United States Department of the Interior

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

IN REPLY REFER TO:

APR 05 2012

1792(ORM060)

Dear Interested Public:

The *Environmental Assessment* (EA) for the Sterling Sweeper Forest Management Project is now available for public review. The EA is available in its entirety online for public review at http://www.blm.gov/or/districts/medford/plans/index.php. A hard copy is available for review at the Medford District Office. The Bureau of Land Management (BLM), Ashland Resource Area, proposes to implement the Sterling Sweeper Forest Management Project, designed to implement specific Management Objectives consistent with the 1995 and the 2008 Medford District Resource Management Plans (RMPs). The Sterling Sweeper project involves harvesting trees in conifer forest stands on BLM-administered lands in the Griffin Creek, Lower Little Applegate River, Anderson Creek-Bear Creek and Larson Creek-Bear Creek Subwatersheds of the Bear Creek and Little Applegate River Watersheds.

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, and maintain northern spotted owl habitat.

As a result of scoping action alternatives analyzed in detail under this EA would harvest timber on 321 to 379 acres utilizing tractor and cable yarding systems. The alternatives also include unit-specific activity fuels treatments and pre-commercial thinning. One alternative proposes 0.41 miles of new road construction, while another alternative proposes no new road construction to access harvest units. An estimated 36 to 42 miles of existing roads would be used as haul routes and improved as needed to meet BLM standards.

A field trip for those interested in seeing areas proposed for project activity is scheduled for **11:00 AM on April 26, 2012**. If interested, members of the public should gather at the Deming Gulch parking area, located off of BLM road 39-2W-9.0. Directions are as follows:

> From Jacksonville on the Sterling Creek road (heading south): at ~9 miles, turn left onto the Armstrong- Deming Road. Drive ~200 yards to "T" – left is to Deming Gulch area. Drive a mile up the gravel road—there will be a Deming Trail sign on the right at about 7/10 of a mile. Keep going about 3/10 mile more to a road on the left (BLM road #39-2W-9.0 road with an open BLM gate). Go down the road several hundred feet to a large parking area.

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. **Although comments are welcome at any time, the comment period will close at 4:30 PM on May 7, 2012.**

Before including your address, telephone number, email address, or other personal identifying information in your comment, please be advised that your entire comment, including your personal identifying information, may be made publicly available at any time. While you can request that we 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 Ted Hass, 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 Ted Hass, Ashland Assistant Field Manager, at (541) 618-2253.

Sincerely,

John Gerritsma
Field Manager
Ashland Resource Area

Enclosure

ENVIRONMENTAL ASSESSMENT

for the

STERLING SWEEPER
FOREST MANAGEMENT PROJECT

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

(DOI-BLM-OR-M060-2012-0011-EA)

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

EA COVER SHEET

RESOURCE AREA: Ashland

ACTION/TITLE: Sterling Sweeper Forest Management Project

EA NUMBER: DOI-BLM-OR-M060-2012-0011-EA

LOCATION: T. 38 S., R. 1 W., Section 30; T. 38 S., R. 2 W., Sections 23, 27 and 34; and T. 39 S., R. 2 W., Sections 1, 3, 9 and 14; Willamette Meridian, Jackson County, Oregon

LIST OF PREPARERS	RESPONSIBILITY
Ted Hass	Project Lead, NEPA Compliance
Kristi Mastrofini	Timber, Engineering & Roads
Jason Tarrant	Logging Systems
Jason Tarrant	Silviculture Prescriptions
Mike Derrig	Hydrology/Water Resources
John McNeel	Road Specifications
Amy Meredith	Soils
Greg Chandler	Fire and Fuels
Chris Volpe	Fisheries, Riparian, T & E Aquatic
Chamise Kramer	Botany (Special Status Plants, Noxious Weeds)
Jeff Stephens	T & E Animals, Wildlife
Nicholas Schade	Recreation & Visual Resources
Lisa Brennan	Cultural Resources
Chamise Kramer	NEPA Planner

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CHAPTER 1 - PURPOSE AND NEED

A. INTRODUCTION

The Bureau of Land Management (BLM), Ashland Resource Area, proposes to implement the Sterling Sweeper Project, a forest management project. The Sterling Sweeper Forest Management Project is designed to implement specific Management Objectives for lands allocated to the production of Timber Resources, Wildlife Threatened and Endangered Species management, and management of Transportation resources described in the Bureau of Land Management's Medford District Resource Management Plan (RMP) (USDI 2008).

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 Sterling Sweeper 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?

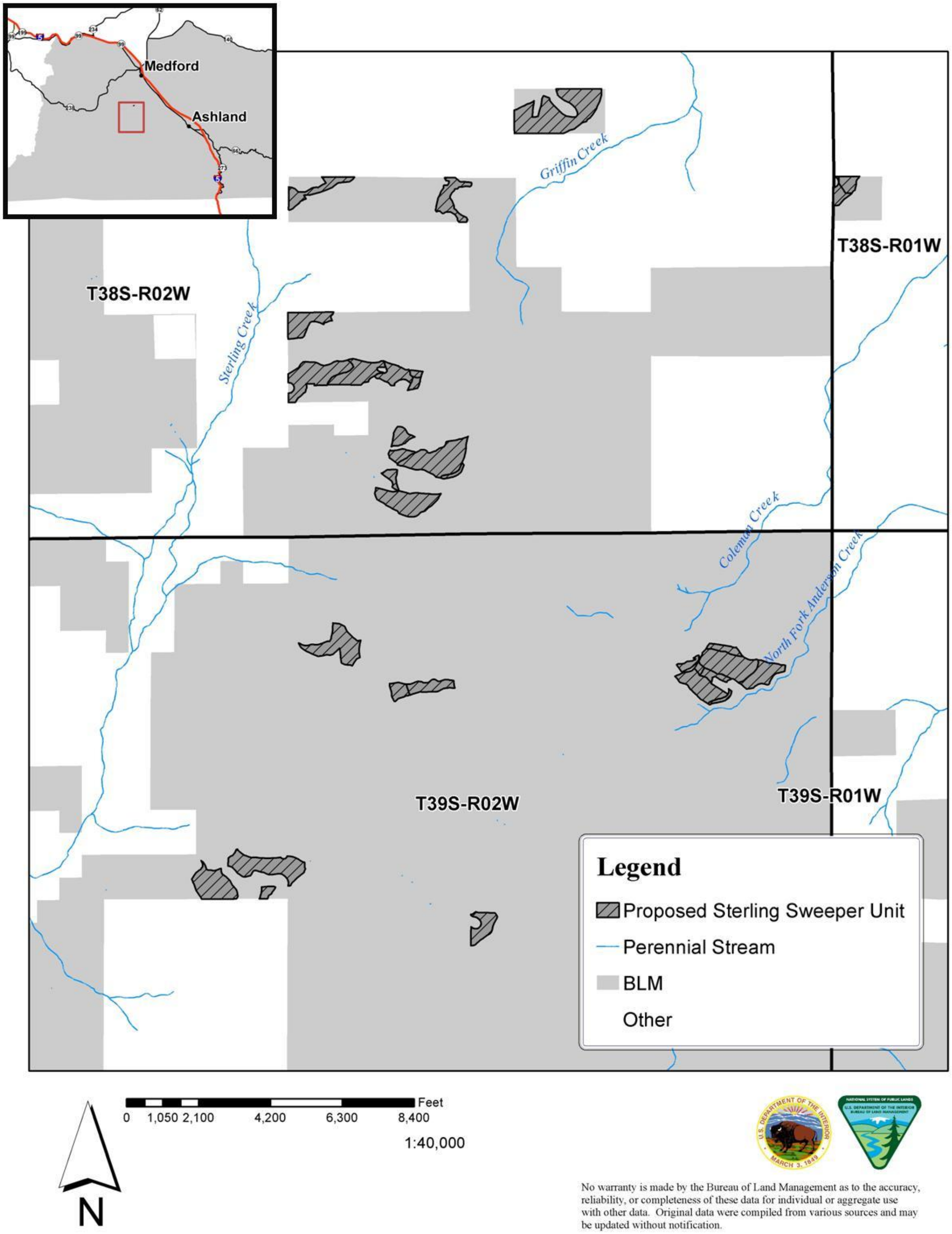
This section provides a brief summary of BLM's proposal for forest management. A more detailed description of BLM's Proposed Action is included in Chapter 2, Alternatives. The proposed 321- to 379-acre Sterling Sweeper Project would harvest trees in conifer forest stands on BLM-administered land in the Griffin Creek, Lower Little Applegate River, Anderson Creek-Bear Creek and Larson Creek-Bear Creek Subwatersheds of the Bear Creek and Little Applegate River Watersheds.

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 timber harvest utilizing tractor and cable logging systems. The alternatives also includes unit-specific activity fuels treatments and pre-commercial thinning (PCT). Under Alternative 2, approximately 0.41 miles of new road construction is proposed. An estimated 36 to 42 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 Sterling Sweeper Project Area is: T. 38 S., R. 1 W., Section 30; T. 38 S., R. 2 W., Sections 23, 27 and 34; and T. 39 S., R. 2 W., Sections 1, 3, 9 and 14; Willamette Meridian, Jackson County, Oregon (Map 1-1 and Maps 2-2, 2-3, 2-4 and 2-5).

Map 1-1. Sterling Sweeper Project Vicinity Map



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

The Sterling Sweeper Project is designed to implement the Management Actions/Direction of the Medford District Record of Decision and Resource Management Plan (RMP) within the Bear Creek and Little Applegate River Watersheds, primarily within the Griffin Creek, Lower Little Applegate, and Anderson Creek Subwatersheds. A small portion of the project is located in the Larson Creek Subwatershed (11 acres). This project is designed to meet management objectives and direction for the varying Land Use Allocations (LUAs) (as defined in the 1995 and 2008 RMPs) in the project area. The lands included in the proposed project area include the following 2008 LUAs:

- Uneven-Aged Timber Management Areas
- Riparian Management Areas

All proposed project units are located on lands categorized as Uneven-Aged Timber Management Areas under the 2008 LUA designation, and are Matrix lands as designated in the 1995 RMP.

This project proposal is designed to provide for long-term forest (timber) production in the Sterling Sweeper 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 2008, pp. 38-39; USDI 1995, p. 72).;

- ➢ Provide forest products from land-use allocations in accordance with the direction in the Medford District's Resource Management Plans (USDI 2008, pp. 38-39; 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 resource management needs (USDI 2008, p. 49; USDI 1995, pp. 84-86).

1. Need for the Proposed Sterling Sweeper Project

The following discussion provides more detail concerning the need for forest and road management based on the RMP direction that applies to the Uneven-Aged Timber Management Area LUA (USDI 2008) and Matrix LUA (USDI 1995), 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, promote uneven-aged, multi-structural stand conditions and provide timber resources, in accord with sustained yield principles and direction for Uneven-Aged Timber Management Area lands (USDI 2008, p. 38) and Matrix lands (USDI 1995) within the Sterling Sweeper Project Area.

One of the applicable laws governing the major portion of BLM-administered lands in the Sterling Sweeper 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. Uneven-Aged Timber Management Area and Matrix lands within the Sterling Sweeper Project Area are intended to achieve sustainable timber production and other forest commodities, providing jobs and contributing to community stability through both growth and harvest, while also promoting the development of fire-resilient forests (USDI 2008, p. 38; USDI 1995, p. 38). Timber products produced from this area would be sold in support of the District's Allowable Sale Quantity (ASQ) declared in the 2008 RMP (USDI 2008, p. 38, USDI 1995, p. 73).

The 1995 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 Sterling Sweeper 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. These same silvicultural treatments are applicable with projects initiated under the 2008 RMP (USDI 2008 pp. 40-41 and 64).

There is a need to maintain existing nesting, roosting, and foraging habitat conditions, in the Sterling Sweeper Project Area to contribute to the conservation and recovery of Federally listed species and their habitats in compliance of the Medford District RMP (USDI 2008, pp. 63-65; USDI 1995, 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 Sterling Sweeper 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 Sterling Sweeper Project Area that provides access for the management of resource program areas (USDI 2008, p. 49; USDI 1995, p. 86) including timber resources, while reducing their effects on water, soils, fish, and wildlife.

The Medford District RMPs provides direction for road management: to “[p]rovide a road transportation system that serves resource management needs” (USDI 2008, p. 49) and to “[d]evelop and maintain a transportation system that serve the needs of users in an environmentally sound manner” (USDI 1995, 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 Sterling Sweeper 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 Sterling Sweeper Forest Management Project. The Ashland Resource Area Field Manager must decide whether to implement a 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 both the Medford District 2008 and 1995 RMP Environmental Impact Statements (EISs) (USDI 2008; USDI 1995), 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 RMPs/EISs, 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 (ASQ)

The Sterling Sweeper 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 (USDI 2008, pp. 9, 38-39; USDI 1995, pp. 37-41, 61-62) would contribute toward the District's ASQ.

Meets the BLM's obligation to protect resources consistent with existing laws, policy, and the direction of the 2008 Medford District Record of Decision and Resource Management Plan and the 1995 Record of Decision and 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 Sterling Sweeper 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.

E. LAND USE CONFORMANCE & LEGAL REQUIREMENTS

Conformance with Land Use Plans

The forest management proposal is designed to be in conformance with the objectives and direction defined in the *2008 Medford District Record of Decision and Resource Management Plan* (ROD/RMP), as well as the 1995 Medford District Resource Management Plan. 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).

On December 17, 2009, the U.S. District Court for the Western District of Washington issued an order in *Conservation Northwest, et al. v. Sherman, et al.*, No. 08-1067-JCC (W.D. Wash.), granting Plaintiffs' motion for partial summary judgment and finding NEPA violations in the *Final Supplemental to the 2004 Supplemental Environmental Impact Statement to Remove or Modify the Survey and Manage Mitigation Measure Standards and Guidelines* (USDA and USDI, June 2007). In response, parties entered into settlement negotiations in April 2010, and the Court filed approval of the resulting Settlement Agreement on July 6, 2011. Projects that are within the range of the northern spotted owl are subject to the *Survey and Management Standards and Guidelines* in the 2001 ROD, as modified by the 2011 Settlement Agreement.

The Sterling Sweeper Project is consistent with the Medford District Resource Management Plan/Forest Land and Resource Management Plan as 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* (2001 ROD), as modified by the 2011 Settlement Agreement.

Consultation with the US Fish and Wildlife Service was initiated January 10, 2012 (Fall FY12 LAA BA), and the Biological Opinion (BO) was issued March 26, 2012. The USFWS BO determined that the proposed action would not jeopardize the continued existence of the northern spotted owl, with a Conference Opinion that the project is not likely to destroy or adversely modify proposed critical habitat (FWS 01EOFW00-2012-F-0049).

On March 12, 2012, the U.S. Fish and Wildlife Service proposed to revise the designated critical habitat for the northern spotted owl (*Strix occidentalis caurina*) under the Endangered Species Act of 1973, as amended (77 Federal Register 46:14062-14165). The final critical habitat rule will be published in November 2012. The BLM will conference with the USFWS as appropriate to assure compliance with Section 7(a)(4) of the ESA, which establishes requirements for conferencing on proposed critical habitat.

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.

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

- **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 1995 and 2001)

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 Sterling Sweeper Project Area falls within the West Bear Creek and Little Applegate Watershed Analysis Areas. 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 Sterling Sweeper Forest Management Project, has been collected and is considered, along with existing information provided by both the 1995 *Little Applegate River Watershed Analysis* and 2001 *West Bear Creek Watershed Analysis.* Management Objectives and Recommendations provided by the Watershed Analysis were considered and addressed as they applied to the Sterling Sweeper 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 December 16, 2011. Comments were requested to be received by January 17, 2011. Three comment letters were received, one on the behalf of 3 separate parties.

The following articles were submitted for BLM review during the scoping process, and are addressed in this document where pertinent:

- Trombulack, S.C. and C.A. Frissell. 2000. Review of ecological effects of roads on terrestrial and aquatic communities. Conservation Biology 14(1): 18-30.
- Thrailkill, J. 2006. "Effects of Habitat Thinning on Northern Spotted Owls? Literature Summarized Through 2005." Appendix F of Interagency Level 1 Team, North Coast Province. 2010. Biological Assessment of Habitat Modification Projects Proposed During Fiscal Years 2011 and 2012 in the North Coast Planning Province, Oregon, that are Not Likely to Adversely Affect (NLAA) Northern Spotted Owl and Marbled Murrelets and Their Critical Habitats, April 13, 2010 (page 101).
- Black, S.H. 2005. Logging to Control Insects: The Science and Myths Behind Managing Forest Insect "Pests". A Synthesis of Independently Reviewed Research. The Xerces Society for Invertebrate Conservation, Portland, Oregon.
- Schowater, T.D. 1990. Consequences of insects. In *Syposium Proceedings. Forests—Wild and Managed: Differences and Consequences.* January 19-20, 1990. Pp. 91-106. University of British Columbia, Vancouver, BC.

- Aber, J., N. Christensen, I. Fernandez, J. Franklin, L. Hidinger, M. Hunter, J. MacMahan, D. Mladenoff, J. Pastor, D. Perry, R. Slangen, and H. van Miegroet. 2000. Applying ecological principles to management of U.S. national forests. *Issues in Ecology* No. 6. Ecological Society of America, Washington, D.C.
- Franklin, J.F., D.A. Perry, T.D. Schowater, M.E. Harmon, A. McKee, and T.A. Spies. 1989. Importance of ecological diversity in maintaining long-term site productivity. In *Maintaining the Long-Term Productivity of Pacific Northwest Forest Ecosystems*, ed. By D.A. Perry, pp 82-97. Timber Press, Portland Or.
- Schowater, T.D. 1995. Canopy arthropod communities in relation to forest age and alternative harvest practices in western Oregon. *Forest Ecology and Management* 78: 115-25.
- Colombaroli, D.C. and D.G. Gavin. 2010. Highly Episodic Fire and Erosion Regime Over the Past 2,000 Years in Siskiyou Mountains, Oregon. PNAS, 107 (2010), pp. 18909-18915.
- Odion, D.C., E.J. Frost, J.R. Strittholt, H. Jiang, D.A. DellaSala and M.A. Moritz. 2004. Patterns of fire severity and forest conditions in the western Klamath Mountains, California. Conservation Biology 18(4): 927-936.

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.

- Timber harvest activities, including road construction, timber yarding and hauling, could increase soil compaction, increased sediment and displacement, reduce site productivity, and alter hydrologic flow, including peak flow and low flow.

- There could be short-term increases in sediment from roadbed and drainage ditch disturbance associated with road maintenance activities.

- Some expressed concerns regarding the potential presence of fragile soils in existing roadbeds in the project area and their possible contribution of sediments to the watershed.

- Concerns have been expressed 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.
- Appropriate harvesting systems, operations costs, road maintenance and the potential for winter hauling should be considered to achieve an economically viable sale.
- 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.
- Course woody material densities need to be consistent with the project RMPs and RODs and should support the natural range of biota within the project area.
- The project is entirely located in the Wildland-Urban Interface (WUI), and as such, should be designed to include appropriate hazard fuels reduction throughout project implementation.

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.

Current condition of nearby LSRs: Commenters raised the question: "What is the current condition of the nearby LSRs? Are they functioning?"

Rationale for eliminating from detailed analysis: There are no mapped Late-Successional Reserves (LSRs) with inclusions in the Bear Creek or Little Applegate River Watersheds. Because the Sterling Sweeper Forest Management Project does not affect any LSRs, NEPA does not require an analysis or discussion of the specific conditions of these LSRs as part of the Project EA. The role of LSRs, as identified under the Northwest Forest Plan, is to provide for the maintenance and enhancement of a well-distributed network of late-successional forests to provide habitat for populations of species associated with late-successional and old-growth forests (NWFP p. B-5; RMP p. 32 and Appendix A). The Northwest Forest Plan EIS (FSEIS) recognized that late-successional reserves are composed of a variety of vegetation classes; under Alternative 9 of the FSEIS (adopted and incorporated by the Medford District 1995 RMP), 42 percent of LSRs were covered by late-successional forests (FSEIS pp. 3- and 4-39). The ability of these reserves to meet the objectives of the Northwest Forest Plan was analyzed and disclosed in the *Final Supplemental Environmental Impact Statement on Management of Habitat for Late-Successional and Old-Growth Forest Related Species Within the Range of the Northern Spotted Owl*.

Analysis of LSRs has taken place at broader scales, and is beyond the scope of analysis contained in this EA.

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 Sterling Sweeper Project

Area. About 54 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 C 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 no pre-commercial thinning or activity fuels treatments. 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. The Action Alternatives

This section describes the two action alternatives considered in detail, including silvicultural and fuels objectives and prescriptions common to all action alternatives. The narrative summary of each alternative is followed by a table of harvest units, a road use table, and a table detailing proposed new road construction. The tables of harvest units provide the following information for each unit: unit number, acreage, harvest prescription, harvest method, and associated fuels or pre-commercial thinning treatments. The road use and road construction tables provide details for project roads (existing or proposed) by road number, approximate length, surface type, and seasonal restrictions. Project design features (PDFs) are described in further detail under Section C.1 (Components Common to the Action Alternatives).

Silvicultural Objectives and Prescriptions

The silvicultural objectives for harvest are as follows: 1) Reduce stand density to increase tree health, growth, and vigor of the residual trees; 2) Create structural diversity (height, age, and diameter classes) and old-growth stand characteristics; 3) Increase growing space and decrease competition for large or legacy pine, oak, and cedar (preserve existing genotypes which are physiologically better adapted to fire disturbance); 4) maintain existing nesting, roosting, and foraging owl habitat within forest stands in specific units (Tables 2-2 and 2-7).

Trees would be marked for treatment within proposed sale 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.

Selective Thinning (ST):

Maintain Northern Spotted Owl Nesting, Roosting, Foraging Habitat (NRF)

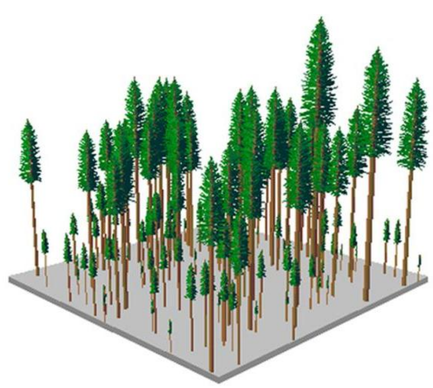
Forest stands that are currently providing for northern spotted owl nesting, roosting, and foraging habitat would be thinned to maintain, and in some cases promote, NRF habitat function. The complex forest structure that forms NRF habitat consists of dead down wood, snags, dense canopy, multi-storied 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. The silvicultural strategy here includes the use of selective thinning.

Selective thinning of NRF habitat is designed to thin low-vigor trees across all diameter classes to accelerate the growth the retained trees while maintaining a minimum of 60 percent canopy cover at the stand level. Canopy cover is the proportion of the forest floor covered by the vertical projection of tree crowns (Figure 2-1). Canopy cover is usually estimated with devices like the moosehorn, aerial photography, or remote imagery.

Figure 2-1. Photographs illustrating >60% canopy cover (on left) and about 40% canopy cover (on right).

Spacing of the residual (leave) trees would involve crown spacing of the healthiest dominant and co-dominant trees to achieve an average crown spacing range of 1-6 feet (dripline to dripline) at the stand level. Trees targeted for removal should include those with crown ratios less than 30 percent, exhibit crown decline, narrow crown widths, and contribute least to the canopy layer. Trees would be individually selected for removal that demonstrate these characteristics, unless it compromises the required minimum canopy cover of 60 percent. Spacing of the residual trees would use the crown widths of the healthiest dominant and co-dominant trees to achieve an average relative density range of 0.29-0.40 (29-40 percent) (Figure 2-2).

Figure 2-2. Selection Thinning: the target stand structure contains the healthiest trees of all species and diameter classes.



This would reduce the number of trees per acre toward levels that the site has water and nutrients to sustain. Relative density is the ratio of actual stand density to the maximum stand density attainable in a stand with the same mean tree volume.

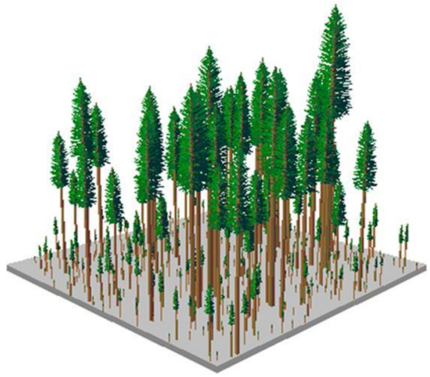
Selective Thinning (ST): Maintain Northern Spotted Owl Dispersal Habitat (DSP)
Selected forest stands that are currently providing for northern spotted owl dispersal-only habitat would be thinned to retain approximately 40 percent canopy cover to maintain the current distribution of dispersal habitat. Dispersal habitat is described as forested habitat greater than 40 years old with an average tree diameter of 11 inches, a canopy cover of about 40 percent or more, and flying space for owls in the understory.

Stands in dispersal habitat that meet the above criteria would be selectively thinned to accelerate the growth of large trees while maintaining approximately 40 percent canopy cover at the stand level. Spacing of the residual (leave) trees would involve crown spacing of the healthiest dominant and co-dominant trees to achieve an average crown spacing range of 3-15 feet (dripline to dripline) at the stand level. Trees targeted for removal should include those with crown ratios less than 30 percent, exhibit crown decline, narrow crown widths, and contribute least to the canopy layer. Trees would be individually selected for removal that demonstrate these characteristics, unless it compromises the required minimum canopy cover of 40 percent. Spacing of the residual trees would use the crown widths of the healthiest dominant and co-dominant trees to achieve an average relative density range of 0.25 to 0.35 (25 to 35 percent) (See Figure 2-2). With the reduction in relative density, the annual mortality rate will decline, and there will be an increase in tree growth of the residual leave trees (approximately 5 to 10 years) once their root systems expand with the new growing space and they utilize available water and nutrients.

Density Management (DM): Maintain Northern Spotted Owl Dispersal Habitat (DSP)
The primary objective of thinning in units identified for density management is to improve tree vigor and growth for long-term forest production and to reduce the impacts of forest disease while maintaining at least 40 percent canopy cover. Silvicultural prescriptions are based on site conditions that dictate forest types such as pine site, dry Douglas-fir, and mixed conifer. The silvicultural strategy here includes the use of density management.

This prescription is typically prescribed for uneven-aged stands for the primary purpose of widening the spacing of residual trees in order to promote the growth and structural development of the remaining stand. Many of these stands developed in conjunction with disturbance (fire, insects, harvest, etc.), and have several canopy layers containing multiple species.
Spacing of the residual trees would use the basal area of the healthiest dominant and co-dominant trees to achieve an average relative density of 0.25 to 0.35 (25 to 35 percent) (Figure 2-3).

Figure 2-3. Density Management: the target stand structure has reduced density levels. Remaining trees will have crown ratios greater than 30 percent and will be the larger and better formed trees. Ponderosa pine, sugar pine, incense cedar, and Douglas-fir will make up the preferred leave species.



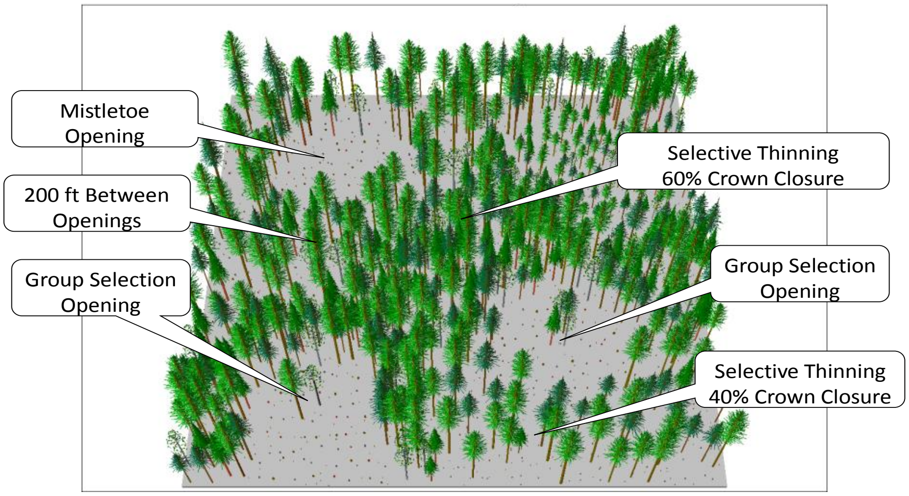
Basal area is the cross-sectional area of all stems (measured at dbh) per unit of measure. This silvicultural treatment would generally result in stands with fewer, but larger, trees with increased growth rates. Tree crowns would increase in size and photosynthetic area, increasing tree health and survivability.

Group Selection (GS):

The principal purpose for group selection treatment is to create structural diversity among stands that have a monoculture appearance or a one-layer overstory. Residual trees will have improved health, vigor, and growth from the added growing space, water, and nutrients that they receive. Group selection will create small openings, allowing regeneration establishment and release, will preserve legacy trees within the stand, and remove diseased trees. Approximately 20 pecent of the acreage in group selection units will be treated.

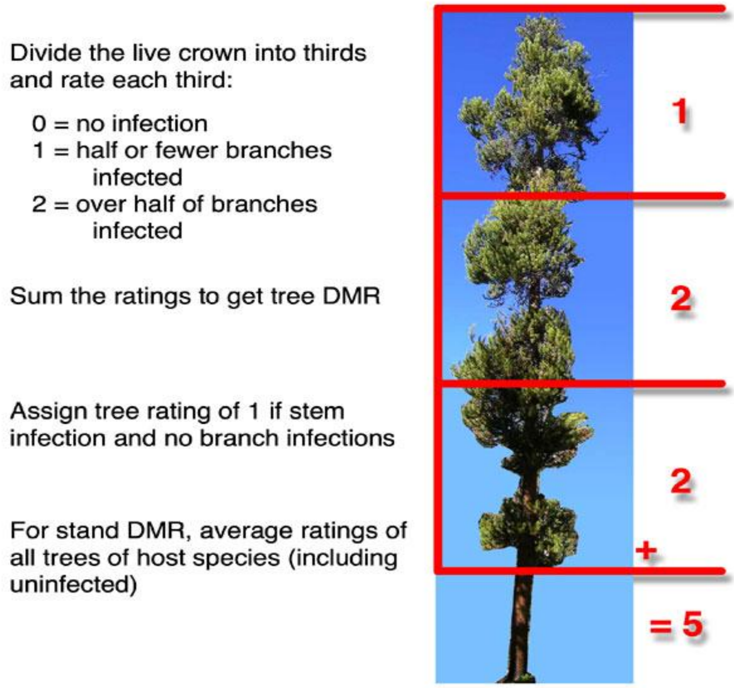
Where dominant legacy candidate ponderosa pine, sugar pine, incense cedar, and Douglas-fir (≥ 18 inches DBH) are encountered, removal of the codominant, intermediate, and suppressed conifers from below the dominant legacy trees would occur. Creation of ¼ -acre openings (59 foot radius or 118 foot diameter) and no more than ½ -acre openings(83 foot radius or 168 foot diameter) in size would be formed for preservation of pines that demonstrate old-growth characteristics. Legacy candidate species would be centered in the ¼ -½-acre circular openings but will vary in shape depending on site conditions and unique stand features (Figure 2-4).

Figure 2-4. Group Selection: creates structural diversity among stands that have a one-layered overstory by creating small openings for regeneration release and establishment.



Group selection will also occur in stands that have pockets of Douglas-fir that are infected with dwarf mitstletoe. Removal of infected Douglas-fir trees will create small openings between ¼- ½ acre in size. The openings formed will vary in shape to capture the diseased trees. Because dwarf mistletoe seeds spread downhill, where high concentrations of mistletoe are found, group openings will be created beginning on the uphill edge of heavily infested areas, and then extend downhill. Where mistletoe is encountered, heavily infected trees will be targeted for removal first (DMR 3-6, see Figure 2-5), focusing on leaving resistant species such as ponderosa pine, sugar pine, and incense cedar, followed by uninfected (or the least infected) Douglas-fir trees with infections that are confined to the lower-third of the tree (DMR 1-2, see Figure 2-5). Removal of dwarf mistletoe-infected Douglas-fir will increase stand health and minimize disease spread to healthy conifers.

Figure 2-5. Douglas-fir Dwarf Mistletoe Rating (DMR) System



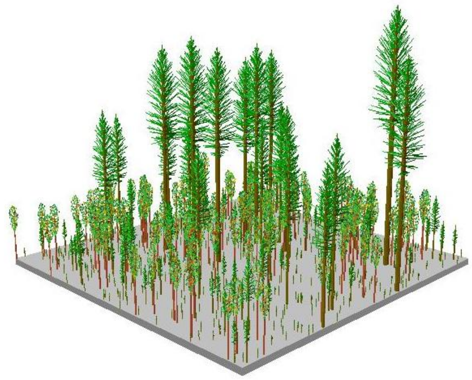
Source: The American Phytopathological Society, 2006

<u>Disease Sanitation (DS):</u>

Forested stands that are heavily infected with Douglas-fir dwarf mistletoe (DMR 3-6, see Figure 2-5) are candidates for disease sanitation. The stands selected for treatment will have infected Douglas-fir removed of various size classes to minimize infection that is likely to spread to other codominant or intermediate trees. Resistant species such as ponderosa pine, sugar pine, and incense cedar will be retained throughout the stands where mistletoe removal occurs. Healthy Douglas-fir that appear resistant to the infection will be retained as residual trees, as well. A minimum of 6 to 8 trees (20 inch dbh or greater) per acre will remain. Removal of dwarf mistletoe-infected Douglas-fir will increase stand health and minimize disease spread to healthy conifers. In forest stands identified for disease sanitation, trees will be designated and reserved to meet the coarse woody debris requirements of 120 linear feet of logs per acre that are greater than or equal to 16 inches in diameter and 16 feet long, with decay classes of 1 or 2.

A second phase of the disease sanitation will take place shortly after the initial treatment, a pre-commercial thin (PCT). These stands have well- stocked understories that are susceptible to infection. Infected regeneration will be removed from the stand by thinning the understory so as not to infect healthy trees (Figure 2-6). The regeneration thinning of infected trees will favor retaining resistant species such as ponderosa pine, sugar pine, and incense cedar.

Figure 2-6. Disease Sanitation: retains healthy Douglas-fir and those species resistant to dwarf mistletoe. A minimum of 6-8 trees (≥20 inch dbh) per acre will remain.



General Guidance Applicable to all Silvicultural Prescriptions

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 as prescribed to meet wildlife objectives (see below and Project Design Features, Provide Wildlife Trees & Habitat for Cavity Dependent Species).

Do not harvest 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 may be 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.

To encourage the maintenance and establishment of fire resilient species, favor leaving sugar pine, ponderosa pine, incense cedar, Douglas-fir, and white fir, respectively.

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

Strive to retain snags of various size and decay classes. Favor large, deformed or unique green trees in the stand for future snag recruitment. When available, leave green trees (any diameter) immediately adjacent to snags that are greater than 20 inches DBH. These trees would provide additional structural and habitat diversity.

When available, leave green trees (any diameter) immediately surrounding large (greater than 20 inches DBH and 8 feet in length) pieces of coarse woody debris. Retention of green trees would minimize coarse woody debris disturbance and maintain the functional integrity of the coarse woody debris.

Do not mark large hardwoods >16 inches DBH for cut. Leave large hardwoods for stand diversity. Do not mark a conifer with its crown entangled in a hardwood tree.

Thin around large (>20” dbh) and old-growth pine, oak and cedar trees. Protect these tree species by increasing growing space and decreasing competition around these trees. Mark all competing conifers around the leave or center tree twice the distance of the trees dripline (distance from tree bole to dripline).

Leave all trees in a group if they exhibit old-growth characteristics. Trees that exhibit old-growth characteristics should be preferred over tree size when selecting an individual or group to protect. Trees that are associated with old-growth trees and create a unique type of stand structure or wildlife habitat would not be marked.

Where mistletoe is encountered, target heavily infected trees for removal first, 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 2-5). Dwarf mistletoe-infected trees may be marked for treatment if prescribed canopy cover retention for the stand is not compromised.

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.

Post-Harvest 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 as stand-alone treatments or in combination. Post-harvest evaluations would determine the extent and method of treatments needed (hand pile and burning, and/or underburning).

a. Alternative 2

Alternative 2, the Proposed Action, was developed to achieve the objectives described in Chapter 1, for the Sterling Sweeper Forest Management Project. The Proposed Action would treat 379 acres of vegetation using the various silvicultural prescriptions as described on pages 2-1 through 2-7. Post-harvest fuels reduction (activity fuels) would occur in commercial treatment units as described on page 2-7.

Table 2-1 summarizes the project by silvicultural treatment prescriptions and timber harvest methods. Unit specific information, including fuels reduction treatments are displayed in Table 2-2 and Maps 2-2, 2-2, 2-4 and 2-5.

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

Silvicultural Prescriptions	Est. Acres
Selective Thinning – Maintain NSO Nesting Roosting, and Foraging	10
Density Management – Maintain NSO Dispersal Habitat	73
Group Selection	229
Disease Sanitation	56
Selective Thinning—NSO Capable and Dispersal	9
Cable Corridors	1
Total Acres	**379**
Timber Harvest Method	**Est. Acres**
Cable Yarding	341
Tractor Yarding	36
Fall to Road	2

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

Unit No.	Silvicultural Prescription	Owl Habitat Type (Habitat Rx)	Harvest Method	Associated Treatments	Acres
30-1	Select Thin	Capable	Cable	Activity fuels	4
30-2	Select Thin	Dispersal	Cable	Activity fuels	5
23-1	Density Management (M)	Dispersal (M)	Cable (rd)	Activity fuels	40
23-2	Density Management (M)	Dispersal (M)	Tractor	Activity fuels	8
27-1	Density Management (M)	Dispersal (M)	Tractor	Activity fuels	11
27-14	Density Management (M)	Dispersal (M)	Tractor	Activity fuels	14
27-7	Group Select (M)	Dispersal	Cable	Activity fuels	14
34-1	Group Select (M)	Dispersal	Cable	Activity fuels	16
34-13	Group Select (M)	Dispersal	Cable	Activity fuels	22
34-15	Group Select (M)	Dispersal	Cable	Activity fuels	29
34-25	Group Select (M)	Dispersal	Cable	Activity fuels	25
34-4A	Group Select (M)	Dispersal	Cable	Activity fuels	9
34-4B	Group Select	Capable	Cable	Activity fuels	2
34-4C	Cable Corridors	Capable	Cable	Activity fuels	1
34-7	Group Select (M)	Dispersal	Cable	Activity fuels	3
34-8	Group Select (M)	Dispersal	Fall2road	Activity fuels	2
34-9A	Group Select (M)	Dispersal	Cable	Activity fuels	5
34-9B	Group Select (M)	Dispersal	Cable	Activity fuels	4
1-2	Disease/sanitation	Capable	Tractor	PCT, Activity fuels	3
3-11	Group Select (M)	Dispersal	Cable	Activity fuels	22
3-18	Group Select (M)	Dispersal	Cable	Activity fuels	5
3-19	Group Select (M)	Dispersal	Cable (spur)	Activity fuels	9
9-1	Group Select (M)	Dispersal	Cable	Activity fuels	21

Unit No.	Silvicultural Prescription	Owl Habitat Type (Habitat Rx)	Harvest Method	Associated Treatments	Acres
9-2	Group Select (M)	Dispersal	Cable	Activity fuels	3
9-3	Group Select	Capable	Cable	Activity fuels	27
1-1A	Select Thin (M)	NRF (M)	Cable	Activity fuels	4
1-1B	Disease/sanitation	Capable	Cable	PCT, Activity fuels	24
1-1C	Disease/sanitation (M)	Dispersal	Cable	PCT, Activity fuels	1
1-1D	Select Thin (M)	NRF (M)	Cable	Activity fuels	4
1-1E	Disease/sanitation	Capable	Cable	PCT, Activity fuels	16
1-1F	Select Thin (M)	NRF (M)	Cable	Activity fuels	2
1-1G	Disease/sanitation (M)	Dispersal	Cable	PCT, Activity fuels	12
14-1	Group Select (M)	Dispersal	Cable	Activity fuels	10
TOTAL					**379**

Abbreviations: M=Maintain
NRF=Nesting, Roosting, Foraging
PCT=Pre-Commercial Thin

Under Alternative 2, construction of approximately 0.41 miles of new road would provide access to proposed Units 23-1 and 23-2, with a barricade (e.g. trench, boulders, etc.) installed at the close of project activity (at boundary between privately- and BLM-administered lands). Access via newly-constructed or improved roads into units in Section 23 (roads 38-2W-23.01A, -23.01B and -23.02 is through private property and a privately-administered locked gate, which also functions as a closure device.

Road improvements on 0.36 miles of existing road would also occur to provide access to these units, and would consist of drainage improvement and soil stabilization. At the close of project activities, a barricade would be constructed at the beginning of road 38-1W-30.00 to prevent unauthorized use.

An estimated 42 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, grading and shaping road surfaces. Table 2-3 provides a detailed road-by-road listing of proposed road work. Table 2-4 provides information on proposed new road construction that would occur under Alternative 2.

Table 2-3. Proposed Haul Routes on Existing Roads in the Sterling Sweeper Project Area

Road Number	Approximate Length (miles)	Existing Surface:	Control	Possible Road Stabilization or Drainage Improvements	Seasonal Restriction
		Depth (inches) and Type			(for log hauling)
38-1W-30.00	0.21	NAT	BLM	Brush/Blade Widen for Truck Traffic	1
38-2W-23.00 A	0.45	ASC	PVT	3	1
38-2W-23.00 B	0.15	NAT	PVT	3	1
38-2W-23.01 A	0.10	NAT	PVT	Widen Road, Convert to Full-Bench	1
38-2W-24.00 A	0.96	BST	BLM	3	0
38-2W-24.00 B1	0.83	BST	BLM	3	0
38-2W-24.00 B2	0.29	BST	BLM	3	0
38-2W-24.00 C	1.90	BST	BLM	3	0
38-2W-24.00 D	1.20	ASC	BLM	3	1
38-2W-24.00 E	1.90	ASC	BLM	3	1
38-2W-24.00 F	1.22	ASC	BLM	3	1
38-2W-25.00 A1	0.59	ASC	BLM	3	1
38-2W-25.00 A2	0.14	ASC	BLM	3	1
38-2W-25.00 B	0.63	PRR	PVT	3	1
38-2W-25.04 A	0.32	NAT	PVT	3	1
38-2W-25.04 B	0.07	NAT	PVT	3	1
38-2W-26.00 A	2.00	ASC	BLM	3	1

Road Number	Approximate Length (miles)	Existing Surface: Depth (inches) and Type	Control	Possible Road Stabilization or Drainage Improvements	Seasonal Restriction (for log hauling)
38-2W-26.00 B	1.80	ASC	BLM	3	1
38-2W-26.00 C	1.84	ASC	BLM	3	1
38-2W-26.01 A	1.14	ASC	BLM	3	1
38-2W-26.01 B1	0.90	ASC	BLM	3	1
38-2W-26.01 B2	0.76	ASC	BLM	3	1
38-2W-26.01 C	1.50	ASC	BLM	3	1
38-2W-27.01 A	0.44	ASC	BLM	3	1
38-2W-27.01 B	0.50	ASC	NKN	3	1
38-2W-27.02	1.11	ASC	BLM	3	1
38-2W-35.01	1.29	ASC	BLM	3	1
38-2W-35.02	0.57	ASC	BLM	3	1
39-2W-01.00 A1	1.01	NAT	BLM	3	1
39-2W-01.00 A2	0.29	NAT	BLM	3	1
39-2W-08.00 A1	0.28	BST	BLM	3	0
39-2W-08.00 A2	2.47	ASC	BLM	3	1
39-2W-08.00 A3	1.14	ASC	BLM	3	1
39-2W-08.00 B	3.25	ASC	BLM	3	1
39-2W-08.00 C1	0.66	ASC	BLM	3	1
39-2W-08.00 C2	0.95	ASC	BLM	3	1
39-2W-09.00 A1	0.61	NAT	BLM	3	1
39-2W-12.00 A	1.52	ASC	BLM	3	1
39-2W-12.00 B	2.04	ASC	BLM	3	1
39-2W-16.01	1.05	NAT	PVT	3	1
39-2W-16.02	0.77	NAT	BLM	3	1
39-2W-17.00 A	0.70	ASC	BLM	3	1
39-2W-17.00 B1	0.62	ASC	PVT	3	1
Total mileage	**42.17**				

Abbreviations:

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

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

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

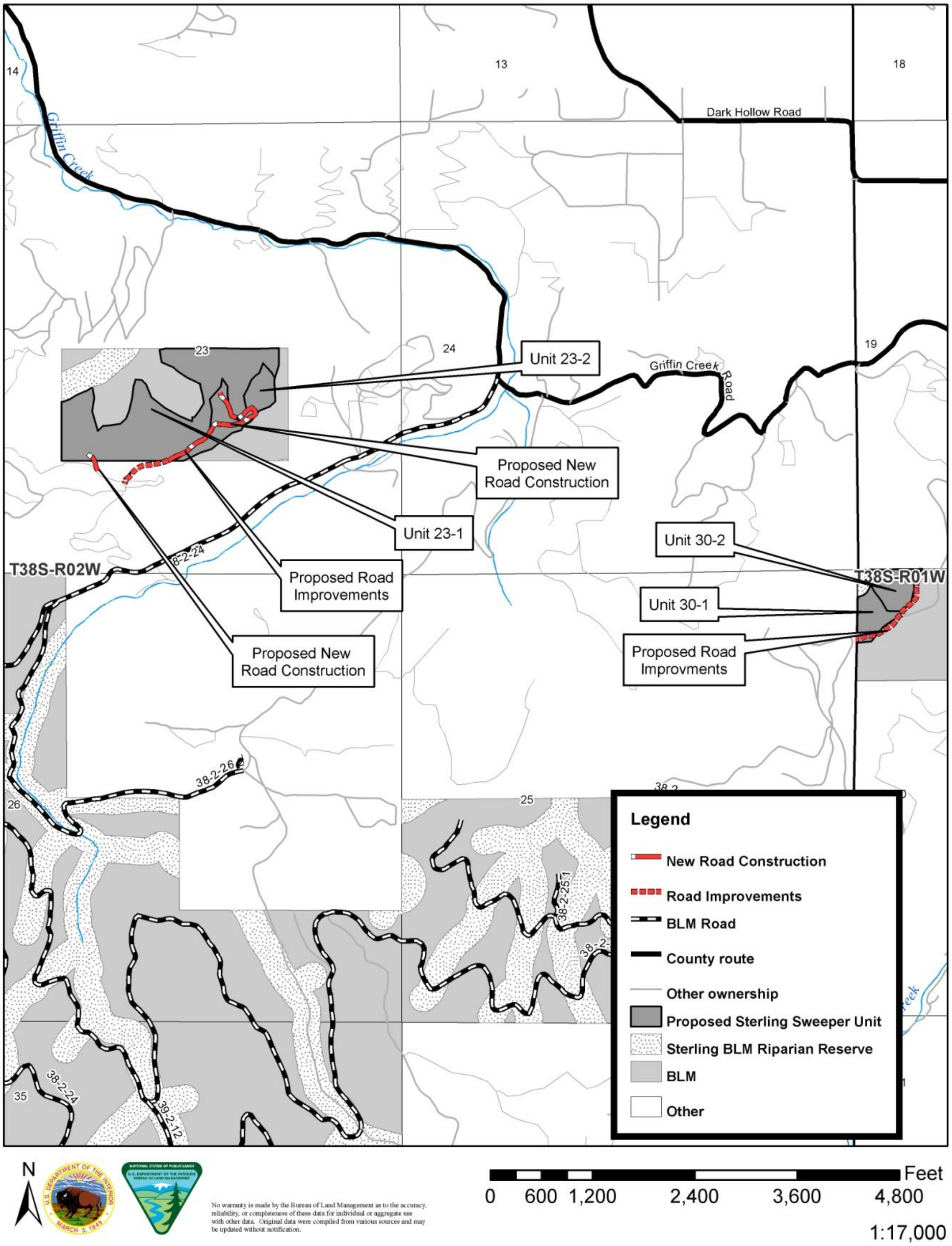
Seasonal Restrictions: (for log hauling) 0=no restrictions
1=hauling restricted between 10/15 and 6/1
Note: If Purchaser furnishes and places additional rock, seasonal restrictions could be modified as approved by the Authorized Officer.

