trees per acre at a stand RDI of .471 (still below the threshold of 0.550; anything at 0.55 and greater results in mortality from competition between trees for limited resources).

Table 3-28. Description of Unit No. 15-3 with and without Treatment of Mixed Conifer Prescription

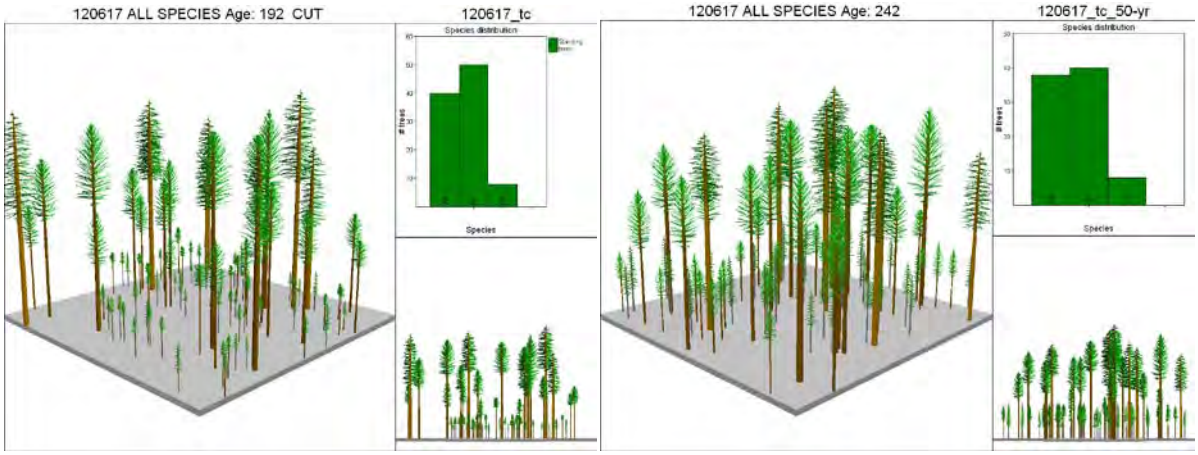
Existing Stand: 15-3 (Mature Stand)						
Stand Age	Trees Per Acre	Basal Area	Relative Density Index	Crown Closure	Quadratic Mean Diameter	Scribner Volume*
192	163	207	0.607	81	15.3	41,713
Growth of Stand if Not Treated (note the decline in trees / acre from natural mortality						
Stand Age	TPA	BA	RDI	Crown Closure	Quadratic Mean Diameter	Scribner Volume
202	155	220	0.629	98	16.1	45,029
212	148	231	0.649	101	16.9	48,198
222	142	242	0.667	102	17.7	51,274
232	136	252	0.684	103	18.4	54,091
242	130	262	0.699	104	19.2	56,749
Future Growth of Stand if Thinned to 100-160 (Average 120 ft² BA/AC) (.349 RDI and 42% Crown Closure)						
Stand Age	TPA	BA	RDI	Crown Closure	Quadratic Mean Diameter	Scribner Volume
202	90	128	0.365	53	16.2	30,129
212	88	139	0.389	67	17.1	32,530
222	86	151	0.416	82	14.3	35,162
232	85	165	0.443	91	18.8	37,610
242	84	178	0.471	96	19.7	40,177
* Scribner Volume of Commercial Size Conifer Species **≥ 8 inches DBH**						

Figures 3-7 illustrates the pre and post-harvest stand conditions of a mature Mixed Conifer stand in the Douglas-fir plant series (Unit #15-3, T39S-R2E-Sec.15). Currently, the stand has 163 TPA, a relative density index of 0.607, a tree diameter range from 4.5 to 50.8 inches dbh, and a species composition of 68% Douglas-fir, 27% white fir, 5% ponderosa pine, and <1/2% incense cedar. There are currently 69 understory TPA (<8 inches DBH) composed entirely of shade tolerant white fir (57%) and Douglas-fir (43%) with no pine species or incense cedar recorded in the understory (Figure 3-7(a)).

Figure 3-7. Sampson Cove Unit 15-3



(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 0.349 (Figure 3-7(c). Immediately following harvest the stand exhibits a projected 94 TPA with a basal area of 119 ft² per acre. The species composition after harvest projects 52% Douglas-fir, 41% white fir, 6% ponderosa pine, and < 1/2% incense cedar. Openings would allow more sun-loving ponderosa pine and incense cedar to regenerate.

Summary of Commercial Treatments

The various prescriptions meet the specifications of restoration thinning and density management as outlined in the Medford District Resource Management Plan.

A total of 3,537 acres of Riparian Reserves, northern spotted owl cores, and other reserves for plants and animals in the Analysis Area would not be treated commercially. Other untreated forested stands include those that lack sufficient conifer stocking to meet a feasible sale under guidelines for maintaining northern spotted owl habitat. This amount constitutes 92% of the forestland base (5,906 acres of forestland in the Analysis Area are not being treated commercially). Only 8% of the commercial forestland base on BLM-Administered lands in the Analysis Area is being treated commercially. Commercial stands in reserve areas would remain in poor vigor and tree mortality can be expected in the future. Conifer canopy closure would decrease with time thus degrading some types of habitat. This also decreases the effectiveness of fuels hazard reduction. 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.

Leaving 48 acres of commercial diseased forest land untreated could increase the radial spread of dwarf mistletoe and root disease as susceptible shade tolerant species such as Douglas-fir and white fir continue occupying the sites. After initial hosts die out, re-colonization of susceptible species occurs readily in the Analysis Area. This would subsequently perpetuate the dwarf mistletoe parasite on the site and its damaging impacts would widen further.

Mortality of untreated pine stands as a result of competition against Douglas-fir and white fir could cause epidemic 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.

If surrounding private lands are clearcut, forest stands on BLM-administered lands would leave patches of forest with variable density treatments that would help the landscape in providing long term forest complexity which is the result of variability. Surrounding BLM lands would be managed with similar prescriptions to assure forest health.

Pre-commercial Thinning

In addition to the commercial treatment, 85 acres would be pre-commercially thinned. The excess, small diameter trees less than 8 inches dbh would be cut from under the drip lines of old-growth trees 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. Pre-commercial thinning would also help to reduce the fire hazard by reducing ladder fuels.

The prescriptions are designed to increase drought resistant conifer species such as ponderosa pine and incense cedar. Maintaining these drought resistant species ensures the resiliencies of forest stands during cycles of drought.

Consideration of the 2005 Black Report

The 2005 Report *Logging to Control Insects: The Science and Myths Behind Managing Forest Insect "Pests"*, also known as the Black Report, was submitted by several commenters to support their opinion that there is no evidence that logging can control bark beetles or defoliators once an outbreak occurs and in the long run could increase the likelihood of epidemics. The Black Report was reviewed by Forest Health Protection Entomologists from Region 6 of the U.S. Forest Service in November 2005, who concluded that the report contained many erroneous statements that were not even supported by the report's cited literature and included many citations taken out of their proper context. The Black Report was reviewed by BLM silviculturists who concur with the findings reported by Region 6 Forest Service entomologists. Many papers cited in the report support BLMs approach to managing forests to prevent bark beetle epidemics.

A recent paper, "*The effectiveness of vegetation management practices for prevention and control of bark beetle infestations in coniferous forests of western and southern United States* (Fettig et al., In Press), reviews tree and forest stand factors associated with bark beetle infestations and analyzes the effectiveness of vegetation management practices for mitigating the negative impacts of bark beetles on forests. The review draws from the examination of 498 scientific publications concerning the topic referenced above and other related topics. Fettig et al. reports that native tree-killing bark beetles are a natural component of forest ecosystems and periodic outbreaks will occur as long as susceptible forests and favorable climatic conditions exist. Recent epidemics of some native forest insects have exceeded historical records and management to reduce stand or landscape-level susceptibility must address factors related to tree density. Increased competition among trees for water, growing space, and nutrients causes trees to become stressed and compromises their resistance mechanisms, thus increasing their susceptibility to bark beetle attacks.

The report concludes that while gaps do exist in information available for some forest cover types and common bark beetle species, thinning as a preventive measure to reduce the amount of bark-beetle caused tree mortality and its effectiveness is supported by scientific literature for most forest cover types including ponderosa pine and Douglas fir forests which are the primary focus of concern for bark beetle infestations in the Sampson Cove Forest Management Project.