Table 2-4. Proposed New Road Construction Under Alternative 2.

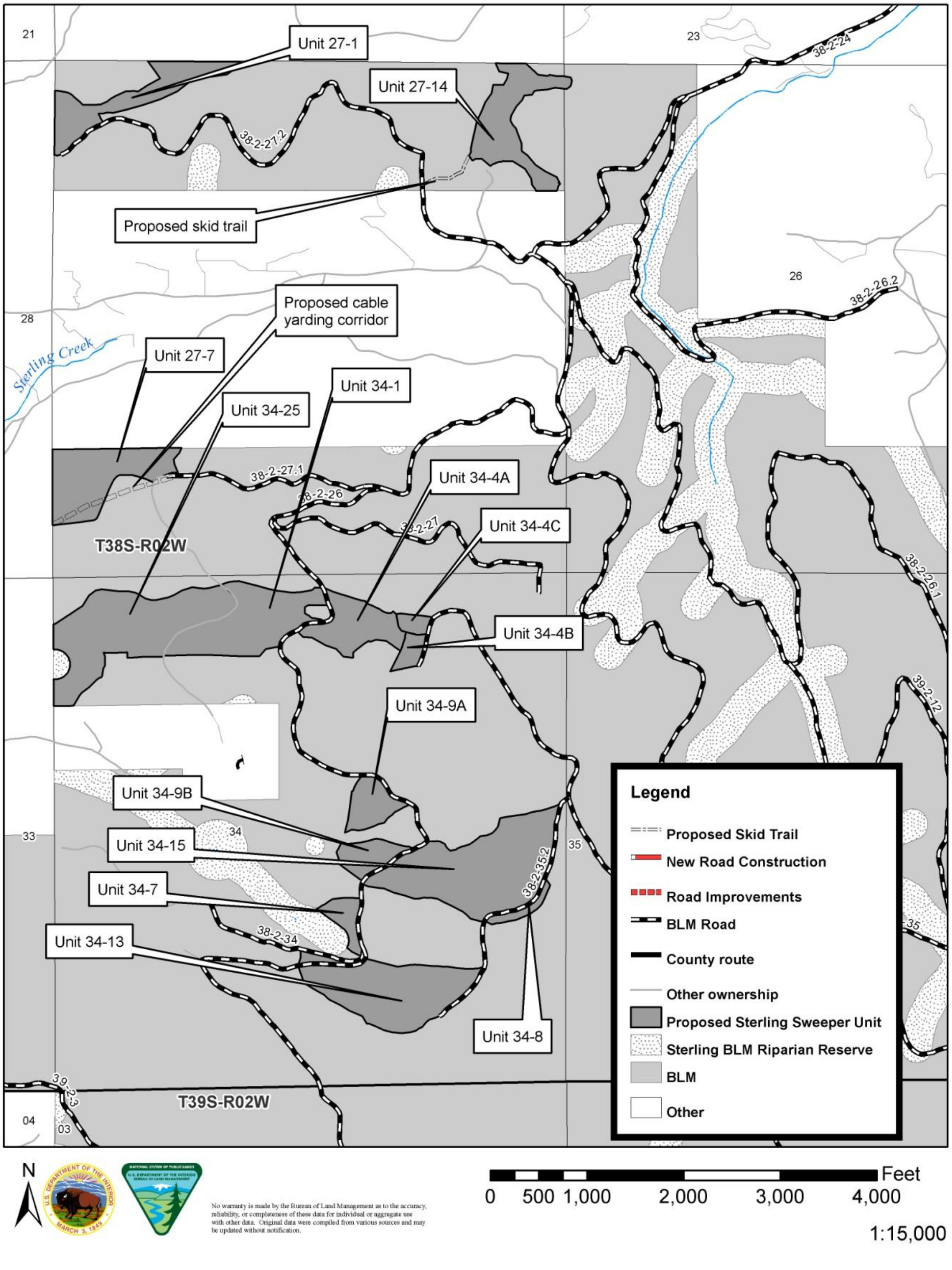
Road Number	Approximate Length (miles)	Existing Surface: Depth (inches) and Type	Control	Closure
38-2W-23.01B	0.36	NAT	BLM	Barricade after use
38-2W-23.02	0.05	NAT	BLM	Barricade after use
Total mileage:	**0.41**			

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

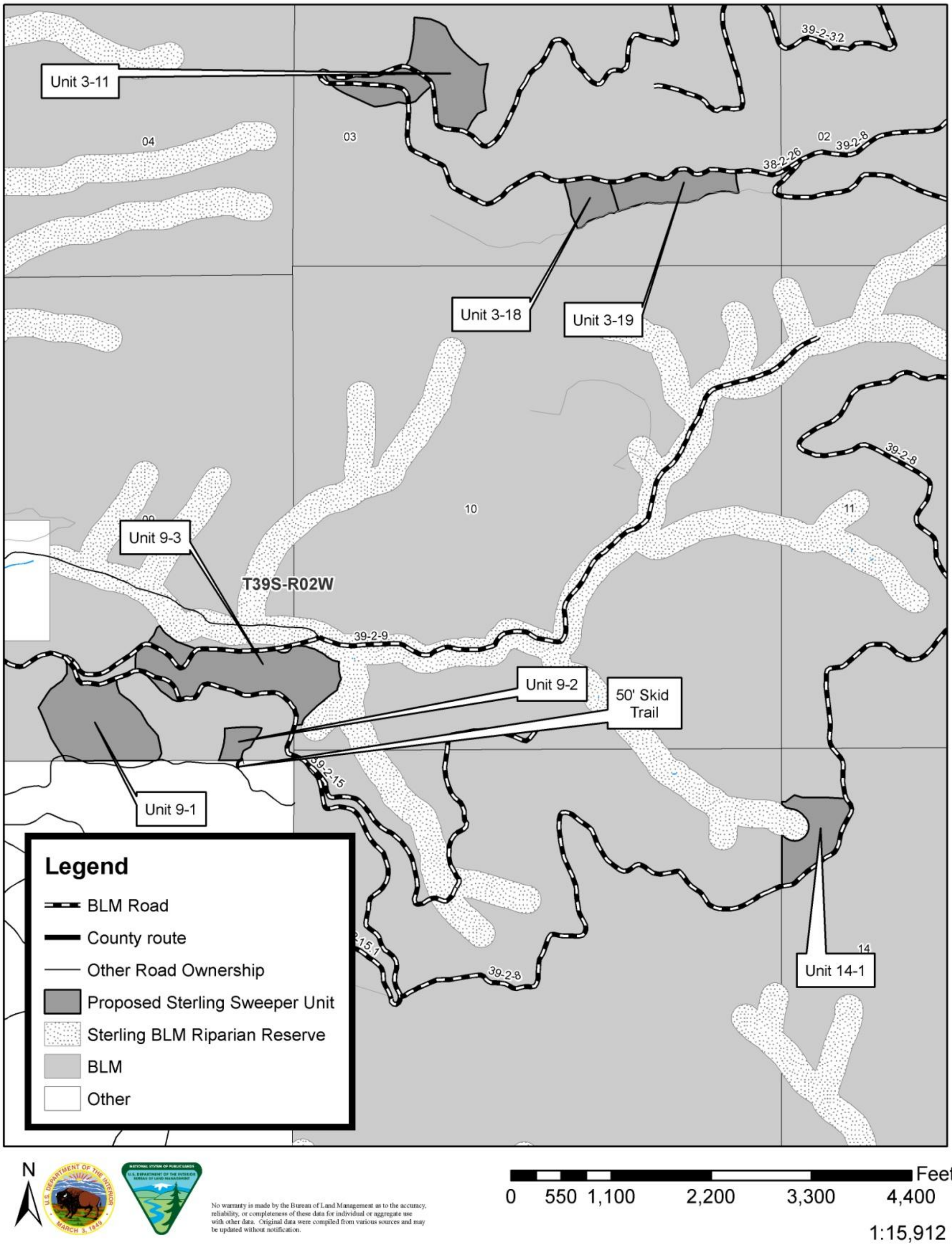
Map 2-1. Sterling Sweeper Project—Alternative 2



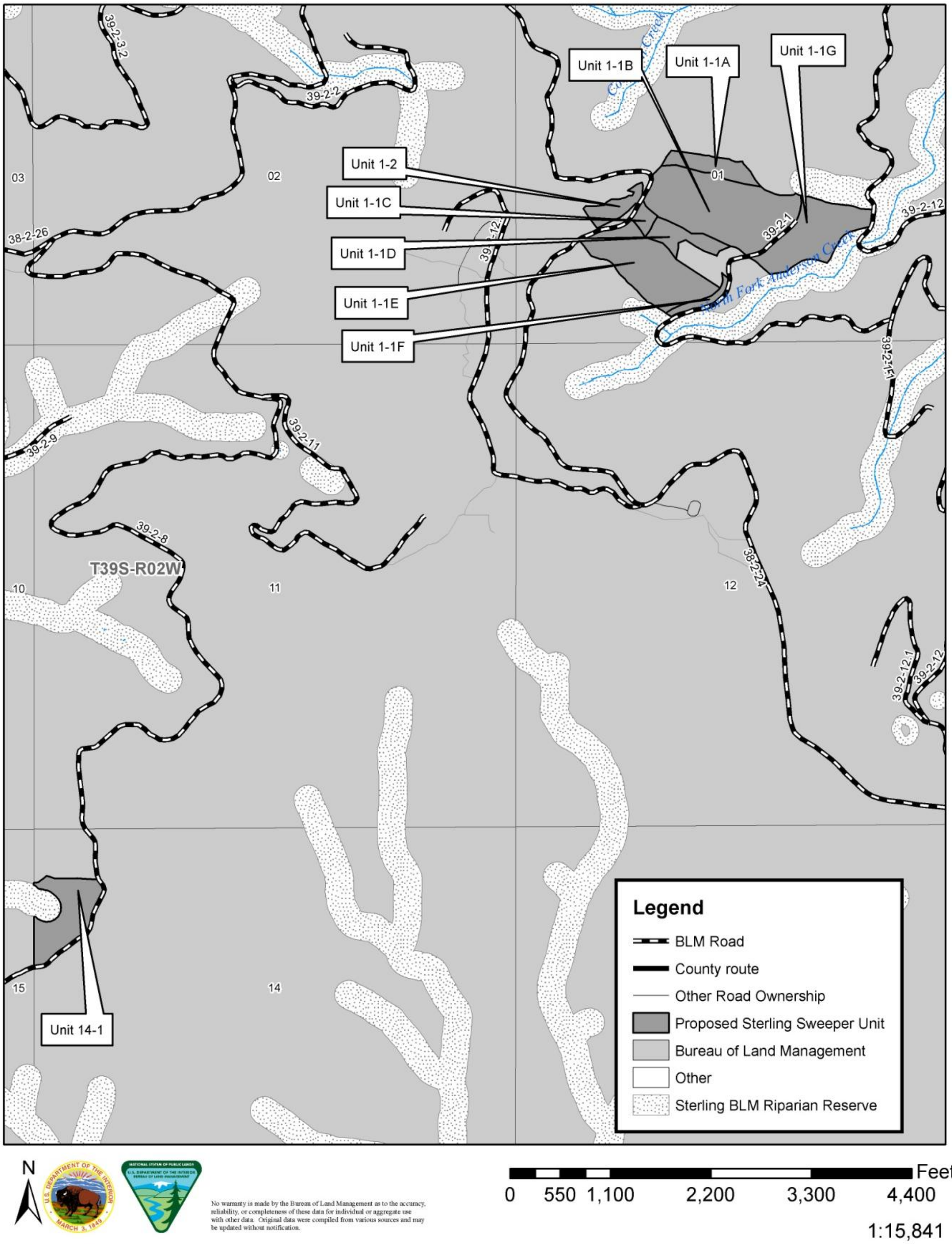
Map 2-2. Sweeper Project—Alternative 2



Map 2-3. Sweeper Project—Alternative 2



Map 2-4. Sweeper Project—Alternative 2



Skid trail

b. Alternative 3

Alternative 3, the No Roads Alternative, was developed to achieve the objectives described in Chapter 1, for the Sterling Sweeper Forest Management Project, while eliminating units that would have required new road construction or extensive drainage and soil stabilization improvements for access. The No Road Alternative would treat 321 acres of vegetation using the various silvicultural prescriptions as described in pages 2-1 through 2-7. Post-harvest fuels reduction would occur in commercial treatment units as described on page 2-7.

Table 2-6 summarizes the project by silvicultural treatment prescriptions and timber harvest methods. Unit specific information, including fuels reduction treatments are displayed in Table 2-7 and Maps 2-6, 2-7 and 2-8.

Table 2-6. Summary of Alternative 3 Acres by Silvicultural Prescription and Harvest Method

Silvicultural Prescriptions	Est. Acres
Selective Thinning – Maintain NSO Nesting Roosting, and Foraging	10
Density Management – Maintain NSO Dispersal Habitat	25
Group Selection	229
Disease Sanitation	56
Cable Corridors	1
Total Acres	**321**
Timber Harvest Method	**Est. Acres**
Cable Yarding	291
Tractor Yarding	28
Fall to Road	2

Table 2-7. Alternative 3 Units by Silvicultural Prescription and Harvest Method

Unit No.	Silvicultural Prescription	Owl Habitat Type (Habitat Rx)	Harvest Method	Associated Treatments	Acres
27-1	Density Management (M)	Dispersal (M)	Tractor	Activity fuels	11
27-14	Density Management (M)	Dispersal (M)	Tractor	Activity fuels	14
27-7	Group Select (M)	Dispersal	Cable	Activity fuels	14
34-1	Group Select (M)	Dispersal	Cable	Activity fuels	16
34-13	Group Select (M)	Dispersal	Cable	Activity fuels	22
34-15	Group Select (M)	Dispersal	Cable	Activity fuels	29
34-25	Group Select (M)	Dispersal	Cable	Activity fuels	25
34-4A	Group Select (M)	Dispersal	Cable	Activity fuels	9
34-4B	Group Select	Capable	Cable	Activity fuels	2
34-4C	Cable Corridors	Capable	Cable	Activity fuels	1
34-7	Group Select	Dispersal	Cable	Activity fuels	3
34-8	Group Select	Dispersal	Fall2road	Activity fuels	2
34-9A	Group Select (M)	Dispersal	Cable	Activity fuels	5
34-9B	Group Select (M)	Dispersal	Cable	Activity fuels	4
1-2	Disease/sanitation	Capable	Tractor	PCT, Activity Fuels	3
3-11	Group Select (M)	Dispersal	Cable	Activity fuels	22
3-18	Group Select (M)	Dispersal	Cable	Activity fuels	5
3-19	Group Select (M)	Dispersal	Cable (spur)	Activity fuels	9
9-1	Group Select (M)	Dispersal	Cable	Activity fuels	21
9-2	Group Select (M)	Dispersal	Cable	Activity fuels	3
9-3	Group Select	Capable	Cable	Activity fuels	27
1-1A	Select Thin (M)	NRF (M)	Cable	Activity fuels	4
1-1B	Disease/sanitation	Capable	Cable	PCT, Activity	24

Unit No.	Silvicultural Prescription	Owl Habitat Type (Habitat Rx)	Harvest Method	Associated Treatments	Acres
				Fuels	
1-1C	Disease/sanitation	Dispersal	Cable	PCT, Activity Fuels	1
1-1D	Select Thin (M)	NRF (M)	Cable	Activity fuels	4
1-1E	Disease/sanitation	Capable	Cable	PCT, Activity Fuels	16
1-1F	Select Thin (M)	NRF (M)	Cable	Activity fuels	2
1-1G	Disease/sanitation	Dispersal	Cable	PCT, Activity Fuels	12
14-1	Group Select (M)	Dispersal	Cable	Activity fuels	10
TOTAL					**321**

Abbreviations: M=Maintain
NRF=Nesting, Roosting, Foraging
PCT=Pre-Commercial Thin

An estimated 36 miles of existing roads would be used as haul routes and improved as needed to meet BLM standards. Road improvements could include such items as spot rocking, cleaning road drainage ditches and culvert basins, repairing and installing water dips, grading and shaping road surfaces. Table 2-8 provides a detailed road-by-road listing of proposed road work. There would be no new road construction, drainage improvements or soil stabilization occurring on existing roads under Alternative 3.

Table 2-8. Proposed Haul Routes on Existing Roads in the Sterling Sweeper Project Area.

Road Number	Approximate Length (miles)	Existing Surface	Control	Possible Improvements	Seasonal Restriction (for log hauling)
38-2W-24.00 A	0.96	BST	BLM	3	0
38-2W-24.00 B1	0.83	BST	BLM	3	0
38-2W-24.00 B2	0.29	BST	BLM	3	0
38-2W-24.00 C	1.90	BST	BLM	3	0
38-2W-24.00 D	1.20	ASC	BLM	3	1
38-2W-24.00 E	1.90	ASC	BLM	3	1
38-2W-24.00 F	1.22	ASC	BLM	3	1
38-2W-26.00 A	2.00	ASC	BLM	3	1
38-2W-26.00 B	1.80	ASC	BLM	3	1
38-2W-26.00 C	1.84	ASC	BLM	3	1
38-2W-27.01 A	0.44	ASC	BLM	3	1
38-2W-27.01 B	0.50	ASC	NKN	3	1
38-2W-27.02	1.11	ASC	BLM	3	1
38-2W-34.00	0.38	ASC	BLM	3	1
38-2W-35.01	1.29	ASC	BLM	3	1
38-2W-35.02	0.57	ASC	BLM	3	1
39-2W-01.00 A1	1.01	NAT	BLM	3	1
39-2W-01.00 A2	0.29	NAT	BLM	3	1
39-2W-08.00 A1	0.28	BST	BLM	3	0
39-2W-08.00 A2	2.47	ASC	BLM	3	1
39-2W-08.00 A3	1.14	ASC	BLM	3	1
39-2W-08.00 B	3.25	ASC	BLM	3	1
39-2W-08.00 C1	0.66	ASC	BLM	3	1
39-2W-08.00 C2	0.95	ASC	BLM	3	1
39-2W-08.00 Spur A	0.34	NAT	BLM	3	1
39-2W-09.00 A1	0.61	NAT	BLM	3	1
39-2W-12.00 A	1.52	ASC	BLM	3	1
39-2W-12.00 B	2.04	ASC	BLM	3	1
39-2W-16.01	1.05	NAT	PVT	3	1

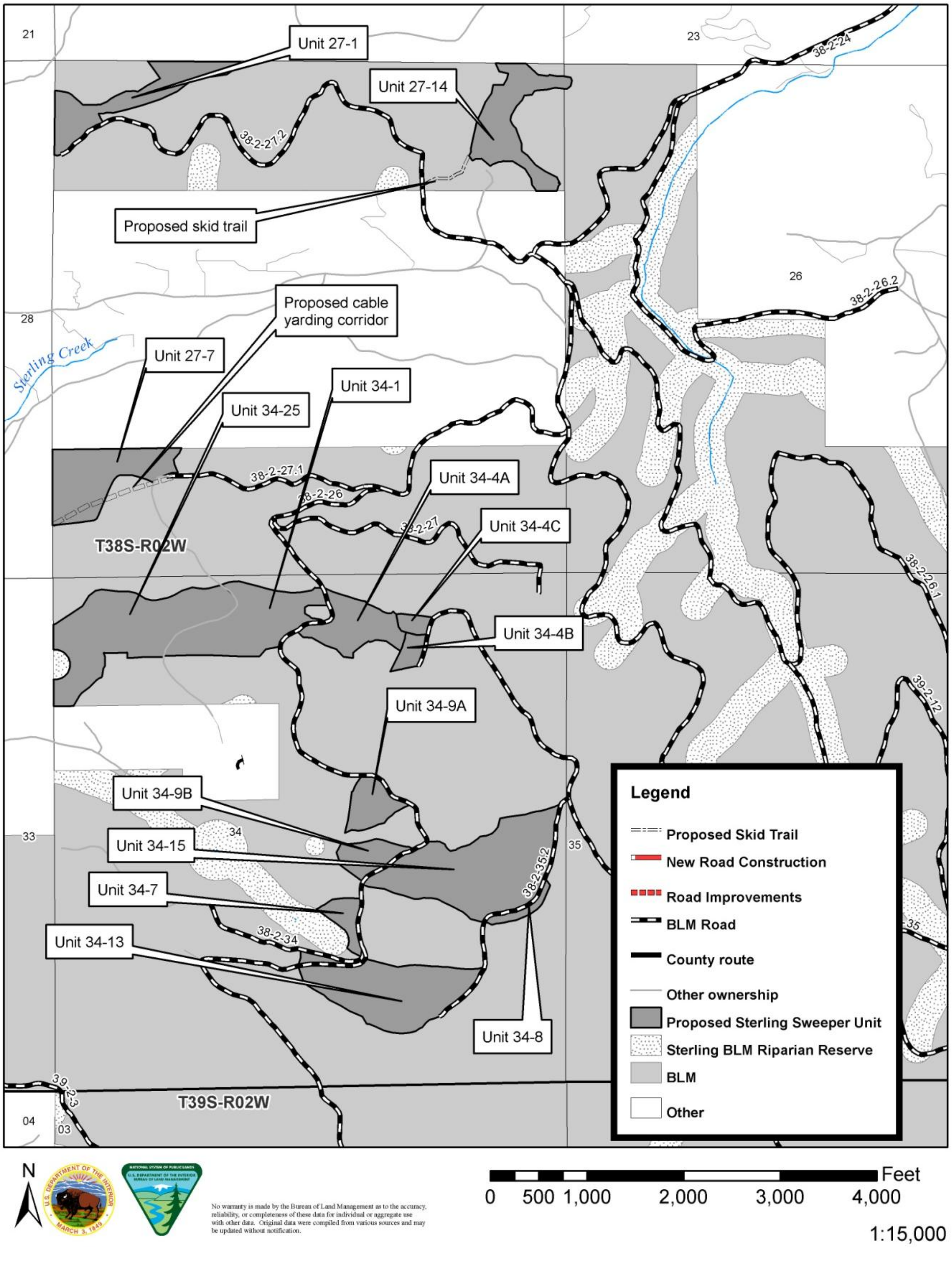
Road Number	Approximate Length (miles)	Existing Surface	Control	Possible Improvements	Seasonal Restriction (for log hauling)
39-2W-16.02	0.77	NAT	BLM	3	1
39-2W-17.00 A	0.70	ASC	BLM	3	1
39-2W-17.00 B1	0.62	ASC	PVT	3	1
Total mileage	**35.93**				

Abbreviations:

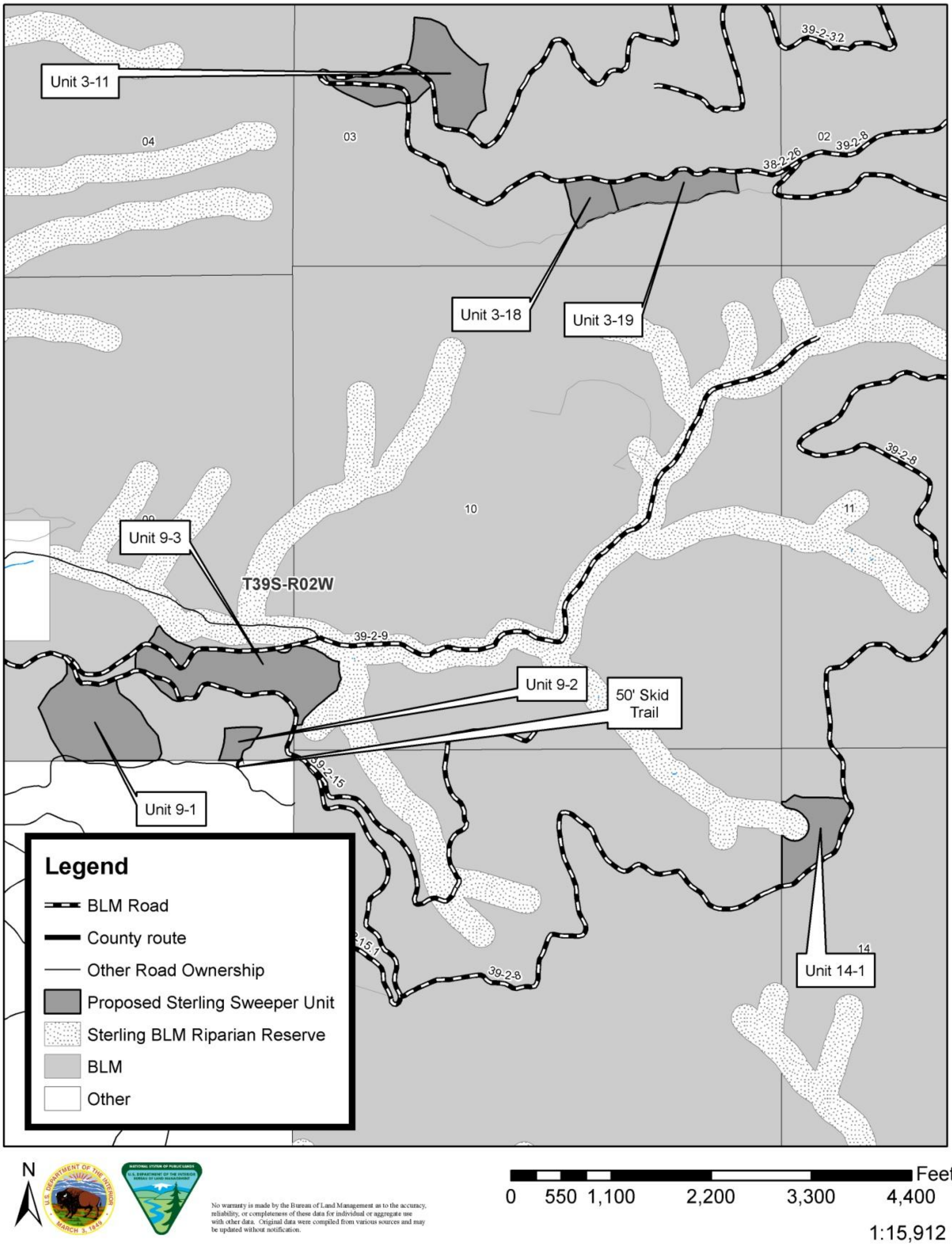
Existing Surface:	NAT=natural; ASC=Aggregate Surface Course; BST=Bituminous Surface Treatment
Control:	BLM=Bureau of Land Management; PVT=Private
Possible Improvements:	3=no road stabilization/drainage improvements. All BLM roads proposed for haul routes would be maintained to BLM-Standards
Seasonal Restrictions:	0=no restrictions
(for log hauling)	1=hauling restricted between 10/15 and 6/1

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

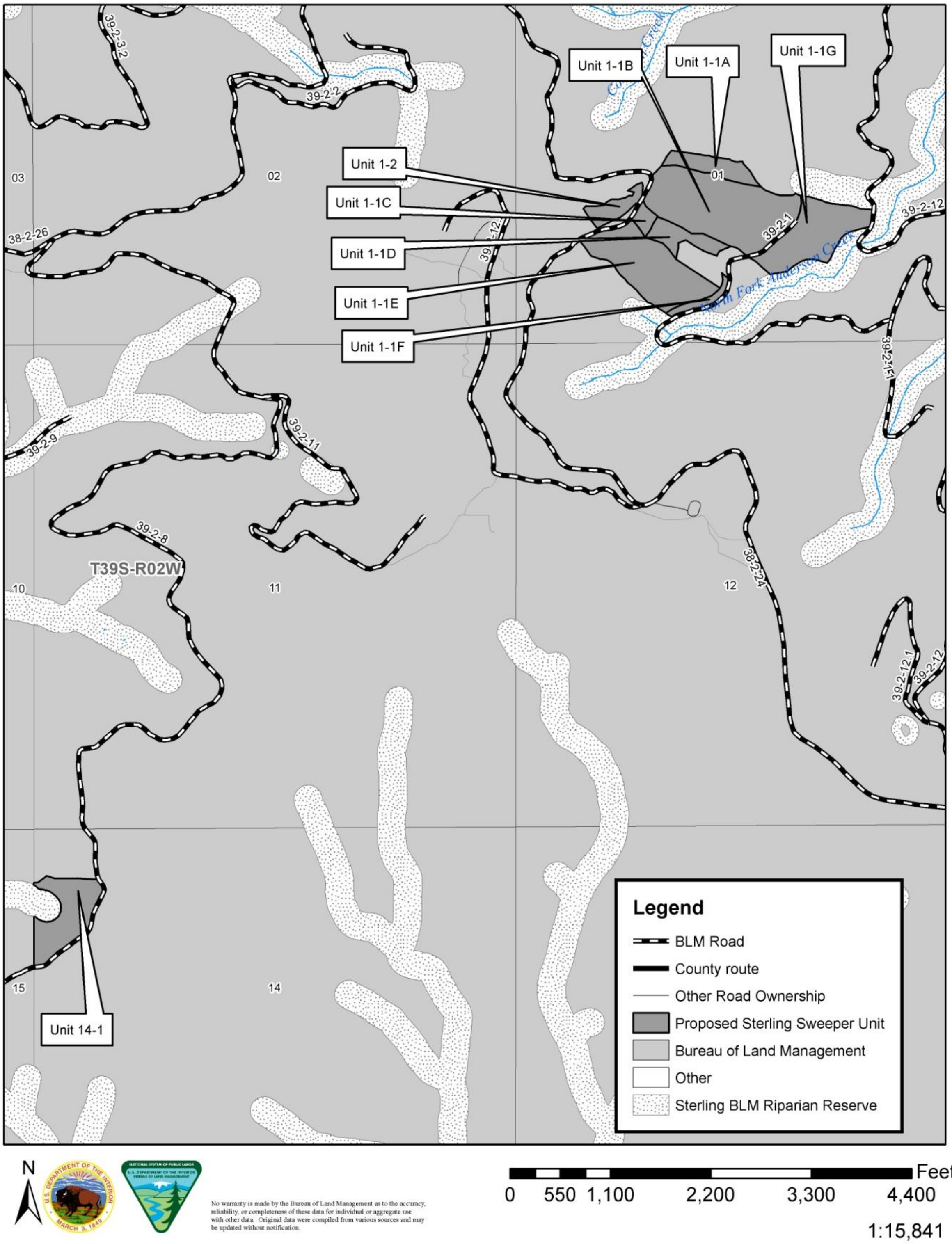
Map 2-6. Sweeper Project—Alternative 3



Map 2-7. Sweeper Project—Alternative 3



Map 2-8. Sweeper Project—Alternative 3



3. Mitigating Measures

Road Construction to Access Northeast Portion of Unit 23-1 (Alternative 2)
To eliminate the construction of a partial-bench, cut-and-fill road segment, the permanent segment of road proposed for construction in T. 38S R. 02W S23 would be shortened by approximately 1000 feet (0.2 mile). A tractor swing system would be used to access portions of the unit that are downslope and beyond the scope of this segment of road, including a 400 foot-long skid trail constructed along the ridgeline (with a slope of approximately 25%) to allow project equipment access to lower, downhill portions of unit 23-1 (Map 2-5). Implementation of this mitigation measure would decrease the length of permanent road construction within the Sterling Sweeper Forest Management Project from 0.41 miles to 0.21 miles total length. The skid trail would be fully-decommissioned at the close of project activity, which would entail ripping, draining, seeding, mulching and scattering project slash. The project landing associated with the skid trail would also be ripped, drained, seeded and mulched with an approved native seed mixture.

Economic Analysis of Proposed Mitigating Measure
To access timber in the northeast and downslope portion of unit 23-1 (approximately 17 acres), three access options were considered: a full-length road, a tractor swing system, and an intermediate support system. Economic analysis was conducted to determine both cost and feasibility of the three options. Both the full-length road and tractor swing are compared here and in Table 2-5; see section E (Actions and Alternatives Considered but Eliminated from Detailed Analysis) for further discussion of the intermediate support system.

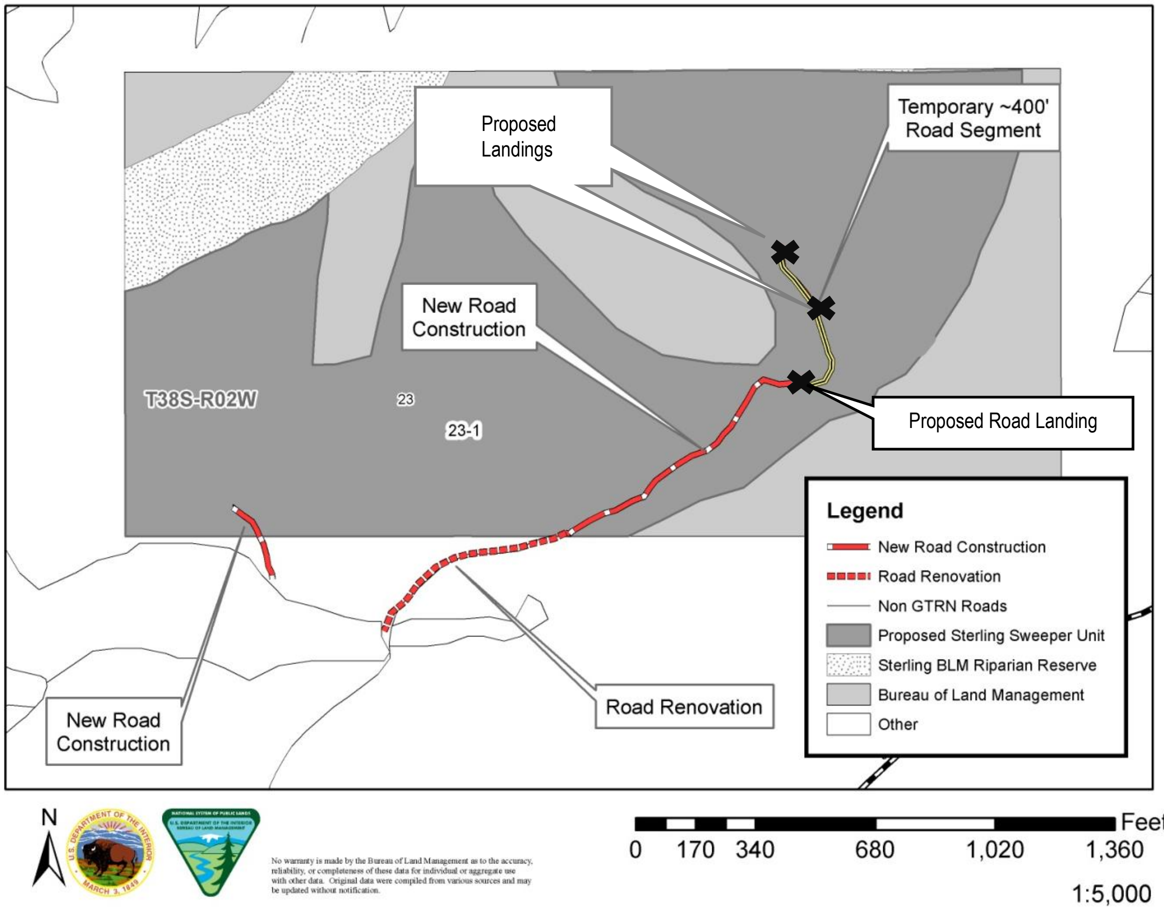
Table 2-5. Comparison of the full-length road tractor swing alternatives for road -23.1.

Option	New Road Construction (ft)	Road Cost	Logging Cost	Total Cost
Full length road (proposed)	2557	$6,053.00	$15,384.00	$21,437.00
Tractor swing (mitigation)	1512	$3,579.00	$19,205.00	$22,784.00

Full-Length Road—proposed
Proposed as permanent road construction under Alternative 2, this option would require that the full-length of proposed road -23.01 be constructed (Map 2-1), including a segment requiring partial-bench, cut-and-fill construction. The estimated total length of road is 2,557 feet. This option would provide access to optimal landings and would be the cheapest option. The cost for road construction and logging is estimated to be $21,437.00.

Tractor Swing—mitigating measure
Tractor swing refers to a logging system in which harvested logs are moved from one landing to another. In this case, logs would be harvested using a skyline system from a yarding position determined to be optimal. From the optimal yarding position, logs would then be moved via a skid trail to a roadside landing located on proposed road 38-2W-23.01B using ground-based equipment (Map 2-5). At each point that a skyline system is used, a level area would need to be constructed to accommodate a yarder. In this particular instance, approximately two areas would need to be developed. The amount of road construction needed under this option is approximately 1512 feet, with an estimated cost for road construction and logging of $22,784.00. Higher predicted logging costs account for the need to tractor yard logs via a tractor swing, which involves adverse haul (uphill) to a landing location accessible by log trucks (Map 2-5).

Map 2-5. Tractor swing system skid trail to access downslope portion of Unit 23-1.



C. COMPONENTS COMMON TO THE ACTION ALTERNATIVES

1. Project Design Features

Project Design Features (PDFs) are an integral part of the Action Alternatives (Alternatives 2 and 3). 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 1995 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) and the *Little Applegate Watershed Analysis* (USDI 1995). 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 Sweeper Project Area are as follows:

(1) Perennial fish-bearing streams: 320 feet slope distance on each side of the stream in the Bear Creek Watershed, 310 feet in the Little Applegate Watershed.
(2) Perennial non-fish-bearing streams: 160 feet (Bear Creek Watershed) and 155 feet (Little Applegate Watershed) slope distance on each side of the stream.
(3) Intermittent streams: 160 feet (Bear Creek) and 155 feet (Little Applegate) 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 155/160 feet slope distance from the edge of the wetland greater than one 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 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 no more than 9 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 feet) 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 maximum width of 15 feet and narrower where possible (dependent on topography and stand characteristics), 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. Where authorized for use, cut material would be placed on the running surface of old skid trails or jeep roads following completion of operations to prevent OHV use. *
(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. *

d. Prescribed Fire

Objective 1: Protect Riparian Reserves

(1) With underburns, no ignition would occur within Riparian Reserves.
(2) No pile burning would occur in the bottom of dry draws.
(3) Foam retardant would not be used in Riparian Reserves (BMP).
(4) No non-commercial fuels reduction would occur within Riparian Reserves.

Objective 2: Reduce Soil Erosion and Soil Productivity Loss

(1) Underburns would be conducted only when a light to moderate burn can be achieved (spring-like conditions when soil and duff are moist), with the objective of maintaining on-site course woody material.
(2) Firelines for underburns would be constructed manually.
(3) Water bars and firelines would be constructed according to District guidelines (USDI 1995, p. 167).
(4) Piles would be dispersed across treatment areas.
(5) Piles would be burned when soil and duff moisture are high.
(6) No mechanical piling allowed off of roads or landing areas.

(7) Any containment lines constructed for fuels projects shall be sufficiently blocked along their entire length to preclude use by OHVs. This would include such measures as placing logs and slash, falling trees less than 8” dbh (excluding riparian reserves) or other actions as necessary.
(8) Where existing trails intersect treatment areas, avoid placement of slash piles on existing trails to prevent trail braiding and widening.

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, water-barring, seeding, mulching, barricading). All construction activities would be stopped during a rain event of 0.2 inches or more within a 24-hour period or if determined by the 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 roads would be scarified, seeded with native or approved seed, and mulched, except where rock occurs. *
(4) Any closed or new permanent roads constructed and/or used during operations would be adequately blocked at the entrance using earthen barriers, logs, rocks or a combination of these or other materials. In addition, the entrance for a minimum distance of 100 feet would be camouflaged using slash, rocks, or other debris. These measures are designed to discourage and prevent use by OHVs.
(5) Slash would be windrowed at the base of newly-constructed fill slopes to catch sediment. *
(6) Skid trails (100 to 500 feet), are identified and analyzed for use. Work would be done between June1st to October 15th. Skid trails would be drained and adequately blocked so their entrances are camouflaged and vehicle use is precluded throughout their lengths. This would apply to the “tractor swing” that may be constructed within unit 23-1, and the proposed skid trail into unit 27-14. *
(7) Proposed disturbance 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 skid trail 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, water bars) would be installed at intervals not greater than the spacing distances identified in the RMP (USDI 1995, p. 177) for soil erosion class and road gradient.

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 roads 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. Some variations in these dates would be permitted dependent upon weather and soil moisture conditions of the roads.

(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) 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.

(2) 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.

(3) No more than 25% of the pine tree live crown should be scorched for trees 8 inches dbh and larger.

(4) Implement prescribed underburning when soil and duff moisture and weather conditions allow for low-intensity burning in order to minimize tree stress and adverse effects on tree roots and foliage.

Objective 2: Create Growing Sites & 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: 1-2, 1-1B, 1-1C, 1-1E, and1-1G. 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.
(2) Seasonally restrict habitat modifying activities from March 1 to September 30 within 0.25 miles of known northern spotted owl sites. The seasonal restriction could be waived in the BLM determines the site is not occupied or owls are not nesting.

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 2-9) 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 2-9 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.
(3) Seasonally restrict treating in unsurveyed northern spotted owl nesting, roosting, and foraging habitat from March 1 to June 30. The seasonal restriction could be waived if the BLM determines the site is not occupied or owls are not nesting. Units affected would be 1-1A,D and F.

Table 2-9. 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) All non-hazardous snags would be retained in all harvest units. If it is necessary to fall snags for safety reasons, they would remain on site as coarse woody debris (CWD).
(2) Do not mark large, broken-top trees and large snags with loose bark. Retain and protect these structures where possible.
(3) All trees damaged during felling operations that were not originally marked for treatment will be retained for future snag and cavity recruitment.

Objective 4: Protect Special Status Wildlife Species

(1) Seasonally restrict disturbance activities from March 1 to July 15 within 0.25 miles of known and occupied nest sites of other raptors (e.g., goshawk, red-tailed hawk, Coopers hawk, flammulated owl).
(2) Seasonally restrict harvest activities up to 0.25 miles no line of sight and 0.5 miles line of sight around active bald or golden eagle nest sites from February 1 to August 15.

Objective 5: Protect Survey and Manage Wildlife Species and Habitat

(1) Seasonally restrict disturbance activities, such as tree felling, yarding and road construction, from March 1 to July 31 within 300 feet of suitable great gray owl nesting habitat. Units affected are: 3-11,-18,and -19;and 34-8,-13,and -15 (unless surveys of the nesting habitat indicate no presence or no nesting).
(2) All existing naturally occurring coarse woody debris would remain on site.
(3) Cull material from harvest activities will not be yarded to the landing and will be left on site. Post-harvest monitoring of the group select cutting areas will determine if 1995 RMP CWD requirements are met; additional trees will be felled if needed to meet CWD requirements in the designated group select cutting areas.
(4) Approximately 10% of fuels reduction handpiles would be left unburned during firing operations.
(5) All mine shafts and adits would receive a 250 foot no-harvest buffer to protect bat habitat.

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) would be protected by one, or a combination of the following: a) no treatment buffered areas; b) method of treatment specification (e.g. manual treatment only); c) seasonal restrictions; and d) other restrictions (e.g., slashing but no piling) as needed (Table 2-10).
(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, 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 species 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) No landings are to be constructed within 300 feet of known populations of Federally Endangered species.
(7) Fuels treatments are allowed in seasonally-restricted plant buffer areas only outside the seasonal restriction period (see Table 2-10). Removal of material is permitted within seasonally-restricted buffer areas, but no maintenance burning or building of handpiles is to occur within seasonally-restricted buffers. No activity is to take place within no-treatment buffers.

Table 2-10. Protection Measures for Special Status and Survey & Manage Plant Species

T_R_S	SPECIES CODE	SITE NO.	PROPOSED TREATMENT	HARVEST METHOD	PROTECTION	RATIONALE FOR PROTECTION
T38S R02W S27	FRGE	**13984**	**Road:** Road 38-2-27.2 to be used as a haul route.	N/A	**Road:** Limit dust abatement on road 38-2-27.2; no magnesium chloride. Mechanized equipment stays within existing road prism 100' in any direction of population boundary. No piling of logs or other material along road 100' in either direction of site. No construction of new landings	**Road:** Management recommendations are based on the Project Design Features as directed in the 2008 District Biological Assessment (USDI 2008a) and USFWS Letter of Concurrence (USDI 2008e).

T_R_S	SPECIES CODE	SITE NO.	PROPOSED TREATMENT	HARVEST METHOD	PROTECTION	RATIONALE FOR PROTECTION
					within 300' of site. No blading, ditch pulling, brushing, etc. 100' in any direction of site. No construction of new roads within 100' in any direction of site. Mechanical equipment is to be cleaned of weed seed prior to entering road system, and upon leaving to prevent further spread of weed seed. Seasonal hauling restrictions apply.	Population is located within 100 feet of the road prism. Effects of magnesium chloride are unknown on species. Large populations of yellow star thistle and scattered populations of diffuse knapweed are present on road system and in close proximity to population.
T38S R02W S27	LETE13	**13985**	**RX:** Unit 27-16 (Disease Management)	Cable	**RX:** 50' buffer, no activity within buffer. Maintain large hardwoods (DBH >20") within 100' of population.	**RX:** Maintain moisture regime and microhabitat. Provide for population expansion opportunity.
T38S R02W S27	LETE13	**13987**	**RX:** Unit 27-14 (Group Select)	Tractor	**RX:** 50' buffer, no activity within buffer. Maintain large hardwoods (DBH >20") within 100' of population.	**RX:** Maintain moisture regime and microhabitat. Provide for population expansion opportunity.
T38S R02W S34	ESCA	**13719**	**RX:** Unit 34-9A (Group Select) **Road:** 38-2-26 to be used as a haul route	Cable	**RX:** 50' buffer, no activity within buffer. **Road:** Limit dust abatement on road 38-2-26; no magnesium chloride. Mechanized equipment stays within existing road prism 100' in any direction of population boundary. Seasonal hauling restrictions apply.	**RX:** Maintain moisture regime, canopy cover, and microhabitat. **Road:** Effects of magnesium chloride unknown on species.
T38S R02W S34	LETE13	**13213**	**Road:** Road 38-2-34 to be used as a haul route	N/A	**Road:** Limit dust abatement on road 38-2-34; no magnesium chloride. Mechanized equipment stays within existing road prism 100' in any direction of population boundary. Seasonal hauling restrictions apply.	**Road:** Effects of magnesium chloride unknown on species.
T38S R02W S35	CIEL	**13989**	**Road:** Road 38-2-24 to be used as a haul route	N/A	**Road:** Limit dust abatement on road 38-2-24; no magnesium chloride. Mechanized equipment stays within existing road prism 100' in any direction of population boundary. Seasonal hauling restrictions apply.	**Road:** Effects of magnesium chloride unknown on species.