K. RECREATION

1. Affected Environment

Recreation use across the Medford District BLM is described in the Medford District Proposed Resource Management Plan/Environmental Impact Statement. BLM lands fall into two recreation management categories, special recreation management areas and extensive recreation management areas. Extensive recreation use areas are all BLM-administered lands not included in Special Recreation Management Areas identified in the RMP (PRMP/EIS, p. 3-71) that provide for dispersed recreation opportunities across the Medford District BLM. Special Recreation Management Areas are those areas identified with high concentrations of recreation use and developed facilities.

Dispersed Recreation

An estimated 799,243 acres provide for dispersed recreation use across the Medford District (PRMP/EIS p. 3-84). The majority of the Sampson Cove Project Area, about 482 acres, is described by the RMP as extensive recreation use areas that provide for dispersed recreation. This represents less than 0.1 percent of the Medford District's extensive recreation use areas. These areas are characterized as low use recreational areas where no developed or designated recreational sites or activities exist.

Dispersed recreation in the Project Area includes hiking, horseback riding, sightseeing, OHV activities, fishing, driving for pleasure, hunting, target practice, dispersed camping, and vegetative gathering. Three units are in proximity to the Pacific Crest National Scenic Trail (PCNST), a developed/designated recreational trail, which is also designated as a Special Recreation Management Area for 50 feet either side of the trail. Special Recreation Management Areas are those areas identified with high concentrations of recreation use and developed facilities. One unit is within a heavily used dispersed recreation area called Frog Creek disc golf course, a non-designated, user created activity area.

Pacific Crest National Scenic Trail

A portion of the boundaries of units Unit 32-3A, 32-2 and 19-3 are within approximately 50 -200ft. of the (PCNST). The PCNST was established through the National Trails System Act (1968) "*in order to provide for the ever-increasing outdoor recreation needs of an expanding population and in order to promote the preservation of, public access to, travel within, and enjoyment and appreciation of the open-air, outdoor areas and historic resources of the Nation*". The PCNST passes through California, Oregon and Washington from Mexico to Canada. Use of the PCNST is limited to hiking and stock use. The Medford District BLM manages 42.5 miles of the PCNST.

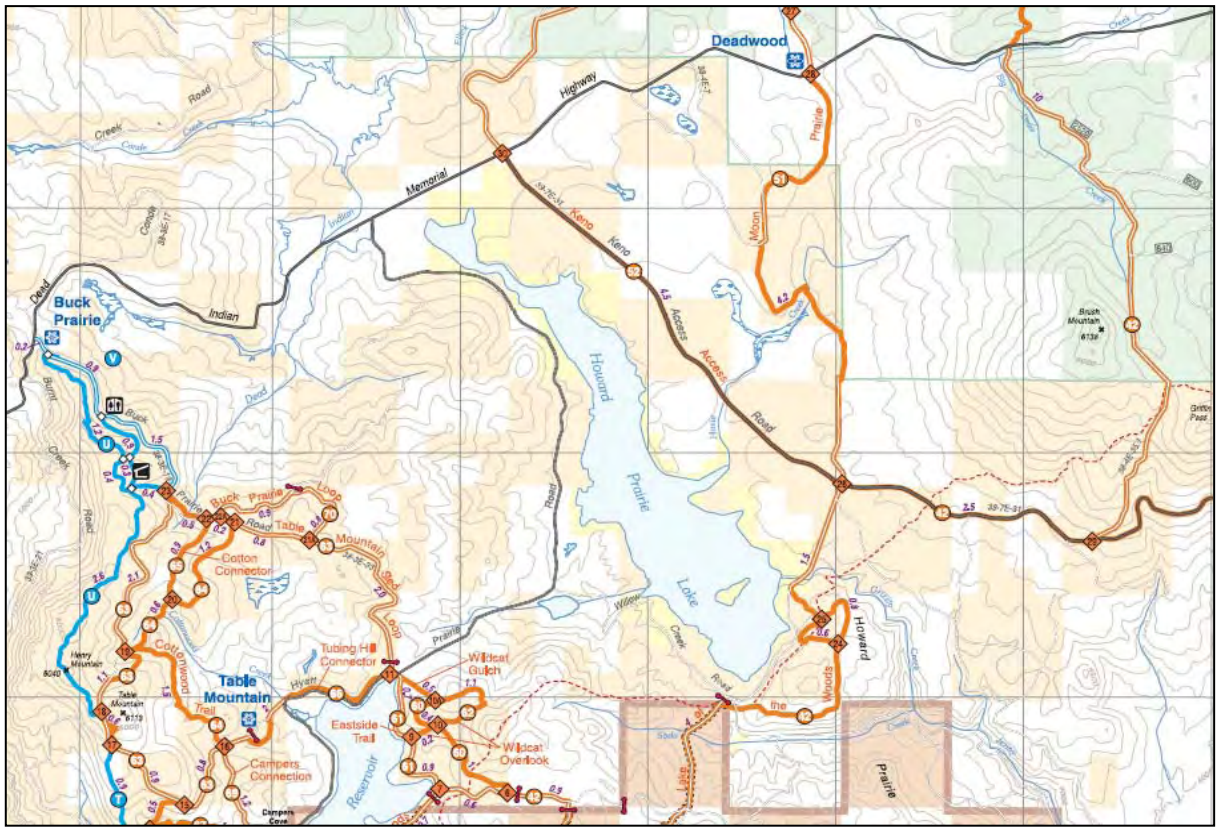
On the Medford District BLM, the Recreation Area Management Plan for the Pacific Crest National Scenic Trail Special Recreation Management Area (1998) provides guidance for the management of the PCNST. The Recreation Area Management Plan for the PCNST calls for no timber harvest within the 100-foot wide Special Recreation Management Area corridor (50' from trail centerline either side of the trail), except for the removal of safety hazard trees. As such, the boundaries for the three units (32-3A, 32-2, and 19-3) lie outside of this corridor.