T_R_S	SPECIES CODE	SITE NO.	PROPOSED TREATMENT	HARVEST METHOD	PROTECTION	RATIONALE FOR PROTECTION
T39S R02W S01	CYMO2	**12641**	N/A	N/A	None	Site located in a riparian reserve. Protected by applicable PDFs.
T39S R02W S03	CYFA	**1326**	**RX:** Unit 3-18 (Group Select)	Cable	**RX:** 100' radius buffer, no activity within buffer.	**RX:** Maintain moisture regime, soil filtration, and microhabitat (USDA and USDI 1998a).
T39S R02W S08	EUVI8	**TBD**	**Road:** Road 39-2-8 to be used as a haul route	N/A	**Road:** Limit dust abatement on road 39-2-8; no magnesium chloride. Mechanized equipment stays within existing road prism 100' in any direction of population boundary during growing season. Seasonal hauling restrictions apply. Avoid ditching, trenching, blading or plowing within 100' of population boundary. Roadside mowing or brushing (if necessary) will be done only outside of the growing season (November-March)..	**Road:** Effects of magnesium chloride unknown on species. Maintain and/or enhance existing roadside habitat as necessary for population survival and/or expansion (USDA and USDI 1998b).
T39S R02W S11/12	CIEL	**12618**	**Road:** Road 38-2-24 to be used as a haul route	N/A	**Road:** Limit dust abatement on road 38-2-24; no magnesium chloride. Mechanized equipment stays within existing road prism 100' in any direction of population boundary. Seasonal hauling restrictions apply.	**Road:** Effects of magnesium chloride unknown on species.
T39S R02W S12	EUVI8	**12620**	**Road:** Road 38-2-24 to be used as a haul route	N/A	**Road:** Limit dust abatement on road 38-2-24; no magnesium chloride. Mechanized equipment stays within existing road prism 100' in any direction of population boundary during growing season. Seasonal hauling restrictions apply. Avoid ditching, trenching, blading or plowing within 100' of population boundary. Roadside mowing or brushing (if necessary) will be done only outside of the growing season (November-March)..	**Road:** Effects of magnesium chloride unknown on species. Maintain and/or enhance existing roadside habitat as necessary for population survival and/or expansion (USDA and USDI 1998b).
T39S R02W S14	EUVI8	**13993**	**RX:** Unit 14-	Cable	**RX:** 50' radius buffer; no	**RX:** Maintain moisture

T_R_S	SPECIES CODE	SITE NO.	PROPOSED TREATMENT	HARVEST METHOD	PROTECTION	RATIONALE FOR PROTECTION
			1 (Group Select) **Road:** Road 39-2-8 to be used as a haul route and roadside landing area.		mechanical activity within the buffer. Follow-up fuels activity is permitted within the buffered area, but piles must be constructed outside of buffered area. May 1-September 1 seasonal restriction on activities permitted within the buffer area. **Road:** Limit dust abatement on road 39-2-8; no magnesium chloride. No mechanical disturbance on the upslope side of the road within 100' in either direction of population. Seasonal hauling restrictions apply. Avoid ditching, trenching, blading or plowing within 100' of population boundary. Roadside mowing or brushing (if necessary) will be done only outside of the growing season (November-March)..	regime, soil filtration, and microhabitat. **Road:** Effects of magnesium chloride unknown on species (USDA and USDI 1998b).
T39S R02W S15	EUVI8	**7099**	**Road:** Road 39-2-8 to be used as a haul route	N/A	**Road:** Limit dust abatement on road 39-2-8; no magnesium chloride. Mechanized equipment stays within existing road prism 100' in any direction of population boundary during growing season. Seasonal hauling restrictions apply. Avoid ditching, trenching, blading or plowing within 100' of population boundary. Roadside mowing or brushing (if necessary) will be done only outside of the growing season (November-March).	**Road:** Effects of magnesium chloride unknown on species. Maintain and/or enhance existing roadside habitat as necessary for population survival and/or expansion (USDA and USDI 1998b).

I. Rangeland Resources/Grazing

<u>Objective 1: Protect Rangeland Improvements</u>

(1) During logging operations use of techniques such as directional falling will be used to prevent damage to fences, cattle guards, livestock watering troughs and other improvements.
(2) If damage to range improvements does occur the BLM shall be notified and proper repair* or replacement will occur within 2 weeks of the completion of logging activities.

*Proper repair of fences and gates includes keeping wire properly attached to posts, splicing or replacing broken wire in kind, repairing structures such as corners, stress panels or gates, and any other work necessary to keep improvements functional. Repair of structures such as stress or corner panels and gates requires pre-approval by BLM staff. Repair or cleaning of cattle guards damaged of filled with sediment by logging activities will require approval of BLM Road Engineering Staff for structural integrity and public safety compliance.

Objective 2: Prevent Livestock Trespass

(1) During logging activities, operators will keep all gates closed and all livestock containment systems functional to keep livestock in authorized areas.

m. Cultural Resources

Objective 1: Avoid Impacts and Protect Cultural Resources

(1) The Sterling Sweeper project area was reviewed for the potential for adverse impacts to cultural resources. The majority of the project area was analyzed and surveyed previously in conjunction with the Buncom Density Management Project (AH96-03) and the Bald Lick Project (AH99-55). Proposed management direction includes protecting and managing the integrity of all historic/prehistoric sites identified in the cultural survey, determined eligible for inclusion to the National Register of Historic Places. The minimum level of protection for eligible sites is avoidance. These eligible sites will be given a 25-foot no-treatment buffer.
(2) Trees will be directionally felled away from the site buffer for one tree length (average 160 feet).
(3) Sites which have been determined **not** eligible, and having received State Historic Preservation Office concurrence, will be managed according to BLM Manual 8100.
(4) If during project implementation the contractor encounters or becomes aware of any objects or sites of cultural value on federal lands, such as historical or pre-historical ruins, graves, grave markers, or artifacts, the contractor shall immediately suspend all operations in the vicinity of the cultural value and notify the COR. The project may be redesigned to protect the cultural resource values present, or evaluation and mitigation procedures would be implemented based on recommendations from the Resource Area Archaeologist with concurrence by the Ashland Field Manager and State Historic Preservation Office.

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 1,415 Acres of Forested Lands

This action included a total of 1,412 acres with the following Land Use Allocations (LUAs) under the 2008 RMP: Administratively Withdrawn (115 acres), Deferred Timber Management Areas (16 acres), Riparian Management Areas (33 acres), and Uneven Aged Management Areas (1,248 acres).

> ***Rationale for Elimination:*** Areas identified as Administratively Withdrawn, Riparian Management Areas, or Deferred Timber Management Areas were eliminated from further analysis based on management objectives and direction stated in the 2008 RMP (pp. 33, 36-38). 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) and the *Little Applegate Watershed Analysis* (USDI 1995). Northern Spotted Owl (NSO) RA32 stands, core areas or nest sites were also eliminated from further study. With regard to RA32 stands, 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 Sterling Sweeper Forest Management Project that met the intent of Recovery Action 32. Stands identified as RA 32 forest stands were removed from consideration for timber harvest and detailed analysis under the Proposed Action.

Construction of Roads into Units 26-15 and 27-16

This action would have allowed for the new construction permanent roads into Proposed Units 27-16 and 26-15.

> ***Rationale for Elimination:*** Two separate proposed roads were considered with regard to both impacts and cost, and the cost analysis of both revealed that the construction of either would deem the units to be uneconomical. The economic feasibility of forest management actions is affected by the ease of access from the forest road system, or lack thereof. Both units and proposed new roads were eliminated from further study.

Use of an Intermediate Support System to Access a Portion of Unit 23-1

This action would have been considered as a third method of entry into the northeast portion of Unit 23-1. Rather than build the full-extent of the proposed full-length road to the optimal yarding point, this option would have allowed equipment to operate from a different position on the hillside. This option would have resulted in less road construction, but skyline intermediate supports would have been needed to harvest “blind” areas of the unit.

> ***Rationale for Elimination:*** Profiles of the harvest area were obtained and analyzed through the logging systems program Skyline XL. This program utilizes ground slopes and distances to calculate the resulting forces placed on skyline equipment used for harvesting and the amount of weight that can be moved at one time. Skyline XL analyzed for high tensions and low maximum weights as potential factors that would have created a harvesting situation that would have potentially lead to catastrophic logging systems failure. Low weights (below 2000 pounds) would have also contributed to a non-economical harvest operation.
>
> The resulting Skyline XL profiles concluded that low weights (below 2000 pounds) were the limiting factor. All profiles were under the 2000-pound threshold, at best reaching a weight of 1249 pounds.

Road Decommissioning (or conversion) of road that ties into Sterling Mine Ditch Trail

This action would permanently remove Road 39-2-9.0 from the road system and convert it to a trail accessible to the public.

> ***Rational for Elimination:*** The road (already in use by pedestrians and equestrians accessing the Sterling Mine Ditch Trail) is currently in stable condition, and is already barricaded to facilitate

natural decommissioning and drained, making it hydrologically sound (as assessed by the Project Hydrologist and Road Engineer). The disturbance resulting from mechanical decommissioning would cause more disturbance than allowing the road to continue to decommission naturally.

Project was designed for economic practicality, utilizing all silvicultural systems

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).

Rational for Elimination: 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).

CHAPTER 3 - AFFECTED ENVIRONMENT & 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 action alternatives. The Environmental Effects portion of this chapter provides the analytical basis for the comparisons of the alternatives (40 CFR § 1502.16) and the reasonably foreseeable environmental consequences to the human environment that each alternative would have on the relevant resources. Impacts can be beneficial, neutral or detrimental. The affected environment is described to the level of detail needed to determine the significance of impacts to the environment of implementing the Proposed Action. The analysis of the direct, indirect, and cumulative effects are organized by resource and the analysis areas for actions proposed under this EA vary by resource. For all resources it includes the project area, which encompasses the areas where actions are proposed for the Sterling Sweeper Forest Management Project.

1. Project Area and Analysis Area

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.

2. 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.

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

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

There are no reasonable foreseeable activities proposed in the vicinity of the Sterling Sweeper Forest Management Project at this time.

B. SILVICULTURE

1. Affected Environment

a. Landscape Pattern

The Sterling Sweeper Forest Management Project proposal is located in the Bear Creek and Little Applegate 5th field watersheds. Within these watersheds are smaller tributaries on BLM-administered lands called catchments, which are considered for purposes of analyzing the affected environment for the proposed project analysis area. Catchments within the Bear Creek watershed are Anderson Creek, Coleman Creek, Griffin Creek and an unnamed creek. In the Little Applegate watershed, the Sterling Creek catchment is considered. The total size of the analysis area is 11,331 acres or about 18 square miles. BLM-administered lands comprise 7,090 acres within this analysis area (Table 3-1).

The current landscape pattern of the vegetation in the Sterling Sweeper analysis area is a result of topography, fires, wind events, timber harvesting, and forest pathogens. There is a natural diversity of vegetation condition classes[1] within stands and between stands whose patterns and boundaries are generally dictated by soils, aspect, past disturbance, and fire suppression. The present-day vegetation pattern across the watershed landscape results from the dynamic processes of nature and human influences over time. As a consequence, the variation and scales of landscape components are innumerable (USDI 1997).

Vegetation disturbance mechanisms (abiotic and biotic) that influence the watershed forest stand structure are logging, fire and fire suppression, pathogens, and dwarf mistletoe species associated with the Douglas-fir species (USDI 1997).

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

Table 3-1. Vegetation Condition Classes—Sterling Sweeper Analysis Area (BLM-Administered Lands)

Vegetation Condition Class	Acres
Grass, Forbs, Herbaceous/Shrubs	894
Hardwoods/Woodlands	683
Early (0-5 years) and Seedlings/Saplings (0-4.9 inches DBH)	1066
Poles (5-11 inches DBH)	784
Mid (11-21 inches DBH)	2418
Mature (21+ inches DBH)	1245
Total Acres	**11,331**
Total Forest Land Acres	**5,513**

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 and minor amounts of white fir are replacing ponderosa pine, sugar pine, and incense cedar because of their more shade-tolerant nature. Douglas-fir and white fir are encroaching into oak woodlands, and meadows are slowly shifting to shrub-dominated sites. Shade-intolerant shrub and hardwood species that once thrived in open canopy conditions are now limited in growing space opportunities and are relegated only to the edges of closed canopy stands. White oak and black oak have dropped out of some conifer stands where light and water have become limited.

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 historical 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. Species that once occupied the early-seral stage of development in a landscape gap will give way to other species as the landscape further develops.

b. Plant Series and Associations

There are 2 plant series types in the Sterling Sweeper Analysis Area: Douglas-fir and ponderosa pine (Table 3-2). Plant association can be defined as a stand or group of stands made up of plants characterized by a definite floristic composition consisting of uniformity in physiognomy and structure and uniform habitat conditions. Descriptions within these 2 series can be found in *Preliminary Plant Associations of the Siskiyou Mountain Province* (Atzet and Wheeler 1984) and *The Field Guide to the Forested Plant Associations of Southwestern Oregon* (USDA 1996). The plant associations described by Atzet and Wheeler (1984) 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 3-2. Tree Series and Plant Associations Common to Sterling Sweeper Analysis Area

Douglas-fir Series / Plant Associations	Ponderosa Pine Series / Plant Associations
PSME-PIPO	PIPO-QUKE
PSME-ABCO/HODI	
PSME/BENE	
PSME/RHDI6-BEPI	
PSME/RHDI	
PSME-PIPO/RHDI6	

Abbreviations:

PSME: Douglas-fir	ABCO: White fir	BENE: Oregon grape
PIPO: Ponderosa pine	HODI: Oceanspray	RHDI6: poison oak
BEPI: Piper's Oregon grape	QUKE: Black Oak	

Douglas-fir plant associations comprise approximately 70 percent of forestland in the analysis area. These associations are predominantly found in cooler and drier site conditions. Ponderosa pine is commonly found in the drier and warmer Douglas-fir sites; however Douglas-fir dominates the understory component of these associations. In stands that are in the stem exclusion stage, overstory trees grow very vigorously at the beginning, actively occupying all available growing space, and vigorously compete with neighbors (Oliver and Larson 1996). Shade intolerant trees such as ponderosa pine and sugar pine struggle to survive against more shade tolerant fir species under increasingly lessening light conditions. Pine and other shade intolerant species become suppressed and eventually are excluded from the stand, giving way to a pure, or nearly pure, fir forest. Without disturbances to release growing space, shade intolerant species such as pine continue to decline in numbers, reducing stand-level species diversity.

In acreage, the PSME-PIPO/RHDI6 plant association is the largest represented forest land plant association in the analysis area at approximately 36 percent. This Douglas-fir plant association is cooler and drier, with pine species occupying about 20 percent of the over story cover. Pine species, incense-cedar, and black oak combine to make up less than 20 percent of the understory cover in this association (USDA1996).

c. Forest Stand Condition and Fire Hazard

Approximately 1,414 acres of forestland were initially reviewed for commercial treatment in the Sterling Sweeper analysis area. Grasslands, shrublands, and woodlands comprise 22 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 historical 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 1997). The absence of fire has converted open savannahs and grasslands to hardwood woodlands and initiated the recruitment of conifers. As hardwoods and shrubs encroach into open savannahs and grasslands, shade tolerant conifers begin proliferating through the understory, converting the site to a mixed hardwood/conifer woodland condition. As a result, Oregon white oak is now a declining species largely due to fire suppression and encroachment by Douglas-fir and white fir on most sites (USDI 1997). 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. The absence of fire due to suppression efforts has changed the make-up of the local forests to fire-intolerant, shade-tolerant conifers and has decreased species such as ponderosa pine and sugar pine (USDI 1997).

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 that 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 (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 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. All of the forested stands chosen for density management or selection thinning in the Sterling Sweeper analysis area have relative densities ranging between 0.55 and 0.75 (Table 3-3). The overall average relative density for these forested stands is 0.67, indicating that physiologically, the trees have entered the zone of imminent competition-induced suppression and mortality (Drew and Flewelling 1979).

Table 3-3. Relative density in stands by proposed unit.

Unit No.	Silvicultural Prescription	Relative Density	Acres
30-1	Select Thin	0.75	4
30-2	Select Thin	0.75	5
23-1	Density Managagement (Maintain)	0.55	40
23-2	Density Managagement (Maintain)	0.55	8
27-1	Density Managagement (Maintain)	0.7	11
27-14	Density Managagement (Maintain)	0.74	14
27-7	Group Select	0.42	14
34-1	Group Select	0.43	16
34-13	Group Select	0.55	22
34-15	Group Select	0.51	29
34-25	Group Select	0.43	25
34-4A	Group Select	0.43	9
34-4B	Group Select	0.43	2
34-4C	Cable Corridors	0.43	1
34-7	Group Select	0.55	3
34-8	Group Select	0.51	2
34-9A	Group Select	0.44	5
34-9B	Group Select	0.51	4
1-2	Disease/sanitation	N/A	3
3-11	Group Select	0.42	22
3-18	Group Select	0.6	5
3-19	Group Select	0.6	9
9-1	Group Select	0.42	21
9-2	Group Select	0.42	3
9-3	Group Select	0.34	27
1-1A	Select Thin (Maintain)	0.61	4
1-1B	Disease/sanitation	N/A	24
1-1C	Disease/sanitation	N/A	1

Unit No.	Silvicultural Prescription	Relative Density	Acres
1-1D	Select Thin (Maintain)	0.61	4
1-1E	Disease/sanitation	N/A	16
1-1F	Select Thin (Maintain)	0.46	2
1-1G	Disease/sanitation	0.42	12
14-1	Group Select	0.26	10

In the units identified for density management and commercial thinning, higher tree densities and increased ground fuels in stands have escalated the threat of stand-replacing crown fires, which were historically rare (USDI 1997). 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. The low-severity fire regime historically prevalent in the analysis area was one of frequent (1-20 years) and widespread fires resulting from the hot, dry summers (USDI 1997). These frequent fires favored ponderosa pine as a dominant species and white fir 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 forestland acreage of vegetation series exhibited in the analysis area, stands in the Douglas-fir Series comprised 70 percent, compared to stands in the Ponderosa Pine Series (4 percent) and the White Oak Series (28 percent). A lack of disturbance, either natural or human caused, alters the vegetation condition of the forest.

Frequent fires prevent fuel from accumulating and prepare a seedbed favorable for perpetuating pine species (Waring and Schlesinger 1985). High severity fire regimes, on the other hand, exhibit infrequent, intense, large, stand-replacing fires that denude entire forests. These occur when tree densities and surface and ladder fuels build up to a level where fire resiliency is compromised and the entire stand is threatened by intensified burning conditions.

Some forested stands have been selectively logged, underburned by fire, commercially thinned, or have suffered mortality from natural processes. Some stands tend to be more diverse in species composition and vertical structure as a result of disturbance, while others tend to have a monocultural appearance. 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 and Larson 1996; Waring and Schlesinger 1985) such as moderate and frequent fires and moderate insect and disease-induced mortality pockets.

Older stands or patches of older trees are in the understory-reinitiation stage of forest development and vertical stand structure is diverse. In the understory-reinitiation stage, natural mortality to the overstory creates canopy openings. Structural complexity begins to develop as new conifers, hardwoods, shrubs and forbs establish in these openings (Oliver and Larson 1996). 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 pre-commercial thinning.

d. Tree Vigor

Waring et al. 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 stem wood growth. Vigorous trees can also fight off beetle attacks with greater success. Waring and Pitman (1985) concluded that trees attacked and killed by bark beetles had such low carbohydrate reserves that they lacked the ability to produce sufficient oleoresins, which protect the tree against beetles.

Vigor rating index numbers are calculations of stem growth per unit of leaf area, expressed as grams of stem growth per meter squared per year ($g/m^2/yr$). Trees with vigor ratings below 30 $g/m^2/yr$ will succumb to attack from bark beetles of relatively low- intensity. Trees with vigor from 30-70 can withstand progressively higher attacks but are still in danger of mortality from infestation. Trees with a vigor rating of 70-100 can generally survive one or more years of relatively heavy attacks, and trees with ratings above 100 cannot be killed by bark beetles (Christiansen et al. 1987; Waring and Pitman 1985).

For all inventory stands, sample cores were taken from 70 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 was also determined from these measurements. Vigor ratings were derived using the Waring Tree Vigor Index and growth rates were tabulated by decade. Almost 80 percent of the Douglas-fir core samples had vigor ratings in the 30-70 range, while about 10 percent were below 30, and 10 percent were above 70.

Pine species in the analysis area are becoming scarce. Stands in the analysis area were identified as Pine and Douglas-fir plant associations, where pine are naturally encountered, shade tolerant species 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.

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). Bark beetles successfully colonize live trees when their host is under some form of physiological stress. Western pine beetles *(Dendroctonus brevicomis*) and pine engraver beetles (*Ips* spp.) in this area attack the pines, while the flatheaded wood borers *(Melanophila drummondi*) and Douglas-fir beetles *(Dendroctonus pseudotsugae*) kill Douglas-fir (Aerial Insect and Disease Survey 2007-2008). Drought conditions and high tree stocking levels contribute to the stressing of trees physiologically, enabling beetles to invade and kill their hosts (Dolph 1985).

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 $\geq$ 1.5 inches of diameter growth per decade, or with less than 150 square feet of basal area[2] per acre, are less prone to pine bark beetle attack. Stands on south and east aspects below 3,500 foot elevations are particularly vulnerable when their densities are high (USDA 1998).

The susceptibility of trees to damage by bark beetles can be mitigated by stocking control, which is tied closely together with tree vigor (Larson et al. 1983). Stocking control increases growing space, water and

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

nutrient availability, sunlight penetration, and photosynthesis rates.

Together, site disturbance such as fire and thinning improves tree vigor. Conifers with vigor ratings above 70 can emit sufficient oleoresins to repel invading beetles and survive even relatively heavy insect attacks. 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.

Waring and Schlesinger 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 solar radiation and precipitation to the forest floor, thereby increasing soil temperature and available water supply. The overall rate of decomposition in a forest ecosystem is largely determined by temperature and moisture, with temperature of primary importance; increasing the soil temperature and moisture stimulates microbial activity and mineralization (Waring and Schlesinger 1985). As forests recover, nutrient and water uptake per unit of leaf area increases, as well as the rate of wood production per unit of leaf area.

Some believe 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 (Black 2005). 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. 2007) 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 in the Sterling Sweeper analysis area.

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 for 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.

Western dwarf mistletoe (*Arceuthobium campylopodum*) and Douglas-fir dwarf mistletoe (*Arceuthobium douglasii*) infections are 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 kill off the infected tree.

Douglas-fir dwarf mistletoe (*Arceuthobium douglassii*) is a parasitic plant that infects Douglas-fir and is widespread in Southern Oregon forests. It is one of the primary diseases (besides root rot) that affects the growth and health of Douglas-fir. Douglas-fir dwarf mistletoe evolved with its host species over the past 10,000 years. The benefits of dwarf mistletoe as wildlife habitat and a food source are well known (Mathiasen 1996). Not only does the presence of mistletoe contribute to stand diversity through the creation of gaps, structural irregularity and contribute to the accumulation of snags and down wood, it also serves as habitat for a variety of mammals, birds and arthropods. In particular, in the Siskiyou Mountains, large witch's brooms serve as nest platforms for spotted owls and raptors. There is evidence that groups of mistletoe infected trees are the most likely areas for spotted owls to nest in the white fir and Douglas-fir forests of the Siskiyou Mountains (Marshall 2003; Mallams and Goheen 2005).

Dry Douglas-fir stands (Douglas-fir/poison oak) and pine-oak stands were historically shaped by frequent fire, and because of fire suppression the number of Douglas-fir trees is far in excess of historical ranges (Brown et al. 2004; North et al. 2004). The proposed forest management project does not attempt to eradicate dwarf mistletoe from the landscape; rather, it attempts to minimize it in specific areas so that the objectives of Matrix lands as defined by the 1995 Medford District Resource Management Plan can be attained. Management efforts are focused towards minimizing the impacts of Douglas-fir dwarf mistletoe by maximizing tree species diversity and by reducing canopy layering. Stands composed of mixed tree species of all size classes provide barriers that inhibit the horizontal and vertical spread of mistletoe. Ponderosa pine, sugar pine, incense cedar, white fir and hardwoods are not susceptible to Douglas-fir dwarf mistletoe. Suppressed and intermediate size classes of Douglas-fir are often targeted for removal, reducing the canopy height structure and the potential for the vertical spread of mistletoe.

With or without management activities, dwarf mistletoe will continue to be a stand and landscape feature on lands managed by the BLM. Because the vast majority of BLM-administered lands are not allocated to intensive forest management (clear cutting), it is expected that Douglas-fir dwarf mistletoe would continue to occur at natural rates and levels within the area.

f. Coarse Woody Material

Measurements of coarse woody material for sampled stands in the Sterling Sweeper analysis area totaled 8,400 feet of transect line. The average amount of coarse woody material (CWM) equaled 4.2 tons per acre. CWM ranged from 1.1 to 11.8 tons per acre. The CWM stems were mostly concentrated in the 12-15 and 16-19 inch classes at the large end, although some sites contained pieces up to 39 inches at the large end diameter. The average total length per acre equaled 553.9 feet. CWM was distributed across all decay classes, although decomposition classes 2 and 3 were most common (Table 3-4).

Table 3-4. Coarse Woody Debris Decay Classes

Log Characteristics	Decay Class				
	1	2	3	4	5
Bark	Intact	Intact	Trace	Absent	Absent
Twigs <3 cm.	Present	Absent	Absent	Absent	Absent
Texture	Intact	Intact to partly soft	Hard, large pieces	Small, soft blocky pieces	Soft and powdery
Shape	Round	Round	Round	Round to oval	Oval
Color of wood	Original color	Original color	Original color to faded	Light brown to reddish brown	Red brown to dark brown
Portion of log on ground	Tree elevated on support points	Tree elevated on support points but sagging slightly	Tree is sagging near ground	All of tree on ground	All of tree on ground
Invading roots	None	None	In sapwood	In heartwood	In heartwood

2. Environmental Consequences

a. Alternative 1—No Action Alternative

Alternative 1 (No-Action) would allow forest stands to remain at high relative density index, allowing density-dependent mortality to occur and leaving forested stands more susceptible to insect and disease agents. Stand densities would continue on their current trajectory of stand development and remain overpopulated.

The current average relative density (0.67) for the overstocked stands in this project area in need of stem density reduction indicates that physiologically, the trees have entered the zone of imminent suppression and mortality. Alternative 1 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 and poor forest health. Stands (mostly group select units) in this project that are below a relative density of 0.55 are lacking structural diversity, and without treatment will remain having a one-layered overstory or a monoculture appearance.

Douglas-fir dwarf mistletoe is found throughout the analysis area at various stages of infection. No action would allow the unchecked spread of disease to continue on the sites. Diseases such as Douglas-fir dwarf mistletoe 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 percent full sunlight, shade-tolerant Douglas-fir would continue to encroach and stands would become a more closed canopy, hindering pine survival with the absence of disturbance. 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. Almost 80 percent of the Douglas-fir core samples had vigor ratings in the 30-70 range, indicating that Douglas-fir is in danger of mortality from a beetle attack.

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-spaced 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.

Forest stands with high relative densities also present a high fuel hazard across the landscape. The Medford District’s 1995 and 2008 RMPs describe the Forest Condition (Forest Health) Restoration

Objective that requires management emphasis on treatments and harvests that restore stand condition and ecosystem productivity. It directs management actions to include density management and understory reduction operations that reduce competition, increased use of understory prescribed fire, and fertilization (USDI 1995; USDI 2008). 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. In overstocked units, 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, including sites that previously saw far fewer 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.

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.

b. Alternative 2

The silvicultural objectives for harvest are as follows: 1) Reduce stand density to increase tree growth, quality, and vigor of the residual trees; 2) Create structural diversity (height, age, and diameter classes) and old-growth stand characteristics; 3) Increase growing space and decrease competition for large or legacy pine, oak, and cedar. (preserve existing genotypes which are physiologically better adapted to fire disturbance); maintain and protect nesting, roosting, and foraging owl habitat within forest stands in the analysis area. Silvicultural prescriptions are detailed in Chapter 2. Table 3-5 summaries the treatment acres proposed under Alternative 2.

Table 3-5. Proposed Silvicultural Treatments in Alternative 2

Silvicultural Prescriptions	Est. Acres
Selective Thinning – Maintain NSO Nesting Roosting, and Foraging	10
Density Management – Maintain NSO Dispersal Habitat	73
Group Selection	229
Disease Sanitation	56
Selective Thinning—NSO Capable and Dispersal	9

Silvicultural Prescriptions	Est. Acres
Cable Corridors	1
Total Acres	**379**

Density management and selective thinning would occur on a total of 73 acres. Stands identified for density management would have the smaller, less vigorous trees harvested. In stands selectively harvested, low vigor trees across all diameter sizes would be removed. These silvicultural treatments would reduce tree density near or below 55% and the number of trees per acre would be at levels the site has water and nutrients to sustain.

With a reduction of tree density to below 55 percent relative density, the annual mortality rate would decline by about 50 percent. An increase in tree growth would occur once the root systems of the residual trees expand (approximately 5 to 10 years) and are able to use moisture, nutrients, and additional growing space. Tree crowns would increase in size and photosynthetic area, with stand crown closure increasing approximately 10 percent every 5 years (based on ORGANON growth and yield projections) until 100 percent canopy closure is reached (USDI 1995). These silvicultural treatments would generally result in stands with fewer but larger trees and trees with increased growth rates.

Group selection treatments would occurr on approximately 20 percent of 229 acres identified in order to create structural diversity among stands that lack multiple canopy layers. Group selection will create small openings (¼ to ½ acre in size) randomly across the landscape in the identified units allowing regeneration establishment and release, preservation of legacy trees within the stand, and in some instances, removal of diseased trees. Residual trees will have improved health, vigor, and growth from the added growing space, water, and nutrients that they receive. The activity fuels from the harvest would be treated and,b ased on post-harvest inspections, sites would be pre-commercially thinned or planted if needed. Most of the units identified for group selection were commercially thinned approximately 15 years ago and lack structural diversity. Creating small openings will facilitate tree species diversity, the growth of a younger seral stage component and provide more habitat diversity for wildlife.

Disease sanitation will occur on nearly 56 acres of forested stands that are heavily infected with Douglas-fir dwarf mistletoe. The stands selected for treatment will have infected Douglas-fir removed of various size classes to minimize infection that is likely to spread to other codominant or intermediate trees. Resistant species such as ponderosa pine, sugar pine, and incense cedar would be retained throughout the stands where infected tree removal occurs. Healthy Douglas-fir trees that appear resistant to the pathogen infection will be retained as residual trees, as well.

Alternative 2 includes 379 acres of various levels of commercial harvest, representing 5 percent of the BLM lands in the analysis area. Under this alternative, 7 percent of the forested land in the analysis area is proposed for commercial treatment. A total of 5,136 acres of Riparian Reserves, northern spotted owl cores, RA32 stands (169 acres), active and inactive spotted owl nest patches within home ranges, and other reserves for plants and animals in the analysis area would not be treated. Other untreated forested stands include those that lack sufficient conifer stocking to meet a feasible sale under guidelines for maintaining northern spotted owl habitat. Forest stands in reserve areas would remain in poor vigor and tree mortality can be expected in the future. Canopy cover for these stands would decrease with time thus degrading some types of habitat. This also decreases the effectiveness of fuels hazard reduction that has or would occur in adjacent units.

Tree species diversity would continue to decline without treatments to maintain shade intolerant species such as pine. The effects would be as described in Alternative 1. Mortality of untreated pine stands as a result of competition against Douglas-fir could cause increasing levels of bark beetle species that could infect adjacent forest stands. Bark beetles are opportunistic creatures that have the ability to detect the chemical signature that a non-vigorous tree emits when it is weakened by competition, drought, disease, or a combination of all three. Leaving these acres untreated would also decrease the effectiveness of fuels hazard reduction in adjacent treated stands. Leaving diseased forest land untreated could increase the radial spread of dwarf mistletoe as susceptible shade tolerant species such as Douglas-fir continue occupying these 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.

If surrounding private lands are clear-cut, 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. Currently, surrounding BLM lands would be managed with similar prescriptions as the Sterling Sweeper Timber Management Project to assure forest health. Additionally, minimizing the spread of insects and fire to adjacent lands would reduce cumulative effects of insects and fire. These effects would be beneficial to forest stands, rather than detrimental.

Permanent road construction would remove all vegetation within the road prism. The permanent roads would be converted from conifer forests to non-forested lands and would no longer contribute to future conifer growth or yield. Approximately 0.41 mile of permanent road construction would convert approximately 1.5 acres of forested to non-forested lands. No new temporary road construction would occur under this alternative. It is assumed that roads identified for renovation are currently non-productive forest lands.

c. Alternative 3

The silvicultural objectives and prescriptions are the same under Alternative 3 as under Alternative 2. Silvicultural prescriptions are detailed in Chapter 2. Table 3-6 summarizes Alternative 3 treatments by acres:

Table 3-6. Proposed Silvicultural Treatments Under Alternative 3.

Silvicultural Prescriptions	Est. Acres
Selective Thinning – Maintain NSO Nesting Roosting, and Foraging	10
Density Management – Maintain NSO Dispersal Habitat	25
Group Selection	229
Disease Sanitation	56
Cable Corridors	1
Total Acres	**321**

Alternative 3 includes 321 acres of various levels of commercial harvest to be harvested without new road construction, representing 5 percent of the BLM-administered lands in the analysis area. Under this alternative, 6 percent of the forested land in the analysis area is proposed for commercial treatment. A total of 5,193 acres of Riparian Reserves, northern spotted owl cores, RA32 stands (169 acres), active and inactive spotted owl nest patches within home ranges, and other reserves for plants and animals in the analysis area would not be treated. This alternative also excludes density management unit 23-1 and selective thinning units 30-1 and 30-2. Tree species diversity would continue to decline without density reduction treatments to units 23-1, 30-1, 30-2 and any other over stocked stand in this project area that needs maintenance for shade intolerant species such as pine. The effects in these areas would be as described above in the No-Action Alternative.

No permanent or temporary road construction would occur under this alternative, thereby eliminating the potential for effects caused by the construction of permanent or temporary roads.

C. FIRE AND FUELS

1. Affected Environment

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

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

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

a. Fire Regimes

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

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

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

> *Fire Regime 1: 0-35 years fire return interval, Low Severity*
> Typical climax plant communities include ponderosa pine, pine-oak woodlands, and oak woodlands. Large stand-replacing fire can occur under certain weather conditions, but are rare events (i.e. every 200 years).
>
> *Fire Regime 2: 0-35 years fire return interval, High Severity*
> This regime includes true grasslands and savannahs with typical return intervals of less than 10 years, and ceanothus and Oregon chaparral with typical return intervals of 10-25 years. Fire severity is generally high to moderate.

Fire Regime 3: < 50 years fire return interval, Mixed Severity
Typical plant communities include mixed conifer and dry Douglas-fir forests. Lower severity fire tends to predominate in many events. This regime usually results in heterogeneous landscapes. Large, stand-replacing fires may occur, but are usually rare events.

b. Predicted Climate Changes

Several studies that model climatic change into the next century also caution land managers in the Pacific Northwest to plan for increased temperatures and possibly some increase in winter moisture in the form of rain over the coming years in the Pacific Northwest (Mote et al. 2003; Hessl 2004). 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 Niño 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 of change in the ecosystems. One option land managers have to affect that change, to protect private property and ecosystems, is to utilize 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 proposed action for the Sterling Sweeper Project is to treat approximately 379 acres. In the Sterling Creek drainage, approximately 287 acres are proposed for treatment using group selection prescriptions. In the late 1990s, the Buncom Project thinned approximately 164 acres of the 287 acres proposed for treatment in the Sterling Creek drainage. The thinning was followed up with prescribed burning. The 164 acres that were treated are in Condition Class 1. The remaining forest stands proposed for treatment (215 acres), which are primarily dry Douglas-fir, mixed conifer and pine stands (Fire Regime 3), are in Condition Classes 2 and 3. Stands are very dense in some areas due to the absence of fire.

d. Fire Hazard

Fire hazard assesses vegetation by type, arrangement, volume, condition and location. These characteristics combine to determine the threat of fire ignition, the rate of 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 project area and reflect the results of past human and natural disturbances. In general, the existing fuel profile within the project area represents a moderate-to-high resistance to control under average climatic conditions. Table 3-7 shows the existing fire hazard of the 379 acres proposed for treatment under this project.

Table 3-7. Fire Hazard Rating Category for the Analysis Area.

Fire Hazard Rating	Percentage by Hazard Category
Low hazard	44%
Moderate / High Hazard	56%

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 project area. Activities within this area such as increased development of homes in the wildland urban interface (WUI), dispersed camp sites, recreational use, and major travel corridors add to the risk component for the possibility of a fire occurring from human causes. The time frame most conducive for fires to occur in the project area is from July through September.

Information from the Oregon Department of Forestry database from 1960 to 2009 shows a total of 197 fires have occurred throughout the project area. Lightning accounted for 35 percent of the total fires and human caused fires accounted for 65 percent of the total. Only 30 percent (60 fires) started on BLM-managed lands. Lightning accounted for 28 of the 60 fires that started on BLM-administered lands. 77 percent of the fires in the project area were less than one acre in size. One fire was greater than 100 acres in size and started on private property.

2. Effects of Past Management

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.

In the late 1990s, a landscape project was implemented in the Sterling Creek drainage. Approximately 2,500 acres of commercial timber lands were thinned from below in this drainage. These acres were followed up with prescribed burning. An additional 1,400 acres of oak woodlands and shrub lands were also treated in this drainage with manual work and prescribed fire. The total amount of BLM-administered land treated with fuels reduction work was approximately 4,900 acres, or 68 percent of the BLM-administered land in the Sterling Creek drainage. The fire hazard on the acres that were treated has been reduced, along with the chance of stand-replacement fires.

The majority of the timber stands (65 percent) in the Sterling Creek drainage were thinned in the late 1900s and followed up with prescribed fire. The major ridge lines in this drainage had fuel breaks established and maintenance burning has occurred over the past 10 years. Fuel loadings are low in these areas and the risk of stand-replacement fires in this drainage has been reduced.

a. Fire Suppression

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

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

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

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

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

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

For 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.

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

b. Logging

Commercial timber harvesting has occurred in the 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 resulted in stands of young, more flammable trees, contributed to the current fire hazard ratings for the fire analysis area. Other timber harvesting that thinned from below and reduced ladder, surface and crown fuels contributed to lower fire hazard ratings within the analysis area.

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

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

c. Fuels Reduction and Fire Restoration

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

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

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

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

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

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

Patterns of fuel treatments can affect fire intensity or rate of spread, and this topology has implications for designing landscape-level fuel-treatment patterns (Finney 2001). In the 2002 Hayman Fire in Colorado, many areas where fuels had been treated before the fire experienced lower-severity effects than adjacent untreated areas (Finney et al. 2002). Areas that had been commercially thinned and the slash removed by prescribed burning experienced lower-severity effects during the Squires Fire in Southern Oregon than untreated areas or areas that had been felled and bucked but the trees had not been removed and fuels treatments had not occurred. The same areas that had been thinned and burned also allowed firefighters to use direct attack measures due to the decrease in fire behavior. The cone fire of 2002, which burned in the cascade mountains of northern California, showed that stands that were thinned experienced lower fire severity than untreated stands (Skinner et al. 2008). It was also observed and documented that stands that were thinned from below and followed up with prescribed fire experienced the lowest fire severity and the fire dropped out of the crowns and died out after entering these stands.

3. Environmental Consequences

a. Alternative 1--No Action Alternative

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

The current trend of increasing stand density, which results in increased mortality to timbered stands, would continue on approximately 215 acres. Trees growing under these conditions often become weakened and are highly susceptible to insect epidemics and tree pathogens. High numbers of younger trees (mostly conifers) contribute to stress and mortality of mature conifers and hardwoods.

The proposed acres for commercial thinning and fuels reduction under the proposed action would not be treated; therefore, the fuels reduction objectives for the 215 acres that were not previously treated would not be met. Without treatment, the Condition Class of the 215 acres would continue to deteriorate to a Condition Class 3.

With no forest management activity, there would be no temporary increase in surface fuels from timber harvest activities. Although there would be no harvest-created slash, the existing surface, ladder, and canopy fuels would remain untreated for 215 acres.

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

b. Alternative 2

The purpose of vegetation treatments under the proposed action for the 215 acres that were not thinned in the past is to reduce vegetative horizontal and vertical structure and to increase fire resiliency.

Discussions for the proposed action reflect the direct and indirect impacts of the activities associated with Alternative 2. The discussion of effects also includes cumulative impacts of those direct/indirect actions when added incrementally to actions past, present, and reasonably foreseeable.

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

Weather and topographic effects on fire behavior and severity are interrelated with the amount and distribution of fuels on a site with respect to the aspect, steepness of slope, and position on slope, along with atmospheric elements of temperature, relative humidity (in relation to fuel moisture) and wind speed and direction. When the environmental and atmospheric conditions are conducive to drying fuels and/or heating them to the ignition point during a fire, we refer to them as "available fuels". The interrelationship between slope and wind 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 are no adverse effects to the vegetation or other site qualities. For example, in some desert areas where vegetation is sparse and extreme fire weather is the norm (high temperatures, low relative humidity, windy and unstable atmospheric conditions), fires often don't spread except under unusual wind conditions due to the lack of continuous fuels. Thinning treatments proposed under the proposed action 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 (SNEP 1996). Treatments designed to reduce canopy fuels through density management increase and decrease fire hazard simultaneously. Slash generated from the commercial thinning of timber stands (if not treated) would create surface fuels that would be greater than current levels. The existing surface fire behavior fuel model in the majority of stands proposed for commercial thinning is represented by a Timber Group fire behavior fuel model. Fuel amounts are measured in tons per acre for different size material. Material up to 3 inches in diameter has the greatest influence on the rate of spread and flame length of a fire, which has direct impacts on fire suppression efforts.

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

Utilizing the modeling tool BEHAVE (with the parameters of a 6 mph wind speed and one-hour fuels moisture of 6%), flame lengths in a slash fuel model are four feet compared to a one-foot flame length in a Timber Litter model. Direct attack can be used under both of these scenarios. The rate of spread of a fire increases by 5 chains per hour in a slash fuel model. The size of a fire in a one hour period for a fire that is not suppressed would be 0.3 acres in a timber fuel type, versus two acres in a slash fuel model.

Fuels treatments for stands that are commercially harvested are proposed for treatment within one year after a unit is harvested. Treatments would take place where slash three inches in size and less exceeds 5 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. Under the proposed action, approximately 379 acres would be handpiled and burned. In the Sterling Creek Drainage, 229 acres are proposed for treatment with group selections. Approximately 20 percent of the 229 acres (46 acres) would be treated.

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.

Thinning treatments are followed with prescribed burns. The reduction in stand density would make it possible to use prescribed fire as a tool to further reduce fire hazard in these stands. 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 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.

In a study on the effects of thinning on fire behavior, Graham et al. (1999) concluded that "depending on intensity, thinning from below and possibly free thinning can most effectively alter fire behavior by reducing crown bulk density, increasing crown base height, and changing species composition to lighter crowned and fire-adapted species." Thinning, accompanied by removal of thinning residues and slash, and followed by periodic prescribed burning, are effective (Omi and Martinson 2002; Pollet and Omi 2002; Agee 1993; Graham et al. 1999; VanWagtendonk 1996). Treatments that result in forests with a lower density and larger trees show lower potential for crown fire initiation and propagation and for less severe fire effects (Pollet and Omi 2002).

Anecdotal observations should not be applied the same as rigorously tested scientific study, but they can be used to report and interpret trends. Anecdotal evidence on the 2002 Squires Fire, which occurred in Southern Oregon, showed that treatments to reduce fire behavior may have merit. Fire weather conditions during the Squires Fire, as measured by the Energy Release Component Indices, was in the 89^{th} to 90^{th} 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. Mortality to the residual stand was minimal due to the decreased fire behavior.

Fire Resiliency

A forest that is fire-resilient has characteristics that allow it to readily recover from a fire event. A forest's resiliency to fire can be increased by applying fire safe principles. This means managing surface fuels to limit the flame length, removing ladder fuels to keep flames from transcending to tree crowns where trees have no defense against fire; decreasing crown density making 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 thinning for 215 (of the 379 total) acres proposed for treatment 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. 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). The remaining 164 acres that are proposed for treatment have been thinned from below in the past. The proposed action for these acres would have little-to-no-impact on fire resiliency of these stands.

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, resulting in less tree mortality in the event of a surface fire. Commercial thinning would also favor more fire-resilient 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 , they are all designed to retain healthy large trees (see Chapter 2). The maintenance of pine species on dry Douglas fir and pine sites contributes to the fire resiliency of forest stands. The larger the ponderosa pine, the greater its resilience to fire due to increasing bark thickness (Agee 1993; Agee 1996). Its bark is one of the key defense mechanisms against mortality from low intensity fire. Thus, removal of larger non-pine species in this context actually improves the ecological role of fire and subsequent fire resiliency of the stand. Although some large trees would be removed for disease management, 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 project area as a whole is improved due to the overall reduction in fire hazard within treatment units.

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

In the study *Patterns of Fire Severity and Forest Conditions in the Western Klamath Mountains, California*, Odion et al. (2004) found closed-canopy forests had less high-severity fire than open-canopy forests and non-forest vegetation types. Based on this finding, they also concluded that a long absence of fire is also a predictor of low severity fire effects. However, this study used no local and specific weather data except for an acknowledgement that a multi-year drought preceded the 1987 wildfires. The well-known inversion conditions during these fires may have had a distinctive effect on the way these landscapes burned (Martin 2005).

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

<u>Changes in micro-climate and effectiveness of fuels treatments</u>

Management of forest stands can result in altered microclimates (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 National Forest in northwest CA burned more intensely and suffered higher levels of tree mortality than unlogged areas (Weatherspoon and Skinner 1995). The partial cuts they examined were typically overstory removals, where large (mature and old growth) trees were removed, leaving smaller trees. The study simply validates that smaller trees, due to thinner bark and crowns closer to the ground, will suffer more damage than large trees. Logging slash was not treated in the study areas. The proposed action for this project proposes to treat slash generated by the treatments, and forest thinning would harvest some commercial sized ladder fuels.

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

Effects of canopy reduction on fuel moistures
Silvicultural prescriptions proposed for stands under the proposed action vary in how much canopy cover will remain after commercial thinning occurs. Under the proposed action all the acres proposed for treatment will have a canopy cover of less than 60%.

Estimates of fuel moisture can be made from the measured ambient air temperatures and relative humidity within a stand. The following example is used to demonstrate the effects of canopy cover on fuel moistures. An ambient air temperature of 90-109 degrees F and a relative humidity of 15-19% would result in a 3% fuel moisture for 1-hour time lag fuels. The fuel moisture of 10-hour fuels would be 5% and the 100-hour fuel moisture would be 7%.

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

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

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

Smoke Impacts
This proposed action proposes to use prescribed fire, and consequently, there would be some smoke-related impacts. Under the proposed action, prescribed burning would comply with the guidelines established by the Oregon Smoke Management Plan (OSMP) and the Visibility Protection Plan. Prescribed burning under this alternatives is not expected to affect visibility within the Crater Lake National Park and neighboring wilderness smoke sensitive Class I areas (Kalmiopsis and Mountain Lakes Wildernesses) 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, under this alternative, is not expected to adversely affect annual PM2.5 attainment within the Grants Pass, Klamath Falls, and Medford/Ashland SSRA. Any smoke intrusions into these areas from prescribed burning are anticipated to be light and of short duration.

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

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

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

Smoke emissions and effects are further reduced because proposed burn sites would include mop-up to be completed as soon as practical after the fire, and hand piles would be covered to keep the material dry to permit burning during the rainy season when there is a stronger possibility of atmospheric mixing and/or scrubbing, thus dispersing the smoke.

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

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

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

Fall versus Spring Underburning

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

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

Burning in the fall with high surface fuel loadings would have adverse impacts to numerous resources due to fires being of higher intensity. Large down woody debris consumption is higher in the fall. Duff consumption is higher and soil heating also tends to be higher. Mortality to the residual stand, as well as other vegetation, is higher due to higher intensity fires and low live fuel moistures. 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 (0.25" - 3") and to retain the majority of large down woody debris due to the higher dead fuel moistures. Soil moisture is also higher in the spring, resulting in minimal duff consumption. 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 wide and are waterbarred to minimize soil erosion. Re-growth of vegetation on the firelines normally occurs within one growing season. Mop-up operations are normally limited to a 100-foot perimeter around a burned unit. Soil disturbance is scattered in localized areas within this perimeter. Because prescribed fire will occur in the spring if fall burning conditions might result in unwanted intensities, damage from prescribed fire will be minimal due to higher moisture levels, and benefits from prescribed fire will be maximized.

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

c. Alternative 3

Alternative 3 (the No Road Alternative) would treat 58 less acres. These acres that would not be treated are stands that have not had previous fuels reduction. Under this alternative, effects for the remaining 321 acres are the same as discussed for Alternative 2.

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

Without treatment, the condition class of the 58 acres would continue to deteriorate to a condition class 3. With no forest management actions, there would be no temporary increase in surface fuels from timber harvest activities. Although there would be no harvest created slash, the existing surface, ladder, and canopy fuels would remain untreated for these acres.

D. SOIL RESOURCES

1. Affected Environment

The project area (approximately 11,330 acres) is located in the upper reaches of the Bear Creek Fifth Field Watershed (231,246 acres) and the Little Applegate Fifth Field Watershed (72,295 acres). Of the total project area, 7,090 acres are BLM-administered lands.

The dominant soils series identified in the project units are Caris, Offenbacher, Jayar, McMullin, Vannoy and Voorhies. The topography in the project area is mainly hillslopes ranging in slope between about 5 and 75 percent slope. Elevation ranges between 2,000 and 5,000 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. Description of Soils Series

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

Table 3-8. Soil Series and Characteristics Within Proposed Harvest Units

Map Unit #	Soil Series Name	Depth (in.)	Soil Texture	Soil Sensitivity Category
25, 26	Caris	31	Gravelly loam, very gravelly clay loam, extremely gravelly loam	1 (S), 2
25, 26	Offenbacher	34	Gravelly loam, loam	1 (S), 2
87	Jayar	31	Very gravelly loam, Extremely gravelly loam	1
113	McMullin	< 20	Gravelly loam, gravelly clay loam	1
195, 196, 197	Vannoy	38	Silt loam, clay loam	3
197	Voorhies	36	Very gravelly loam, very gravelly clay loam, very cobbly clay loam	3

Abbreviations:
1= (highly sensitive): burn only in spring-like conditions when soil and duff are moist. Maximize retention of duff layer. Assure retention of minimum levels of coarse woody debris and recruitment of snags as specified in the Standards and Guidelines.
2= (moderately sensitive): burn only in spring-like conditions when soil and duff are moist. Maximize retention of duff layer. Assure retention of minimum levels of coarse woody debris and recruitment of snags as specified in the Standards and Guidelines. Write fire prescriptions that reduce disturbance and duration and achieve low fire intensity.
3= (least sensitive): burn to avoid high intensity (severe) burns to protect a large percentage of the nutrient capital. Maximize retention of duff layer. Assure retention of minimum levels of coarse woody debris and recruitment of snags as specified in the Standards and Guidelines (USDI 1995, p. 168).
S= slopes ≥ 65%

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

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

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

Jayar Series
The Jayar soil is moderately deep and well-drained. It formed in colluvium weathered from altered sedimentary and extrusive igneous rocks. Typically, the organic horizon is 0 to 1 inches thick with a loose litter of needles, leaves, bark and lichen. The surface layer, approximately 3 inches thick, is a very gravelly loam. The subsoil, approximately 28 inches thick, is and ranges from very gravelly loam to extremely gravelly loam with depth. Bedrock is at a depth of 31 inches and consists of fractured metamorphic rock. Permeability is moderate in the Jayar soil. Slopes range from 12 to 90 percent in the project area but are lower than 65 percent in the project units.

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

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

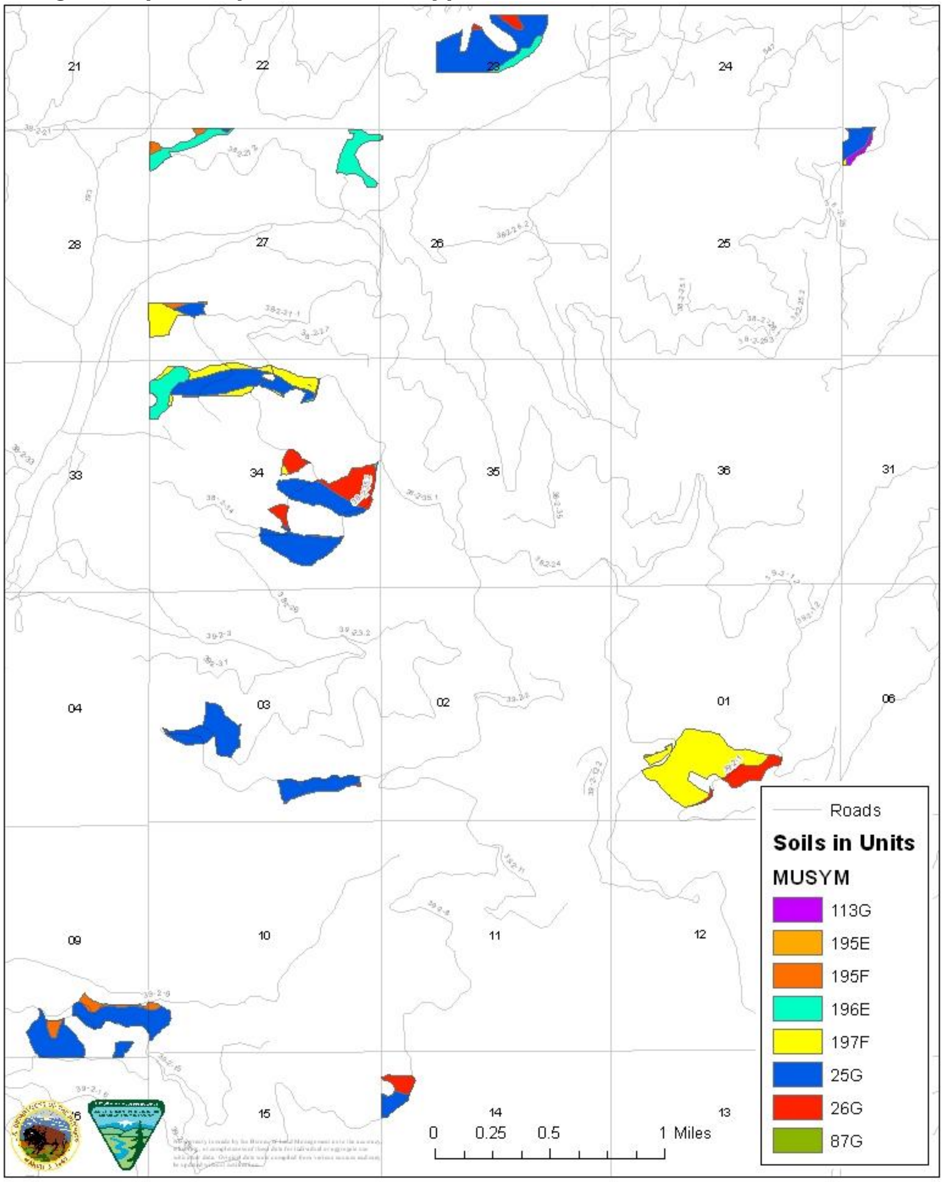
It is estimated that the natural erosion rates for soils in the Klamath Mountain Range to be about 0.13 yd^3/ac/year and erosion rates increased in harvest areas to 0.89 yd^3/ac/yr (in Amaranthus, 1985, p.233). Erosion rates are highly dependent on the intensity and amount of rainfall that a particular 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 project area consists of slopes ranging from around 20 percent to 75 percent (with slopes less than 65 percent in proposed units) with a very slight potential for landslides. For this reason it is anticipated that erosion rates in the project area to be much less than those reported by Swanson and should not be of concern.

b. Roads

There are approximately 101 total miles of road in the 11,330 acre analysis area. Approximately 55 miles of the existing roads are confirmed 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). Additionally, there are about 25 miles of road not catalogued or designated within the BLM general transportation network system (GTRN). These non-GTRN roads are more concentrated on the outer portion of the project area in private or state 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 ungraveled 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.

Map 3-1. Sterling Sweeper Project Area Soil Types



c. Soil Productivity

Soil is a fundamental resource that controls the quantity and quality of such renewable forest resources as timber, wildlife habitat, forage, and water yield. Soil productivity is the inherent capacity or potential of a soil to produce vegetation, and the fundamental measure of soil productivity is the site's carrying capacity for plant growth. The key properties directly affected by management are site organic matter (OM) and soil porosity. These two properties regulate critical site processes through their roles in microbial activity, soil aggregate stability, water and gas exchange, physical restrictions on rooting, and resource availability (Powers 2004 p.194). Although other factors such as water regimes, soil biological types and populations, and soil loss 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 (rain). Organic matter is the ultimate source of substances that bind soil particles together into stable aggregates that resist erosion. Through its carbon compounds, organic matter constitutes the energy source for soil fauna and microbes and is a concentrated reservoir of plant nutrients supplied to the soil.

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

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

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

d. Past Actions

An inventory of past actions with harvest dates and units of treatments was made for the analysis 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. Approximately 40 acres of the project area does not have past action data.

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, 2005 and 2010. 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 stream sedimentation impacts. Many of the roads have been poorly maintained and have been degraded as a result of use during the wet season. Clearcutting and broadcast burning in the 1980s created highly erosive conditions, especially when ground-based yarding systems were used without much regard for the location and number of skid trails, and/or tractor-piling of slash was incorporated. These sites have been re-established with vegetation and, save for roads, erosion rates are near natural levels.

In the project area, approximately 6,650 acres of the total area (11,290 acres [excluding the 40 unknown acres]) has been logged at some time in the past. Areas that have not been logged are either agricultural land, have no evidence of logging, non-forest land (i.e. meadows, shrubland, oak woodland) or residential land. Of the 6,650 acres previously harvested, 3,732 acres were last tractor harvested, 2,023 acres were cable or skyline harvested and 894 acres were helicopter harvested.

It is estimated that most of past tractor harvest occurred before 1980 and was not on designated skid roads. Timber harvest after 1980 required the use of designated skid roads in order to reduce the amount of unit area compacted. It is assumed that tractor units harvested after 1980 on BLM-administered land are below the 12 percent areal compaction threshold. Since 1970, 2,931 acres have been tractor harvested on all lands in the project area. The remaining 801 acres were tractor harvested prior to 1970.

Approximately, 1,050 acres of the total tractor yarded area (3,732 acres) was logged after the 1980s on BLM-administered land; this area is assumed to be under the 12 percent compaction threshold. The remaining 379 acres of BLM-administered land between 1970 and 1980 (in addition to all private or state land after 1970 [1,502 acres]) is likely over 12 percent aerial compaction on a unit by unit basis. In total, it is estimated that 1,881 acres out of the total 11,330 acres are over 12 percent compacted (approximately 16.6 percent of all lands and 3.3 percent of BLM-administered land).

The BLM-administered lands that were logged between 1970 and 1980 and are considered over the threshold are not being harvested in the Sterling Sweeper timber sale.

Most of the harvesting before the 1970s (1,520 acres) was in the form of single tree selection or group selection, removing the biggest and most valuable trees. During the 1970s and through the 1980s, clearcutting was implemented and was often followed by broadcast burning of the logging slash on the site. During the 1980s on BLM-administered lands, tractor harvesting was restricted to designated skid trails that would impact about 12 percent of the harvest area. It is estimated that unrestricted tractor logging resulted in about 25 percent of the area being compacted.

It is difficult to predict compaction's effects on soil productivity because of all the variables, but McNabb and Froehlich (1983) estimate that stand growth losses can range from 5 to 13 percent and compaction's effects can last 30 years. Luckow and Guldin, in a compaction study of Arkansas forest, found evidence that old disturbance areas have partially self-mitigated since the previous harvest entry. The old disturbance compaction observed in this study was caused from harvest equipment activities that occurred at least 15-20 years earlier. Old disturbance areas are composed of secondary or primary skid trails and areas that received 1-2 equipment passes. They estimate it would take from 50-80 years for skid trail soil density levels to recover to near-natural density levels (2007). This estimated recovery period is in line with other findings. Perry (1964) estimated a 40-year recovery period for reduced infiltration rates on old compacted woods roads to approach natural rates on a southern Arkansas soil. For this reason, it is assumed that tractor harvested area prior to 1970 is considered recovered.

A 40-acre piece of BLM-administered land within the project area does not have information of past actions. Under Alternatives 2 and 3, there is a proposed 9-acre unit in this area. The unit will be cable logged; therefore, it is assumed that it is under the 12 percent compaction threshold.

2. 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 Sterling Sweeper project.

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

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

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

a. Alternative 1

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 project area, except in areas where roads and trails exist. The units that were harvested in the past have stabilized, with vegetation and erosion rates back to near natural levels. There is no way to be certain that possible future actions 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). 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 have on sedimentation in local waterways is included in the Water Resources (section C.1.a).

b. Alternative 2

New Road Construction

Two roads are proposed for construction in this project: Road 38S-2W-23.01 (0.36 miles) and Road 38S-2W-23.02 (0.05 miles) (Map 3-2 and Map 2-1).

Proposed road, 38S-2W-23.01 follows a ridge top, or is generally within 100 feet of ridge top (approximately 0.26 miles of road). This portion of the road is on the Vannoy soil series. The road then continues down the ridge and switchbacks above a dry draw (0.05 miles), with partial bench construction. The end of the road then would traverse down slope for a short distance (0.05 miles) along the adjacent ridge. This portion of the road is on the Caris-Offenbacher soil map unit. The total length of proposed road is approximately 0.36 miles.

Due to the position of the road (at or near ridge top) and extreme unlikelihood of the displaced eroded particles to travel downslope for a long distance, this road is not likely to have adverse effects to soil displacement. The high clay accumulation, depth and slope position of the Vannoy soil are indicators that the soil is relatively stable and cohesive. The partial bench will require endhaul.

Road 38S-2W-23.02 is a short spur road on gentle topography. The road is on or near an upland ridge. The road is on the Caris-Offenbacher soil map unit. Due to the gentle topography (generally 25 percent), the amount of soil displaced is expected to be minimal. BLM is effectively minimizing this risk by laying out roads on gentle ridgetop ground. The construction of this segment of road would take approximately 0.20 acres out of vegetative productivity.

Soil erosion from the new road, temporary route and landing is expected to be avoided or minimized for the following reasons:

- Seasonal restrictions during all road construction activities would reduce the potential for runoff and erosion from intensive winter storms and saturated soil conditions.
- Road location: New roads and spur are on an upland ridge.

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

Road construction would have the greatest impact on the soil resource as approximately 4 acres of land are disturbed and taken out of vegetation production for every one mile of road construction proposed. Approximately 1.64 acres will be taken out of vegetation production through the construction of the two roads (road 35S-2W-23.02 is 0.05 miles and 38S-2W-23.01B is 0.36 miles).

There would be a noticeable increase in soil erosion the first few significant rain events after construction. Erosion rates from roads and landings on the Klamath Mountains geomorphological unit (similar to that of the analysis area) were reported to be about 14.51 $yd^3/ac/yr$ (Swanson and Dyrness [1975] in Amaranthus et al. 1985). This total includes mass slope failures from roads and landings on unstable slopes in calculating the number. Because most of the newly proposed road construction would be located on stable slopes it is anticipated that, under average rainfall conditions, the erosion rates would be less than one-half of those reported by Swanson (<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 the roadbed is graveled or compacted. Soil loss from fully graveled roadbeds was only 3 to 8 percent of that from the bare soil roadbed of otherwise similar construction (Swift, 1988. p.321).

The temporary spur would be mainly on Caris-Offenbacher soils. The slopes range from 25 to 30 percent on a ridge that is approximately 200 feet wide. There is very little displacement expected for the temporary spur. The spur will be compacted and then decommissioned after use. Decomissioning will not return the soil to the original bulk density right away but seeding and mulching it will discourage soil displacement and begin to reintroduce organic material and rooting systems into the soil and facilitate the vegetative recovery of the soil.

The road construction and decommissioning project will follow the applicable best management practices from both the 1995 (p. 165) and 2008 (p. 283) Medford District ROD/RMPs.

A proposed mitigating measure for road 38S-2W-23.01B would be to end the road on the ridge, resulting in a reduction of new road construction by 0.2 miles. The proposed tractor swing system is on the Caris-Offenbacher soil map unit. This tractor swing would be decommissioned after use, which includes ripping, draining, seeding, mulching and scattering project slash to camouflage.

This mitigating measure would reduce the amount of acres removed from vegetative productivity (resulting from new roads) from 1.64 to 0.84 acres. It would eliminate the need for new partial bench construction. The tractor swing system would be on a broad upland ridgetop of slopes less than 25 percent. The mitigating measure would be less impacting to the soil resource than the road construction proposed under Alternative 2.

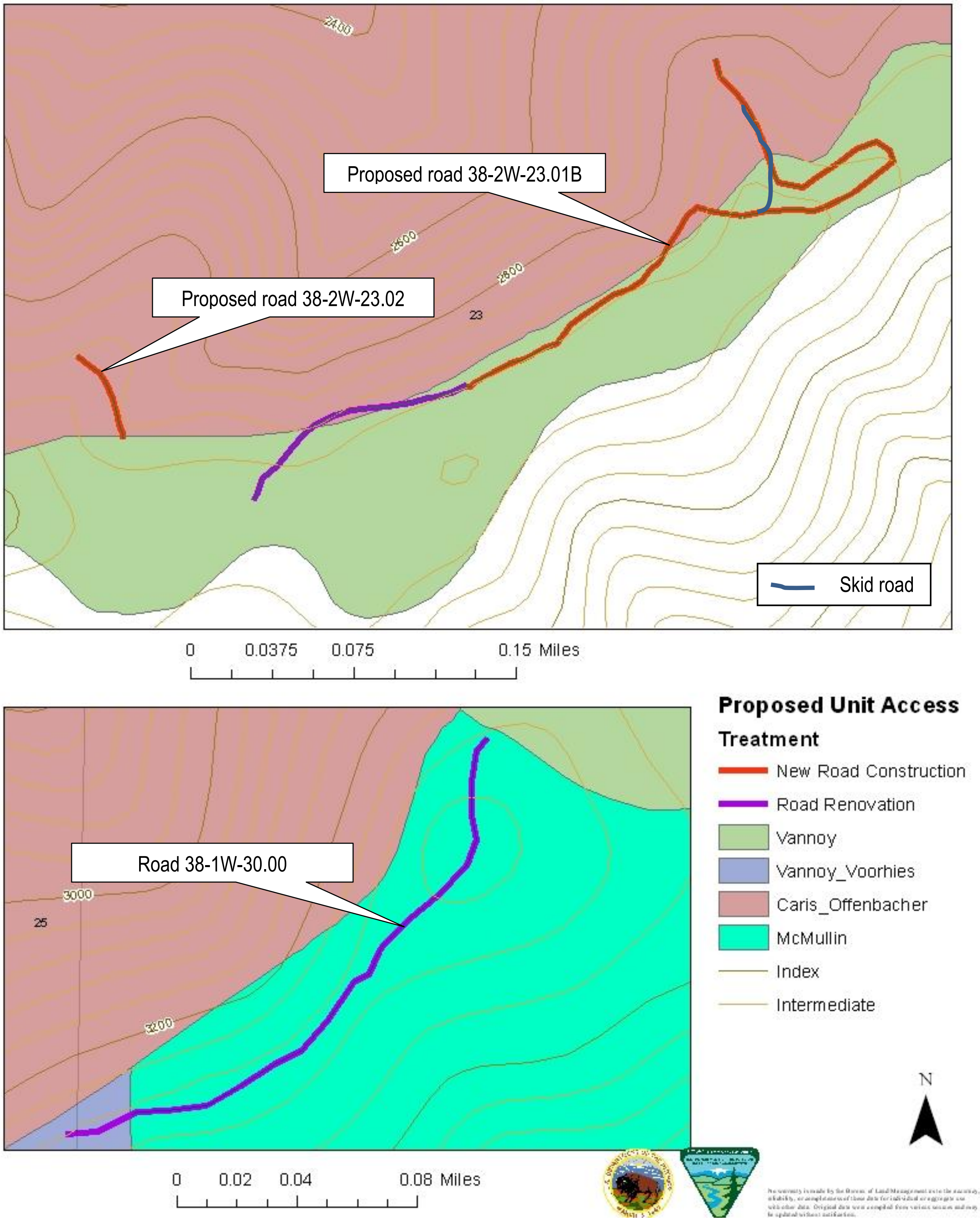
Road Improvements

Two roads are proposed for improvements: Road 38-2W-23.01A (0.15 miles) and road 38-1W-30.00 (0.21 miles). Improvements would include drainage improvements and soil stabilization. The roads will follow the 1995 and 2008 Medford District ROD/RMP and the 2010 best management practices for roads.

Road 38-2W-23.01A connects to proposed road, 38-2W-23.01B. It is natural surfaced, on private land and was not constructed using the current best management practices. Currently, there is an existing route approximately 10 feet wide with cut and fill (the cut is over 5 feet deep). The location is on approximately 45 to 60 percent slope just below the ridge on primarily the Vannoy soil series, with a small area of Caris-Offenbacher. The width of the route needs to be widened to accommodate truck traffic. Additionally, the current road contains excess material on the fill slope. This material, as well as additional material removed during renovation will be endhauled to a suitable disposal site. This will be an improvement to the current condition because the slopes are high enough that the excess soil currently in place has been shifting downslope. By removing the excess soil material, the road will be upgraded to the current Best Management Practices (BMPs).

Road 38-1W-30.00 begins on Vannoy-Voorhies soil map unit (approximately 0.02 miles of road) and ends on the McMullin rock outcrop soil map unit (0.19 miles). The road improvements that would occur consists of roads that have had little use and or maintenance in the recent past and need more work than standard maintenance improvements. Improvements may include removing brush or trees from the running surface of the road. Soft spots would be fixed with filter fabric in conjunction to the spot rocking to restore the road surface. Ditches could need continuous cleaning rather than just spots. A portion of the road proposed for improvement has a grass surface and erosion rates are currently near normal. Road renovation would increase erosion in the local area, but the topography of the proposed renovation is very gentle and no off-site erosion is anticipated.

Map 3-2. Soils within areas proposed for new road construction



Approximately 377 acres of BLM-administered land is proposed for management activities. Soil disturbance from timber harvesting is not avoidable, but can be minimized. Preventative measures are more effective in minimizing impacts on soils than remedial mitigation because of the remedial expenses, loss of productivity until mitigation occurs, and the possibility that the original soil conditions may never be restored (Miller et al. 2004). The commercial timber harvest activities planned in Alternative 2 would disturb, on average, about 15 percent of the ground in the proposed harvest units. As a result of implementing designated skid trails, the units tractor logged (36 acres) would result in approximately 12 percent or less of the area compacted (USDI 1995). Designating skid trails would minimize the area that would be deeply disturbed during tractor logging operations.

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

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. Most of the eroded particles would not reach waterways as a result of riparian reserve buffers, waterbars and the dispersal of yarding skid trails. The decrease in soil pore space as a result of the compacted skid roads causes a slower infiltration rate. On slopes less than 20 percent and skid roads that follow the contour, runoff velocity tends to be reduced and soil particles are transported only a short distance. Although erosion rates would increase initially in the harvested units, most soil particles would not reach local waterways under normal rainfall conditions; erosion rates would be expected to return to near normal rates within 5 years as vegetative cover is re-established. In most operations, a major portion of the harvest area would remain essentially undisturbed. Even logging systems that cause the most disturbances seldom bare more than 30 percent of the soil surface. Since surface erosion depends primarily on extent and continuity of bare areas, soil loss is usually slight (Rice 1972).

Group selection is prescribed for 229 acres. This would result in openings of ¼ to ½ acre in size. These openings would not have continuity with each other as stated above. These openings are dispersed throughout the unit so any displaced soil from one opening is expected to be intercepted by vegetation and organic material before it reaches another opening. The (BMPs) and project design features (PDFs) will be followed, and creation of the group selection openings would not result in soil productivity loss or detrimental soil displacement.

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 (in Beschta, online). There are no harsh or poor sites being treated in Alternative 2, as such sites were screened through the Timber Productivity Capability Classification process (USDI 1994) and taken out of the timber harvest base. It is estimated that there are approximately 101 miles of road that exist in the 11,330-acre project analysis area resulting in an average road density of 5.6 miles of road per square mile and about 404 acres of compacted area.

Prescribed burning planned under Alternative 2 would be in the form of handpile burning or broadcast burning. Broadcast burning would not occur in the group select units. As the broadcast burning planned in this project would be an underburn conducted only during spring-like conditions, the intensity of the burn would be light-to-moderate and have slight direct short-term effect on soil properties. A light surface fire will 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).

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 associated with the piles is completely consumed.

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

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

Cumulative Effects

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

Currently there are 101 miles of road in the project area. This would increase the number to approximately 101.3 miles over 11,330 acres.

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

It is estimated that about 254 of the 379 acres proposed for harvest have had some type of timber harvest in the past. Past harvest has included tractor, cable and helicopter yarding. Of the acres harvested, 43 of the acres that have been logged in the past were with tractors. The rest of the acres were harvested by cable and helicopter. The most recent harvest activity within proposed Sterling Sweeper units occurred in 1999, resulting in harvest of 104 acres by helicopter and cable; in 1998, 104 acres within proposed units were cable harvested. Prior to that, very small portions of the current units were harvested at a time, primarily utilizing both tractor and cable as harvest methods.

c. Alternative 3

This alternative proposes 321 acres of treatment, a reduction from proposed acres under Alternative 2 due to the lack of road construction and resulting elimination of units.

The prescription proposed would be the same as Alternative 2 for the remaining units. Logging systems and proposed fuels activities within proposed units would be the same as described in Alternative 2.

This alternative would be less impacting to the soil resources, as there would be no road construction or intensive improvement (a reduction of 0.31 miles of construction and 0.36 miles of improvement). Implementation of Alternative 3 would eliminate the amount of soil displaced (due to road construction/improvement) completely. Road 38-2W-23.01A (proposed for improvements under Alternative 2) would not be widened and hauled on. This road (route) currently does not follow current best management practices required for BLM roads. Leaving this road un may lead to more soil displacement than if it was improved to fit the BMPs required by the BLM.

In acres proposed for treatment under Alternative 3, the effects to the soil resource are the same as those described in Alternative 2. There would be less damage to soil resources in the absence of new road construction or improvements. Cumulatively, 1.64 acres (0.84 acres with the implementation of the proposed mitigation measure) out of the 11,330 acres in the project area would remain in vegetative productivity instead of becoming a road, and approximately 1.44 acres will not be disturbed through renovation/improvements proposed in Alternative 2. In addition, 54 acres will not be treated due to access. The total reduction of impacted areas is about 0.5 percent of the total project area.

E. WATER RESOURCES

1. Affected Environment

A watershed analysis provides general water resources background information for the project area. These documents are titled the *Little Applegate River Watershed Analysis* (USDI 1995) and the *West Bear Creek Watershed Analysis* (USDI 2001).

a. Analysis Area Description

The Sterling project area is located in the northeastern portion of the Little Applegate River watershed and the western portion of the Bear Creek watershed. Both are tributaries to the Rogue River. The planning/project area is smaller than the analysis area and for purposes of analyzing the affected environment and the proposed project, specifically cumulative effects, the analysis area for water resources will consider portions of Griffin Creek, Anderson Creek, and the Lower Little Applegate River. There is a small amount of harvest (11 acres) proposed within Larson Creek; however, no new roads will be constructed, nor will canopy cover be reduced below criteria used to assess potential changes in peakflows. Therefore, it is not included in this analysis.

These are called sub-watersheds and represent 6th field hydrologic unit codes (HUCs). These sub-watersheds are further subdivided into 7^{th} field HUCs called drainages, which range in size from 1,364 to 6,861 acres (Table 3-8). The total size of the analysis area is 19,765 acres (31 square miles) and consists of drainages where treatments are proposed. The size of a 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 occurring 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.

The analysis area is within Jackson County, and is a mix of public and private land (Table 3-9 and Map 3-3). Private lands make up the majority of the analysis area. BLM parcels are scattered and somewhat discontinuous. The affected sub-watersheds are Griffin and Anderson Creeks, which are tributaries of Bear Creek and the Lower Little Applegate River, which is a tributary of the Little Applegate River. Both are considered a 5th field HUC or watershed and eventually flow into the Rogue River. The analysis area is within a portion of "interior southwest Oregon". Elevations range between approximately 1,600 feet to over 5,100 feet along the Bear/Applegate divide in the south-central portion of the analysis area. The headwater areas of these drainages are steep and forested. As they flow towards their confluences with larger streams, the steep mountains gradually transition to gentle foothills, and then to lowland valleys.

The climate is characterized by mild wet winters and hot dry summers. Average annual precipitation ranges from approximately 21 inches in the lower elevations to 48 inches at nearby Wagner 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 (TSZ). 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.

The analysis area lies along the eastern margin of the Klamath Mountains Geologic Province and consists primarily of metavolcanic and metasedimentary rocks with minor amounts of sedimentary deposits draping the lower slopes. The landscape is deeply dissected and has a well-developed dendritic drainage pattern. Mass wasting and surface erosion are responsible for the majority of annual sediment transport to streams, although under natural conditions these processes are of minor concern except in isolated areas.

Private lands within the analysis area are generally used for timber harvest 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, fuels reduction, and recreation, which in some areas is a significant use on public lands. Regional public issues reflect the dominant uses of the analysis area and include concerns with recreational activities such as off-highway vehicle (OHV) use, concerns with timber harvest on private and public lands, concerns about fish and water quality, and concerns over general degradation of the natural environment.

As a result, the hydrology of the analysis area has been altered primarily through roads, timber harvest, and scattered residential development. The effects on channel morphology and flows are particularly evident in the lower more developed portions of the sub-watersheds where the stream channels are characterized as depositional. In the upper portion of the sub-watersheds, the impacts are largely the same, although the effects are somewhat different. Streams in this area are considered transport channels, whereas sediment is routed through these reaches, only to be deposited in lower gradient depositional reaches. Therefore, stream morphology may be less affected, although (as in the lower reaches) impacts to water quality and aquatic ecosystems still occur.

The major factors currently influencing both water quantity and quality within the analysis area where harvest is to occur include canopy cover and roads and trails, particularly those within riparian reserves. Reduced canopy cover within the upper forested portion of the drainages, especially within the TSZ 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. Although limited by steep, forested terrain, grazing along streams and within meadows can elevate stream temperatures and accelerate erosion by reducing streamside shade and altering channel form and process.

Table 3-9. Analysis Areas and Ownership Associated with the Sterling Project Area.

Sub-Watershed	HUC 7 (drainage)	Acres	BLM (percent)	Private/Other (percent)
Anderson Creek	0912	3,961	34	66
	0921	3,068	14	86
	Total	**7,029**	**24**	**76**
Griffin Creek	1103	6,861	22	78
Lower Little Applegate	0412	2,435	46	54
	0418	1,364	94	6
	0424	2,076	93	7
	Total	**5,875**	**78**	**22**
	Total (all)	**19,765**	**41**	**59**

b. Roads and Road Density

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 by altering hydrologic processes through both chronic and episodic erosion. Chronic erosion is where material is detached and transported to streams via the road prism 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 TSZ. Large failures 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 road density with riparian reserves are gross indicators of the level of road impacts in watersheds. High road densities, greater than 4.0 miles per square mile (USDI and U.S. Dept. of Commerce 2004; King and Tennyson 1984) are found in all of the drainages within the analysis area (Table 3-10). 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.

From data derived from BLM GIS information, there are approximately 205 miles of managed GTRN roads, representing all ownerships and jurisdictions within the Analysis Area. Of these, approximately 38 percent are surfaces, 12 percent are unsurfaced, and 50 percent are of an unknown surface type. For the 78 miles located on BLM-administered land within the Analysis Area, approximately 77 percent are surfaced and 23 percent are unsurfaced. All roads proposed for haul routes are surfaced; see Tables 2-3 and 2-8. In addition, 25 miles of the BLM roads are administratively closed via gates, barricades or other closure devices, which are currently effective in precluding un-authorized vehicular use (Hass 2012). In addition to managed roads, non-GTRN roads consisting of user-created routes, old logging roads, jeep trails, driveways, etc. were assessed through aerial photo analysis. A total of 66 miles were identified, with 12 percent located on BLM lands and the remaining 88 percent located on private or other lands. Much of this total is located within the lower portions of the drainages where rural homesites occur. In addition, approximately 29 miles of OHV routes on BLM-administered lands have been identified from previous inventories within the analysis area, some of which are included within the non-GTRN total mileage amounts.

Some of these 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. Riparian road densities are particularly high, likely the result of steep dissected terrain and many roads being located within valley bottoms.

Although some road work has been accomplished, crossings can be susceptible to failure through culvert plugging and stream diversion. 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 a network of OHV trails. These features often utilize old road beds or are established through repeated off-road travel, or illegally constructed by enthusiasts. They exist on the landscape irrespective of sensitive soils, adequate drainage, or proximity to watercourses and are also responsible for increased sediment production.

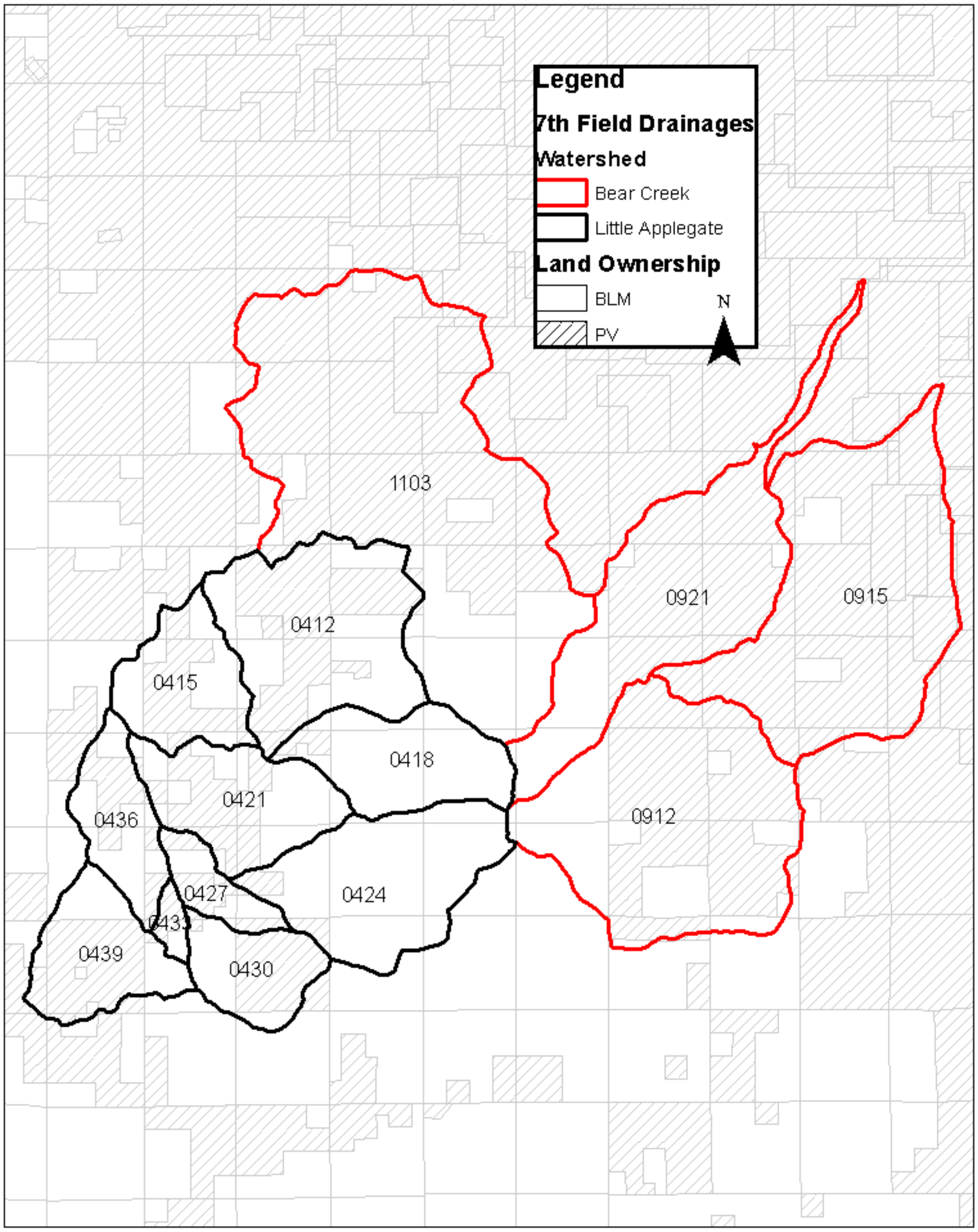
Table 3-10. 7th Field Road Densities and Road Densities within Riparian Reserves by Ownership.

Sub-Watershed	HUC 7 (drainage)	Road Density (miles/square mile) [1]			Road Density within Riparian Reserves (miles/square mile) [1]		
		BLM	PVT/ Other	Total	BLM	PVT/ Other	Total
Anderson Creek	0912	5.2	5.2	**5.2**	4.7	7.7	**7.2**
	0921	4.2	4.5	**4.4**	5.8	5.8	**5.2**
Griffin Creek	1103	7.2	10.0	**9.4**	8.0	12.6	**10.4**
Lower Little Applegate	0412	6.1	9.0	**7.6**	6.0	14.6	**12.6**
	0418	5.8	4.5	**5.7**	11.6	4.7	**10.0**
	0424	4.3	10.3	**4.7**	5.9	2.5	**7.2**

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

The majority of tributaries in the Anderson, Griffin, and Lower Little Applegate sub-watersheds, which comprise the 7th field HUCs analyzed have steep gradients, often greater than 10 percent. The channels are naturally entrenched with steep sideslopes. Material is quickly moved through these reaches and deposited within the lower reaches as the gradient flattens

Map 3-3. Sterling Sweeper Analysis Area



c. Canopy Cover and Transient Snow Zone

Historically, geomorphic processes that shape landscape and channel geometry are triggered by large, infrequent storm events. In recent times, these events can be characterized by warm moist storms that result in high intensity, long-duration rainfall. The results can be intensified when rainfall occurs on an established snowpack. The percent of a watershed in the transient snow zone (TSZ), for Sterling 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 percent of the drainage area are of hydrologic concern, particularly where large openings such as clearcuts exist. The TSZ occupies 37 percent of the Anderson drainages, 14 percent of the Griffin drainage and 40 percent of the Lower Little Applegate drainages (Table 3-11). Large areas of vegetation removal in the TSZ are of particular concern due to alterations of the streamflow regime and the potential for resultant increased peak flow magnitudes (Christner and Harr 1982).

Table 3-11. 7th Field HUCs Percent within TSZ, Percent Less Than 30% Canopy Cover (CC) and Percent Less Than 30% Canopy Cover within the TSZ.

Subwatershed	HUC 7 (drainage)	Percent Forested Area Less Than 30% CC[1]	Percent within TSZ	Percent Forested Area Less Than 30% CC within TSZ [1]
Anderson Creek	0912	2.4	53.5	2.0
	0921	0.2	19.4	> 0.1
Griffin Creek	1103	15.5	13.7	9.1
Lower Little Applegate	0412	2.1	13.1	0.0
	0418	12.5	57.2	9.2
	0424	3.9	49.4	0.3

[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 (WPN 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. Table 3-10 summarizes percent of forested acres within the drainages that are below 30 percent canopy cover, percent within the TSZ, and percent of the forested area that is below 30 percent within the TSZ.

Different levels of harvest in watersheds have demonstrated variable effects on peak flows (Wemple et al. 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 clear-cut harvesting, many in areas that removed close to 100 percent of the overstory canopy. For this analysis, any area where 30 percent or greater of the forested acres is less than 30 percent canopy cover is assumed to be hydrologically altered and responds similar to a clearcut. This is particularly true if a large percentage of the drainage is located within the TSZ. Although proportions of these drainages have been previously harvested, including clearcuts, vegetative recovery provides for a relatively continuous canopy over much of the area. All drainages analyzed are well below the established thresholds where peakflows may be affected.

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 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). This suggests that if increases in peak flows occur, they are unlikely to result in adverse effects to the higher gradient channels located within the analysis area. Also, that peak flows are only detectable in smaller storm events with return periods of 6 years or less, where channel forming processes are minor in effect.

d. Surface Water

Surface water in the Sterling Sweeper analysis area includes streams, ditches, springs, wetlands, and reservoirs. Streams in the project area are classified as perennial, intermittent with seasonal flow (long duration intermittent), intermittent with ephemeral flow (short duration intermittent), and dry draws with ephemeral flow. Streams categorized as perennial or intermittent 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; USFS and non-federal land stream types were estimated using aerial photo interpretation and extrapolation from information on adjacent BLM-managed lands. For this analysis, the site potential tree heights used for establishing riparian reserves are 155 feet for the Little Applegate Watershed and 160 feet for Bear Creek Watershed.

e. Grazing

Cattle and sheep were introduced in the area in the mid-1800s with relatively heavy livestock use continuing until the early 1900s. They tended to concentrate along the lower stream courses and likely caused streambank deterioration as they moved in and out of channels. Some livestock grazing is currently occurring on private lands in the analysis area; however use is limited by the steep forested terrain and lack of suitable forage. 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 magnified 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.

f. Harvest History

Within the upper watersheds where harvest is proposed, the primary concerns are lack of riparian shade and large wood recruitment from 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. Any altered stream temperatures 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 primarily from past logging. Stream temperatures on Federal lands are expected to improve as Riparian Reserves promote the maintenance and improvement of streamside vegetation on BLM-administered lands.

g. Fuel Loading

Within the forested portions of the watersheds, fuel-loading beyond historic conditions has increased the potential for high intensity wildfire. Although humidities 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.

h. Water Quality

Within the analysis area two streams are, or have been, listed by the Oregon Department of Environmental Quality (ODEQ) as water quality limited. Griffin Creek is currently designated as water quality limited (303 (d)) for fecal coliform (mile 0-14.4), of which 1.4 miles flows through BLM-managed lands. Sterling Creek was listed as water quality limited (303 (d)) for summer temperature, but was subsequently delisted in 2004 following approval of the Applegate Total Maximum Daily Load (TMDL) (ODEQ, 2003b).

i. Groundwater

Groundwater supplies in the analysis area are limited due to the low permeability of the rocks found in the majority of the analysis area. In the lower portions, sand and gravel materials are more permeable; however, these materials are too small in extent to be major groundwater sources. 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 Sterling Sweeper analysis area has been identified as a critical groundwater area by the Oregon Water Resources Department (OWRD 1989).

2. 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 Sterling project. Discussion for Alternative 2 and 3 reflect the direct and indirect impacts of the proposed actions. Effects discussion also includes cumulative impacts of those direct/indirect actions when added incrementally to actions past, present, and reasonably foreseeable. Short-term effects are defined as those lasting ten years or less and long-term effects last more than ten years (USDI 1994:4-4).

As part of an assessment of cumulative effects, a discussion of reasonably foreseeable future activities combined with those of the action alternatives is included. Below is a summary of those actions that may occur with reasonable certainty. The Affected Environment section (section 3.C.1) summarizes present conditions and effects.

Future timber harvest on private lands would likely occur within the planning area and this analysis assumes 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 4,872 acres of private timberland within the analysis area is predominantly 60 years old or older and may be available for harvest. The drainages with the highest number of those acres are 0912 and 1103 which contain 969 (24% of drainage) and 2,869 (42% of drainage) acres, respectively. Of those, a small amount of timber harvest on Federal land (BLM) has recently occurred within Anderson Creek (HUC 0912) as part of the Wagner-Anderson Sale. Approximately 30 acres were cable logged, however canopy cover was not reduced below 30 percent and no new permanent roads were constructed. HUC 0912 is currently at 2.4 percent canopy cover less than 30 percent and 2.0 percent within the TSZ. These numbers are considered low, and as a result increased harvest on private land could be accommodated without approaching the 30 percent threshold that may increase risk. However, if new road construction is initiated, this could elevate already high road densities and result in an increased risk of adverse effects.

a. Alternative 1

There are no actions proposed under Alternative 1 (No Action Alternative); therefore, direct and indirect effects are the current conditions in the analysis area which are the result of past actions not related to the Sterling Sweeper project. All current conditions and trends will continue as specified in the description of the affected environment (section 3.C.1). 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 in-stream wood.

Over time, vegetation recovery on BLM-managed lands 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.

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

Fire Risk
Given these impacts, effective climate change adaptation strategies will need to focus on maintaining watershed resiliency. Under this alternative, although much of the BLM-administered lands have been treated to reduce fuel levels and continuity, given the right conditions a high intensity wildfire over part or all of the area may occur. Should this happen, it could alter the surface water and groundwater regime. Immediately after a severe fire, the loss of vegetation would make more groundwater available for streamflow and low summer flows would likely increase. However, the absence of vegetation may also result in an increased risk of higher peak flows and increased erosion.

b. Alternative 2

This alternative proposes various prescriptions of commercial tractor and cable timber harvest, new road construction, and road renovation. In addition, depending on post-harvest conditions, activities would be followed up by fuels treatments that would entail hand thinning, piling and burning.

A total of 0.41 miles of new road construction and 0.36 miles of road renovation are proposed, none of which would occur within riparian reserves. In addition, road maintenance (including spot rocking and drainage improvements) would be implemented as necessary.