Buck Prairie Nordic Trails

Figure 3-8, is an excerpt for the Jackson-Klamath Winter Trails Guide Map, showing nordic trails (blue) and multiple use trails (orange) in the vicinity of Hyatt-Howard Prairie SRMA.

The Buck Prairie Nordic Trail System (Figure 3-8) is a popular non-motorized winter trail system consisting of approximately 16 miles of Nordic Trails. Many of these trails follow roads that are closed, behind locked gates, during the winter months. The Buck Prairie Nordic Trail System is also located within the Hyatt Lake-Howard Prairie Lake Special Recreation Management Area (RMP Map 9). Use of the system includes various forms of cross country skiing, snowshoeing and winter hiking. Unit 29-1 is located on the northeastern edge of the Hyatt Lake-Howard Prairie Lake Special Recreation Management Area. Road 39-3E-29 serves as the northern most boundary of Sampson Cove project unit 29-1. A small portion of the Table Mountain Loop trail runs along Road 39-3E-29 during the winter months.

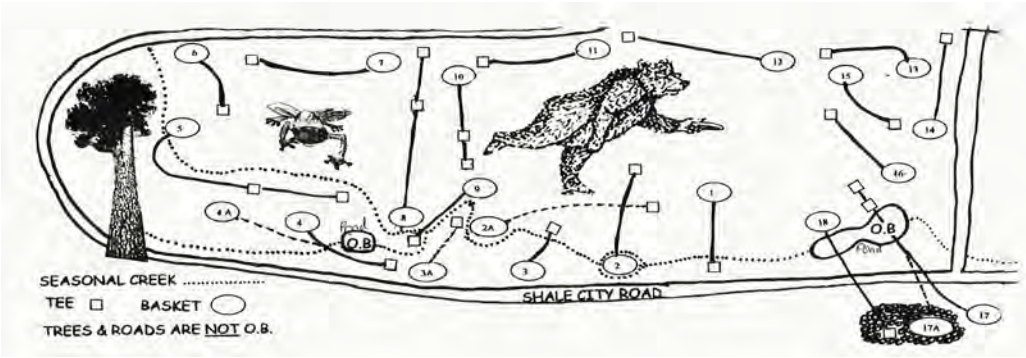
Figure 3-8. Jackson-Klamath Winter Trails Guide Map; showing Nordic and Multiple-use Trails



Frog Creek Disc Golf Course at Shale City

The Frog Creek Disc Golf Course (Figure 3-9) is a user created, un-designated Frisbee golf disc course that is part of the dispersed recreation that takes place in the Project Area. The course receives heavy use during the months of June, July, August, and into September. Project unit 9-4 encompasses part of this course.

Figure 3-9. Frog Creek Disc Golf Course Map



(http://www.dgcoursereview.com),

2. Environmental Consequences

a. Alternative 1

In the No-Action Alternative, recreation opportunities would remain unchanged. Dispersed recreational activities such as hiking, horseback riding, sightseeing, OHV activities, fishing, driving for pleasure, hunting, target practice, dispersed camping, and vegetative gathering would continue. Activities on the PCNST and on the Buck Prairie Nordic trails would remain unchanged.

b. Alternative 2

Dispersed types of recreation within the Sampson Cove Project units would receive adverse short-term intermittent impacts as a result of the Samson Cove Proposed Action. During the summer months when use is highest, recreational users would encounter log trucks, equipment, noise from machinery, and some traffic congestion. However, some of the safety risks associated with project activities would be mitigated through increased signage on major travel routes. The types of prescriptions called for in each unit of the Sampson Cove Project would not change the overall character of the landscape from the point of view of the average recreationist and therefore would not impact the desirability of the area for dispersed recreation in the long-term. Greater short term impacts to recreation use at the developed and designated trails (PCNST and Buck Prairie Nordic Trails) near project units would occur. The same is true for the heavily used non-designated, user created Frog Creek disc golf course at Shale City which is partially within a project unit.

Pacific Crest National Scenic Trail

A portion of the boundaries of units 32-3A, 32-2 and 19-3 are within approximately 50-200 ft. of the (PCNST). The silvicultural prescription for these three units calls for *Maintaining Northern Spotted Owl Nesting, Roosting, and Foraging Habitat*. This prescription would use selective thinning to improve tree growth and vigor while maintaining 60 percent canopy cover. This type of thinning, which retains large trees and substantial canopy cover, along with the no harvest 100 foot corridor along the trail, allows for the persistence of the existing landscape character as observed from the PCNST. Therefore, long-term impacts to the trail and the trail user would not be realized.

In the short-term, intermittent negative impacts as a result of the Samson Cove Project would occur. The PCNST crosses Road 39-3E-32 twice in areas near project units. This road would be used to transport equipment into and from the units during implementation of the project. PCNST users would encounter log trucks, equipment, noise from machinery, and some traffic congestion at the two crossings. To mitigate these impacts and improve the safety of PCNST users, signs would be placed at trail crossings both on the road and on the trail.

Signs would also be placed on roads 32-3E-32 and 32-3E-29 in the vicinity of the units closest to the PCNST. Signs would alert trail users of the project and workers associated with the project of the location of the trail crossing.

Buck Prairie Nordic Trails

A small portion of the Table Mountain Loop trail runs along Roads 39-3E-29.6 and 38-33E-32.2. Road 39-3E-29 serves as the northern most boundary of Sampson Cove Project unit 29-1. The silvicultural prescription for this unit is to *Maintain Northern Spotted Owl Dispersal Habitat*. This type of thinning retains approximately 40 percent canopy cover. Group selection of trees is done to create patchy habitat, a multi-storied canopy, complex forest structure, and a species mix that provides habitat for the northern spotted owl. This type of thinning allows for the persistence of the existing landscape character as observed by winter recreational users from the Table Mountain Loop trail. The landscape surrounding the Buck Prairie Nordic Trail System area has largely been previously harvested and replanted. The average or casual winter trail user would likely not notice the effects of the thinning project. No short term impacts to the winter trail recreationist would occur, as no timber harvest or log hauling would be allowed in/from Unit 29-1 from December 1st to April 1st (see Chapter 2, Project Design Features).

Frog Creek Disc Golf Course at Shale City

The Frog Creek Disc Golf Course is a user created, un-designated Frisbee golf disc course that is part of the dispersed recreation that takes place in the Project Area. Project unit 9-4 encompasses part of this course. The prescription for project unit 9-4 is *Dry Douglas-fir-Thinning*. This treatment thins trees to a 10 to 25-foot crown spacing while maintaining an average of 100 ft^2 basal area per acre. Large healthier trees are favored as leave trees. The Frisbee golf disc course receives heavy use during the months of June, July, August, and into September and is likely to receive both short and long term adverse impacts as the result of the Sampson Cove Project. As part of the course is encompassed in project unit 9-4, this portion of the course would be closed during thinning operations. Thinning operations could take place during the predominant season of use (summer).