Vegetation Treatments
All vegetation treatments would maintain an overstory and mosaic of understory vegetation where at least 30-50 percent canopy cover would be maintained except for units identified as group selection. Within these units, up to 20 percent of the area may be treated. It is estimated that a total of 46 acres would likely be reduced below 30 percent canopy cover within the harvest units. There would be a slight increase in percent canopy cover less than 30 percent within the analysis area in drainages 0412, 0418 and 0424 (Table 3-12). These are the drainages where group select harvest would occur; however, currently all drainages are well below levels, including the TSZ, where peak flows may be affected. Baseflows would likely remain unaffected as the magnitude of vegetation removal would not significantly reduce transpiration. Since there is no harvest proposed within riparian reserves, stream temperatures would not be affected by the proposal and the project is in compliance with the Aquatic Conservation Strategy (ACS).

Table 3-12. 7th Field HUCs Percent Less Than 30% Canopy Cover (CC) by Alternative.

Subwatershed	HUC 7 (drainage)	Alternative 1 Percent Forested Area Less Than 30% CC[1]	Alternative 2&3 Percent Forested Area Less Than 30% CC[1]
Anderson Creek	0912	2.4	2.4
	0921	0.2	0.2
Griffin Creek	1103	15.5	15.5
Lower Little Applegate	0412	2.1	3.8
	0418	12.5	13.1
	0424	3.9	4.7

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

Fuels Treatments
Where fuel treatments occur, tree thinning and low intensity underburning and pile burning would retain a mix of hardwoods and conifers, organic duff layer, leaf litter, and coarse wood debris. Collectively these forest components provide nutrients, bacteria and fungi decomposers, and mycorrhizae to maintain long-term site productivity. Additionally, fuels treatments would likely occur over a period of years, distributing activity over time. These activities would not appreciably decrease canopy cover as only small diameter vegetation would be cut, piled and burned.

Roads and Road Construction
Sediment levels due to roads, past harvest and other disturbances is the primary focus of concern. In addition to road construction and renovation, 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 will become an immeasurable fraction of the total sediment load and would not be detectable at downstream locations.

Road construction has the potential to increase sediment production, as well. Compared to the existing road system, the amount proposed is minor in extent and would not measurably increase road density and the compacted area attributed to roads. An indirect effect that is difficult to quantify is OHV use following harvest. In areas not already closed by gates or other measures, OHV use of skid trails and other features such as previously closed roads has been observed. 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. However, the probability that OHV use will increase is low because most of the tractor harvest units where use is likely is behind locked gates, and cable harvest units are generally less-suited for OHV use. In addition, PDFs designed to discourage this type of use are included in the project proposal.

Actions included in this proposal that have a higher probability of sediment delivery include road use and maintenance, cable and tractor yarding, and road construction. All of the proposed new road construction and renovation is located near or along ridges. Although cut and fill would occur with both, thus increasing ground disturbance, transport to stream channels is unlikely due to the long distances involved. A possible exception includes a portion of new road that swithchbacks downslope and crosses the headwall of a dry draw in unit 23-1. Where this occurs, the slope ranges between 30-40 percent. Since steep areas in dry draws commonly contain sub-surface drainage networks, constructing this segment increases the potential to intercept/disrupt subsurface flow. Although the nearest channel is 0.37 miles downslope, this could elevate the potential for short and long term sediment delivery. A mitigation measure that was identified and described in Chapter 2 (pg. 2-5) avoids constructing this segment. Instead, a yarder would be "walked" downslope to a landing site and the logs skidded up a ridge on what's referred to as a tractor swing. The ridge where this would occur is ranges between 15-25 percent slope and the skid trail would be drained and blocked following use. If this is implemented, excavation through the dry draw would be avoided and the likelihood of sediment delivery would be decreased. Also, new road construction would be reduced by approximately half, from 0.41 miles to 0.21 miles.

PDFs and Plan Compliance

Project design features (PDFs) and BMPs are designed to protect water quality and are integral in ensuring compliance with applicable State and Federal statutes, such as the Clean Water Act (CWA). BMPs required for this project are contained in both Medford District Resource Management Plans (USDI 1995; USDI 2008), with the more protective taking precedent. If project design features (PDFs) and BMPs are implemented properly, there would be minor increases of sediment routed to stream channels, largely the result of road use and haul. Also, given the small amount of additional compacted area and slight increases in canopy cover less than 30 percent (Table 3-11), there is little probability the proposal would modify the magnitude or timing of peak or base flows. This alternative is compliant with the Bear Creek TMDL (ODEQ 2006c). Griffin Creek is listed for fecal coliform, and project activities would have no effect on this parameter.

Climate and Hydrologic Change

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

Given these impacts, effective climate change adaptation strategies will need to focus on maintaining watershed resiliency. Under Alternative 2, although much of the BLM-administered land has been treated to reduce fuel levels and continuity, additional vegetation and fuels treatments may decrease the likelihood a high-intensity wildfire over part or all of the area may occur. This would maintain, or slightly improve, watershed resiliency. Alternately, roads and road construction can decrease watershed resiliency. Given the uncertainty in climate models and predicted effects on a site specific scale, it is difficult to make accurate statements pertaining to this projects effect on climate change and resultant impacts.

Cumulative Effects

As described in the Affected Environment (section 3.C.1), impacts from roads, recreation, OHVs, and clearcut logging has altered watershed processes in the upper drainages. In the lower stream reaches of the sub-watersheds, grazing, roads, residential development, channel alteration, and water diversions are responsible for degraded aquatic processes and conditions. This mix of impacts is typical of many of the drainages that are tributary to Bear and Sterling Creeks.

Reasonably Foreseeable Future Actions

It is expected that reasonably foreseeable future actions (including rotational harvest on commercial timberlands) that maintain forest conditions in an early- to mid-seral condition (USDI 1995) and land disturbance attributed to development of private lands will continue. Activities on BLM-administered lands will likely continue to focus on commercial thinning for forest health and fuels reduction projects. Some recovery is expected to occur as previously harvested areas within riparian reserves improve shade and large wood recruitment. Grazing impacts on private lands will likely continue to occur at near present levels.

Road Density

Increased road density, particularly with riparian reserves, can increase the potential for sediment delivery to stream channels. Although road densities are considered high in all drainages, the small amount (0.41 miles) of new construction occurring within HUC 1103 would not appreciably increase overall road density, which would remain at 9.4 percent under Alternative 2. All new road construction would be outsloped to eliminate concentrating runoff. Also, all new construction occurs high up in the drainages, along or near ridges. No channels will be affected. Although road densities are high, it is expected that sediment delivery from new road construction would be short-term and is not likely to reach surface water. Additionally, there are nine roads that were identified in the West Bear Creek Watershed Analysis that are proposed for decommissioning should funding become available. Also, two additional roads, both of which are located with riparian reserves and adjacent to streams, were identified for decommissioning (Table 3-13). They are both constructed roads but lack road numbers, and are located in T. 38S. R. 02. NE ¼ of Sec 35 and SE ¼ of Sec 26. If implemented, this would further reduce road densities in the affected drainages. Completion of these decommissioning opportunities is dependent on current and future funding levels.

Table 3-13. Roads Identified in the West Bear Creek WA as Opportunities for Decommissioning

Road Number	Road Number	Road Number
38-2-25.1	39-2-1.0	39-1-17.0
38-2-26.1 (block)	39-2-1.1	39-1-21.3
38-2-35.0	39-2-12.1	39-1-21.1

Overall, Alternative 2 does not reduce canopy cover below critical thresholds or result in appreciable increases in road density. These would be the primary catalysts that may trigger synergistic responses. The proposal does not appreciably decrease canopy cover within the TSZ that may result in peak flow increases. Road densities however are considered high in all drainages, including within riparian reserves. The drainage with proposed new road construction under this alternative is 1103. Within this drainage there would be no new construction within Riparian Reserves and overall road density would remain unchanged at 9.4 percent. Drainages that may be at an elevated risk of experiencing adverse cumulative effects typically have both high road densities and large percentages of canopy cover less than 30 percent. Drainages with large percentages of private land with forested stands greater than 60 years old were also included in this analysis. Although unlikely, if all those acres were reduced below 30 percent canopy cover, the potential cumulative impacts would be magnified. This is particularly true in HUC 1103, where 75 percent of the watershed would be below 30 percent canopy cover.

Summary

Alternative 2 does not elevate the potential for cumulative effects beyond those that may be currently occurring. Sediment production resulting from road use and construction may increase in the short-term. In many cases, riparian vegetation vigor would improve over time, thus potentially decreasing stream temperatures. Although there are both natural- and human-induced risk factors for cumulative effects, the proposed action is not expected to significantly increase these within the project area drainages, or the larger sub-watersheds.

c. Alternative 3

This alternative proposes various prescriptions of commercial tractor and cable timber harvest; however, there would be no new road construction or road renovation. Road maintenance including spot rocking and drainage improvements would be implemented as necessary. In addition, depending on post-harvest conditions, activities would be followed up by fuels treatments that would entail hand thinning, piling and burning.

Vegetation Treatments

Effects resulting from proposed vegetation treatments would be the same as under Alternative 2.

Fuels Treatments

Effects resulting from proposed fuels treatments would be the same as under Alternative 2.

Roads and Road Construction

Sediment levels due to roads, past harvest, and other disturbances is the primary focus of concern. This proposal includes log hauling and associated road maintenance (which includes ditch cleaning, road blading, and maintenance of drainage features). Effects resulting from transport and road maintenance would be the same as under Alternative 2.

Road construction has the potential to increase sediment production as well. Under this alternative, no new road construction is proposed; therefore, any increase in sediment production would be attributed to hauling activities and to a lesser degree tractor and cable harvesting. 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, light-to-moderate use is occurring. However, the probability that OHV use will increase is low because most of the tractor harvest units where use is likely is behind locked gates, and cable harvest units are generally less-suited for OHV use. In addition, PDFs designed to discourage this type of use are included in the project proposal.

PDFs and Plan Compliance

Project design features (PDFs) and BMPs are designed to protect water quality and are integral in ensuring compliance with applicable State and Federal statutes, such as the Clean Water Act (CWA). BMPs required for this project are contained in both Medford District Resource Management Plans (USDI 1995; USDI 2008), with the more protective taking precedent. If project design features (PDFs) and BMPs are implemented properly, there would be minor increases of sediment routed to stream channels. Also, given the small amount of additional compacted area and slight increases in canopy cover less than 30 percent (Table 3-12), there is little probability the proposal would modify the magnitude or timing of peak or base flows. This alternative is compliant with the Bear Creek TMDL (ODEQ, 2006c). Griffin Creek is listed for fecal coliform, and project activities would have no effect on this parameter.

Hydrologic Change

Effects on annual hydrologic change with regard to climate change would be the same as under Alternative 2.

Cumulative Effects

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

Reasonably Foreseeable Future Actions

Cumulative effects resulting from reasonably foreseeable future actions would be the same as under Alternative 2.

Road Density

Although road densities are considered high in all drainages, they would not increase under Alternative 3. As in Alterative 2, implementing road decommissioning opportunities identified under the West Bear Creek Watershed Analysis (see Alternative 2: Cumulative Effects—Road Density and Table 3-13) would be considered, dependent upon current and future funding levels.

Overall, Alternative 3 does not reduce canopy cover below critical thresholds or result in increases in road density. These would be the primary catalysts that may trigger synergistic responses. The proposal does not appreciably decrease canopy cover within the TSZ that may result in peak flow increases. Road densities however are considered high in all drainages, including within riparian reserves. Drainages that may be at an elevated risk of experiencing adverse cumulative effects typically have both high road densities and large percentages of canopy cover less than 30 percent. Drainages with large percentages of private land with forested stands greater than 60 years old were also included in this analysis. Although unlikely, if all those acres were reduced below 30 percent canopy cover potential cumulative impacts would be magnified. This is particularly true in HUC 1103, where 75 percent of the watershed would be below 30 percent canopy cover.

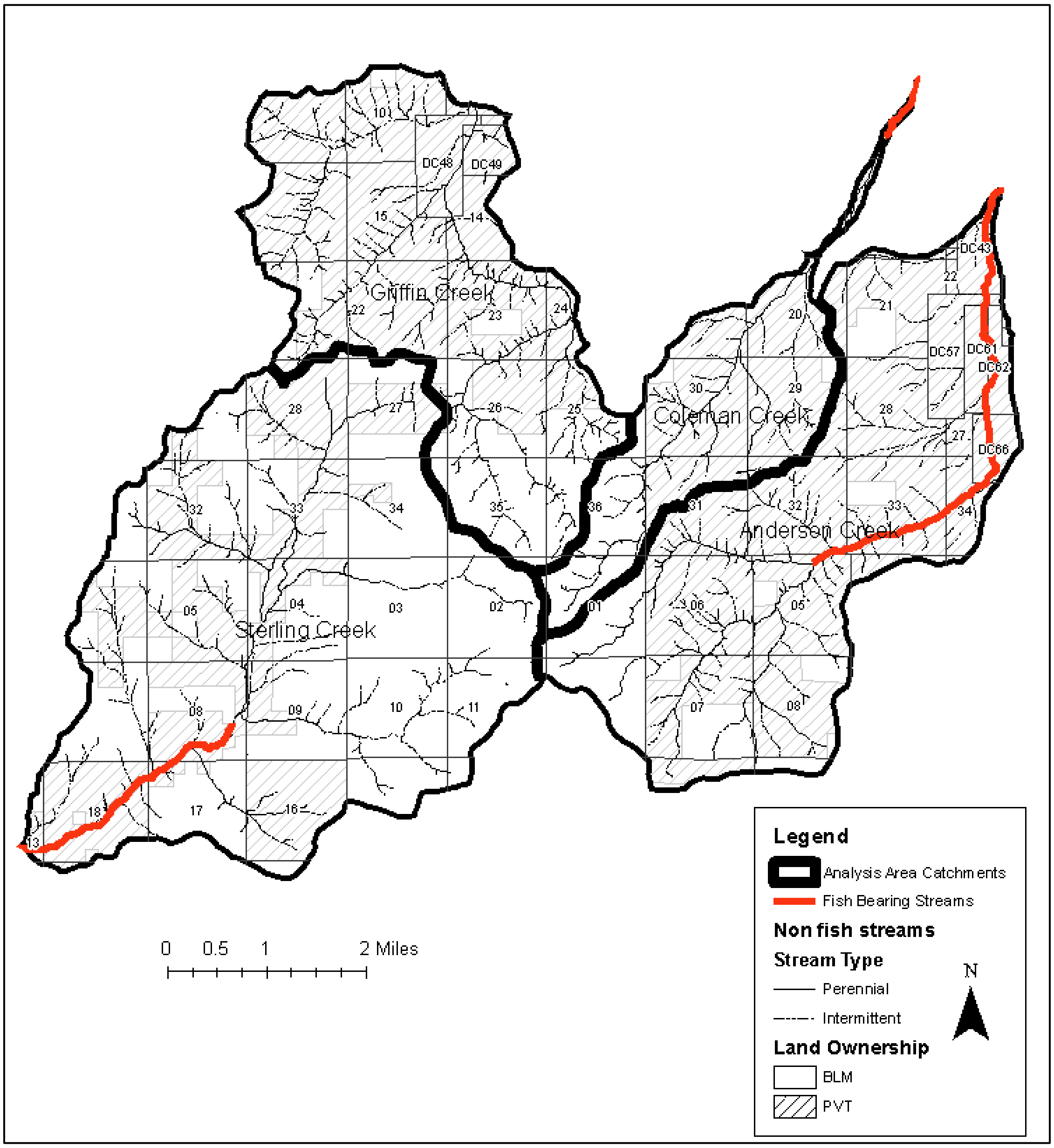
Summary

Alternative 3 does not elevate the potential for cumulative effects beyond those that may be currently occurring. Sediment production resulting from road use and may increase in the short term. In many cases riparian vegetation vigor would improve over time, thus potentially decreasing stream temperatures. Although there are both natural and human induced risk factors for cumulative effects, the proposed action is not expected to significantly increase these within the project area drainages, or the larger subwatersheds.

F. AQUATIC HABITAT & FISH

The proposed Sterling Sweeper Forest Management Project would be located on either side of the ridge system that divides the Bear Creek and Little Applegate River 5th field Watersheds. Included in the timber sale area are portions of several distinct catchments, defined as areas which outlet via a named channel at a distinct point (in this case the outlets are the mainstem channels of Bear Creek and the Little Applegate River). Most of the units are proposed in the Anderson and Griffin Creek catchments in the Bear Creek Watershed, and in the Sterling Creek catchment in the Little Applegate Watershed. Additionally, less than 2 acres of proposed units would extend over a ridge into the Coleman Creek catchment (Bear Creek Watershed), and approximately 9 acres of units are proposed in an unnamed Bear Creek frontal catchment. These catchments will represent the fisheries/aquatic habitat analysis area (Map 3-4). The analysis will focus on drainages within these analysis catchments where activities related to the Sterling Sweeper Forest Management Project are proposed, as it is in these small drainages where any effects to aquatic habitat may be discernible. It will also include a brief, broad discussion of the larger catchments and watersheds, as the Northwest Forest Plan states that Aquatic Conservation Strategy (ACS) objectives (see Section E: Consistency with Aquatic Conservation Strategy) will be analyzed at the site, drainage, and 5th field watershed scales.

Map 3-4. Aquatic Analysis Catchments and Fish Distribution



1. Key Fisheries and Aquatic Resources Issues

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

- Riparian areas and instream aquatic habitats in the watersheds and analysis area streams are currently degraded from a host of past and ongoing activities, particularly (but not limited to):

  1) extensive urbanization and development in the Bear Creek Watershed has resulted in a high percentage of the drainage areas now being covered by non-porous surfaces. This has affected run off patterns, which in turn has led to reduced water quality, and physical alterations of aquatic habitat.

  2) Past mining activities in both watersheds have removed/relocated instream substrates, which has physically altered aquatic habitat.

3) Extensive road construction has created high road densities with hydrological connectivity which has led to increased chronic sediment inputs to aquatic habitat.

4) Demands for water use have led to: construction of dams which may obstruct fish passage; some streams in the watersheds being over allocated; diversions and transfer of water into and out of drainage basins; and altered stream flow regimes.

5) Past timber harvest has reduced riparian canopy cover and the potential for large wood inputs. As a result of these activities, many of the mainstem channels of the analysis area catchments are water quality limited for one or more parameters (see water resources analysis).

- Sedimentation from road construction/renovation, haul, and other ground disturbing activities could increase sediment levels in stream channels, which could further degrade habitat, as a result of implementing an action alternative.
- Off Highway Vehicle (OHV) use is occurring in the area, and approximately 34 miles of user-created OHV trails have been identified in the analysis area. These trails are concentrated near the ridge tops. Openings and new roads created by timber harvest operations may encourage increased use by OHV. In areas with hydrologic connectivity, this could, lead to increased sediment delivery to aquatic habitats.

2. Fish and Designated Habitat

Endangered Species Act & Coho Critical and Essential Fish Habitat

In 1997 the Southern Oregon/Northern California Coasts (SONCC) 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). SONCC coho have been observed in the mainstem of Bear Creek and several of its larger tributaries, and in the lower ~ 1 mile of the Little Applegate River. None of the analysis catchments are known to support coho currently, though it is probable that lower reaches of Anderson, Griffin, and perhaps Coleman Creek would have historically been accessible and provided seasonally suitable habitat for coho. A natural barrier falls on the Little Applegate precludes coho from accessing Sterling Creek.

On May 5, 1999, NMFS designated Coho Critical Habitat (CCH) for SONCC coho salmon. Critical habitat includes "all waterways, substrate, and adjacent riparian zones below longstanding, naturally impassable barriers." It further includes "those physical or biological features essential to the conservation of the species and which may require special management considerations or protection...", including all historically accessible waters (F.R. vol. 64, no. 86, 24049). CCH is broken into occupied CCH, habitat known to support coho based on observation or historical records, and unoccupied CCH, which is habitat that is assumed to be capable of supporting populations of coho should the species and habitat be recovered. The upper distribution of unoccupied CCH is often determined by fish 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. As lower portions of Griffin, Coleman, and Anderson Creeks support steelhead, these reaches will be considered CCH for analysis purposes.

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 planning 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 (NWFP), 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 160 feet in the Bear Creek Watershed, and 155 feet in the Little Applegate Watershed. Widths are measured as slope distance from the edge of the stream, and are applied to both sides of the channel. These Riparian Reserve widths are in accordance with the Medford District Resource Management Plan (RMP) (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, filter sediment carried from disturbed ground via overland flow, and provide habitat for a diverse range of other aquatic and terrestrial organisms (Meehan 1991).

Aquatic Conservation Strategy
The Aquatic Conservation Strategy (ACS) was developed to restore and maintain ecological health of watersheds and aquatic ecosystems on public lands. It includes 9 objectives, which guide BLM's management of Riparian Reserves. These objectives are examined at the site (e.g. a single pool or stream reach), HUC 7 (drainage) and HUC 5 (large watershed) scale. The 9 objectives and effects from implementation of the preferred alternative are presented in Section E of this document.

3. Foreseeable Future Actions

This section will present projects proposed in the foreseeable future that may add cumulative impacts to fisheries resources on top of anticipated impacts resulting from the Sterling Sweeper project, within the analysis area. Anticipated direct and indirect affects to fisheries resources will be described from each action. For any foreseeable future action determined to have any anticipated effects to aquatic habitat, the cumulative effect of the action coupled with effects from the Sterling Sweeper timber sale will be discussed at the end of this analysis.

Private Timber Harvest
At this time, it is not known when or where other private timber harvest will occur in the planning area, but is assumed 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 approximately 60 year tree-growing rotations). This analysis will assume that in general, all suitable private lands will continue to be subject to intense 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, as described in the aquatic habitat current conditions.

Federal Timber Harvest
The Wagner Anderson Timber sale on BLM managed lands includes harvest and haul in the Anderson Creek catchment. Anticipated effects to aquatic habitat resulting from the Wagner Anderson Timber sale were disclosed in the Environmental Assessment prepared for the sale. No measurable effects to aquatic habitat in Anderson Creek from harvest are anticipated to result as harvest units would be separated from streams by full width Riparian Reserves, and harvest prescription would retain between 40 and 60 % canopy cover. It was determined unlikely that haul from the sale would contribute measurable sediment to aquatic habitats in Anderson Creek, as all routes in the vicinity of the main channels are paved, haul would only occur during the dry season, and there would only be two non-paved crossings over perennial channels. No road work in the Anderson catchment was proposed in the Wagner Anderson Timber sale.

Future Fuels Treatments
Fuel treatments are tentatively planned in the project area, to clean up activity fuels. Fuels treatments would not occur within Riparian Reserves, require minimal ground disturbance, and would not treat large trees. 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 they will not be considered further in this analysis.

4. Affected Environment—Fish and Designated Habitat

This section will present baseline conditions in the Bear Creek and Little Applegate River Watersheds and within the analysis area catchments and drainages specifically, as well as anticipated effects resulting from this project. The effects of past actions manifest themselves in the current conditions. Effects added on top of these past actions as a result of the Sterling Sweeper Timber Sale, coupled with foreseeable effects from future projects as described above, are the cumulative effects of this project to fisheries resources.

Bear Creek Watershed

SONCC coho salmon, fall Chinook salmon (*O. tshawytscha)*, summer and winter steelhead (*O. mykiss*), and Pacific lamprey (*Entoshpenus tridentatus)* are native migratory fish species present in the watershed. Their distribution includes the mainstem of Bear Creek from its mouth to barriers just below Emigrant Dam, which are complete upstream passage barriers. Many of these species are also present in the larger tributary streams to Bear Creek, though Chinook are less likely to stray from the mainstem channel. 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. In addition, a host of introduced fish species are present in the watershed, including redside shiners (*Richardsonius balteus*), large and smallmouth bass (*Micropterus dolomieui* and *M. salmoides*), bluegill (*Lepomis macrochirus*), common carp (*Cyprinus carpio)* as well as other introduced warm water fish.

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 winter steelhead and coho 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.

Within the analysis area catchments, steelhead and cutthroat trout have been described in the lower 3.2 miles of Griffin Creek, the lower 5.3 miles in Anderson Creek, and in the lower .8 miles of Coleman Creek (Map 3-4).

Little Applegate River Watershed

A barrier falls on the Little Applegate limits distribution of chinook and coho to the lower ~ 1 mile of the mainstem. Steelhead, as notable jumpers, are able to ascend the falls and therefore are present much further upstream and in many of the tributaries, including the lower 2.7 miles of Sterling Creek. Lamprey, cutthroat, rainbow, and sculpin are also widely distributed throughout the Little Applegate River Watershed, and the latter three species are likely to be found in lower reaches of Sterling Creek at times.

5. Environmental Consequences—Fish and Designated Habitat

a. Alternative 1

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

b. Alternatives 2 and 3

Both Alternatives 2 and 3 have been determined to be "*no effect*" to SONCC coho salmon, CCH, and EFH. This determination was made based on analysis to fish and aquatic habitat in this EA. Effects to aquatic habitat were determined to be of insufficient magnitude and of a nature to not meaningfully impact threatened fish or their habitats (see aquatic habitat discussion, below) in the Bear Creek or Little Applegate watersheds.

6. Affected Environment—Aquatic Habitat

Bear Creek Watershed

Instream habitats in the Bear Creek Watershed as a whole are 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. Many tons of substrate were turned over and removed from streams. In addition, 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.

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.

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 bottom areas 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, the east half of the watershed is 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.

Many miles of road have been constructed in the watershed. Roads which are connected with the stream network (channel crossings) have contributed to sedimentation of instream habitat. 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 from high sediment amounts can disrupt feeding and territorial behavior of juvenile salmonids, which 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 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 proposed Johns Peak/Timber Mt OHV area are being negatively impacted by trail related erosion (USDI 2001; USDI 2005). Trail density and related erosion are particularly high in the Jackson Creek catchment (USDI 2005), and use is known to occur on both sides of Anderson Butte in the analysis area as well.

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.

Anderson Creek

Composed of two 7th field drainages, the 8,242 acre Anderson Creek catchment is a medium sized tributary to Bear Creek. BLM managed lands account for 20% of the basin, and are concentrated in upland and headwater areas. As such, all fish bearing channels are contained within private lands.

Anderson Creek from it confluence with Bear Creek is surrounded by agricultural and rural residential lands for over five miles. Riparian vegetation is sparse to non-existent for the majority of this reach. Anderson Creek Road, paved to this point, parallels the stream. The landscape changes in upstream reaches to forested stands, and riparian corridors surrounding the South and North Forks of Anderson Creek are much more intact than in lower stream reaches. Private and county rocked and natural surfaced roads parallel both forks.

Aquatic habitat inventories have not been conducted on any lower reaches of Anderson Creek and little information is available to characterize habitat throughout the fish bearing reach. BLM has conducted inventories on all stream reaches on BLM lands (USDI 2006), and documented high (30-40%) percentages of fines in both the North and South Forks of Anderson Creek. Fines were found to be abundant in other surveyed perennial tributaries in the Anderson Creek catchment as well. There are several ponds and impoundments on private lands downstream of these surveyed reaches, several of which may potentially act as sediment traps.

Griffin Creek/Coleman Creeks/Unnamed Bear Creek Frontal

The Griffin catchment is 13,912 acres in size, and includes 4 7th field drainages. Only 1536 acres (11%) are managed by the BLM. Coleman Creek drains 3068 acres, of which less than 14% are managed by the BLM. In both instances, BLM managed lands are limited to the headwaters in the extreme southern tiers of the catchments. All fish bearing channels are located on private lands many miles downstream. The lower reaches of both streams flow through highly developed urban areas, while middle reaches flow through agricultural and residential areas. Both catchments are heavily roaded, and roads and residences parallel the mainstem channels of both of these streams for most of their lengths.

All but less than 1 mile of perennial channels in the Griffin Creek catchment are on private lands, while BLM lands include less than 2 miles of perennial channels in the Coleman Creek catchment. These streams have not been inventoried by the ODFW, and no quantitative aquatic habitat information is available for them. Casual observations made during presence absence surveys by the Oregon Department of Fish and Wildlife (ODFW 1999) described multiple fish passage barriers in lower valley reaches of Griffin Creek, but noted that habitat included abundant deep pools, riffles, overhead cover, and favorable substrate composition, all of which provide suitable spawning and rearing habitat. Observations by BLM hydrology technicians made on the perennial reach on BLM lands suggest good habitat for aquatic organisms as well, as deep pools, cut banks, and cobble and gravel dominated substrate are present within the reach. ODFW surveyors also noted numerous passage barriers on lower reaches of Coleman Creek, and instream habitat was described as lacking pools and riparian vegetation.

The unnamed Bear Creek frontal catchment includes an estimated 2,500 acres, whose primary outlet channel is an intermittent stream which disappears on the developed flood plain of Bear Creek. BLM lands total only 11 acres at the top of the ridge, and account for less than 1% of the catchment area. All stream channels are on private lands. No aquatic habitat information is available for this frontal.

Little Applegate River Watershed

Like the Bear Creek Watershed, the Little Applegate River watershed has been impacted by mining, stream cleaning, logging, extensive road building, grazing, urbanization, reduction of riparian vegetation, and water developments. The effects of these activities to aquatic habitat in the watershed are similar to those described for the Bear Creek Watershed, though as the Little Applegate does not flow through major urban areas, runoff and pollution issues are much less. Additional impacts to the Little Applegate include those stemming from flood events and irrigation ditch failures which episodically discharge many tons of sediment directly into aquatic habitat. Noted problems for anadromous fish include summer water withdrawals (interbasin transfer from Little Applegate to Bear Creek Watershed), migration barriers, and in particular, excessive sedimentation. Habitat quality varies. In general, lower reaches, paralleled by roads and residences are in poorer condition, while middle reaches (private and BLM) and upper reaches (mostly USFS) which flow through forested landscapes are in better condition; however, the impact of sediment is pervasive throughout most of the length of the mainstem channel, and this limits the amount of quality spawning and rearing habitat available to fish and other aquatic organisms.

Sources of sediment in the watershed stem in large part from the geology, which includes areas of highly erodible decomposed granite. These pockets are prevalent in upper reaches of the Little Applegate and some of its main tributaries. Roads through these areas with connectivity to aquatic habitats exacerbate erosion and transport rates, and chronically contribute sediment annually to the system, while the aforementioned ditch failures episodically contribute very large quantities of sediment. Sterling Creek, the only analysis area catchment in the Little Applegate Watershed, does not drain any areas of decomposed granite.

Another notable problem in the watershed is the reduction of much of the riparian corridors in the valley reaches of the mainstem and many of the tributaries, as roads and residences parallel most of the larger channels in the watershed. As a result, many streams in the watershed are water quality limited for exceeding summer water temperature criteria.

Sterling Creek

At approximately 11,891 acres in size and comprised of ten 7th field drainages, the Sterling Creek catchment basin is among the larger tributaries to the Little Applegate River. BLM-managed lands are concentrated in upland areas in the catchment, and though they account for 61% of the catchment, the entire mainstem channel of Sterling Creek is on Privately-administered lands.

Aquatic habitat in Sterling Creek has been greatly influenced by instream mining, the legacy of which is visible at present day as several reaches of the creek flows constrained through large tailings piles. Reaches such as these have been observed to be prone to subsurface flow conditions, reducing or eliminating the ability of aquatic species to migrate at times.

The mainstem channel is paralleled by the paved Sterling Creek road from its confluence upstream for 4 miles, while above this point the rocked Griffin Creek road follows the stream for the remainder of its length. For the most part, riparian vegetation along the main channel is relatively sparse and in many areas limited only to a thin strip immediately adjacent to the channel as rural residences and the aforementioned roads parallel the channel. This situation allows for increased solar heating of the creek. As a result, the lower 2.5 miles (the majority of the fish bearing section of the creek) is water quality limited for exceeding summer temperature criteria. The smaller tributary streams to Sterling Creek flow through forested lands, managed primarily by the BLM and private timber companies, and their riparian corridors are more intact.

Aquatic habitat has been quantified by the ODFW (ODFW 1998) for the mainstem of Sterling Creek, from its confluence to the end of the perennial channel (approximately 5.3 miles). The survey noted that fast water habitat units were more prevalent than pools, that instream large wood was lacking, and that the percentage of sand and sediment (fines) are high and well above the ODFW benchmark (< 10% desirable, >20% undesirable). This would indicate that quality spawning and rearing habitat are in short supply. The main reason surveyors noted for the high percentage of fines stems from a high percentage of actively eroding banks, which were associated primarily with mining (and to a lesser extent grazing) activities occurring on private lands.

Large wood densities were found to be low on surveyed reaches of Sterling Creek, as tallies made by the ODFW during stream surveys recorded less than 1 key piece per 100 meters of surveyed stream. This is well below the ODFW benchmark of > 3 “key” (24 inch) pieces per 100 meters. The lack of large wood limits the amount of cover habitat available for aquatic organisms, and reduces the complexity and functionality of the stream.

7. Environmental Consequences—Aquatic Habitat

a. Alternative 1—No Action Alternative

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 drainages, catchments, and watersheds would continue to exist in their current degraded state. As no new road construction would occur, road densities would remain at the current level within the planning area. Fish habitat would continue to be impacted as a result of past and ongoing activities.

Urban and agricultural lands would likely remain in their current state, impacting fish habitat in the drainages and in the Bear Creek and Little Applegate Watersheds 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 rehabbed after ignition operations, minimizing the risk of erosion and transport of sediment down the lines towards aquatic habitats.

b. Alternative 2

Alternative 2 proposes various prescriptions of commercial timber harvest and yarding, road construction and road improvements, and log haul, as described in Chapter 2 of this document. All commercial harvest activities may potentially be followed up by fuels treatments. No road construction or improvements would cross or parallel any stream channels, dry draws, or Riparian Reserves.

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 Soils (Section D—Soils, pp. 3:28-40) and Hydrology (Section E—Water Resources, pp. 3:40-52) portions of this document describe where and by what means erosion will likely occur, and the mechanisms for displaced sediments to enter the stream network. The harvest and yarding of timber, road construction, and log haul proposed under this alternative have been identified as having the greatest potential to increase erosion rates (see Section D—Soils, pp. 3:28-40) though haul routes are the only surfaces with direct connectivity to aquatic habitat. Units and haul routes are spread amongst the analysis area catchments, though activities related to the Sterling Sweeper timber sale are largely concentrated in the Sterling, Griffin, and Anderson Creek catchments (Table 3-14).

Table 3-14. Amount of activity proposed in Alternative 2 in Analysis Area catchments in the Sterling Sweeper Project, including the number of stream crossings the estimated haul routes would include.

Catchment	Proposed Activities					
	Harvest (acres)	Road construction (miles)	Road Improvement (miles)	Haul* (miles)	# haul route Stream Crossings	
					Perennial	Intermittent
Sterling	242	0	0	16.3	4	4
Griffin	62	0.4	.2	8.5	0	20
Anderson	64	0	0	4.3	2	1
Coleman	2	0	.1	1.0	0	0
Bear Frontal	9	0	.1	1.0	0	1
TOTAL	**379**	**0.4**	**0.4**	**31.1**	**6**	**26**

All reported acres and miles in this table are rounded to the nearest tenth.
*Note that haul routes are estimated based on easiest access to timber units, and only includes those portions which are not paved.

<u>Commercial Timber Harvest</u>

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) downslope towards stream channels.

In the Sterling Sweeper timber sale, 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 this timber sale documented that harvest operations would not reduce canopy cover within any of the planning area catchments enough to measurably affect or alter the timing of peak or base flows (Section E—Water Resources, pp. 3:40-52).

Riparian buffers are known to be effective at filtering off-site sediment movement, such as may occur following ground disturbance in harvest units (Rashin et al. 2006). In the Sterling Sweeper Project, all harvest units would be buffered from stream channels by full-width Riparian Reserves (see Chapter 2 pp. 2:24-25), and hence any fine sediment mobilized from units or skid trails would be filtered by vegetation within the Riparian Reserves, and assimilated into the forest floor before reaching aquatic habitat. In sum, no connectivity, and therefore 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. A potential indirect effect could result if unauthorized OHV use were to occur on the skid trails following harvest. However, the potential for this to occur is limited, as there are only 27 acres of tractor units in this sale. Cable corridors, as they are located on very steep terrain and do not connect with anything other than the bottom of the unit, are less likely to attract OHV users than the flatter and interconnected tractor trails. If OHV use were to occur in the tractor units, it would not affect aquatic habitat; the tractor units are ridge top units located far from stream channels. For these reasons, harvest is not anticipated to indirectly impact fish or aquatic habitat, and as such would not add a cumulative effect.

Activity Fuels Treatments

This activity would treat non-commercial small diameter vegetation and accumulated understory fuels remaining in the commercial harvest units, following harvest operations. Fuel treatment activities would be entirely manual, with crews thinning only small-diameter vegetation. Minimal ground disturbance would occur. Any check lines would be rehabbed 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 fuels activities. This activity would not impact aquatic habitat. The treatments would leave no-treatment buffers, as outlined in the PDFs, around stream channels, and consequently 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 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 fuels treatments. Fuels treatments as proposed in the Sterling Sweeper timber sale would have no causal mechanism to affect any aquatic habitats, and hence would not contribute to cumulative effects.

Roads

Of all forest management activities, roads typically have the greatest potential to influence aquatic habitat in forested watersheds. Impacts include both near-term and ongoing (chronic) impacts. Near-term impacts stem from activities which include new ground disturbance, such as construction or maintenance of road segments. These activities lead to increased potential for erosion and transport of sediment to channels. Sediment contribution to channels stemming from these activities generally diminishes after 1-3 years (Luce and Black 2001; Megahan 1974).

Long-term and indirect effects are more pervasive, and may persist even beyond the life of the road. For example, new road construction requires clearing along the road right of way. Where a road crosses a stream, the removal of shade producing riparian vegetation occurs, which would not fully recover until long after the road is decommissioned or abandoned. Road segments located away from stream channels can also greatly influence aquatic habitat. Numerous studies have shown how roads may increase the length of the drainage network by intercepting ground or surface flow and precipitation, resulting in disruption of natural flow paths. This, in turn, may lead to increases in peak flow and/or timing to peak flows (Wemple et al. 1996; Jones et al. 1999). Increased peak flows, if great enough, can cause channel adjustments that physically alter aquatic habitat. Additionally, roads that cut through steep side slopes or are in unstable areas are at risk to failure, which can trigger mass wasting events such as debris torrents, which are capable of scouring out channels and transporting and depositing tons of material, including large wood and sediment of all size classes in large episodic pulses.

Weathering of road surfaces can lead to chronic sediment and turbidity contributions to aquatic habitats, and maintenance and use of roads (such as for haul) can accelerate rates of erosion, particularly during the wet season (Luce and Black 1999; Reid and Dunne 1984). Intercepted runoff, which becomes concentrated over erodible road surfaces, mobilizes and transports sediment with it. Surfaces armored by pavement do not experience this type of chronic weathering, while rocked roads are more resistant than natural-surfaced ones. For these reasons, natural surfaced (or broken down rocked surfaced) roads that have a high degree of hydrological connectivity are particularly problematic to aquatic habitat. Within the analysis area, fine sediment delivery to stream channels resulting from weathering of road surfaces is the primary concern to aquatic habitat. The climate and geology of the area render mass wasting events rare, and the channel morphology of the analysis area streams renders them relatively resistant to changes stemming from peak flows (Section E—Water Resources, pp. 3:40-52).

It is important to note that not all roads or road segments contribute deleterious effects to aquatic habitat. Many variables interact to determine the potential for any given stretch of road to influence aquatic habitat, with the most important being the degree to which the road is hydrologically connected with the aquatic system (Furniss et al. 2000; Jones et al. 1999; MacDonald and Coe 2008). Hydrological connectivity is present at any point where roads and streams interface. Midslope and valley bottom roads constructed in areas of high drainage density (which necessitates many crossings) have a high degree of connectivity, while ridgetop segments which do not cross channels have no connectivity. Segments with high connectivity have high potential to affect aquatic habitat, while those with no connectivity have no potential. Based on location and design, none of the proposed new roads in the Sterling Sweeper sale would have hydrological connectivity to the aquatic system.

In addition to channel crossings, the design of the road also plays into the degree of hydrological connectivity. Roads which are designed to shed intercepted water quickly off their surface and back to the forest floor have connectivity only from the point of the last turn out device to where the road crosses the stream. Examples of such designs include outsloped road surfaces, rolling dips, and waterbars, which when constructed and maintained properly are effective and common designs used to reduce connectivity between roads and the aquatic system (Luce and Black 2001; MacDonald and Coe 2008). Contrast this with an insloped road drained by an inboard ditch with few cross drains; such a road would have a greater portion of its length directly connected to the stream, and hence, a greater potential to impact aquatic habitat. Connectivity also changes in response to climactic conditions, with the greatest road-stream hydrological connectivity occurring during the wettest period of the year, when soil moisture contents are high, groundwater tables elevated, and runoff more likely (Furniss et al. 2000). For this reason, wet season use of a given road system would have a higher potential to contribute impacts to aquatic habitat then dry season use. In the Sterling Sweeper Forest Management Project, road construction, improvement, and log haul are proposed. These activities would be restricted to the dry season.

Road Construction/Improvement
In the Sterling Sweeper Forest Management Project, two new road segments are proposed to facilitate access to harvest units, totaling a little over 0.4 miles in length. Road construction would occur during the dry season. The new construction would occur in the Griffin Creek catchment. These segments would be constructed on previously undisturbed ground, and adjacent to ~ 0.2 miles of existing road proposed to be widened (improved via drainage improvement and slope stabilizing) to accommodate log truck traffic. An additional segment (road 38-1W-30.00, <0.2 miles long) is proposed for improvements (drainage improvement and slope stabilization) on the drainage divide between Coleman Creek and the unnamed Bear Creek frontal catchment. This segment would follow an existing jeep trail, which would be widened to allow for larger vehicles. All of the proposed new road locations and improvements would be located on or just below ridgetops; no segments would interface with any stream channels or Riparian Reserves.

As the proposed road work would be located on/near ridgetops, there is little probability that they would intercept ground water. They would be able to intercept precipitation directly, which could potentially become concentrated flow capable of rutting the road surface and transporting eroded material downslope. However, drainage relief would be incorporated into the new construction and improvement, which would ensure that road surfaces would shed intercepted water and any mobilized sediment off of their prisms and into downslope vegetation, minimizing the potential for rutting and disruption of natural flow paths. This, coupled with the absence of hydrological connectivity, precludes the potential for new road construction and improvement proposed in the Sterling Sweeper Project to affect aquatic habitat.

Although the construction of the new roads would increase road densities in catchments and watersheds that already have high road densities, the proposed new roads would lack hydrological connectivity, and there is no chance that construction of these roads would impact fisheries or aquatic resources. In the event that sediment generated from construction, improvement, use, or maintenance of these segments was mobilized during a precipitation event, the roads would shed the water and eroded particulates into downslope vegetation, where it would be filtered and stored before reaching any stream channels.

Haul Routes

Haul is known to accelerate erosion rates on roads, through the breakdown of surface material and creation of erosion features, such as ruts. Roads are more susceptible to disturbance when they become saturated. During such periods they are more likely to develop ruts which can expose the subgrade. Dry season use is less damaging, as ruts are unlikely to result, but heavy use even in the dry season would result in increased erosion of the road surface through the breakdown of aggregate or native surfaces. Because haul increases erosion rates, portions of haul routes with connectivity to streams would be expected to contribute greater amounts of sediment. Luce and Black (2001) found that a volume of haul equivalent to 12 daily truck loads per work day for one month (240 total truck loads) on rocked roads during the wet season in the coast range of Oregon increased sediment production from the road surface by ~ 380 kg/km of road. (Note that the study did not attempt to quantify how much of this increased sediment production was likely to find its way to aquatic habitat. Though a quantitative comparison of wet season vs. dry season haul erosion rates is not available, the authors did note that proscription of wet weather haul is an effective BMP for reducing sediment production stemming from haul.)

For the Sterling Sweeper Project, all haul would be seasonally restricted to the dry season and the majority of the routes are both well rocked and regularly drained, and consequently, haul would not likely result in rutting of the road surfaces. However, repeated use of the unpaved haul roads could potentially 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. The heavier the volume of haul, the greater the potential for breakdown of the road surfaces to occur. Small direct contributions of fine sediment could occur if dust mobilized by haul should settle out in perennial stream channel crossings 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 events 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. Given the nature of the sediment (very small particles of dust) inputs would likely primarily occur as slightly elevated turbidity levels which would be flushed through the system during high flow events.

Log haul would occur on an estimated 31 miles of non-paved roads in the analysis area, of which 25 miles would occur on rocked roads, and 6 miles on natural surfaced roads. Most of the hauling would be in the Sterling and Griffin catchments (see Table 3-14). An estimated 380 log truck loads would be required to haul felled timber from all proposed units. As this particular sale is spread out over a large area, haul routes are also spread over a relatively wide spatial scale, with 6 different access points from paved roads (the Sterling Creek and Anderson Butte roads). This limits the amount of haul any one non-paved road segment would receive under this sale. Haul routes are largely concentrated in upslope areas, and though they include 32 channel crossings, only 6 are over perennial channels. Therefore, the primary mechanism by which road-derived sediment is most likely to enter streams as a result of log haul is from storm runoff, not directly through airborne contributions.

No unpaved routes would parallel fish habitat, and only one short segment (~ 0.7 miles) parallels any stream (Armstrong Gulch, a perennial Sterling Creek tributary) in the entire haul analysis area. This route would have the greatest potential to contribute sediment to aquatic habitat, as it includes three perennial crossings, and is very close to the creek in spots. There would be one additional perennial crossing in

Sterling Creek, and two over headwater channels in the Anderson catchment. All crossings are via culvert.

There is no potential for haul to contribute sediment to aquatic habitat in Coleman Creek; routes are limited to near ridgetop locations and would not cross any channels; there would be no connectivity with the routes and the aquatic system. It is extremely unlikely that haul would contribute detectable quantities of sediment to aquatic habitat in Anderson Creek; though there would be two perennial and one intermittent crossings, the truck volume that would use this route would be very light (estimated at 10 truckloads), as it only accesses one 12-acre unit. There is also little likelihood for haul to contribute detectable amounts of sediment to channels in the unnamed Bear Creek frontal; routes in this catchment are limited to less than one mile of near ridgetop roads, with only one crossing over an intermittent channel and only an estimated 7 truckloads of timber would come out via this route. This same route includes the majority of the channel crossings in the Griffin Creek catchment (15 of the 20 crossings).

The remaining five crossings in Griffin Creek would be subject to a moderate amount of haul (estimated at 50 truckloads), which would occur within a small intermittent drainage. All of the crossings in the Griffin catchment would be over intermittent streams. The greatest volume of haul would occur in the Sterling Creek catchment (estimated at 300 truckloads), though hydrological connectivity with haul routes and the aquatic system is limited to only 8 stream crossings, 7 of which are clustered in Armstrong Gulch. The route with the greatest potential to affect aquatic habitat is a ~ 3 mile-long rocked surfaced road which includes three perennial and 4 intermittent crossings, and one segment which closely parallels Armstrong Gulch. This route accesses 24-acres of units, and would receive an estimated volume of haul of 25 truckloads.

It is likely that haul would contribute small amounts of fine sediment into aquatic habitat in the small Griffin Creek tributary and in Armstrong Gulch, given that there is both hydrological connectivity and a moderate volume of haul. It is not possible to accurately quantify how much dry-season haul may increase erosion rates or sediment input into aquatic habitat because there are too many interacting variables (MacDonald and Coe 2008), and what studies have been done have focused on wet-season haul. However, a very rough estimate of what wet-season haul may be expected to produce may be obtained by extrapolating results from relevant studies, and incorporating some broad assumptions. Utilizing erosion rates described by Luce et al., and assuming a constant rate of aggregate break down, one truckload would equate to approximately 1.6 kg of sediment production per kilometer of road. Assuming 100 meters of road on either side of a crossing is the area of a road most likely to deliver sediment to a channel, this would equate to an estimate of 0.66 pounds of sediment per crossing. In Armstrong Gulch, with 7 crossings and 25 truckloads, 115 pounds of sediment would be delivered to aquatic habitat in such a scenario. To put this in perspective, this would be approximately equivalent to the volume of one cubic foot of wet dirt, dispersed amongst the seven crossings. In Griffin Creek, the same rational would yield an estimate of just over two cubic feet with inputs spread amongst 20 dispersed locations.

Given that dry season haul would yield both substantially less initial erosion of the road surface and less subsequent transport of eroded sediment, amounts contributed to aquatic habitat would likely be much less than estimated above. And given that these inputs would occur only during a precipitation event, would be spatially spread over many input locations, and would occur in the nature of increased turbidity, it is extremely unlikely that sediment input by haul would be detectable behind background levels.

Although haul would have a high likelihood of inputting some sediment into aquatic habitats, the magnitude of the inputs would be small because dry season haul restrictions would reduce impacts to the road surfaces, and haul routes would be spread over a large spatial scale, minimizing the use any one surface would receive. It is not anticipated that the amount would be discernible above those contributions chronically occurring. As such, the amount of dust (sediment) to reach and settle out in any one pool would be insufficient to adversely modify aquatic habitats or meaningfully affect aquatic organisms.

Aquatic Habitat Effects Summary
Short-term (one to three years) there would likely be small inputs of sediment in the nature of small turbidity pulses to channels in the Sterling and Griffin Creek catchments as a result of haul. Any sediment increases would be minor relative to existing sediment levels, and would not meaningfully impact either aquatic organisms or aquatic habitat. The construction of new roads would increase road densities and represent a decline of this gross health indicator in both the Bear Creek and Little Applegate Watersheds, but is not anticipated to contribute sediment to aquatic habitat, or alter hydrologic functions as none of the new road construction would be hydrologically connected to the stream system. Upland work such as timber harvest and follow up fuels treatments would have no effect on fine sediment levels, due to the filtering action of Riparian Reserve buffers, extensive PDFs designed to prevent overland sediment movement, and normal BMPs. Stream temperatures would not be affected, as no riparian vegetation is proposed to be treated.

Future private timber harvest is assumed to continue at present levels, and cumulative effects to water resources have been assessed (Section E—Water Resources, pp. 3:40-52). Future private harvest is expected to continue the declining trends in streambank stability, sedimentation potential, and health of riparian areas currently present in the planning area. The Sterling Sweeper Project would, in the short-term, contribute a small amount of sediment to headwater channels, on top of the large amounts contributed annually from all other sources. Direct inputs of fine sediment resulting from haul (airborne dust) would not occur in fish habitat. Indirect inputs from haul would be minimal and would occur at times that would preclude detection in fish-bearing channels (i.e. as brief pulses of elevated turbidity during high flow events), located downstream of input locations. In sum, though this project would not benefit aquatic resources (i.e. no road decommissioning or closures), no measurable changes to aquatic habitat conditions are anticipated to result from implementation of Alternative 2.

c. Alternative 3

Alternative 3 is the same as Alternative 2, except it does not propose new road construction, and as a result also proposes less harvest, as those units accessed by the proposed new roads would be dropped. As no new road construction would occur, road densities would not increase in the Bear Creek and Little Applegate Watersheds, resulting in no change to this gross watershed indicator. From the perspective of aquatic habitat, Alternative 3 would result in the same effects except for in the Griffin Creek catchment, where haul would be significantly reduced: 6 less crossings would be utilized, and the estimated volume of haul would be only 7 truckloads, as compared to 50 under Alternative 2. This would considerably reduce the potential for sediment being input into aquatic habitats in Griffin Creek. Effects stemming from haul as they relate to aquatic habitat would not appreciably change under this alternative in any of the other analysis area catchments.

8. Affected Environment—Riparian Reserves

Riparian corridors on private lands along fish-bearing stream reaches in both watersheds (including the mainstems of the Little Applegate and 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. 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 watersheds, 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. Both the Little Applegate and Bear Creek are listed as water quality limited for exceeding summer stream temperature criteria by the Oregon Department of Environmental Quality

(DEQ). While riparian corridors in lower reaches of the analysis area catchments are narrow and impacted by roads and residences, they are generally intact in upper reaches which flow through forested landscapes.

On BLM-administered lands, Riparian Reserves have been established adjacent to all stream reaches displaying signs of annual scour and deposition. This includes perennial and intermittent channels, springs, seeps, and wet areas. 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). In the project area, there are 1065 acres of Riparian Reserves in various states of vegetative condition (Table 3-15).

Table 3-15. Seral state of Riparian Reserves (RRs) in the Sterling Sweeper project area.

Catchment	Riparian Reserve Acres by Vegetation Type						
	Grass and shrubs	Hardwoods	Early Seral (seedlings/saplings)	Poles (5-11" DBH)	Mid Seral (11-21" DBH)	Mature (>21" DBH)	Total Acres of RRs
Sterling	43	52	62	12	219	160	548
Griffin	2	0	198	80	68	6	354
Anderson	0	0	0	32	23	35	90
Coleman	0	0	4	3	56	9	72
Project total	**45**	**52**	**264**	**127**	**366**	**210**	**1064**

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 inch diameter at breast height [DBH]) or older will function to provide full shade to stream channels, and that pole size trees (< 11 inch 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 inch 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-sized trees likely underestimates the percentage of reserves that are currently providing sufficient levels of shade to stream channels. Table 3-16 displays the percent of all reserves that are in mid-seral (or greater) stage (capable of providing high levels of shade), and in a mature stage (capable of providing large wood to channels).

Table 3-16. Percent of all reserves in mid-seral or greater, and mature seral stages in the Sterling Sweeper Project Area.

Catchment in Planning area	% of Reserves in Mid Seral Stage or Greater (Trees >11" DBH)[1]	% of Reserves in Mature Stage (Trees >21" DBH)[1]
Sterling	70%	29%
Griffin	21%	1%
Anderson	65%	39%
Coleman	90%	13%
Project Total	**54%**	**20%**

[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 project area, Riparian Reserves capable of providing ample shade are relatively intact in the Sterling and Coleman catchments, but are lacking elsewhere, particularly in the Griffin Catchment. However, this is of limited consequence to water quality and aquatic habitat in the catchment, as these Riparian Reserves are all adjacent to intermittent streams in the Griffin catchment, and these channels would not contribute to summer water temperature problems farther downstream. The analysis also suggests that reserves capable of providing large wood are lacking throughout the entire planning area. Ground layer vegetation and intact duff within all of the Reserves, regardless of seral stage, still function to filter water and transported sediment washed off of disturbed surfaces such as roads. As the RRs mature over time, 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.

9. Environmental Consequences—Riparian Reserves

a. All Alternatives

The Sterling Sweeper Forest Management Project would have no effect to Riparian Reserves, regardless of which alternative is selected. Commercial timber harvest, activity fuels treatments, and new road construction are not proposed in Riparian Reserves in the Sterling Sweeper Project. The only project element which would occur within Riparian Reserves is log haul. Haul would not necessitate the removal of riparian vegetation, and therefore would have no causal mechanism to negatively impact the form or function of Riparian Reserves.

G. CONSISTENCY WITH AQUATIC CONSERVATION STRATEGY

1. Introduction

The Northwest Forest Plan's (NWFP) Aquatic Conservation Strategy (ACS) has four components: Riparian Reserves, Key Watersheds, Watershed Analysis, and Watershed Restoration. It is guided by nine objectives which are meant to focus agency actions to protect ecological processes at the 5^{th}-field hydrologic scale, or watershed, at the 6^{th} and or 7^{th} fields (subwatershed and or drainage), and at the site level. In this case, Sterling Creek is a portion of a sixth field subwatershed and is composed of 10 smaller 7^{th} field drainages. The Anderson Creek catchment, composed of only two 7^{th} field drainages, is half of another 6^{th} field subwatershed, while Griffin and Coleman Creeks are smaller catchments composed of several 7^{th} fields. Griffin, Coleman, and Anderson Creeks are within the larger Bear Creek 5^{th} field watershed, and Sterling Creek is within the Little Applegate 5^{th} field. How the four components of ACS relate to the Sterling Sweeper 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 Sterling Sweeper Timber Sale.

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. The upper half of the Little Applegate Watershed is a key watershed; Sterling Creek is in the lower half of the Watershed, and not included within the designated area.

3. Watershed Analysis: BLM completed the West Bear Creek Watershed Analysis in 2001. The Watershed Analysis covers the western third of the watershed only, which encompasses the project and planning areas. The Little Applegate Watershed Analysis was completed in 1995 and covers the planning area (Sterling Creek).

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

Evaluation of This Action's Consistency with Northwest Forest Plan Aquatic Conservation Strategy Objectives

ACSO 1. Maintain and restore the distribution, diversity, and complexity of watershed and ***landscape-scale features*** <u>*to ensure protection of the aquatic systems*</u> *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 Watersheds. One of the treatment objectives of the timber sale is to compensate for an altered fire regime and restore certain plant communities. The intent of this objective is to restore the function of landscape-scale processes like wildfire in order to protect the complexity and distribution of plant communities (including riparian areas) across the landscape. This would be noticeable at the site level, but would have only a minor benefit at the watershed scale, as less than 1% of the watersheds would be treated.

ACSO 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 both Watersheds, BLM-managed lands are concentrated in the steeper slopes of the tributary streams. Here, longitudinal connectivity and road densities are the primary issues for aquatic species. No activities planned under the Sterling Sweeper timber sale would affect spatial and/or temporal connectivity, as no culverts are proposed for addition or removal on any stream channels.

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

No activities are proposed in/adjacent to stream channels in the Sterling Sweeper Timber sale. This indicator would be unaffected at all levels.

ACSO 4. Maintain and restore ***water quality*** *necessary to support healthy riparian, aquatic and wetland ecosystems. Water quality must remain within the range that maintains the biological, physical, and chemical integrity of the system and benefits survival, growth, reproduction, and migration of individuals composing aquatic and riparian communities.*

There would be no effect on water temperature, because shade would not be reduced along any perennial stream channels. Short term (one to three years) there would likely be a small amount of fine sediment entering stream channels as small turbidity pulses adjacent to certain roads used as haul in the Sterling and Griffin Creek catchments (see EA and objective 5 below). Sediment increases resulting from these activities would be minor relative to existing sediment levels, and not detectable behind background levels even 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.

ACSO 5. Maintain and restore the ***sediment regime*** *under which aquatic ecosystems evolved. Elements of the sediment regime include the timing, volume, rate, and character of sediment input, storage, and transport.*

The only element of this project which could affect the sediment regime is log haul, which is expected to contribute small amounts of sediment in the nature of turbidity pulses to aquatic habitats. Haul would likely result in inputs of very small amounts of fine sediment to aquatic habitats adjacent to or crossing haul routes. This turbidity would pass through habitat during a time of year (in response to storm events) when stream flows were elevated and prone to natural increases in turbidity. At such a time, 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 harvest of industrial and federal timber lands, extensive agricultural and urban development, increasing OHV use, episodic ditch failures, and the legacy of past and ongoing mining will continue to impact the sediment regime in the watersheds.

ACSO 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 Sterling Sweeper Timber Sale. See Section E—Water Resources, pp. 3:40-52. Any effects on ground water availability from the project would be too insignificant to be noticeable at the site, much less the drainage or watershed scale. Storage dams, water transfers and withdrawals for agriculture and residential use, and the high amount of non-porous surfaces (roads, buildings, etc.) have the most significant impacts to instream flows in the watersheds.

ACSO 7. Maintain and restore the timing, variability, and duration of floodplain inundation and water table elevation in ***meadows and wetlands****.*

Only harvest would have any mechanism to affect the timing, variability, and duration of floodplain inundation and water table elevation. However, harvest would not occur in Riparian Reserves and would leave at canopy cover within the range of natural variability within the planning area. 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.

ACSO 8. Maintain and restore the species composition and structural diversity of ***plant communities in riparian areas*** *and wetlands to provide adequate summer and winter thermal regulation, nutrient filtering, appropriate rates of surface erosion, bank erosion, and channel migration and to supply amounts and distributions of* ***coarse woody debris*** *sufficient to sustain physical complexity and stability.*

The only activity proposed in Riparian Reserves under this sale is log haul. Haul would not disturb riparian vegetation. This indicator would remain unaffected by the Sterling Sweeper project.

ACSO 9. Maintain and restore ***habitat*** *to support well-distributed populations of native plant, invertebrate, and vertebrate riparian-dependent species.*

See previous objectives. No detectable site level effects to aquatic and riparian habitat are anticipated to occur as a result of this project.

H. TERRESTRIAL WILDLIFE

1. Introduction

This section discusses terrestrial wildlife habitats and the potential impacts to terrestrial wildlife species from the proposed actions as described in Chapter 2 of this document. The terms “project area” and "analysis areas" are used throughout this analysis. For the purposes of the analysis, this EA section will hereafter refer to two reference scales: the project area and the analysis area. The project area describes where action is proposed, such as units where forest thinning is proposed and where road construction or road improvements are proposed (Maps 2-1 through 2-8).The larger analysis area is used for a more applicable spatial scale for species with larger home ranges and dispersal movements.

Wildlife-related issues associated with the Sterling Sweeper Project have been identified through public scoping or ID team specialists and will be addressed in this document. These key issues are:

- Logging may degrade suitable habitat for northern spotted owls, resulting in perceived adverse effects.
- Some commenters submitted peer-reviewed articles that discuss the impacts of proposed road construction on density, habitat fragmentation, edge effects and other effects to wildlife.
- 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.

Assumptions:

- No activities will occur within the 100-acre spotted owl activity centers or 300-meter nest patch radius of known nest sites.
- PDFs will be properly implemented.
- If no T&E (threatened and endangered) or special status species habitat is known or suspected to be present in the project area, or the area is outside the range for the species, then no further analysis is needed. If habitat is present, but no activities are planned for that habitat or the project would not impact the population or habitat, no further analysis is needed. If a T&E or special status species is known or suspected to be present and habitat is proposed to be disturbed, then the species will be analyzed.
- Coarse wood already on the ground will be retained and protected from disturbance to the greatest extent possible during treatment.
- Snags which do not need to be felled for safety reasons will be retained within the harvest units to the extent possible.
- "Treat and maintain" spotted owl habitat means the action occurs within NRF (nesting, roosting, and foraging) or dispersal habitat but would not change the conditions that classify the stand as NRF or dispersal post treatment. NRF habitat will retain at least 60 percent canopy cover, large trees, multistoried canopy, standing and down dead wood, and diverse understory adequate to support prey, and may contain some mistletoe or other decay. Dispersal habitat will retain at least 40 percent canopy. The habitat classification of the stand following treatment will be the same as the pretreatment habitat classification.
- Late-successional forest is forest habitat 80 years or older. Late-successional forest generally, but not always, provides suitable habitat for spotted owls. Suitable spotted owl habitat is generally 80 years and older, but also contains other attributes such as multiple layers.
- Spotted owl habitat is specifically rated for suitability for spotted owls, while late-successional habitat not rated as suitable spotted owl habitat may provide habitat for other species such as fishers.

2. Affected Environment—General

a. Vegetation Conditions and Terrestrial Wildlife Habitats (General)

The Sterling Sweeper Forest Management Project proposal is located in the West Bear Creek and Upper Little Applegate 5th field watersheds. The total size of the analysis area is 25,166 acres (approximately 39 square miles). BLM-administered lands comprises 12,270 acres within the analysis area, and the remaining acreage is private or state managed lands (Maps 3-4, 3-5; 2-1 through 2-4).

The present-day composition and distribution of vegetation in the project area is influenced by site characteristics (soil types, aspect, and topography), natural disturbance (wildfires, insects, disease, etc.) historic mining, rural residential development, agricultural activities, timber harvest, fuels reduction projects, fire suppression, and road building. Common forest types include Douglas-fir, ponderosa pine, and white oak forest series (USDI 1995). Within the 2 watersheds, most south- to westerly-facing slopes are dominated by shrub early- and mid-successional vegetation, with north to easterly slopes dominated by mixed conifer mid- to late-successional vegetation. Although the Inland Siskiyous have always been fragmented by meadows and shrubland, the current habitat conditions have changed from that which existed in the pre-settlement environment. As a consequence, the variation and scales of landscape components are innumerable.

The predominant vegetation type within the project area is Southwest Oregon Mixed Conifer-Hardwood Forest (Chappell and Kagan 2001). This vegetation type is composed of mixed conifers (primarily Douglas fir [*Pseudotsuga menzeseii*], sugar pine [*Pinus lambertiana*], ponderosa pine [*P. ponderosa*], and incense cedar [*Calocedrus decurrans*]) and evergreen hardwoods (primarily madrone [*Arbutus menzeseii*]), as well as deciduous hardwoods. Other habitat types in the project area are Westside Oak and Dry Douglas-fir Forest and Woodlands, Ceanothus-Manzanita Shrublands and Westside Riparian-Wetlands.

The vegetation condition classes presented in Table 3-17 provide habitat for the terrestrial wildlife species found in the proposed Sterling Sweeper analysis area. Acreage of each vegetation condition class and several wildlife species that are representative of the various habitats are also displayed. Over 200 vertebrate terrestrial wildlife species are known or suspected to occur in the analysis area based on known range and habitat associations. This includes species that migrate through the area.

Table 3-17. Vegetation Condition Classes on BLM-Administered Lands within the Sterling Sweeper Analysis Area.

Vegetation Condition Class	Acres (BLM Lands)	Representative Species (from Brown 1985)
Grassland/Shrubland	2107	gopher snake, California ground squirrel, western meadowlark, wrentit, dusky-footed woodrat
Hardwood/Woodland	2680	acorn woodpecker, western gray squirrel, ringneck snake
Seedling/Sapling	1323	northwestern garter snake, mountain quail, pocket gopher
Small Conifer	950	golden-crowned kinglet, porcupine, Southern alligator lizard
Large Conifer	3747	ensatina, Stellar's jay, mountain lion
Mature Conifer	1461	northern spotted owl, northern flying squirrel, pileated woodpecker,

b. Special Status Wildlife Species

Special Status Species are those species that are Federally listed as Threatened or Endangered; proposed or candidates for Federal listing as Threatened or Endangered; or are BLM-designated Sensitive species (USDI 2011). Survey and Manage species are listed for protection under the Northwest Forest Plan. Table 3-18 lists the Special Status and Survey and Manage species that are known, suspected or have habitat in the project area. Species determined to have a very low likelihood of occurring in the project area, or whose presence would be considered accidental, were not included in this analysis.

Table 3-18. Wildlife Species Known, Suspected or Habitat Occurs in the Project Area

Scientific Name	Common Name	Status	Occurrence
Strix occidentalis caurina	northern spotted owl	FT	Known
Strix nebulosa	great gray owl	SM	Suspected
Haliaeetus leucocephalus	bald eagle	SEN/EPA	Habitat
Aquila chrysaetos	golden eagle	EPA	Habitat
Martes pennanti	fisher	SEN/FC	Known
Arborimus longicaudus	Oregon red tree vole	SEN/SM	Habitat
Antrozous pallidus	pallid bat	SEN	Suspected
Corynorhinus townsendii	Townsend's big-eared bat	SEN	Known
Myotis thysanodes	fringed myotis	SEN	Known
Aneides flavipunctatus	black salamander	SEN	Known
Helminthoglypta hertleini	Oregon shoulderband	SEN	Suspected
Monadenia chaceana	chase sideband	SEN/SM	Suspected
Monadenia fidelis celeuthia	travelling sideband	SEN	Suspected
Vespericola sierranus	Siskiyou hesperian	SEN	Suspected
Callophrys johnsoni	Johnson's hairstreak	SEN	Suspected

Status:
FT – Federally Threatened   SEN – Bureau Sensitive Species   EPA – Bald and Golden Eagle Protection Act
FC – Federal Candidate   SM – Survey and Manage Species
Occurrence:
Known – Species is known to occur in the project area
Suspected – Species not known to occur but reasonable potential to exist in the project area
Habitat – Less probable for species to occur but suitable habitat is found in the project area and is within the known or suspected range of the species

c. Federally Listed Species

Northern Spotted Owls (NSOs)

The northern spotted owl, a Federally-listed Threatened species, is associated with existing habitat within and adjacent to the Sterling Sweeper project area. Spotted owls prefer coniferous forest with multiple vertical layers of vegetation and a variety of tree species and age classes with the presence of large logs and large diameter live and dead trees (snags), for nesting, roosting, and foraging habitat. They may also be found in younger stands with multilayered, closed canopies, large diameter trees, and abundance of dead and down woody material. Based on studies of owl habitat selection (including habitat structure and use and prey preference throughout the range of the owl), spotted owl habitat consists of four components: nesting, roosting, foraging, and dispersal (Thomas et al. 1990).

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

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

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

However, Anthony (2010) stated that that there is now an apparent decline in spotted owl occupancy in the Southern Cascades Study Area while the presence of barred owls is increasing.

These reports listed above did not find a direct correlation between habitat conditions and changes in NSO populations, and they were inconclusive as to the cause of the declines. Even though some risk factors had declined (such as habitat loss due to harvesting), other factors had continued, such as habitat loss due to wildfire, potential competition with the barred owl, West Nile virus, and sudden oak death (USFWS 2004; Lint 2005). The barred owl is present throughout the range of the spotted owl, so the likelihood of competitive interactions between the species raises concerns as to the future of the spotted owl (Lint 2005).

In more recent reports (Davis et al. 2010, 2011; Forsman et al. 2011), it has become more evident that the barred owl population is increasing across the range of the northern spotted owl. Forsman (2011) indicates that the spotted owl populations have declined across most of the range, with the most significant declines occurring in Washington where the barred owl has been present the longest. Although analysis within the nearest NSO demography study (Klamath Study Area, or KSA) to the project area indicates a stable spotted owl population during the study period, the recent data shows the beginning of a trend towards a declining population (Davis et al. 2010). Davis et al. (2010) states that

> [t]here is mounting evidence that barred owls are negatively impacting spotted owl population within the KSA. This is illustrated by several population trends beginning about 2003, which is when barred owl detections within the KSA exceed 10% of the sites. Spotted owl detections have been steadily decreasing since 2002 and reached the lowest point in 2010, the same year barred owl detections reached their highest level. Fecundity rates appear to be declining during the past 8 years and in only 1 of those 8 years was the rate above average. Fecundity rates for sites with known barred owl presence were lower than at other sites. If these trends continue, a combination of lower occupancy and reduced fecundity, there may be cause for concern regarding the spotted owl population.

On June 30, 2011, the USFWS released the *Revised Recovery Plan for the Northern Spotted Owl* for public comment (USDI Fish and Wildlife Service 2011). This Revised Recovery Plan recommends achieving recovery of the spotted owl through 1) the retention of more occupied and high-quality habitat, 2) active management using ecological forestry techniques, both inside and outside of reserves, 3) increased conservation of spotted owls on State and private lands, and 4) the removal of barred owls in areas with spotted owls. The plan recommends retaining the Northwest Forest Plan reserve network while the Service utilizes a habitat modeling framework to develop and propose a new critical habitat network for the spotted owl. At the time of this analysis, new critical habitat has not been finalized.

The original foundation for spotted owl recovery was the 1994 Northwest Forest Plan (NWFP). Management direction and land allocations in the standards and guidelines of the NWFP are intended to constitute the Forest Service and BLM contributions to the recovery of the northern spotted owl (USDA USDI 1994a). The NWFP provides a network of late-successional reserves, 100-acre Known Spotted Owl Activity Centers (KSOACs), connecting riparian corridors, and connectivity blocks across the lands within the Plan area.

The NWFP-designated KSOACs were the best habitat on Federal lands to be retained as close as possible to the spotted owl nest site, or owl activity center, for all sites known as of January 1, 1994 (USDA and USDI 1994a). This was intended to preserve an intensively used portion of the breeding season home range close to a nest site or center of activity (USDI 1995). There are five KSOACs in the project area, and no proposed treatment units are located within these activity centers.

The Sterling Sweeper project area is located within the provincial home ranges (1.3-mile radius from the site center) of nine historic spotted owl sites. No known nests are located within the proposed treatment units. The survey history for each NSO site within the planning area has varied over the years, but the majority of the survey efforts were done up to the early 2000s, and very limited surveys have been conducted across the planning area over the past 10 years. For purposes of this analysis, all sites are conservatively assumed to be occupied. While there is no requirement to survey for spotted owls prior to implementing forest management actions, the BLM conducted two survey visits to all of these sites in 2011, and the sites will be surveyed once more in the 2012 field season. The 2011 surveys resulted in one recorded male aural (vocalization) detection at one of the sites.

Northern Spotted Owl Habitat

For the purposes of this analysis, the vegetation within the Sterling Sweeper project area was typed into habitat categories pertinent to the northern spotted owl. These categories are distinct and not over-lapping. These habitat types are used throughout this document to describe and quantify habitat conditions across the landscape (Table 3-19).

Table 3-19. Northern Spotted Owl Habitat Types and Area in the Sterling Sweeper Project Area

Habitat Type	Description	Areas (Acres)
Suitable Habitat (NRF)	Meets all spotted owl life requirements. Stands are generally older than 80 years, have a high canopy closure (greater than 60 percent), a multilayered structure, and large overstory trees. Deformed, diseased, and broken-top trees, as well as large snags and down logs, are also present. Suitable habitat also includes areas with more uniform structure that may not have nesting structures, but provides roosting and foraging habitat with flying space for owls in the understory.	3,801
Dispersal Only Habitat	Not suitable for spotted owl nesting/roosting/foraging, but has sufficient patchy cover to be used for travel between suitable stands, a minimum 40 percent canopy cover, and an average tree diameter greater than 11 inches with flying space for owls in the understory.	1,651
Capable Habitat	Forest that is currently not spotted owl habit, but can become NRF or dispersal in the future as trees mature and canopy fills in.	2,192
Non-Suitable Habitat	Lands that do not provide habitat for spotted owl and would not develop into NRF or dispersal in the future (open prairies, meadows, shrub lands, etc.)	4,643
	TOTAL	**12,287**

Highly suitable, or **RA32 habitat** (Recovery Action 32), is a sub-set of NRF habitat . Under the NSO Recovery Plan, the US Fish and Wildlife Service recommends agencies maintain substantially all of the older and more structurally complex, multilayered conifer forests on Federal lands (USFWS 2008c). These forests are characterized as having large diameter trees; high amounts of canopy; and decadence components such as broken-topped live trees, mistletoe, cavities, large snags and large coarse wood. Stands proposed for harvest in the Sterling Sweeper Project Area were evaluated using interagency draft methodology. Stands evaluated and meeting the definitions in the methodology are referred to as RA32 stands. Through field evaluations, 169 acres were determined to meet RA32 stand conditions and were withdrawn from consideration for treatment (see also Chapter 1.2: Issues Considered but not Further Analyzed).

Spotted Owl Prey Base

Dusky-footed woodrats, the primary prey species for spotted owls in southwest Oregon, are found in high densities in early-seral or edge habitat (Sakai and Noon 1993). Down wood is an important habitat feature for these major prey species in southwest Oregon. Dusky-footed woodrats build stick nests, sometimes incorporating logs as part of the structure. Northern flying squirrels are another major source of owl prey in southwest Oregon, while red tree voles (RTVs) comprise only 2.6 % of the diet of spotted owls in this area (Forsman 2004).

Northern Spotted Owl Proposed Critical Habitat

Critical habitat is designated under the auspices of the Endangered Species Act of 1973 and was designated for the northern spotted owl first in 1992. Critical habitat includes the primary constituent elements (PCE) that support nesting, roosting, foraging, and dispersal. It also includes forest land that is currently unsuitable, but has the capability of becoming NRF habitat in the future (57 FR 10:1796-1837). On February 28, 2012, the US Fish and Wildlife Service released the proposed revised critical habitat in the form of maps and the draft form of the federal register publication. The proposed rule was published in the Federal Register on March 8, 2012 (77 Federal Register 46:14062-14165). The final CHU rule will be published in November, 2012.

The proposed project is located in the Klamath East (KLE) critical habitat unit and specifically, it is within the subunit KLE-6. The KLE-6 subunit consists of approximately 167,089 ac (67,619 ha) in Jackson County, Oregon, and Siskiyou County, California, all of which are Federal lands managed by the BLM and Forest Service per the NWFP (USDA and USDI 1994, entire). This subunit is expected to function primarily for north-south connectivity between subunits, but also for demographic support. The USFWS evaluation of sites known to be occupied at the time of listing indicates that approximately 97 percent of the area of KLE-6 was covered by verified spotted owl home ranges at the time of listing (USDI FWS 2012).

Based on current research on the life history, biology, and ecology of the northern spotted owl and the requirements of the habitat to sustain its essential life history functions, the Service has identified the following PCEs for the spotted owl (USDI FWS 2012):

1) Forest types that may be in early, mid, or late-seral states and support the spotted owl across its geographical range

2) Habitat that provides for nesting and roosting (NR). This habitat must provide:

- a) Sufficient foraging habitat to meet the home range needs of territorial pairs of northern spotted owls throughout the year.
- b) Stands for nesting and roosting that are generally characterized by:
  - i. Moderate to high canopy closure (60 to over 80 percent),
  - ii. Multilayered, multispecies canopies with large (20- 30 in (51-76 cm) or greater dbh) overstory trees,
  - iii. High basal area (greater than 240 ft2/acre (55 m2/ha)),
  - iv. High diversity of different diameters of trees,
  - v. High incidence of large live trees with various deformities (e.g., large cavities, broken tops, mistletoe infections, and other evidence of decadence)
  - vi. Large snags and large accumulations of fallen trees and other woody debris on the ground, and
  - vii. Sufficient open space below the canopy for northern spotted owls to fly.

3) Habitat that provides for foraging (F), which varies widely across the northern spotted owl's range, in accordance with ecological conditions and disturbance regimes that influence vegetation structure and prey species distributions (see specific description for the Klamath province below).

4) Habitat to support the transience and colonization phases of dispersal (D), which in all cases would optimally be composed of nesting, roosting, or foraging habitat (PCEs (2) or (3)), but which may also be composed of other forest types that occur between larger blocks of nesting, roosting, and foraging habitat. In cases where nesting, roosting, or foraging habitats are insufficient to provide for dispersing or nonbreeding owls, the specific dispersal habitat PCEs for the northern spotted owl may be provided by the following:

- a) Habitat supporting the transience phase of dispersal, which includes:
  - i. Stands with adequate tree size and canopy closure to provide protection from avian predators and minimal foraging opportunities; in general this may include, but is not limited to, trees with at least 11 in (28 cm) dbh and a minimum 40 percent canopy closure; and
  - ii. Younger and less diverse forest stands than foraging habitat, such as even-aged, pole-sized stands, if such stands contain some roosting structures and foraging habitat to allow for temporary resting and feeding during the transience phase.
- b) Habitat supporting the colonization phase of dispersal, which is generally equivalent to nesting,

roosting, and foraging habitat as described in PCEs (2) and (3), but may be smaller in area than that needed to support nesting pairs.

Specific Klamath Province Foraging Habitat PCEs:

- Stands of nesting and roosting habitat; in addition, other forest types with mature and old-forest characteristics;
- Presence of the conifer species, incense-cedar, sugar pine, Douglas-fir, and hardwood species such as big leaf maple, black oak, live oaks, and madrone, as well as shrubs;
- Forest patches within riparian zones of low-order streams and edges between conifer and hardwood forest stands;
- Brushy openings and dense young stands or low-density forest patches within a mosaic of mature and older forest habitat;
- High canopy cover (87 percent at frequently used sites);
- Multiple canopy layers;
- Mean stand diameter greater than 21 in (52.5 cm);
- Increasing mean stand diameter and densities of trees greater than 26 in (66 cm) increases foraging habitat quality;
- Large accumulations of fallen trees and other woody debris on the ground;
- Sufficient open space below the canopy for northern spotted owls to fly.

d. Survey and Manage Species

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 and USDI 2002). The broad management objective for this species under the Survey and Manage program is to retain sufficient habitat to maintain its potential for reproduction, dispersal, and genetic exchange. The Sterling Sweeper Project is outside the current known range of this species. RTV surveys were conducted in the project area and only four potential nest trees were located and climbed. These four nests were determined not to be RTV nests. The nearest RTV site is over 8 miles to the west of the project area.

Great Gray Owls

Great gray owls nest in a varied array of open forests associated with grassy areas suitable for their preferred prey species (e.g., voles, moles, gophers). Broken top trees, abandoned raptor nests, mistletoe clumps, and other platforms provide suitable nest structures (USDA and USDI 2004). All of the great gray owl (GGO) nests located in the western half of the Ashland Resource Area have been platform nests, whereas nests located in the higher elevation eastern areas have been in broken top snags. Suitable nesting habitat is defined in the "Survey Protocol For The Great Gray Owl " (USDI and USDA 2004) as large diameter trees with roosting cover within 200 meters 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. They have been observed foraging up to 2 miles from the nest (Bull and Henjum 1990).

The majority of the forested stands present around the project area are dense, steep and do not provide an open, grassy understory condition typical of GGO habitat, but does offer potential nesting habitat. There is a limited amount of suitable foraging habitat present within the project area. The most recent surveys in the project area detected great gray owls (all aural and one visual detection), but no reproductive sites were located, nor was a male and female observed in proximity to each other.

Mollusks

The proposed action is located within the suspected ranges of two terrestrial Survey and Manage mollusk species and two Bureau Sensitive species, which are not known to occur but suitable habitat is present. Although very little is known regarding the ecology of these species, they are generally associated with moist areas and use rock substrate, large woody debris and logs as refugia during the dry months (Duncan et al. 2003). Protocol surveys for terrestrial mollusks were conducted in the project area during Fall of 2011. Voucher specimens collected from surveys are currently being identified and sent to a regional malacologist for verification.

The **chase sideband** is commonly found within 30 meters of rocky areas, talus deposits and in associated riparian areas. Areas of herbaceous vegetation in these rocky landscapes adjacent to forested habitats are preferred.

The **Oregon shoulderband** (also Bureau Sensitive) utilizes similar habitat as the chase sideband, but is generally associated with shrublands or rocky inclusions in forested habitat with substantial grass and subsurface water sources.

Habitat attributes for the **travelling sideband** (also Bureau Sensitive) include dry basal talus and rock outcrops, with oak and maple overstory components. Also, they have been found along spring run-off in rocks and moist silty alluvial benches adjacent to creeks with moist vegetation and detritus in mixed conifer-hardwood forest.

The **Siskiyou hesperian** (also Bureau Sensitive) is primarily a riparian associate found in perennially moist habitat, including spring seeps and deep leaf litter along stream banks and under debris and rocks.

e. BLM Bureau Sensitive Species

Bureau Special Status Species (SSS) are species listed or proposed for listing under the ESA and species requiring special management consideration to promote their conservation and reduce the likelihood and need for future listing under the ESA. The SSS list was most recently updated in January 2012. This list has two categories: Sensitive and Strategic. According to BLM Special Status Species Management (USDI BLM 2008), only Sensitive species are required to be addressed in NEPA documents. All Sensitive species were considered and evaluated for this project, and only those that could be impacted by the proposed actions are discussed in more detail.

Fishers

Fishers (a mammal from the weasel family) are found in forest woodland landscape mosaics that include conifer-dominated stands. Their occurrence is closely associated with low- to mid-elevation forests (generally less than 4,100 feet) with a coniferous component, large snags or decadent live trees and logs for denning and resting, and complex physical structure near the forest floor (Aubry and Lewis 2003). Forest type is probably not as important to fishers as the vegetative and structural complexity that lead to abundant prey populations and potential den sites (Lofroth et al. 2010). Fishers do not appear to occur as frequently in early-successional forests as they do in late-successional forests in the Pacific Northwest (Powell and Zielinski 1994), but they will use harvested areas if patches of habitat with residual components (i.e., logs, hardwoods) and areas where patches of larger trees are left in the landscape (Lofroth et al. 2010). In addition, Buskirk and Powell (1994) hypothesized that the physical structure of the forest and prey associated with forest structures are the critical features that explain fisher habitat use, not specific forest types. Prey and scavenged remains recovered from den and rest sites in southwest Oregon include rabbit, ground squirrel, flying squirrel, woodrat, opossum, skunk, porcupine, bobcat, deer and elk carrion, jay, woodpecker, grouse, berries, and yellow jackets (Lofroth et al. 2011 ; Aubry and Raley 2006).

Females usually give birth in cavities (natal dens) in large live or dead trees. These cavities are in trees with openings that access hollows created by heartwood decay (Aubry and Raley 2002). After the kits become more active, the females move them to a larger den (maternal den) on or near the forest floor. These dens are primarily cavities in the lower bole or butt of live or dead large trees. Fishers also use snags, mistletoe brooms, rodent nests, logs, and cull piles for rest sites (Lofroth et al. 2010).

Currently, there are two populations of fisher in Oregon which appear to be genetically isolated from each other: a small population in the Southern Cascades near Prospect and Butte Falls, and a second population in southwestern Oregon in the Klamath Siskiyou Mountains (Lofroth et al. 2010; Aubrey et al. 2004). This is considered to be the result of the presence of potentially strong ecological and anthropogenic barriers including the white oak savanna habitat of the Rogue Valley and Interstate 5. Based on DNA analyses, individuals in the southern Oregon Cascades appear to be descendants of animals reintroduced from British Columbia and Minnesota during the late 1970s and early 1980s by the Oregon Department of Fish and Wildlife (Drew et al. 2003). Animals in the eastern Siskiyou Mountains of Oregon are genetically related to individuals in the northwestern California population, which is indigenous (Wisely et al. 2004 ; Farber and Franklin 2005).

Fishers are highly mobile and have large home ranges, and travel over large areas. In the Southern Cascades population, the average home range for females was approximately 6,200 acres (25 km^2). Male home ranges varied from approximately 36,300 acres (147 km^2) during breeding season to 15,300 acres (62 km^2) during the nonbreeding season (Aubry and Raley 2006). One male dispersed approximately 34 miles (55 km) to the Big Marsh area on the Deschutes National Forest (Aubry and Raley 2002). Other fisher research studies on the west coast have shown that fisher mean home range size vary considerably. Females' mean home ranges vary from 1.7 km^2 to 59 km^2, and males' from 7.4 km^2 to 177.5 km^2.

The northern spotted owl NRF habitat-type described above adequately describes suitable fisher denning and resting habitat because there is a direct correlation of key habitat features used to assess NSO habitat and fisher habitat (high canopy cover, multi-storied stands, large snags, and large down trees on the forest floor). Using northern spotted owl habitat as a surrogate for fisher habitat has been accepted by the courts as a reasonable practice (*KS Wild v. US BLM*, Case No. 06-3076-PA, Order and Judgment 9/10/2007).

Based on the NSO habitat analysis, approximately 5,053 acres of suitable fisher denning and resting habitat exist on BLM-administered lands within the analysis area. The project area contains approximately 436 acres of suitable fisher habitat. However, all of these acres may not provide optimal fisher habitat because past harvest practices and land ownership patterns have resulted in fragmented habitat. BLM "checkerboard" ownership may be one of the primary factors limiting the ability of BLM lands to provide optimal habitat for fishers (USDA and USDI 1994). This checkerboard ownership pattern was created by the Congressional acts that provided land grants, and is beyond the scope of the BLM's authority.

Fisher surveys using baited camera stations and hair snares have been conducted in portions of the Applegate Valley and proximate to the project area in 2011. A fisher was detected at one camera station in the project area; hair was collected and is currently being analyzed at the RMRS genetics lab in Missoula, Montana. In 2005, a fisher was treed by dogs and photographed behind a residence off of Dark Hollow Road, approximately two miles north of the project area. The extent (dispersal, foraging, or breeding) to which the Sterling Sweeper Project area is used by fisher is not known and there is a lack of research available for fisher in the Oregon Siskiyou Mountains.

USFWS published a finding in April 2004 that a petition to list fishers as a "Federally Threatened" species was warranted but precluded by higher priority listing actions. The species remains a USFWS candidate species (69 FR 68:18770). An interagency team of Federal agency and State biologists from British Columbia, Washington, Oregon, and California completed a draft Conservation Strategy (September 2011) and is currently being reviewed by Regional Supervisors. Fishers remain a BLM Bureau Sensitive Species.

Bald Eagle

The bald eagle is a Bureau Sensitive Species and is also protected under the Bald and Golden Eagle Protection Act and the Migratory Bird Treaty Act. The US Fish and Wildlife (2007a) bald eagle Management Guidelines state:

> Bald eagles generally nest near coastlines, rivers, large lakes or streams that support an adequate food supply, usually fish and waterfowl. They often nest in mature or old-growth trees; snags (dead trees); cliffs; rock promontories; rarely on the ground; and with increasing frequency on human made structures such as power poles and communication towers. In forested areas, bald eagles often select the tallest trees with limbs strong enough to support a nest that can weigh more than 1,000 pounds. Nest sites typically include at least one perch with a clear view of the water where the eagles usually forage. Shoreline trees or snags located in reservoirs provide the visibility and accessibility needed to locate aquatic prey. Eagle nests are constructed with large sticks, and may be lined with moss, grass, plant stalks, lichens, seaweed, or sod. Nests are usually about 4-6 feet in diameter and 3 feet deep, although larger nests exist.

There are no known bald eagle nests in or adjacent to the project area, but the stands do have large enough trees to support nesting.

Bats

Townsend's big-eared bats are found in the western U.S. in habitats that include conifer forest (reviewed in Verts and Carraway 1998). Townsend's big-eared bats typically roost and hibernate in mines and caves, but have been found roosting in hollow trees, as well (Fellers and Pierson 2002). A single Townsend's big-eared bat has been documented in the Project Area.

Pallid bats west of the Cascade Range are restricted to the drier interior valleys of the southern portion of the state. They are usually found in brushy, rocky terrain, but have been observed at edges of coniferous and deciduous woods and open farmland (Verts and Carraway 1998). Roost habitat includes buildings, bridges, large decadent snags, and rock outcrops. Pallid bats have not been confirmed in the project area, but they could be present.

Fringed myotis bats appear adapted to live in areas with diverse vegetative substrates. They are associated with a variety of habitats including conifer forests and oak woodlands. They roost in buildings, caves, and mines, and in crevices and cavities in large trees. A single fringed myotis bat has been documented in the project area.

All mining adits that can provide suitable bat habitat are protected with a 250-foot no-cut buffer (ROD/RMP). Scattered large remnant trees and snags that could provide roosting opportunities during foraging are present in and adjacent to the proposed units. Those within the units are not the subject of treatment and would be protected to the greatest extent possible, unless they present a safety hazard.

Black Salamander

The black salamander is a terrestrial salamander that does not need standing or flowing water for any part of its life cycle, yet may be found near creeks or seeps. In Oregon, they are typically found in coniferous forests, deciduous woodlands and open hillside habitat from sea level to ~4,500 feet in elevation (Bury 2005). Microhabitat for black salamanders includes surface cover such as down wood and rocks. They frequent talus slopes and have been found in the talus exposed by road cuts. At drier sites, they have been found among rocks along streams. Several black salamanders have been documented in the project area and these locations represent the northern tip of the species' range.

Johnson's Hairstreak Butterfly

The Johnson's hairstreak butterfly is dependent on conifer mistletoe for egg-laying and for food in its larval stage. The host plants are dwarf mistletoes (*Arceuthobium campylopodum*) and other mistletoes (including *A. tsugense*). It spends much of its lifespan in and near the tops of conifer trees, although it descends to ground level for nectaring (including Oregon grape, Pacific dogwood, ceanothus, pussy paws, and *Rubus* species), and to visit moist muddy areas as a source of water (Pyle 2002). Surveys for the species are difficult as it spends the majority of its lifecycle high in the canopy of older conifers with mistletoe infection. It is not known to occur in the project area and there is some uncertainty whether the project area is within its range, but habitat exists in the area and therefore will be included in this analysis. The nearest known site is east of Medford, approximately 20 miles away from the project area.

f. Other Wildlife Species of Concern

USFWS Birds of Conservation Concern and Game Birds Below Desired Condition

Resident (found year-round) and Neotropical bird species are addressed here due to widespread concern regarding downward population trends and habitat declines. BLM has interim guidance for meeting Federal responsibilities under the Migratory Bird Treaty Act 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). Table 3-20 displays those species that are known or likely to be present in the analysis area.

Table 3-20. BCC and GBBDC Species Known or Likely to be Present in the Project Area

Scientific Name	Common Name	Status
Patagioenas fasciata	band-tailed pigeon	GBBDC
Zenaida macroura	mourning dove	GBBDC
Contopus cooperi	olive-sided flycatcher	BCC
Selasphorus rufus	rufous hummingbird	BCC
Carpodacus purpureus	purple finch	BCC

GBBDC – Game Birds Below Desired Condition
BCC – Birds of Conservation Concern

Current research indicates the most appropriate scale to study impacts to migratory birds is at the eco-regional scale (California Partners in Flight 2002). Breeding bird surveys in the Southern Pacific Rainforest Physiographic Region (which includes western Oregon) indicate that songbirds are declining. The exact cause of these declines is still unclear, but issues associated with their winter grounds (Central and South America) are suspected to be an important factor.

Band-tailed pigeons are generally found in temperate and mountain coniferous and mixed forests and woodlands, especially pine-oak woodland. They will often forage in diverse habitats not used for nesting, including cultivated areas, suburban gardens and parks (Braun 1994). Mineral springs and mineral graveling sites are important for mineral intake by adults, especially during the nesting season. Pigeons show strong fidelity to mineral sites and have been documented traveling 32 miles from a nesting site to a mineral spring (Jarvis and Passmore 1992).

Mourning doves breed in variety of open habitats, including agricultural areas, open woods, deserts, forest edges, cities and suburbs. A dove may have up to five or six clutches in a single year. Human alteration of original vegetation in North America is generally beneficial for this species, with creation of openings in extensive forests and plowing of grasslands for cereal-grain production of particular importance. Mourning doves are one of the most widespread avian species in North America.

Olive-sided flycatchers are most often associated with forest openings, forest edges near natural openings (e.g., meadows, canyons, rivers) or human-made openings (e.g., harvest units), or open to semi-open forest stands. In Douglas-fir forests of northwest California, Olive-sided Flycatcher is the only common species detected more often at forest edges than in forest interior (Rosenberg and Raphael 1986). In rain forests of western Oregon, which are characterized by dense canopy closure and function as unsuitable habitat, Olive-sided flycatchers occur primarily in harvest units where at least a few large snags and live trees are retained.