Long term impacts from tree removal are likely to be noticed and have an impact on Frisbee golf recreationist as the physical character of the existing course would be altered. This alteration of the physical character of the course may have both positive and negative consequences depending on the skill level of the Frisbee Golf recreationist. The Frisbee when thrown requires an opening in tree canopy for flight. A novice or beginner may appreciate the increased space in between trees, as a result of the project, for Frisbee flight while an experienced Frisbee golf recreationist may appreciate closer spaced trees for the technical challenge it presents. The locations of poles in the ground that players use as targets and the course layout may change as a result of the change in landscape components and tree stand structure. Any adverse impacts to this recreational activity would not be significant as the course can be altered to accommodate the changes in tree and forest structure and there are almost 800,000 acres of BLM lands that provide for dispersed recreational activities.

The remaining usable portion of the course would likely be subject to adverse short-term impacts during project operations from equipment noise and an increase in truck and equipment traffic on area roads. The road leading to the thinning unit would have signs posted alerting drivers on the road to the presence of the thinning project; however increased safety risks are likely to occur for those using the remaining open portion of the course.

L. VISUAL RESOURCES

1. Affected Environment

Medford District BLM-administered lands have been classified under a Visual Resource Management (VRM) Inventory Class system established by the BLM "Visual Resources are the land, water, vegetation, structures, and cultural modifications that make up the scenery of BLM-administered land" (RMP/EIS p. 3-70). The criteria used to determine VRM classes were scenery quality ratings, public sensitivity ratings and distance zone-seen area mapping criteria.

Approximately 60 percent of the viewsheds in the Medford District RMP planning area have fragmented land ownership patterns with private lands dominating the viewed landscape (RMP/EIS p. 3-70). Project units in the Sampson Cove Project Area are classified as VRM Class II, III, IV (RMP Map 10), with most of the project units classified as VRM Class III. Units 19-3, 32-1, 32-2, 32-3 near the Pacific Crest National Scenic Trail all fall within or partially within VRM Class II.

Class II Objective
The objective of this class is to retain the existing character of the landscape. The level of change to the characteristic landscape should be low. Management activities may be seen, but should not attract the attention of the casual observer. Any changes must repeat the basic elements of form, line, color, and texture found in the predominant natural features of the characteristic landscape.

Class III Objective
The objective of this class is to partially retain the existing character of the landscape. The level of change to the characteristic landscape should be moderate. Management activities may attract attention but should not dominate the view of the casual observer. Changes should repeat the basic elements found in the predominant natural features of the characteristic landscape.

Class IV Objective
The objective of this class is to provide for management activities which require major modification of the existing character of the landscape. The level of change to the characteristic landscape can be high. These management activities may dominate the view and be the major focus of viewer attention. However, every attempt should be made to minimize the impact of these activities through careful location, minimal disturbance, and repeating the basic elements.

2. Environmental Consequences

a. Alternative 1

Visually, the area associated with proposed units would remain the same. There would be no changes to the existing landscape.

b. Alternative 2

Resource development patterns that disrupt the land surface (road construction) and vegetative patterns (vegetation thinning) can have adverse effects on visual resources (RMP/EIS p. 4-86). As described above, units of the Sampson Cove Project are classified as VRM Class II, III, or IV (RMP Map 10), with the majority of these units classified as VRM Class III. The management 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 and not dominate the view of the casual observer. Project units 19-3, 32-1, 32-2, and 32-3 near the Pacific Crest National Scenic Trail (PCNST) lay within or partially within VRM Class II management areas. The management objectives of VRM Class II is to retain the existing character of the landscape, the level of change to the landscape should also be low.

In accordance with the RMP, a visual resource contrast rating system analysis was completed for the Sampson Cove Project. Two Known Observation Points (KOPs) near project units 19-3 and unit 32-2 and the PCNST in VRM Class II management areas were used to complete the visual resource contrast rating system analysis. Views of the landscape from the major roads of travel surrounding the project area were also used to determine if any changes in landscape character from the point of view of a casual observer traveling the major roads would be observed.

The major roads in the area of the project include Highway 66 (Green Springs Highway), East Hyatt Lake Road, Hyatt Howard-Prairie Road, and Dead Indian Memorial Highway.