Rufus hummingbirds' breeding habitat includes coniferous forest, second growth, thickets and brushy hillsides, foraging in adjacent scrubby areas and meadows with abundant nectaring flowers. They are associated with secondary succession communities and forest openings (Healy and Calder 2006). Nest sites are located in a variety of plants and sites including shrubs and drooping lower branches of conifers and oaks. There are reports of colonies of up to 20 nests only a few yards from each other in timber or second growth (Bent 1940).

The **purple finch** is found in the proposed project. In summer, purple finch mainly breed in moderately moist, open conifer forests, and edge habitat at low -to-mid elevations. They use a variety of habitats including deciduous woodlands, riparian corridors and edge habitat (Marshall et al. 2003). In winter they are more widespread, using forests, shrubby areas, weedy fields, hedgerows, and backyards.

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 Species program. However, protection is afforded under the Bald and Golden Eagle Protection Act and under the 1995 and 2008 Medford District RMPs.

In Oregon, golden eagles inhabit a wide range of habitats, including shrub steppe, grasslands, juniper, open ponderosa pine, and mixed conifer/deciduous habitats. The preferred foraging habitat is generally open areas with a shrub component that provides food and cover for prey (primarily black-tailed jackrabbit). Nests are typically large (3-10' 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). There are no known golden eagles nests in the project area, but they are often seen soaring in the Applegate and there are large enough trees in the project area to support nesting.

2. Environmental Effects

Impacts to wildlife from the proposed actions are best measured by the predicted potential changes in stand structure within different habitat types that would result from the activities proposed under each Alternative. Quantifying the predicted changes in wildlife habitat is the best method to evaluate the potential affects to wildlife species because they reflect the modification to and the resulting functionality of the residual stand after treatment. Each wildlife species will respond differently to these stand structure changes; some may be negatively affected, others may benefit, while still others may remain unaffected. The effects to key species associated with these habitats are linked to these changes in stand structures, as well as the magnitude (total treatment acres) and intensity of the treatments. Only Federally listed, Bureau Sensitive species, and Survey and Manage species known or suspected to occur within the Planning Area and with the potential to be impacted by the proposed actions are addressed further in this EA.

a. Alternative 1—No Action Alternative

Under the No-Action Alternative, no vegetation management would be implemented and there would be no direct effects to wildlife species on BLM-administered lands. Without treatment , the current stand conditions would likely develop into less complex stand structures and species compositions than that of late-successional stands (Sensenig 2002), or at the very least, would require a much longer time scale to develop (Tappeiner et al. 1997). Unthinned stands would remain at a higher risk of stand-replacement fire than if the stands were thinned. Recent trends in Southwest Oregon illustrate that fire has been converting mature forest structure into earlier seral stages at a higher rate than harvest. For this reason, the retention of mature forest habitat is problematic in dry forested ecosystems (Courtney et al. 2004; Spies et al. 2006). Habitat conditions would remain generally unchanged at the unit scale in the short term unless a major disturbance such as fire, wind, ice, insects, or disease occurred.

Conditions in the proposed thinning units would be most affected in the long term by this competition of overstory trees. Overstocked stand conditions would result in relatively slow growth rates that would prolong crown differentiation. Eventually, some trees would become dominant and shade out suppressed trees. These trees would stand as small-diameter snags and ultimately fall, but would not create openings as occur in late-seral stands because of their small size. The remaining dominant trees would soon expand their crowns into the newly-available growing space, increasing the effects of mortality on understory vegetation. Multiple waves of such competition mortality would occur before dominant tree density would be low enough for understory reinitiation. This growth trajectory would be unfavorable to the development of mature and late-successional forest attributes. These processes are discussed in further detail in the Silviculture portion of this EA (Section 3.B).

Under Alternative 1, conditions in the proposed group select treatment units would continue to lack structural complexity and would function as suitable habitat for a more limited suite of species. The principal purpose for group selection treatment is to create structural diversity among stands that have a monoculture appearance or a one-layer overstory. Residual trees will have improved health, vigor, and growth from the added growing space, water, and nutrients that they receive. Group selection will create small openings, allowing regeneration establishment and release, will preserve legacy trees within the stand, and remove diseased trees.

Private lands surrounding the project area are made up of early, mid, and late seral forests, agriculture, urban areas, and barren land. Most private forest lands are managed as tree farms for production of wood fiber on forest rotations. It is expected that any remaining late-seral forests on private timber lands will be converted to early seral forest over the next one or two decades. For those species dependent on early-seral habitat, private forest lands are not expected to provide quality habitat as competing vegetation that includes flowering plants, shrubs and hardwood trees are regularly sprayed to reduce competition with future harvestable trees.

b. Alternative 2

All of the treatments proposed under the Proposed Action were designed to meet the following objectives:

- Conserve and improve survivability of older trees (trees >150 years of age) by reducing nearby fuels and competing vegetation.
- Increase resistance/resilience of forest stands and landscape to wildfire, drought, insects, etc. by reducing stand densities, ladder fuels, and shifted tree species diversity.
- Restore more sustainable structure and composition by reducing stand densities and enhancing tree diversity, including hardwoods, and desirable understory species.
- Accelerate development of structural complexity such as larger tree structures and decadence.
- Develop spatial heterogeneity within stands (e.g. fine-scale structural mosaic).
- Create conditions that are favorable for the initiation, creation, and retention of snags, down wood, large vigorous hardwoods, and understory vegetation diversity in areas where these are lacking.
- Increase growing space and decrease competition for large or legacy pine, oak, and cedar (preserve existing genotypes which are physiologically better adapted to fire disturbance);
- Maintain and create nesting, roosting, and foraging northern spotted owl habitat within forest stands in the analysis area.

<u>Federally Threatened Species—Northern Spotted Owl</u>

Effects to Northern Spotted Owl Habitat

All action alternatives may affect northern spotted owls to some degree (Likely to Adversely Affect or Not Likely to Adversely Affect), and therefore require consultation under Section 7 of the Endangered Species Act. Consultation with the USFWS is ongoing for the activities proposed under this Action Alternative, and will be completed before any decision on this proposed action is signed.

Under the Proposed Alternative, 379 acres are proposed for treatment including 10 acres NRF habitat, 292 acres dispersal habitat and 77 acres of capable habitat. No actions are proposed in the 100-acre known northern spotted owl activity centers or in nest patches of historic spotted owl sites.

When discussing changes to spotted owl habitat, the following definitions are used to describe the anticipated effects of the activities associated with the proposed action to the NSO habitat types within the Sterling Sweeper project area. Canopy closure is used as one of the critical habitat thresholds because it is highly important to NSO nest site selection and general habitat use, because increased levels of canopy afford protection from predators, and regulate temperature extremes (Courtney et al. 2004). The proposed treatments can be assigned into the following general effect type:

1) A **Treat and Maintain** of NRF or dispersal habitat means an action or activity will occur within NRF or dispersal habitat but will not change the habitat classification post treatment. The NRF stand will retain an average of 60% canopy cover post treatment, large trees, multistoried canopy, standing and down dead wood, diverse understory adequate to support prey, and may have some mistletoe or other decay. Dispersal habitat will continue to provide at least 40% canopy, flying space, and trees 11 inches diameter at breast height (dbh) or greater, on average. The habitat classification of the stand following treatment will be the same as the pretreatment habitat classification.

Table 3-21. Effects of Alternative 2 Proposed Treatments to NSO Habitat in the Project Area

Habitat Type	Pre-Project Acres	Treat and Maintain	Removal	Post-Project Acres	Percent Change
NRF	3,801	10	0	3,801	0.0%
Dispersal-only	1,651	131[1]	0	1,598	0.0%
Total	5,452	141	0	5,399	0.0%

[1] Under Alternative 2, 292 acres of dispersal habitat considered for treatment. Of the 292 acres, 200 acres are being proposed for group select treatments and only 20% (or 40 acres) of those units would receive group select (patch) harvest. The remaining 91 acres of dispersal maintained is in the proposed disease sanitation, density management and select thin units.

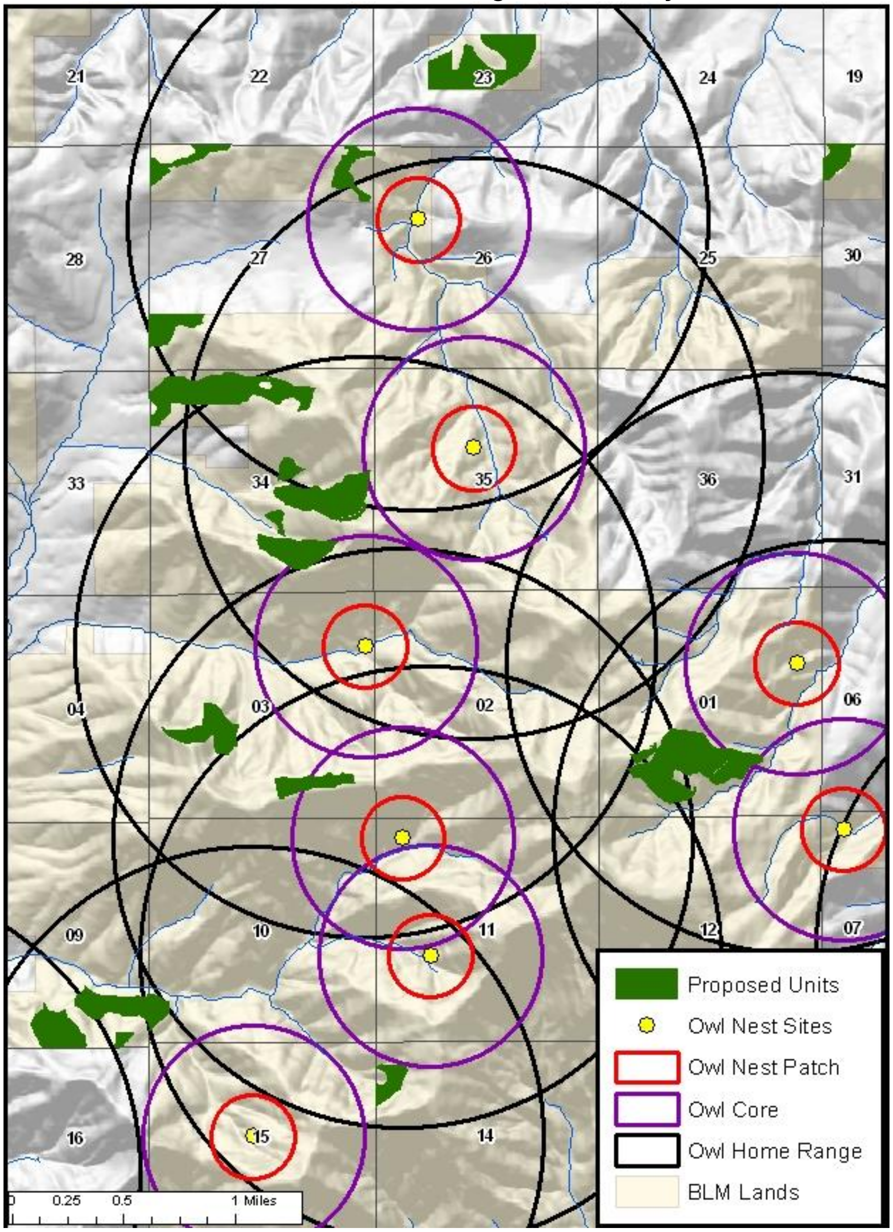
When analyzing the impacts to spotted owls from timber harvest, the amount, intensity and duration of the harvest are not the only factors to consider. A critical factor to consider is the spatial distribution of the habitat found across the landscape and where the proposed treatments would occur in relation to known NSO nest sites. The areas surrounding a NSO nest site can be delineated into three concentric circles (Map 3-5). These concentric circles represent three scales of use during the course of breeding and non-breeding season. These areas of use are defined as follows:

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

- **Core Area** is a 0.5-mile radius circle (approximately 500 acres) from the nest or center of activity to delineate the area most heavily used by spotted owls during the nesting season; it is included in the provincial home range circle. Core areas represent the areas which are defended by territorial owls and generally do not overlap the core areas of other owl pairs (USDI et al. 2008d).

- **Provincial Home Range** is defined by a circle located around an NSO activity center and represents the area owls are assumed to use for nesting and foraging in any given year. For the Klamath Mountains Province the home range is a 1.3 mile radius circle (approximately 3,400 acres (USDI et al. 2008d). The home ranges of several owl sites may overlap.

Map 3-5. NSO Nest Patch, Core Areas and Home Ranges in the Project Area



These three areas represent how NSOs utilize the forest environment around their nest sites, and the importance of the habitat located within each spatial scale to a given NSO pair. They also provide a better understanding of how habitat altering treatments may affect NSOs life functions depending on where the treatment would occur in relation to known NSO nest sites. A more detailed description of the scientific rationale for the development of these three (3) scales is provided in in the Methodology for Estimating the Number of Northern Spotted Owls Affected by Proposed Federal Actions (USDI et al. 2008d).

No harvest treatments are proposed in the Nest Patch of any NSO sites. Research has shown that the habitat quality within 300 meters of a nest site (known as the nest patch) is critically important to determining nest site positioning across the landscape (Perkins et al. 2000). Under Alternative 2, there are 31 acres of proposed treat and maintain of dispersal habitat in four spotted owl Core Areas.

The proposed action would take place within the Provincial Home Range of nine historical northern spotted owl sites. Under Alternative 2, there are 357 acres of proposed treatments within these owl home ranges. The group select (patch cuts) treatment of approximately 40 acres of dispersal habitat inside of northern spotted owl home ranges may reduce, but should not prohibit, the ability of owls to disperse through the patch cuts. The 40 acres represent approximately 20% of the available dispersal habitat in the group select treated stands. There is little evidence that small openings in forest habitat influence the dispersal of spotted owls, but large, non-forested valleys apparently are barriers to both natal and breeding dispersal (Forsman et al. 2002). Ten (10) acres of NRF and 80 acres of dispersal would be treated, but will be maintained and still function the same following treatment. Across the analysis area, more than 96% of existing suitable northern spotted owl habitat would remain untreated. Therefore, only minimal negative effects are anticipated as a result of the proposed treatments.

Effects to Northern Spotted Owl Prey

Timber harvest and associated activity fuels reduction projects could impact foraging by changing habitat conditions for prey. Some disturbance of habitat can improve forage conditions, provided some ground cover is retained or created. Removal of tree canopy would bring more light and resources into the stand, stimulating forbs, shrubs and other prey food. Once the initial impact of disturbance recovers (6 months to 2 years), the understory habitat conditions for prey forage would improve over the years, until shrubs and residual trees again close in the forest floor.

While some reports suggest negative impacts of thinning on flying squirrels (Wilson 2010; Holloway and Smith 2011), there is also some counter research as to these effects (Gomez et al. 2005; Ransome et al. 2004; Waters and Zabel 1995). Woodrats (both bushy-tailed and dusky-footed) are important components of the spotted owls' diet in in the project area (Forsman et al. 2004). Some beneficial effects to dusky-footed woodrats due to shrub development in thinned stands will be possible (Sakai and Noon 1993; Suzuki and Hayes 2003). Also, bushy-tailed woodrat presence is more dependent on cover and food availability than on a stand's seral stage.

Treatments associated with Alternative 2 that would remove or maintain spotted owl habitat may impact foraging by changing habitat for spotted owl prey species (USFWS 2006). Residual trees, snags, and down wood retained in the thinned stands would provide some cover for prey species over time, and would help minimize harvest impacts to some prey species, such as dusky-footed woodrats. Group select harvest treatments (< 1/2 acre) would remove suitable habitat for arboreal prey species (flying squirrels, red tree voles), but could improve habitat for non-arboreal species (western red backed voles and deer mice). Treatment implementation would be spread out temporally and spatially within the project area, which would provide areas for spotted owl foraging during project implementation and reduce the impact of these short-term effects at the project level. Even though northern spotted owls seldom venture far into non-forested stands to hunt, edges created by the treatments may present new foraging opportunities.

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

Bingham and Noon (1997) reported that a spotted owl core area (closest to the nest) is the area that provides the important habitat elements of nest sites, roost sites, and access to prey, benefiting spotted owl survival and reproduction. Rosenberg and McKelvey (1999) reported that spotted owls are "central place" animals with the core area being the focal area. Several studies (Wagner and Anthony 1998; Dugger et al. 2005; Zabel et al. 2003; Bingham and Noon 1997) indicate the core area size for the Klamath province is 0.5 miles from the nest site (or 500 acres). Therefore, effects to prey species for each alternative would be assessed by the amount of habitat treated within the core area. Due to the spatial distribution of the proposed treatments, adequate and sufficient prey habitat would remain within the core areas and would continue to provide suitable foraging opportunities within the home range. Therefore, effects to prey species are most critical at the nest patch and core areas. Within the Sterling Sweeper Project, there would be no treatment within nest patches and all treatment within core areas would be "treat and maintain" except for removal of 8 acres of dispersal habitat spaced across three units.

Implementation of Project Design Features that would retain and/or place large down wood while also retaining snags in the treatment units will provide cover for prey species, and will help minimize harvest impacts to prey habitat.

Effects of Noise Disturbance to Northern Spotted Owls
Mandatory PDFs would be incorporated into all action activities. Nesting owls are confined to an area close to the nest, but once the young fledge, they can move away from noise and activities that might cause them harm. Since all projects would follow mandatory PDFs that restrict activities to outside of the breeding season and beyond recommended disturbance distance thresholds, as established by the US Fish and Wildlife Service, no harm to nesting owls, or their young, is expected from project related noise or activities.

Effects of Fuels Reduction Treatments to Northern Spotted Owls
Alternative 2 proposes to treat slash created from harvest treatments. The fuels reduction treatments as proposed in Chapter 2 would not alter the overstory forest structure or remove additional key habitat components related to spotted owl habitat. In the thinning units, these treatments reduce understory density and improve flight paths within stands, in turn increasing the accessibility of owls to the forest floor and prey abundance or availability (Sakai and Noon 1993 and 1997).

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

Fuels treatments do have potential to impact the spotted owl prey base because some snags or coarse woody debris habitat that prey species utilize can be consumed during underburn operations. However, these effects are expected to be limited and localized because not all the existing snags or CWM within a unit is lost during firing operations and every reasonable precaution is taken to prevent loss of wildlife habitat (Mason 2012). In addition, while some prey species may be adversely affected from fuels treatments, a proportion of the prey are primarily arboreal in habit, and would remain largely unaffected by these treatments.

Effects of Road Construction to Northern Spotted Owls
Trombulak and Frissel (2000) conducted a literature review on the ecological effects of roads. These effects range from direct mortality to alteration of the chemical environment. They stressed the need to retain remaining roadless areas, remove or restore existing roads, and to consider the full range of ecological process when designing a new road. The fact that there is an array of possible negative effects associated from building roads is not debatable. The magnitude of these effects from implementing the proposed project is discussed in the analysis. From a terrestrial wildlife standpoint, BLM Specialists have selected mitigation measures to limit some of the described negative effects, which include (but are not limited to) wildlife surveys, seasonal restrictions, and placement of the road to miss large trees and retaining large woody material.

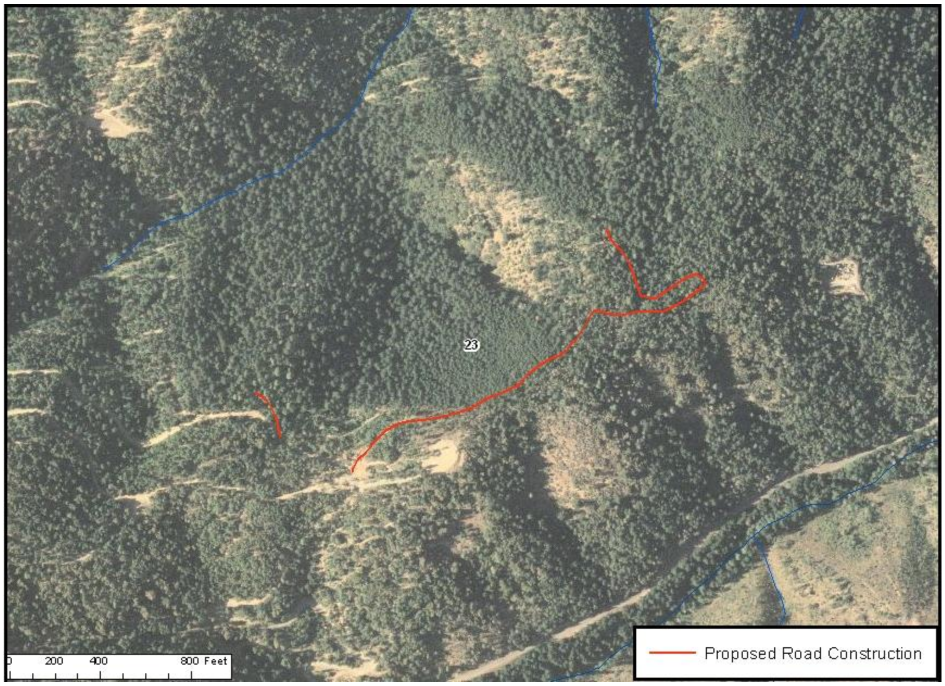
There are a number of ways roads affect wildlife (in addition to habitat removal), including vehicular noise disturbance (which affects behavior patterns), increased potential for poaching, increased potential for over-hunting along roads due to easy access, and microclimatic changes to the habitat adjacent to roads.

Under Alternative 2, the BLM proposes to utilize and maintain (as needed) about 42 miles of existing roads (i.e., road grading, rock surfacing, and water drainage improvements). Road maintenance has the potential to impact wildlife species through noise and displacement, but would be of short duration and subject to wildlife seasonal PDFs.

Approximately 0.41 miles of new road (Map 3-6) would be constructed under this alternative. The new road construction will be located in dispersal and capable northern spotted owl habitat. Seasonal restrictions listed as PDFs would avoid adverse disturbance to adjacent nesting spotted owls during road construction. Additionally, at the close of project activities, a trench barricade would be constructed at the beginning of road 38-1W-30.00 to prevent unauthorized use.

New road construction is in “land locked” BLM lands and behind a private gate. Coupled with proper implementation of PDFs, it is not expected that new roads 38-2W-23.01B or -23.02 will receive any unauthorized use post project implementation and will minimize the effects to spotted owls.

Map 3-6. Location of New Road Construction in Section T38S R02W S23



Effects to Northern Spotted Owl Proposed Critical Habitat

Alternative 2 is located within critical habitat sub-unit KLE-6 and proposes treatment in 244 acres of critical habitat. Of that acreage, 177 acres are proposed group select (patch cuts) in dispersal habitat and will only be treating approximately 20% of the stand, therefore the actual treatment in dispersal habitat would be near 34 acres. There is an additional 12 acres of treat and maintain thinning in dispersal habitat and 10 acres in nesting, roosting and foraging (NRF) habitat. The remaining 45 acres of proposed treatment are found in capable habitat, which currently does not function as suitable spotted owl habitat.

The US Fish and Wildlife Service (USDI FWS 2012) issued a Biological Opinion on the proposed project that determined the removal of dispersal habitat, PCE 4, within critical habitat sub-unit KLE-6 may affect, and is likely to adversely affect critical habitat due to a reduction of PCE 4 within the affected sub-units. However, the proposed action is not expected to affect the intended conservation function of this unit (north-south connectivity between subunits and demographic support) because the combination of 65,287 acres of NRF and dispersal habitat will allow spotted owls to effectively disperse within and beyond this critical habitat sub-unit. Although the proposed action will remove a small amount of dispersal habitat within the KLE-6 sub-unit, the overall objectives of these projects are to restore ecological processes or long-term forest health to forested landscapes (see summation below), which is consistent with the 2011 Revised Recovery Plan and the 2012 Proposed CHU.

At the time the BLM submitted the Biological Assessment (USDI BLM 2012) to the USFWS, the proposed action included removal of 244 acres of dispersal and therefore triggered a may affect, likely to adversely affect critical habitat determination. Through project refinement, only 20% of these dispersal stands will be treated using group select treatments. The group select (patch cuts) are limited to ¼ to ½ acre in size and should not prohibit spotted owls dispersing through these stands (Forsman et al., 2002). The stands will still function as dispersal habitat, and meet the intended conservation function of sub-unit KLE-6.

In their Biological Opinion, the USFWS (USDI FWS 2012) also determined that the proposed treat and maintain of PCE 2, 3 (NRF) and 4 (dispersal) within proposed critical habitat sub-unit KLE-6 will have an insignificant effect and therefore may affect, is not likely to adversely affect critical habitat because:

- Canopy cover within treated NRF stands will be retained at or above 60 percent.
- Canopy cover within affected Dispersal-only stands will be maintained at 40 percent or greater post-treatment.
- Any multi-canopy, uneven-aged tree structure that was present prior to treatment will remain post-treatment.
- No spotted owl nest trees will be removed.
- Decadent woody material, such as large snags and down wood, will be retained in the same condition as prior to the treatment.
- The proposed treatments will be dispersed in relatively small patches within the CHU to further minimize the potential for adversely affecting stand characteristics for dispersal habitat.

Table 3-22. Affects to PCEs in KLE-6 within the Section 7 Applegate and Bear Creek Watersheds

Primary Constituent Elements	KLE-6 Acres	Treat and Maintain	Removal	Post-Project Acres	Percent Change
2,3 (NRF)	61,858	10	0	61,858	0.0%
4 (Dispersal)	65,287	189	0	65,287	-0.006%

Northern Spotted Owl Summation

The long-term (>10 year) effects of the proposed action are anticipated to increase the health and vigor of the residual stands post treatment. It is likely that the treated stands will develop into more complex, structurally diverse forests in the long term in comparison to the No Action Alternative. In fact, thinning dense stands may be necessary in order to achieve old-growth forest characteristics in the absence of natural disturbance events (Tappeiner et al. 1997). Thinning younger forest stands may provide growing conditions that more closely approximate those historically found in developing old growth stands (Hayes et al. 1997). Many of the treatments as proposed under Alternative 2, especially those that would occur in dispersal quality habitat, would have long-term beneficial effects to NSOs by increasing growth rates of the residual stand and accelerating the development of late-successional structural complexity within the treated areas than would occur if left untreated.

Spotted owl habitat in the project area is already below a threshold point to where any habitat effects in a home range would trigger a required consultation with the U.S. Fish and Wildlife Service. The proposed action would treat and maintain 131 acres of and 10 acres of NRF habitat. Consultation with the Service was initiated in the fall of 2011 and the BLM submitted a Biological Assessment (Reference Number 01EOFW00-2012-F-0049) on January 10, 2012. The Biological Opinion received from the Service (USDI FWS 2012) includes a finding that implementation of the proposed action would not jeopardize the continued existence of the spotted owl.

Conservation Measures implemented that will reduce impacts to spotted owls or key habitat areas:

- Spotted owl habitat assessments were used to reduce impacts to NRF and eliminate treatments in RA-32 habitat
- Protection and buffering of Special Status Species sites found during protocol surveys
- Protection of sensitive plants that occur in the treatment areas
- Placement of riparian area buffers
- Protection and buffering of all known mining adit locations
- Project design that incorporated historic owl survey data assessments
- None of the projects occur in Late-Successional Reserves (USDA and USDI 1994)

- No projects occur with Known Spotted Owl Activity Centers (KSOAC). KSOAC are the best 100 acres around northern spotted owl activity centers that were documented as of January 1, 1994 on Matrix and AMA lands, and are managed as Late-Successional Reserves (LSR). The criteria for mapping these areas are identified on pages C-10 and C-11 of the Northwest Forest Plan Standards and Guidelines (USDA USDI 1994)
- None of the proposed treatments would occur within a NSO nest patch

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

- All proposed treatments in NRF and dispersal habitat would be maintained post-harvest.
- The majority (95%) of the proposed treatments would occur at the home range scale of the NSO territories present in the planning area.
- None of the proposed treatments are located within any NSO nest patches
- Negative impacts to NSO prey are anticipated to only occur in the short term (<5 years) and would be spatially separated and well distributed across the planning area.
- Seasonal restrictions will reduce the likelihood of noise disturbance to nesting owls

Survey and Manage Species

Red Tree Voles

Protocol surveys were conducted for red tree voles in all of the proposed treatment units; 4 suspected nests were located. These trees were climbed to access the nests but were determined not be tree vole nests. Red tree voles have never been documented in the project area and the nearest confirmed nest is over 8 miles to the west. Therefore, no direct impacts to RTVs are anticipated as a result of implementing the actions included under Alternative 2.

Great Gray Owls

The most recent great gray owl (GGO) surveys in the project area detected owls (all aural and one visual detection). No nests were located during the “follow-up” survey visits, nor was a male and female observed in proximity to each other. Although no nests were found, suitable habitat is present in the project area and is predominately situated at lower elevations in the Sterling Creek valley. Great gray owls most often nest in mature stands adjacent to open canopied woodland and meadows.

Alternative 2 proposes treatment in five units adjacent to suitable GGO habitat. These are group select units and the prescription will only be treating 20% of the units and considerably less of the contiguous stand. Openings created by these treatments may remove potential nests trees. However, the reduction of canopy closure from these openings is spatially dispersed throughout the stands and will not impact owl nesting opportunities. The average canopy closure at great gray owl nest sites across the Medford District averages 52% (Godwin 2012).

Long term beneficial effects include accelerated development of late-successional forest habitat suitable for nesting and improved potential foraging habitat as understories respond from increased light penetrating to the forest floor . In addition, implementing required PDFs (seasonal restrictions, retaining snags, cull material, down woody debris, and placing woody debris (logs) in RMP deficient treatment areas) will be beneficial to this species prey base. The proposed new road construction associated with Alternative 2 would not occur in suitable great gray owl habitat, and thus would not directly affect any nesting habitat.

Terrestrial Mollusks

If 2011 surveys result in confirmed Special Status Species mollusks presence in the project, those known sites will receive protection buffers before this project would be implemented. An adjacent project area was surveyed within the past 10 years, and no Special Status Species were detected.

In the short term, thinning of the canopies could desiccate fine scale habitats, but the canopy would eventually fill back in when shrubs and saplings reestablish the forest floor. Impacts from implementing treatments in Alternative 2 are likely to have minimal effects and will not trend these species towards listing because:

- The dispersed impact of the proposed treatments in relation to the project area and the proximate undisturbed habitat for species to recolonize the impacted areas
- Very little of the key habitat attributes are found in the project units and perennial riparian areas and water sources are buffered
- Large course woody debris will be maintained and in some areas where it is determined to be lacking, cull material will be retained or the BLM could fell trees to help reach RMP standards.
- Any known locations will receive protection buffers or management recommendations

Bureau Sensitive Species

Fishers

Fisher occurrence is closely associated with low to mid-elevation (generally less than 4,100 feet) forests with a coniferous component, large snags or decadent live trees and logs for denning and resting, and complex physical structure near the forest floor (Aubry and Lewis 2003). Forest type is probably not as important to fishers as the vegetative and structural complexity that lead to abundant prey populations and potential den sites (Lofroth et al. 2010). Currently, there is a lack of research of fisher habitat use and preferences in the Oregon Siskiyou Mountains. The most applicable data available to the BLM where these key structural habitat components are located across the landscape is the northern spotted owl nesting, roosting and foraging (NRF) habitat models.

There is considerable information on the importance of structural elements (e.g., large trees and snags with cavities) for fisher. The strongest and most consistent habitat association observed across all fisher studies in the West Coast Distinct Population Segment was the use of cavities in live trees and snags by reproductive females with kits. Natal dens are typically found in the largest trees available in a stand and there is a preference towards hardwood cavities when present on the landscape. These large trees with cavities and platforms are also used extensively by both sexes for resting sites. Naney (2012) stated that the reduction in structural elements used for denning and resting distributed across the landscape was the highest ranked and geographically most consistent threat to fishers. Currently, there are no empirical thresholds at which the reduction of structural elements may begin to negatively affect fishers (Naney et al. 2012).

Other threats to fishers in SW Oregon include overstory reduction, roads, fragmentation, uncharacteristically sever wildfires, and the reduction of structural elements mentioned above (Naney et al. 2012). These changes in habitat have the greatest effect on fisher new home range establishment. Fishers typically have large home ranges, use habitat at multiple spatial scales, and typically avoid areas with little or no contiguous canopy cover (Lofroth et al. 2010). Fragmentation is primarily influenced by land ownership patterns, management practices, and is a higher threat on commercial timber lands (Naney et al. 2012). These effects likely have the strongest influence on females because males have been known to disperse great distances to settle new home ranges. Although not always successful, dispersing juveniles have been documented moving long distances and navigation across or around landscape features including rivers, highways and rural communities (Lofroth et al. 2010). In a study in the south Oregon Cascades, juvenile males averaged a dispersal distance of 18 miles (Aubry and Raley 2006). Dispersal into and through the project area probably represents a “pinch point” because it is surrounded on three sides by open agricultural lands and rural development.

According to the closet fisher study (Aubry and Raley 2006) to the project area, fisher male non-breeding home ranges average 24 mi^2 (15,320 acres) and females average 9.6 mi^2 (6,177 acres). These are probably underestimated because the landscape in the project area contains more woodland and grasslands than that encompassing the south Cascades fisher population study. Since female home ranges frequently overlap, the project area has the potential to contain at least two female home ranges and one male home range, and possibly more, depending on their home range juxtaposition on the landscape surrounding the project area. Surveys conducted in 2011 confirmed fisher presence in the project area; currently, genetic analysis is trying to determine gender and the source population. This detection was outside breeding season and likely represents a resident fisher within its home range.

A considerable amount of research exists describing denning and resting habitat use and landscape-level selection (Lofroth et al. 2010), but very little is known regarding how forestry practices affect how fishers continue to use previously untreated areas. Historically, a change in habitat is used as a surrogate to determine the effects of habitat modification in lieu of published research. As previously mentioned, our best tool for determining suitable fisher habitat, while not implying a level of fitness, is to use spotted owl habitat models. Field surveys have shown that spotted owl NRF habitat can contain similar decadent attributes or structural elements that fisher use for denning and rest sites. The proposed treatments in Alternative 2 would treat (and maintain) 10 acres out of 3,800 acres (total) of NRF habitat in the project area.

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

Disturbance from treatment activities would likely be the principal effect to fisher within the project area. However, fishers are highly mobile and with large home ranges, they would likely move to another part of their home range while the activity is ongoing. Unrelated to disturbance, ongoing radio telemetry work in the nearby Ashland watershed has shown that fishers are quick to respond to environmental changes (e.g. heavy snowfall) and move to other parts of their home ranges (Clayton 2012a).

Under Alternative 2, there are Project Design Features that will minimize impacts to fishers. These include the retention of key structural elements such as old-growth and decadent trees, snags, CWD, and large hardwoods for denning. Also, the majority of treatments (group select) proposed under Alternative 2 are expected to increase areas of structural complexity within stands that have remained homogenous from previous treatments. While 3% of the project area is proposed for treatments, areas such as riparian reserves, NSO RA-32 habitat, 100-acre KSOAC owl cores, NSO Nest Patches, Administratively Withdrawn land and other reserves will continue to provide undisturbed habitat for fishers.

Bald Eagle

No known Bald eagle nest trees are located within the Planning Area. Therefore, no direct effects are anticipated. Bald eagles in Oregon primarily nest within 1 mile of water sources such as lakes, rivers, reservoirs, or oceans (Marshall et al. 2003). If a nest is located prior to (or while) implementing the project, it would be protected under the 1995 and 2008 RMP guidelines and the National Bald Management Guidelines. Even though Alternative 2 could remove some potential nest/roost trees, bald eagles would not be precluded from nesting due to retention of larger suitable nest trees in treatment units and the amount of suitable nest trees located within the project area.

Bats

The three Bureau Sensitive bat species (Townsend's big-eared, Pallid, Fringed Myotis) utilize mines, caves, manmade structures, snags and rock outcroppings for roosting and hibernacula sites. No surveys have been conducted for these species and very few have been documented in the project area. Even though the proposed action may potentially adversely disrupt local bat populations, and may cause the loss of habitat in some cases, this project is not expected to affect long-term population viability of any bat species in the project area. Project design features and marking guidelines requiring the retention of snags, decadent wildlife trees, buffering of mines, riparian reserves, 100-acre spotted owl KSOAC cores, NSO Nest Patches and other reserves, would continue to provide undisturbed habitat for these sensitive bat species.

Black Salamander
In this part of the black salamander's range, they are typically found in deciduous woodlands near open mixed conifer stands (Clayton 2012b) while utilizing cover down wood and rocks cover objects as refugia. At drier sites, they have been found among rocks along streams. Several black salamanders have been documented in the project area and these locations represent the very northern tip of the species' range. Based upon this species habitat selection, the placement of the treatment units outside of this habitat, and all of the PDFs and reserves previously discussed, implementation of Alternative 2 would have minimal effects and would not trend the black salamander towards listing.

Johnson's Hairstreak
This species is not known to occur in the project area and there is some uncertainty whether the project area is within its range. If present, this butterfly may be impacted through removal of older conifer trees and the mistletoe which they host. As mistletoe will not be eradicated from the area and the proposed action will not remove old-growth trees, suitable habitat will continue to persist in the project area and Alternative 2 should have minimal impacts to the species.

Other Wildlife Species of Concern

USFWS Birds of Conservation Concern and Game Birds Below Desired Condition
Some migratory bird individuals other than USFWS species of concern may be disturbed or displaced during project activities. Some nests may be destroyed from timber harvest occurring during active nesting periods. However, there would be no perceptible shift in species composition the following breeding season because of the small scale habitat modifications in relation to the project area. Adequate undisturbed areas adjacent to the project area would maintain habitat for displaced individuals. Overall, populations in the region would be unaffected due to this small amount of loss that would not be measurable at the regional scale. Analyzing bird populations at this scale, as appropriate, is supported by Partners in Flight (California Partners in Flight 2002).

As described in the Affected Environment, the five USFWS species of concern (band-tailed pigeon, mourning dove, olive-sided flycatcher, rufous hummingbird and purple finch) known or suspected to occur in the project area prefer open to semi-open forests, stand edges, woodlands, brush, and agriculture land to nest and forage. Indirect effects from habitat changes in Alternative 2 will be beneficial to these species while the forest matures into a mid- to late-successional seral stage.

Golden Eagles
There are no known golden eagle nest sites in the project area but they are regularly observed in the Applegate and Rogue Valleys. Due to the suitable habitat available to golden eagles within these watersheds, any impact to the species from the Sterling Sweeper Project is expected to be minimal because of the retention of over 97% of all habitat types within the project area. Most large suitable nest trees would be retained post-harvest. There are some grasslands suitable for foraging in the area (which would not be treated) and will remain usable by golden eagles to their present extent. The most suitable foraging habitat is found in the valleys outside the project area.

c. Alternative 3

The effects to terrestrial wildlife in Alternative 3 would be very similar to Alternative 2, except the overall affects would be slightly lessened. Under Alternative 3 there would be no new road construction (0.41 miles) or road renovation to access three units that then would not receive treatment. This would be a reduction of 58 acres considered for thinning. The main discernible indirect effect of Alternative 3 is the remaining potential threat of wildfire in the dropped units. All three units are surrounded by private property in low-elevation dry habitats susceptible to severe fire behavior. Unit 23-1 is a dense overstocked stand, and unit 30-1 is predominately a snag patch with dense understory poles and heavy down wood material.

Northern Spotted Owl

Effects to spotted owls, spotted owl habitat, and spotted owl prey species under Alternative 3 would be very similar to the effects of Alternative 2. The analysis in Alternative 2 is reasonable applicable under this alternative. The elimination of treatments in 53 acres of dispersal habitat and the elimination of new road construction both contribute to this alternative being of lesser impact to northern spotted owls (Table 3-23).

Table 3-23. Effects of Alternative 3 Proposed Treatments to NSO Habitat in the Project Area

Habitat Type	Pre-Project Acres	Treat and Maintain	Removal	Post-Project Acres	Percent Change
NRF	3,801	10	0	3,801	0.0%
Dispersal-only	1,651	79[1]	0	1,651	0.0%
Total	5,452	89	0	5,452	0.0%

1. Under Alternative 3, 239 acres of dispersal habitat is considered for treatment. Of the 239 acres, 200 acres are being proposed for group select treatments and only 20% (or 40 acres) of those units would receive group select (patch) harvest. The remaining 39 acres of dispersal treat and maintain is in the proposed disease sanitation and density management units.

All Other Special Status Wildlife Species

The difference in effects to wildlife species between Alternative 3 and Alternative 2 would be negligible or difficult to quantify and the analysis in Alternative 2 is reasonable applicable under this alternative.

3. Cumulative Effects

Cumulative effects are environmental changes that are affected by more than one land-use activity, and include beneficial changes. Cumulative effects for wildlife species and habitat are reviewed at the watershed level to capture the varying habitats, species home ranges, and varying degrees of species mobility. Technical issues that complicate analysis of cumulative effects include the large spatial and temporal scales involved, the wide variety of processes and interactions that influence cumulative effects, and the lengthy lag-times that often separate a land-use activity and the landscape's response to that activity. Fire suppression, road building, and timber harvest throughout the project area have resulted in habitat modification and fragmentation, and have changed the distribution and abundance of wildlife species surrounding the project area. Timber harvest has occurred on BLM lands in the West Bear Creek and Upper Little Applegate watersheds for decades. The associated habitat modification has negatively affected late-successional forest habitat-dependent species by reducing stand seral stage and changing habitat structure. However, species associated with younger forested conditions have benefited from these changes due to the increased acres of young stands within the watershed.

Private lands surrounding the project area are made up of early-, mid-, and late-seral forests, agriculture, urban areas, and barren land. Most private forest lands are managed as tree farms for production of wood fiber on forest rotations. It is expected that any remaining late-seral forests on private timber lands will be converted to early seral forest over the next one or two decades. For those species dependent on early-seral habitat, private forest lands do not always provide quality habitat as competing vegetation that includes flowering plants, shrubs and hardwood trees are regularly sprayed to reduce competition with future harvestable trees.

Ongoing and foreseeable management actions that are occurring and will have effects within the West Bear Creek and the Upper Little Applegate watersheds include:

- Wagner Anderson timber sale
- O' Lickety and Lick Stew timber sale and stewardship project

Both of these projects are sold and awarded timber management projects that are currently being implemented. Wagner Anderson TS is treating 247 acres and O'Lickety/Lick Stew is treating 194 acres. Both sales are entirely a "Treat and Maintain" prescription of 268 acres of northern spotted owl NRF habitat and 173 acres of spotted owl dispersal habitat. In combination with the proposed Sterling Sweeper project, this represents less than 2% of the total mid- to late-seral habitat in these watersheds.

a. Northern Spotted Owl

The Sterling Sweeper project proposes commercial treatments on 10 acres of NRF, 219 acres of dispersal-only, and 77 acres of capable NSO habitat. These treatments, coupled with the other recent and reasonably foreseeable projects described above, would increase fragmentation within the watersheds. However, the only activity that is likely to remove NRF habitat within the watersheds would be timber harvest on private lands. This amount of removal at the watershed level would not preclude spotted owls or other late-successional forest species from dispersing within or through the watersheds. Additionally, even when the Sterling Sweeper project is combined with current and foreseeable actions, it is unlikely the actions proposed in this project would appreciably reduce or diminish the survival or recovery of the northern spotted owl. This is because of the small percentage of suitable habitat affected at the provincial and the regional population levels. The level of harvest associated with this project would not preclude owls occupying historic home ranges and continuing to reproduce in the project area and watersheds. Although no barred owls have been documented in the project area, it is likely that they soon will inhabit the area and continue to have negative effects on spotted owl. It is anticipated that the protection of RA-32 habitat would provide refugia from the intrusion of barred owls.

Non-Federal lands are not expected to provide demographic support for spotted owls across and between physiographic provinces (Thomas et al., 1990; USDA and USDI 1994). The Medford BLM assumes these past management practices will continue and reduce the amount of NRF habitat for spotted owl on non-Federal lands over time.

b. Fisher

Fishers are likely using the proposed timber harvest units and areas that have received treatments in the past. No habitat management guidelines have been established for fisher, relative to how much of what stand character units should be maintained. Patches of older seral habitat will remain near the project within riparian management zones and spotted owl cores that will provide ample corridors of cover for denning, resting and dispersal. Results from surveys can only be used to make rough inferences on presence and not habitat selection since the fishers are baited in to the survey camera stations.

Impacts of the action alternatives on fishers are predicted to be low, since a patchwork mosaic of stand types and ages would remain in the project area and fishers have been documented in the area. Most coarse down wood and snags, except for those that present a safety hazard, would be maintained. Areas of closed canopy would remain in each section. The Northwest Forest Plan and the 2008 WOPR were designed with a network of Late-successional Reserves and Deferred Timber Management Areas surrounded by younger, managed forests. Although these reserves may provide suitable habitat that is well-distributed on Federal lands, fisher populations may never respond and be well-distributed because of (1) their apparently low rates of recolonization of restored habitats after local extirpation, (2) the lower amount of Federal land at lower elevations, and (3) their natural rareness (Forest Service and Bureau of Land Management 1994, Appendix J2-470).

c. Other Wildlife Species

There is no evidence that current forest practices on Federal land immediately threaten any terrestrial vertebrate species in Oregon. Even though the proposed actions may potentially adversely disrupt local individuals of sensitive wildlife species and may cause the loss of habitat in some cases, this project is not expected to affect long-term population viability of any Bureau Sensitive, or Survey and Manage wildlife species known to be in the area. Additionally, this project combined with other actions in the watershed would not contribute to the need to Federally list any Bureau Sensitive or Survey and Manage wildlife species, because of the small scope of the proposed action compared to the available habitat within the West Bear Creek and Upper Little Applegate watersheds. The combination of all treatments proposed under Alternative 2 and 3 would treat only 3% of the project area. Because of the relatively small foot-print of the project, and because of the dispersed distribution of proposed treatments across the watershed, no substantial negative effects are anticipated to any Bureau Sensitive or Survey and Manage wildlife species.

I. BOTANY

1. Introduction

Analysis regarding botanical resources within the Sterling Sweeper Forest Management Project has been conducted at the 6th Field sub watershed level, and includes the Griffin Creek, Anderson Creek-Bear Creek and Lower Little Applegate River sub-watersheds in their entirety. All references to the "Sterling Sweeper Analysis Area" include the areas of these sub-watersheds.[3]

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 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 (USDI 2008b).

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* with the 2011 update to the species list, as put forth in the settlement agreement in *Conservation Northwest v. Sherman* (Case number 08-CV-1067-JCC). The 2011 Settlement Agreement states:

> *"For projects with signed Records of Decision, Decision Notices, or Decision Memoranda from December 17, 2009, through September 30, 2012, the Agencies will use either of the following Survey and Manage species lists:*
> *a. The list of Survey and Manage species in the 2001 ROD (Table 1-1, Standards and Guidelines, pages 41-51).*
> *b. The list of Survey and Manage species and associated species mitigation, Attachment 1 to the Settlement Agreement."*

The Sterling Sweeper Project applies the Survey and Manage species list in the 2011 Settlement Agreement and thus meets the provisions of the 2001 *Record of Decision and Standards and Guidelines for Amendments to the Survey and Manage, Protection Buffer, and other Mitigation Measures Standards and Guidelines*, as modified by the 2011 Settlement Agreement (Appendix A).