From the major roads of travel, most project units would not be visible. Project units that may be visible or partially visible would not be noticed by the casual observer due to expected speed of travel and nature of the proposed project (thinning). The units receiving disease management and regeneration harvest treatments, in which overstory trees are thinned to 6 to 25 trees per acre, would likely be the units with the most visible affect on landscape character. However, these units are not visible from any of the major roads.

While driving on secondary roads these units may be visible but these harvest treatment units are in areas of VRM Class III and IV management areas. VRM Class III allows for moderate change to the characteristic landscape where management activities may attract attention do not dominate the view of the casual observer. VRM Class IV management areas allow for major changes in landscape character. The regeneration harvest and disease management units proposed in this project are not likely to cause major changes in the character of the landscape and would generally meet higher VRM Class III management objectives. This is because the disease management units are already below 40 percent canopy closure due to natural disturbance from forest disease, and the change from current conditions would not be major. The regeneration harvest units would retain 16 to 25 trees per acres and about 40 percent canopy cover and the resulting stand conditions would not dominate the landscape.

The two KOPs used for analysis are near project units 19-3, unit 32-2, and the PCNST in VRM Class II management areas. Both KOPs where chosen as they are along or in the area of the PCNST, are likely to receive higher than average recreational visits compared to the surrounding area, and are in areas managed for class II VRM management objectives. Class II VRM objectives call for the least amount of change to the character (minimal) of all the VRM management classes for the project units within the Sampson Cove Project.

KOP 1

From KOP 1, on the PCNST looking at unit 19-3, the thinning project would have a weak degree of contrast to the landscape character elements of form, line, color, and texture when compared to landscape character prior to the proposed project. The level of change to the landscape would be low and would not attract the attention of the casual observer from the PCNST. This is due to the objectives for maintaining $\geq$ 60 percent canopy to maintain northern spotted owl nesting roosting and foraging habitat; only light thinning is proposed.

KOP 2

From KOP 2, on road 39-3E-32 near the PCNST, the thinning project would have a weak degree of contrast to the landscape character elements of form, line, color, and texture when compared to landscape character prior to the proposed project. The level of change to the landscape would be low and would not attract the attention of the casual observer from the road near the PCNST. This is due to the objectives for maintaining $\geq$ 60 percent canopy to maintain northern spotted owl nesting roosting and foraging habitat; only light thinning is proposed.

Contrast rating worksheets were completed for viewsheds identified for KOP as described above. It was determined that Alternative 2, the Sampson Cove Proposed Action, would meet Visual Resource Management objectives. The project treatments consist of various forms of thinning and the level of change to the landscape character would be low to moderate. The casual observer would likely not notice the changes in landscape character as a result of the thinning projects. An observer living in the area or more familiar than the casual observer with the landscape may notice the slight changes in character of the landscape as a result of the Sampson Cove Project; however, the project would meet Visual Resource Management objectives of the 1995 Medford District RMP.

M. AIR QUALITY

1. Affected Environment

Prior to Euro-American settlement, Native Americans created long periods of smoke by frequently burning the forests to create the necessary conditions to satisfy food, ceremonial, and cultural needs. With the advent of mining in the 1850s, miners burned off large tracts of forest generating smoke. In the 1930s to present day, organized wildland fire suppression resulted in much less smoke than prior to organized firefighting, except during wildfire events, especially in 1987 and 2002. As community development occurred in the Medford/Ashland Air Quality Management Area, increasing amounts of smoke (wood stoves, agriculture, and dust, from users on forest roads) increased particulates reducing air quality. Industrial particulates increased as lumber mills and the agricultural industry grew. An increase in the use of prescribed fire for fire and fuels management in the 1980s added smoke to the Medford/Ashland area.

In the recent past, the population centers of Grants Pass, Medford/Ashland (including Central Point and Eagle Point), and Klamath Falls have been in violation of the national ambient air quality standards for PM-10 and were 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 nonattainment area is smoke from woodstoves, 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 nine years the population centers of Grants Pass and Medford/Ashland have been in compliance for the national ambient air quality standards for PM-10. These areas are now (since January 2008) classified as Smoke Sensitive Receptor Areas (SSRA).

Air Quality - Pollutants

Air pollutants--called particulates--include dust, dirt, soot, and smoke. Particulates are emitted directly into the air by sources such as motorized vehicles, construction activity and fires, natural or prescribed. 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 (PM) smaller than 2.5 micrometers (PM 2.5) is a term used to describe airborne solid and liquid particles. Because of its small size, PM 2.5 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.

The pollutant most associated with the Medford District's resource management activities is PM 2.5 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 2.5 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:

-Regulate prescribed burning operations on forest land.
-Achieve strict compliance with the smoke management plan.
-Minimize emissions from prescribed burning.

For the purpose of maintaining air quality, the State Forester and the Department of Environmental Quality shall approve a plan for the purpose of managing smoke in areas they designate. The authority for the State administration is ORS 477.513(3)(a).

ORS468A.005 through 468A.085 provides the authority to DEQ to establish air quality standards including emission standards for the entire State or an area of the State. Under this authority the State Forester coordinates the administration and operation of the plan. The Forester also issues additional restrictions on prescribed burning in situations where air quality of the entire State or part thereof is, or would likely become adversely affected by smoke.

In compliance with the Oregon Smoke Management Plan, prescribed burning activities on the Medford District require pre-burn registration of all prescribed burn locations with the Oregon State Forester. Registration includes specific location, size of burn, topographic and fuel characteristics. Advisories or restrictions are received from the Forester on a daily basis concerning smoke management and air quality conditions.

2. Environmental Effects

a. Alternative 1

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 Sampson Cove Project described under the Affected Environment. This section highlights key findings related to the question "What would it mean to not meet the objective of maintaining air quality?

Although sources of air particulates vary, air quality standards measure particulates regardless of their source. Prescribed burning activities unrelated to Sampson Cove Project would comply with the guidelines established by the ODF Oregon Smoke Management Plan and the DEQ Visibility Protection Plan. Therefore, air quality standards for the communities of Grants Pass and Medford/Ashland will continue to be met, as current pollution standards and air quality measures continue to control the amount of PM 2.5 emissions.

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.

b. Alternative 2

The Proposed Action proposes to use prescribed fire, consequently there would be some smoke related impacts. 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 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 escaped wildfire.

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

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

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.

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.

Because of actions to minimize smoke effects and because of DEQ smoke regulations, smoke associated with this action 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 the Proposed Action is very minor because it may affect only a few out of 150,000+ people (approximate population in the Medford/Ashland area).

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 the Proposed Action.

N. OTHER EFFECTS

1. Public Health and Safety

No aspects of the Sampson Cove Forest Management Project have been identified as having the potential to significantly and adversely impact public health or safety.

2. Cultural Resources

This project would not result in restricting access to, and ceremonial use of, Indian sacred sites by Indian religious practitioners or adversely affect the physical integrity of such sacred sites. No sites have been identified in the Project Area. Executive Order 13007 (Indian Sacred Sites)

This project would have no effect on Indian Trust Resources as none exist in the Project Area. This project was determined to have no adverse effects on properties listed or eligible for listing on the National Register of Historic Places. This includes Native American religious or cultural sites, archaeological sites, or historic properties. The proposed project would have no adverse effects on any known cultural resources.

3. Environmental Justice

This project was reviewed for the potential for disproportionately high or adverse effects on minority or low income populations; no adverse impacts to minority or low income populations would occur. Executive Order 12898 (Environmental Justice)

CHAPTER 4 - PUBLIC PARTICIPATION

A letter briefly describing the Proposed Action and inviting comments was mailed to adjacent landowners, interested individuals, organizations, and other agencies on March 25, 2010. Two field trips were led by the BLM to view and discuss the project proposal in the field with interested individuals and organizations. The first field trip was conducted on April 13, 2010 and the second on June 3, 2010. Comments were originally requested to be received by April 16; the scoping period was later extended to June 4, 2010. The BLM continued to accept and consider comment letters received after June 4, 2010. A copy of this Environmental Assessment was sent to individuals and the following organizations:

Organizations and Agencies

American Forest Resource Council
Cascadia Wildlands
Center for Biological Diversity
Friends of the Greensprings
Fruit Growers Supply Co.
Hannon Library Southern Oregon University
Klamath Siskiyou Wildlands Center
Latgawa Native American Indian Tribe
Oregon Wild
Pacific Crest Trail Association - Northern California/Southern Oregon
Soda Mountain Wilderness Council

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