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[3] Two units (30-1 and 30-2) are located in the Larson Creek-Bear Creek sub watershed. These two units, totaling 9 acres, comprise the only BLM-administered land on the south side of Interstate 5 in the sub-watershed. There are no known Special Status Plant sites in the area at this time (although surveys have yet to be completed in unit 30-2), and no documented weed sites requiring mitigation. Due to these factors, this analysis will not include this 9-acre parcel. The area will be analyzed further, pending future survey results, prior to ground-disturbing activity.

2. Affected Environment

The Sterling Sweeper Analysis Area is within the range of *Fritillaria gentneri*, a species listed under the Endangered Species Act with ranges on the Medford District. The Sterling Sweeper Analysis Area is entirely outside the ranges of other Federally Endangered species found on the Medford District (*Arabis macdonaldiana*, *Limnanthes floccosa* ssp. *grandiflora*, and *Lomatium cookii*). Table 3-24 lists the SSP found within the Sterling Sweeper Analysis Area, including those sites that are located within or bordering proposed treatment units or haul routes.

Survey Methods and Completion

Surveys are conducted to conform to the *FY 2009-2013 Programmatic Assessment for Activities that May Affect the Listed Endangered Plant Species Gentner's Fritillary, Cook's Lomatium, McDonald's Rockcress, and Large-Flowered Woolly Meadowfoam,* and are valid for 10 years. Survey of unsuitable habitat for federally listed plants is not required, and 2-year surveys in all suitable habitat is required for larger scale projects. For those surveys for *Fritillaria gentneri*, two surveys must occur within a 10-year interval, and are recommended to be within 5 years of each other (USDI 2008a).

Surveys are conducted using the intuitive controlled survey method. Field work is conducted during the stage of plant phenological development that assures visibility of characteristics necessary for accurate identification of special status plant species. Timing of fieldwork takes into consideration seasonal climate, elevation, aspect, target species and suitable habitat.

Surveys for all species on the Medford SSP list (current at the time of survey) and the amended 2011 S&M species list were completed in 2010 and 2011 in units 14-1, 15-2, 27-1, 27-14, 27-7, 30-1, 3-11, 3-17, 3-19, 34-1, 34-15, 34-25, 34-27, 34-4A, 34-4B, 34-7, 34-8, 34-9A, 9-3A, 9-4 and a portion of 27-16. Second-year surveys for *Fritillaria gentneri* will be completed (prior to ground disturbance) in 2012 in units 1-1A, 1-1B, 1-1C, 1-1D, 1-1E, 1-1F, 1-1G, 34-4C and 34-13. Surveys, including 2nd year *Fritillaria gentneri* surveys (where appropriate), will be completed prior to ground-disturbing activity, in the following units: 23-1, 30-2, 3-18, 9-1, and 9-2. Sites of Special Status Plant sites that are located as a result of future surveys will be managed and protected per professional judgement and as directed in BLM IM OR-99-27.

a. Vascular and Non-Vascular Plants

The Analysis Area includes areas of varying stand overstory and understory density, due to a history of previous land management activity in all proposed units. Sapling and pole trees are even-aged in most units, resulting in homogeneous stands and filtered-light canopies. Ground cover is often minimal, and is primarily comprised of graminoids when present. Dense patches of short (3-6 feet) madrone and Douglas-fir seedlings and saplings also create monocultures in many units, especially those where the overstory canopy is lighter, allowing more light to reach the forest floor. Large diameter trees are present in all units, providing more habitat for those species (primarily non-vascular) that prefer conditions associated with late-seral forest conditions.

Surveys have documented 13 occurrences of 7 Bureau Special Status and Survey and Manage plant species (Table 3-24) within the Sterling Sweeper Analysis Area that occur within 100 feet of haul routes within the Analysis Area and/or in (or within) 100 meters (330 feet) of proposed units.

Table 3-24. Special Status and Survey and Manage Plant Species In or Adjacent to Analysis Units or Haul Routes

Scientific Name	Common Name	Lifeform	Survey & Manage Status*	2010 Heritage Rank**	2010 ORBIC List***	2010 Federal Status +	2010 ODA Status ++	BLM Status	Sites
Cimicifuga elata var. *alpestris*	Mountain tall bugbane	Vascular	--	G4T4/S4	4	--	C	SEN	2
Cypripedium fasciculatum	Clustered lady's slipper	Vascular	C	G4/S3	2	SOC	C	SEN	1
Cypripedium montantum	Mountain Lady's slipper	Vascular	C	G4/S3S4	4	--	--	--	1
Eschscholzia caespitosa	tufted poppy	Vascular	--	G5/S1	2	--	--	SEN	1
Eucephalus vialis	wayside aster	Vascular	A	G3/S3	1	SOC	LT	SEN	4
Fritillaria gentneri	Gentner's fritillary	Vascular	--	G1/S1	1	LE	LE	FE	1
Leptogium teretiusculum		Lichen	E	G4G5Q/ S2?	3	--	--	STR	3

***Survey and Manage: as determined by the 2011 Settlement Agreement.**

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. Pre-disturbance surveys are not applicable.
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 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.
Q=Questionable taxonomy. This indicates that there are questions related to the taxonomic validity of the taxon.
? = Not yet ranked or assigned rank is uncertain.

*****ORBIC List: Oregon Biodiversity Information Center maintains extensive databases of Oregon biodiversity, concentrating on rare and endangered plants, animals, and ecosystems.**

1=taxa which are threatened or endangered throughout their range or which are presumed extinct.
2=taxa which are threatened, endangered, or possibly extirpated from Oregon but are stable or more common elsewhere.
3=taxa for which more information is needed before status can be determined, but which may be threatened or endangered in Oregon or throughout their range.
4=taxa which are very rare but are currently secure, as well as taxa which are declining in numbers or habitat but are still too common to be proposed as threatened or endangered.

+Federal Status

SOC=Species of Concern. Taxa which the USFWS is reviewing for consideration as a Candidate for listing under the ESA.
LE=Listed Endangered. Taxa listed by the USFWS as Endangered under the Endangered Species Act (ESA).

++ODA Status: Oregon Department of Agriculture

C=Candidate for (State) listing as Threatened or Endangered by the ODA.
LE=Listed Endangered. Taxa listed by the ODA or ODFW under the Oregon Endangered Species Act of 1987 (OESA).
LT=Listed Threatened. Taxa listed by the USFWS, ODA, or ODFW as Threatened.

BLM Status

SEN = Sensitive (USDI Oregon State Director's List)
STR = Strategic (USDI Oregon State Director's List) (No surveys or protection required, but sites are documented to fill in species' "information gaps".
FE= Federally Endangered (USDI Oregon State Director's List)

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

Cimicifuga elata var. *alpestris* is a native perennial bugbane that is found in mixed conifer forest and forest openings at elevations 1100-5500 feet. In the Sterling Sweeper Analysis Area, some populations occur in previously managed conifer stands. There are 2 known sites adjacent to (within 100 feet of) haul routes proposed for use in the Sterling Sweeper project, representing 4.3% of the known populations in the Sterling Sweeper Analysis Area and 1.6% of documented sites on the Medford District.

Cypripedium fasciculatum is a relatively long-lived perennial orchid, living at least 30 years, and perhaps as long as 95 years. Despite appearing to have a broad range, its distribution within the 8 western states from which it is known to occur is relatively scattered and disjunct. It can occur in a variety of plant community types throughout its range, and within these communities, there is great diversity in soils, elevation, aspect, and plant communities. Site moisture regime varies from dry to damp, soils vary from rocky to loamy, and elevations range from 1000-5300 feet. Aspect tends to be northerly, but this, too, varies (USDA and USDI 1998). There is 1 documented site occurring within 100 meters of a project unit, representing 4.3% of the total sites within the Sterling Sweeper Analysis Area, and 0.1% of the total known sites on the Medford District.

Cypripedium montanum is an orchid known from Washington, Oregon and California. Typically growing in coniferous forests, it has small and scattered populations that are declining. There is 1 documented site occurring within 100 meters of a project unit, representing 20% of the total sites within the Sterling Sweeper Analysis Area, and 0.2% of the total known sites on the Medford District.

Eschscholzia caespitosa is an annual that typically grows in in large populations on dry flats and brushy slopes, with a blooming period of March-June. Elevation tends to be below 3,500 feet. It is known in Oregon from Curry, Josephine and Douglas Counties, and is found throughout California (Mullens and Showalter 2007). There is 1 documented site occurring within 100 feet of a haul route and 100 meters of a proposed unit, representing 100% of the total sites within the Sterling Sweeper Analysis Area, and 5% of the total known sites on the Medford District. This site is unverified, and will be visited in 2012 to confirm species identification. If confirmed, the site will be protected as described in the Project Buffer Table (Table 2-10).

Eucephalus vialis is a perennial that blooms from July-September. It typically grows in coniferous forest, usually on drier upland sites that are dominated by Douglas-fir and mixed hardwoods, serpentine hillslopes, and edges between meadows and forest. It occurs in various successional stages, from clear-cuts to mature forests, and has also been found to thrive in burned areas. Across the Medford District, it has also been observed growing in areas of heavy ground disturbance, specifically road cuts. Elevation varies widely, ranging from 500-5,100 feet. Populations have been documented in Douglas, Jackson, Josephine, Lane and Linn Counties. There are 4 documented sites occurring within 100 feet of haul routes or 100 meters of proposed units, representing 21.1% of the total sites within the Sterling Sweeper Analysis Area, and 2.6% of the total known 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 180 documented sites on the Medford District (comprising the total of all Oregon sites) of which 90% consist of 20 or fewer flowering plants. Population size on the District ranges from one to 260 flowering individuals. There is 1 population within the Sterling Sweeper Analysis Area occurring within 100 feet of roads. There are no known sites adjacent to or within project units. The documented roadside sites accounts for 11.1% of total sites in the Sterling Sweeper Analysis Area, and <1% of total sites on the Medford District.

Leptogium teretiusculum is a fruticose lichen that is widespread, but rarely collected due to its small size and high variability in appearance. It grows mostly on the bark of hardwood tree species in areas of varied moisture regime (from riparian to savannah conditions) (McCune and Geiser 2009). There are 3 documented populations occurring within 100 feet of haul roads or 100 meters of units, representing 50.0% of sites within the Analysis Area, and 2.7% of total sites on the Medford District.

c. Fungi

Of the 19 species of fungi that are on the Medford District Sensitive Species list, 18 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. There are no sites of Sensitive fungi species documented within the Sterling Sweeper Analysis Area.

New surveys were not conducted (due to stands within proposed unit areas not meeting the 180-year stand age requirement to trigger surveys), and prior surveys have not documented any sites of Special Status (including Survey and Manage) Fungi within the Sterling Sweeper Analysis Area. Stands are evaluated for age using the standardized Microstorms data in the Forest Operations Inventory (FOI) layer in GIS. The BLM assumes that surveying for fungi in stands 180-plus years old, protecting known and future found sites, and the existence of late-successional forest stands in reserves (i.e. riparian reserves, owl cores, etc.) across the landscape will ensure that Sensitive fungi species will not trend toward listing, and Survey and Manage fungi species will persist (USDI 2004).

Of the 81 Survey and Manage fungi species included in the 2012 Survey and Manage Settlement Agreement, 23 are documented on the Medford District BLM, and 19 are suspected to occur, but are not currently known. There are no known and documented sites of Survey and Manage fungi species within the Sterling Sweeper Analysis Area.

3. Environmental Effects

This section discusses the direct and indirect effects of implementing each of the alternatives and the impacts the proposed actions 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

<u>Special Status Plants</u>
Under Alternative 1, fire risk in dense stands would remain at current levels. Habitat for SSP in these areas would neither improve nor increase, due to continued high stocking levels, low species diversity, and suppressed and/or unnatural light and water regimes.

Without localized vegetation treatment, Special Status Plant populations in those areas with more dense vegetation would continue to decline over time due to the slow degradation of suitable habitat through continued increase of low-growing shrub cover, increased seedling and sapling cover, and for species that prefer more light, increased canopy cover. Plant communities will continue to become overly dense, decadent thickets with increased competition for resources in those localized areas. 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 these areas would destroy the habitat and directly kill existing SSP populations.

Implementation of Alternative 1 would result in No Effect to documented sites of *Fritillaria gentneri*. Sensitive species within the analysis area would not trend towards further listing, and the persistence of documented Survey and Manage species would not be affected.

b. Alternative 2

The following documents the analysis of effects to botanical resources resulting from the implementation of Alternative 2.

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, disruption of habitat, 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

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 (see Table 2-10 for site and species specific protection measures). 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 short-term 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 (in the no-treatment buffer areas) would also increase over time; however, a decrease in predicted fire behavior would be expected in those areas surrounding where treatment occurs.

SSP that have treatment effects mitigated by a seasonal restriction would experience limited direct physical effects. Seasonal restrictions on operations generally cover the period of SSP above-ground growth. Operations occurring outside this period would take place while these plants are below ground and dormant, and would not be subject to most causes of direct physical damage. With time, it is expected that local population numbers would increase due to the beneficial indirect effects of the improved condition of occupied and potential habitat. Loss of some individuals will not contribute to the need to list the species as threatened or endangered under the ESA. Fuels treatments are allowed in the buffer area only when the SSP is dormant (see Table 2-10).

SSP protection by seasonal restriction will allow treatment within known sites that produce beneficial to slightly negative habitat changes. Generally, proposed treatments (follow-up fuels) would produce more open conditions that are more favorable to *Eucephalis vialis*.

Group Selection Treatment and Disease Sanitation
In areas where shade-dependent SSP are known, the creation of ¼- to ½-acre openings would be avoided, and measures would be taken to ensure that moisture regime, shade availability and duff layer density would not be impacted in areas considered to be associated habitat with those sites (i.e. no-treatment buffer size would be adequate to mitigate for increased edge effects that would result from the creation of those openings).

The creation of openings would create more potential habitat for SSP species that prefer open-canopied habitats or areas of filtered-light, particularly in those areas where dense understory canopy is currently comprised of early-seral trees, resulting in lower species diversity and limited light availability.

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. PDFs establish that activity is prohibited from taking place within the established reserves.

Roads and Landings
There are approximately 42 miles of roads proposed for use as haul routes under Alternative 2. Known Special Status plant sites will be protected according to Project Design Features and Management Recommendations based on professional judgment, knowledge of the area, and proposed activity. There will be no effect to documented sites that occur within 100 feet of existing roads within the Sterling Sweeper Analysis Area.

In the Sterling Sweeper Analysis Area, construction of 2 new permanent roads is proposed, with a proposed combined approximate length of 0.41 miles. Both roads will be barricaded or closed in some fashion after project activities are completed.

Proposed road 38-2W-23.01B has an approximate length of 0.36 miles, and travels through a previously disturbed Douglas-fir-dominated forest comprised of early- to mid-seral trees. Due to the history of disturbance in the area, coupled with the condition of the neighboring private lands, there is minimal potential for special status species habitat or sites. Currently, there are no noxious weeds or known special status species that occur within the area proposed for road construction. Future surveys are pending, and sites that may result from those surveys would be appropriately protected per professional judgment prior to any ground-disturbing activity. The proposed newly constructed portion of road is behind a privately-administered locked gate.

Road 38-2W-23.02 has an approximate length of 0.05 miles, beginning on heavily disturbed private lands, and enters a homogeneous BLM stand that is comprised of Douglas fir pole trees. This portion of the road is proposed for renovation, as it is currently in existence. There is no special status species habitat in this stand—the likelihood of SSP occurrence is low. Currently, there are no noxious weeds or known special status species that occur within the area proposed for road construction. Future surveys are pending, and sites that may result from those surveys would be appropriately protected per professional judgment prior to any ground-disturbing activity. Like other roads in this section, it is behind a privately-administered locked gate.

Proposed road 38-1W-30.00 has an approximate length of 0.21 miles. It primarily follows the proposed unit boundary along a currently existing road that needs renovation. The renovated road would be blocked with a trench barricade at the close of project activity in the area. Currently, there are no noxious weeds or known special status species that occur within the area proposed for road renovation. Future surveys are pending, and sites that may result from those surveys would be appropriately protected per professional judgment prior to any ground-disturbing activity.

With proper implementation of PDFs (as described in Chapter 2), there would be no effect to SSP due to road construction or renovation in the project area.

All disturbance activity for road work 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 roads proposed for improvements would be treated to prevent further spread of plant material and/or weed seed. SSP sites near roads where dust abatement is proposed would be protected from the adverse effects of magnesium chloride (or other salt compounds); the use of magnesium chloride would be prohibited.

Cumulative Effects
Land ownership in the Sterling Sweeper Analysis Area is both public (BLM) and private. The condition of the local landscape and its associated sub-watersheds relies heavily on privately-owned land and activities that affect its habitat condition.

Grazing
Approximately 3040 acres (5.7%) of the Sterling Sweeper Analysis Area is currently authorized for grazing as part of the Lower Big Applegate grazing allotment (a total of 26% of the total allotment area).

Approximately 551 acres (1.0%) of the Sterling Sweeper Analysis Area is categorized as light (or heavier) use over the past 10 years, with that use occurring entirely in the southern portion of the Lower Little Applegate River sub-watershed, not in close proximity to project proposed ground-disturbing activities. Field visits by the BLM Botanist have confirmed that there is no indication that cattle have been present in the areas proposed for project ground-disturbing activity. Slope is steep, road cutbanks into units are steep, water is not readily available, and the amount of forage available is very limited, particularly in the forested areas.

An indirect effect resulting from grazing is the potential for introduction of nonnative species, which in turn alter the natural and preferred habitat for Special Status Species. While soil disturbance does increase the likelihood of movement and introduction of noxious weed and nonnative plant species, the human activity in these areas (e.g. privately-owned timber lands, OHV recreation, and use of the Sterling Mine Ditch Trail) presents a more likely mode of transport for non-native species than the low level of localized grazing activity occurring annually within the allotment area.

Due to the low level of annual authorized use on the Lower Big Applegate allotment and known patterns of use of cattle within the allotment, professional judgment is that there is no anticipated measurable cumulative effect of grazing in relation to the activities proposed in the Sterling Sweeper Forest Management Project.

Private Land-Use Operations

Future proposed timber harvest and other vegetation treatments on private lands 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 fewer resource protection measures. Federal laws protecting endangered and special status plans do not apply to private land without a federal nexus.

Recreational Operations

Ridgelines and areas with mild-to-moderate hill slopes 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.

Areas currently prone to unauthorized use would continue to be problematic due to the lack of natural barriers in those areas. The creation of skid trails and areas of lighter vegetation cover would further increase the risk presented to natural resources with regard to illicit recreational operations, due to the further removal of natural barriers and increased accessibility in areas where slope is mild-to-moderate. Proper implementation of the PDFs (i.e. blockading/obliterating entry points) would result in no effect on botanical resources, and no increase in unauthorized use.

New permanent road construction is proposed in section T38S R02W S23 (0.41 miles). This area is considered to be comprised of mild-to-moderate hill slopes, and without implementation of PDFs, would be susceptible to unauthorized recreational operations. However, proper implementation of the PDFs (i.e. same-season open and closure, blockading/obliterating entry points) would result in no effect on botanical resources, and no increase in unauthorized use. In addition to the implementation of PDFs, proposed roads in section 23 are behind a private, locked gate and originate on or adjacent to privately-owned lands, making access for the general public less available.

Past and Proposed Actions

Recent past and proposed federal timber sales and commercial/non-commercial vegetation projects in the Sterling Sweeper 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.

The Wagner Anderson Forest Management Project, sold in 2010 with ongoing work, neighbors the Sterling Sweeper Forest Management Project. Any noxious weed species or sensitive status species sites within the Wagner Anderson project area were analyzed as part of the Wagner Anderson Forest Management Project EA. Through PDFs designed under that project, known Special Status Species plant sites were protected, ensuring that species would not trend towards further listing. With the implementation of designated project design features in both projects, there would be no effect on botanical resources related to the proximity of these two projects and therefore no potential for adverse cumulative effects to botanical resources as a result of implementing the Wagner Anderson and Sterling Sweeper Forest Management Projects.

c. Alternative 3

The following documents the analysis of effects to botanical resources resulting from the implementation of Alternative 3 (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

Commercial Timber Harvest, Pre-Commercial Thinning and Follow-Up Fuels Treatments
Effects to SSP due to timber harvest, PCT and follow-up fuels treatments in the Sterling Sweeper Project would be the same with the implementation of Alternative 3 as with the implementation of Alternative 2. There are no SSP that would be affected by the elimination of new road construction or the consequent elimination of units 23-1, 30-1 and 30-2.

Roads and Landings
There are approximately 36 miles of roads proposed for use as haul routes under Alternative 3 (See Chapter 2). Known sites will be protected according to Project Design Features and Management Recommendations based on professional judgment, knowledge of the area, and proposed activity. There will be no effect to documented sites that occur within 100 feet of existing roads within the Sterling Sweeper Analysis Area.

Roads used as haul routes would be maintained as needed (ditch cleaning, spot rocking, etc.) to ensure adequate protection. These roads are existing and need treatments that would enable large equipment to travel through. 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 roads proposed for improvements would be treated to prevent further spread of plant material and/or weed seed. SSP sites near roads where dust abatement is proposed would be protected from the adverse effects of magnesium chloride (or other salt compounds); the use of magnesium chloride is prohibited.

SSP that are present in the project area but not protected by buffers, seasonal restrictions, or other mitigation will not be affected by any proposed treatments due to their topographic relationship to, or distance from, areas of proposed activity.

Cumulative Effects
Land ownership in the Sterling Sweeper Analysis Area is both public (BLM) and private. The condition of the local landscape and its associated sub-watersheds relies heavily on privately-owned land and activities that affect its habitat condition.

Grazing
Cumulative effects to SSP due to grazing activity in the Sterling Sweeper Project area would be the same with the implementation of Alternative 3 as with the implementation of Alternative 2.

Private Land-Use Operations
Cumulative effects to SSP due to private land-use operations in the Sterling Sweeper Project area would be the same with the implementation of Alternative 3 as with the implementation of Alternative 2.

Recreational Operations
Ridgelines and areas with mild-to-moderate hill slopes 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 currently prone to unauthorized use would continue to be problematic due to the lack of natural barriers in those areas. The creation of skid trails and areas of lighter vegetation cover would further increase the risk presented to natural resources with regard to illicit recreational operations, due to the further removal of natural barriers and increased accessibility in areas where slope is mild-to-moderate.

Past and Proposed Actions
Cumulative effects to SSP due to past and proposed actions in the Sterling Sweeper Project area would be the same with the implementation of Alternative 3 as with the implementation of Alternative 2.

J. NOXIOUS WEEDS AND INTRODUCED PLANTS

1. Affected Environment

a. Noxious Weeds

Analysis regarding botanical resources within the Sterling Sweeper Forest Management Project has been conducted at the 6th Field sub watershed level, and includes the Griffin Creek, Anderson Creek-Bear Creek and Lower Little Applegate River sub-watersheds in their entirety. All references to the "Sterling Sweeper Analysis Area" include the areas of these sub-watersheds.[4]

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.

Within the Sterling Sweeper Analysis Area, there are a total of 585 documented noxious weed sites in the Medford BLM weed database, comprised of 11 species (Table 3-25).

[4] Two units (30-1 and 30-2) are located in the Larson Creek-Bear Creek sub watershed. These two units, totaling 9 acres, comprise the only BLM-administered land within the entire sub-watershed. There are no known Special Status Plant sites in the area at this time (although surveys have yet to be completed in unit 30-2), and no documented weed sites requiring mitigation. Due to these factors, this analysis will not include this 9-acre parcel. The area will be analyzed further, pending future survey results, prior to ground disturbing activity.

Table 3-25. Noxious Weed Species and Occurrences in Sterling Sweeper Analysis Area

Scientific Name	Common Name	Documented Occurrences in HUC6	ODA Designation*
Acroptilon repens	Russian knapweed	17	B
Centaurea biebersteinii (syn. *C. stoebe, C. maculosa*)	spotted knapweed	5	B, T
Centaurea diffusa	diffuse knapweed	1	B
Centaurea pratensis(syn.*C. debeauxii* ssp. *thuilleri*)	meadow knapweed	3	B
Centaurea solstitialis	yellow star-thistle	370	B, T
Chondrilla juncea	rush skeleton weed	1	B, T
Circium vulgare	bull thistle	172	B
Conium maculatum	poison hemlock	1	B
Cytisus scoparius	scotch broom	1	B
Hypericum perforatum	St. Johnswort	1	B
Rubus discolor (syn. *R. armeniacus*)	Himilayan blackberry	13	B

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

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.

Of these database sites, 242 are located in or within 100 meters of proposed units or 100 feet of proposed haul routes and proposed road construction (Table 3-26). Surveys conducted confirmed the presence or absence of these populations within proposed unit boundaries, along roadsides associated with traveling to proposed units, or in lands neighboring proposed units.

Table 3-26. Noxious Weed Species and occurrences in areas potentially affected by Sterling Sweeper activity.

Scientific Name	Common Name	Occurrences*	ODA Designation**
Acroptilon repens	Russian knapweed	5	B
Centaurea biebersteinii (syn. *C. stoebe, C. maculosa*)	spotted knapweed	1	B, T
Centaurea diffusa	diffuse knapweed	1	B
Centaurea pratensis(syn.*C. debeauxii* ssp. *thuilleri*)	meadow knapweed	3	B
Centaurea solstitialis	yellow star-thistle	124	B, T
Chondrilla juncea	rush skeleton weed	1	B, T
Circium vulgare	bull thistle	102*	B
Conium maculatum	poison hemlock	1	B
Cytisus scoparius	scotch broom	1	B
Hypericum perforatum	St. Johnswort	1*	B
Rubus discolor (syn. *R. armeniacus*)	Himilayan blackberry	2*	B

*Species is under-reported in the GeoBob Weeds database, but is known to occur with frequency within Analysis Area, based on survey reports and professional knowledge.

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

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.

All of the documented noxious weed species are considered to be “B-Designated Weeds”, as determined by the Oregon Department of Agriculture. Three of these species are also considered to be “T” species. There are no species from the federal noxious weed list in the Analysis Area.

Oregon Department of Agriculture List B Noxious Weeds

Russian knapweed (*Acroptilon repens*) is an aggressive native of Eurasia, and once it is established, it can overrun native grasslands, as it has dense growth and spreads entirely by fragments of its creeping rootstocks or by seed. It can be successfully controlled with successive years of herbicide treatment. There are 20 documented sites of Russian knapweed on the Medford District BLM and 17 documented sites in the Sterling Sweeper Analysis Area. Of these, 5 occur within 100 feet of haul routes (existing roads) or within 100 meters of proposed project units.

Spotted knapweed (*Centaurea biebersteinii*, syn. *C. stoebe, C. maculosa*) is a native of Eurasia with 90 documented sites of spotted knapweed on the Medford District BLM and 5 documented sites in the Sterling Sweeper Analysis Area. Of these, 1 site occurs within 100 feet of haul routes (existing roads) or within 100 meters of proposed project units.

Diffuse knapweed (*Centaurea diffusa*) was first introduced to the Pacific Northwest as a contaminant in alfalfa seed imported from Eurasia. It can be controlled using biocontrol agents, and can be successfully eradicated with herbicide treatments. There are 32 documented sites of diffuse knapweed on the Medford District BLM and 1 documented site within the Sterling Sweeper Analysis Area. That one site is located within 100 feet of haul routes (existing roads) or within 100 meters of proposed project units.

Meadow knapweed (*Centaurea pratensis*, syn. *C. debeauxii* ssp. *thuilleri*) is native to Europe, and is well-distributed throughout the Pacific Northwest. It can be eradicated through repeated herbicide applications and can be controlled through a variety of biocontrol agents. There are 472 documented sites of meadow knapweed on the Medford District BLM and 3 documented sites within the Sterling Sweeper Analysis Area. The 3 sites are all located within 100 feet of haul routes (existing roads) or within 100 meters of proposed project units.

Yellow star-thistle (*Centaurea solstitialis*) is an annual or biennial that is a native of Eurasia. Successful control methods include chemical, biological, cultural, and mechanical (including pulling and mowing). There are 2,598 sites reported for the Medford District and 370 documented site in the Sterling Sweeper Analysis Area. Of those, 124 populations are located within 100 feet of haul routes (existing roads) or within 100 meters of proposed project units.

Rush skeletonweed (*Chondrilla juncea*) is a perennial with 141 documented sites on the Medford District, and one known population occurring in the Sterling Sweeper Analysis Area. The single population is located within 100 feet of an existing road and haul route.

Bull thistle (*Cirsium vulgare*) is a taprooted biennial that is a native of Eurasia. There are 1768 sites reported on the Medford District, and 102 of those are located within 100 feet of haul routes (existing roads) or within 100 meters of proposed project units. However, this weed is under-documented within the GeoBob weed database, as active control methods are not usually employed. Based on recent records and field reconnaissance, BLM botanists verified sites within the Analysis Area. Bull thistle is eventually outcompeted by other vegetation for light, moisture, and nutrients.

Poison hemlock (*Conium maculatum*) is native to Eurasia, and typically grows in areas associated with moist soils and disturbance (pastures, irrigation ditches, etc.). This species is underreported on the Medford District BLM. There are 22 reported sites on the Medford District, and 1 reported site within the Sterling Sweeper Analysis Area. That one site is located within 100 feet of an existing road and proposed haul route.

Scotch broom (*Cytisus scoparius*) is a perennial that has three approved biological control agents, and it can also be eradicated using manual and chemical methods. There are 872 documented sites of Scotch broom on the Medford District, and one known population occurring in the Sterling Sweeper Analysis Area. The single population is located within 100 meters of a proposed project unit.

Common St. Johnswort (*Hypericum perforatum*) is a perennial forb with extensive creeping rhizomes introduced from Eurasia as an ornamental plant. 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 Sterling Sweeper Analysis Area, on both federal and privately-owned lands

Himalayan (Armenian) blackberry (*Rubus discolor,* syn. *R. armeniacus*) is a perennial that requires long-term control methods for effective eradication. There are 773 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 two documented sites within the District database that occur within 100 meters of proposed project units or within 100 feet of proposed haul routes (existing roads).

Medusahead rye (*Taeniatherum caput-medusae*) is an annual grass that found throughout the West. 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 Sterling Sweeper 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 portions of the Sterling Sweeper Analysis Area. Recorded surveys indicate that there are 57 non-native species documented within the Analysis Area (USDI 1998-2011).

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 and introduced species' 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. The mode of spread would be generally attributed to wind, water, wildlife, and recreational activity.

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 stand replacement fires in localized areas that would produce early seral habitat conditions that are favorable for weed and 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 weed and introduced plant species establishment. Also, the use of harvest equipment presents the opportunity for introduction or spread of noxious weeds and other nonnative species.

The creation of new roads also increases the risk of spread of weeds into otherwise weed-free areas on the landscape. Roads and streams promote the introduction of nonnative species by acting as corridors or agents for seed dispersal, as well as providing for suitable habitat and reservoirs of propagules for future invasions. The increase of light availability, bare soil and road traffic is correlated to the increase of nonnative species diversity and population numbers (Parendes and Jones 2000; Gelbard and Belnap 2003).

Project Design Features as described in Chapter 2 are incorporated into the proposed action to minimize the risk of spread of noxious weeds and nonnative plant species. Noxious weeds would not be spread as a direct result of executing the proposed actions 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 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 through 2011. 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, with populations varying in size and density. Noxious weed populations in the Analysis Area and on BLM are mostly associated with roads. The Weed Risk Assessment was conducted using the survey results, as well as previous surveys on file.

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.

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. Class C Weed species commonly found on the Medford District BLM primarily include nonnative annual grasses and nonnative buttercup species, and are not typically managed for due to widespread occurrences and unmanageable populations sizes.

Twenty nonnative species are located within the Sterling Sweeper Analysis Area that meet the following criteria: they are exotic, have a high frequency from recent survey lists (Class C species with frequency >50%), and have the potential to cause ecological damage.

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 (0.41 miles permanent), landings (less than ¼ acre each), road renovation/maintenance sites (approximately 0.1 miles) as listed in Chapter 2, yarding corridors, and openings created for disease management and group select cuts (less than ½ 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.

c. Alternative 3

The Weed Risk Assessment yields the same weed risk analysis and rating for Alternative 3 as for Alternative 2 (Low to Moderate), based on the current conditions on the landscape and the location of existing weed populations. The implementation of PDFs to prevent weed introduction and spread remain in place (see Chapter 2), as do the indirect effects (i.e. spread and introduction as a result of non-project activity). While the amount of ground disturbance is reduced under Alternative 3, the locations of known weed sites are outside of those areas that would have been affected by new road construction or associated units.

K. RECREATION

1. Affected Environment

Recreational resources in the area of the proposed Sterling-Sweeper Forest Management Project will be managed under both the BLM's 1995 RMP and under the 2008 Medford District RMP.

Recreation use across the Medford District BLM is described in the 1994 Medford District Proposed Resource Management Plan/Environmental Impact Statement (USDI 1994). BLM lands fall into two recreation management categories, special recreation management areas and extensive recreation management areas. Extensive recreation use areas are all BLM-administered lands not included in Special Recreation Management Areas (SRMAs) identified in the RMPs (USDI 1994: 3-71; USDI 2008:3-417) that provide for dispersed recreation opportunities across the Medford District BLM. SRMAs are those areas identified with high concentrations of recreation use and developed facilities.

An estimated 799,243 acres provide for dispersed recreation use across the Medford District (PRMP/EIS p. 3-84). Under the 1995 RMP the entire Sterling Sweeper Project Area, 378 acres, is described by the RMP as extensive recreation use areas that provide for dispersed recreation in the Sterling Sweeper Project Area. 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, Off-Highway Vehicles (OHV) activities, fishing, driving for pleasure, hunting, target practice, dispersed camping, and vegetative gathering.

The 2008 Medford District RMP designated 11,482 acres of land in the Anderson Butte area as a SRMA. SRMAs are to be managed according to their planning frameworks (USDI 2008 RMP/ROD p.53). The Anderson Butte SRMA was identified as an OHV Emphasis Area with the primary identified activity being OHV riding on designated roads and trails. The management objective for the SRMA is to address SRMA issues associated with OHV recreation use in designating a road and trail system and facilities including loop routes, signage, informational opportunities, noise mitigation, road and trail construction and/or maintenance, terrain variety, visual resource management, and prevention of user conflicts or resource damage (USDI 2008 RMP/ROD Appendix G p. 9). Under the 2008 Medford District RMP the entire Sterling-Sweeper Forest Management Project, 378 acres, is within the Anderson Butte SRMA. The SRMA designation does not exclude other types of recreational uses.

Sterling Mine Ditch Trail

Three project units proposed for treatment under both Alternatives 2 and 3 (9-1, 9-3, and 9-4, totaling 58 acres) are near (within 0.5 miles of) the Sterling Mine Ditch Trail. The Sterling Mine Ditch Trail is a 17.4 mile non-motorized trail open to stock use, hiking, and mountain biking. The Sterling Mine Ditch Trail is designated under both the 1995 RMP and the 2008 Medford District RMP. The trail primarily utilizes a ditch berm that was constructed beginning in 1877, following gold being discovered on Sterling Creek. The first gold was easily removed by panning. Eventually, the greatest success was achieved with hydraulic mining, which uses a powerful jet of water from a hydraulic giant to wash out gold lying under layers of soil and rock. Ditch construction began in 1877 to bring water from the Little Applegate to operate hydraulic giants. The Sterling Mining Company was the contractor. A 26.5 mile long ditch, three-feet deep, was completed in December,1877. Up to 400 workers, many of them Chinese laborers, were employed to construct the ditch. The ditch was in use through the 1930s. Today, the 17.4 mile designated Sterling Mine Ditch Trail follows the ditch. Much of the 26.5 mile total length is on BLM-managed land and is used as a trail for recreational purposes; however, both the BLM's 1995 RMP and the 2008 Medford District RMP recognize a 17.4 mile section as a designated trail. According to the BLM's Recreation Management Information System (RMIS) there were 4,651 visitors who used the Sterling Mine Ditch Trail in fiscal year 2011 (Oct. 1, 2010 – Sept. 30, 2011).

2. Environmental Consequences

a. Alternative 1—No Action Alternative

In the No-Action Alternative, recreation opportunities would remain unchanged. Dispersed recreational activities including hiking, horseback riding, sightseeing, OHV activities, fishing, driving for pleasure, hunting, target practice, dispersed camping, and vegetative gathering would continue. There would be no impacts to the Anderson Butte SRMA or the Sterling Mine Ditch Trail.

b. Alternatives 2 and 3

Under the 1995 RMP the entire Sterling-Sweeper Project Area, 378 acres, is described by the RMP as extensive recreation use areas that provide for dispersed recreation in the Sterling-Sweeper Project Area. Dispersed types of recreation within the Sterling-Sweeper Project Area would receive adverse short-term intermittent impacts as a result of the Sterling-Sweeper proposed action. Recreational users of the area 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 (mostly group selection cuts) proposed for treatments under Alternatives 2 and 3 of the Sterling-Sweeper 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.

Under the 2008 Medford District RMP the entire Sterling-Sweeper Forest Management Project, 378 acres, is within the Anderson Butte SRMA. The Anderson Butte SRMA was identified as an OHV Emphasis Area with the primary identified activity being OHV riding on designated roads and trails. The Anderson Butte SRMA in the Sterling-Sweeper Project Area would receive adverse short-term intermittent impacts as a result of the Sterling-Sweeper Action Alternatives. OHV and other recreational users of the area 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 (mostly group selection cuts) proposed in each unit of the Sterling-Sweeper 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 OHV recreation in the long-term. The creation of skid trails, and corridors for cable logging, as well as the loss of vegetation caused by the cutting of timber itself may open up areas and provide an opportunity for increased OHV travel in project areas. This would likely be minimal as currently most project units have an even-aged over story and lack a dense understory that prohibits off-road OHV travel. Forest management activities of Sterling-Sweeper Project units are not likely to significantly contribute to an increase in off-road OHV use in project units.

Sterling Mine Ditch Trail

In the short-term, intermittent negative impacts as a result of Action Alternatives would occur. Trail users would encounter log trucks and equipment on the way to trailheads and parking areas and hear noise from machinery when using the west end of the trail system in the area of Deming Gulch. Vehicle traffic on roads in the area of Deming Gulch is not uncommon and can normally be heard by trail users when logging activity is not occurring. However, the duration, frequency, and amplitude of noise from machinery would increase when project activities are occurring. These impacts would be minimal and short-term. To improve the safety of trail users, signs would be placed along haul routes warning drivers of project activity.

L. VISUAL RESOURCES MANAGEMENT

1. Affected Environment

"Visual Resources are the land, water, vegetation, structures, and cultural modifications that make up the scenery of BLM-administered land." Medford District BLM-administered lands have been classified under a Visual Resource Management (VRM) Class system established by the BLM. The criteria used to determine VRM classes were scenery quality ratings, public sensitivity ratings and distance zone-seen area mapping criteria. Approximately 60 percent of the viewsheds in the Medford District RMP planning area have fragmented land ownership patterns with private lands dominating the viewed landscape (USDI 1994: 3-70). The characteristic landscape in the area of the Sterling-Sweeper Forest Management Project is that of an even aged canopied forest environment with meadow openings in steep to moderately steep mountainous terrain. The proposed Sterling-Sweeper project is within an area to be managed as VRM Class III under BLM's 1995 RMP and Class IV under the 2008 Medford District RMP.

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

Class IV Objective: Manage for moderate levels of change to the characteristic landscape. Management activities may dominate the view and be the major focus of viewer attention. However, attempts should be made to minimize the effects of activities through careful location and minimizing disturbance so as to repeat the basic elements of form, line, and color.

The area is primarily viewed by recreationists including hunters, horseback riders, hikers, OHV users and by drivers along area roads. These types of visitors to public lands would constitute the typical casual observer.

As with all proposed projects, it must be determined whether the potential visual impacts from a proposed ground-disturbing activity will meet the management objectives established for the area, or whether design adjustments would be required. A visual contrast rating process is used for this analysis, which involves comparing the project features with the major features in the existing landscape using the basic design elements of form, line, color, and texture. This process is described in BLM Handbook H-8431-1, Visual Resource Contrast Rating.

The characteristic landscape within the zone is typical of a highly managed and altered forest scene. Past activities such as extensive road building, complete conifer harvest and ranching on adjacent private lands, and extensive hardwood stands, meadows, and ranch land scattered throughout create a highly modified forest and valley landscape. The intermingled private lands with their associated developments and past harvest treatments provide a variety of visual contrast.

2. Environmental Consequences

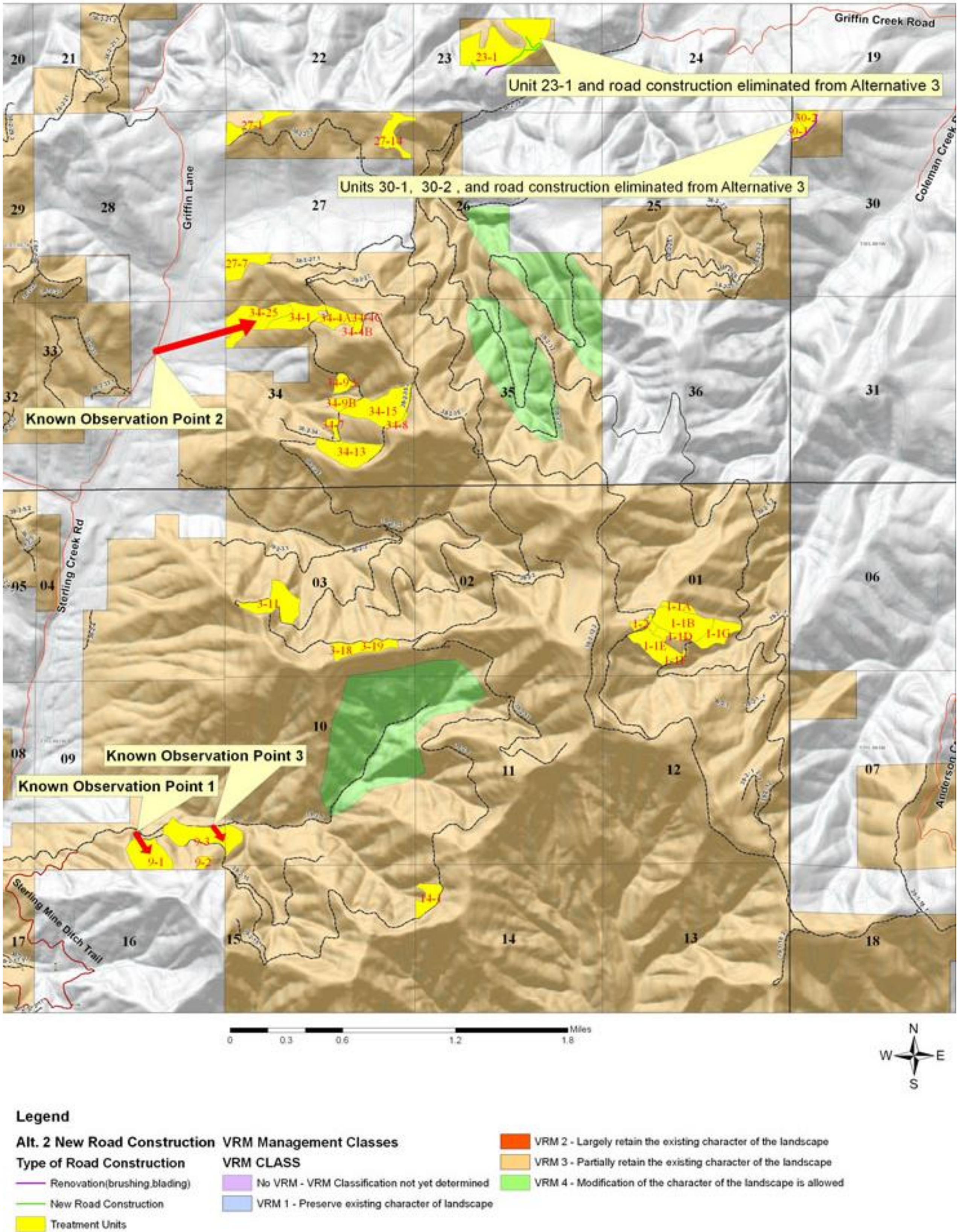
a. Alternatives 2 and 3

Resource development patterns that disrupt the land surface (road construction) and alterations to vegetative patterns can have adverse effects on visual resources (USDI 1994: 4-86). The proposed Sterling-Sweeper Forest Management Project is located on land classified as VRM Class III under the 1995 Medford District RMP and VRM Class IV under the 2008 Medford District RMP. Management objectives are the most restrictive for VRM Class III under the 1995 RMP, which calls for partially retaining the existing character of the landscape (USDI 1995a: 70). As management objectives are the more restrictive in VRM Class III under the 1995 RMP than under the VRM Class IV under the 2008 Medford District RMP, visual resources for the purposes of the Sterling-Sweeper Forest Management Project were analyzed to determine if the more restrictive VRM Class III management objectives would be met. VRM Class III allows a moderate degree of change to the landscape. Activities may attract the attention but should not dominate the view of the casual observer (USDI 1995a).

In accordance with the 1995 Medford District RMP and 2008 Medford District RMP, a visual resources contrast rating system analysis (on file at the Medford District BLM Office) was completed for Alternatives 2 and 3 of Sterling-Sweeper Forest Management Project. Alternative 3 differs from Alternative 2 in that new road construction is eliminated and project units 23-1, 30-1, and 30-2 are eliminated as they would require new road construction for access.

Known Observation Points (KOPs) were used to view the landscape in areas where the project, both as the project exists in Alternative 2 and Alternative 3 would occur. Three KOPs near project units were used to complete the visual resource rating system analysis (Map 3-7). KOPs were chosen for their proximity to a high-use recreation trail, the Sterling Mine Ditch Trail, and from roads traveled in the area of the project. The same KOPs were used in analyzing potential visual changes to the landscape.

Map 3-7. VRM Management Classes and Location of Known Observation Points Within the Sterling Sweeper Forest Management Project.



KOP #1 is located on Road 39-2-8 above (south) the parking area for the Sterling Mine Ditch Trail system off of Road 39-2-9 in the area of Deming Gulch (Figure 3-1). Treatment Unit 9-1 was viewed facing southeast. Treatment planned for unit 9-1 under Alternatives 2 and 3 is a group selection. The principal purpose for group selection treatment is to create structural diversity among stands that have a monoculture appearance or a one- layer overstory. Treatment of unit 9-1 would result in a weak degree in contrast as compared to the current vegetation landscape components of form, line, and texture. The treatment would result in no change in overall color of the vegetation within the landscape. The treatment would also result in no change to the land and structure (road) present in the viewed landscape from KOP #1.   The treatment as viewed from KOP #1 would partially retain the existing character of the landscape and would not dominate the view of the casual observer. Both of the action alternatives, Alternative 2 and Alternative 3, of the Sterling-Sweeper Forest Management Project meet VRM Class III management objectives in Unit 9-1 from KOP #1.

Figure 3-1. Known Observation Point (KOP) #1

KOP #2 is located on Griffin Lane in an area with sparse foreground vegetation screening, from which Unit 34-25 is visible from Griffin Lane (Figure 3-2). Treatment Unit 34-25 was viewed facing northwest from Griffin Ln. Treatment planned for unit 34-25 under Alternatives 2 and 3 is a group selection. The principal purpose of group selection treatment is to create structural diversity among stands that have a monoculture appearance or a one-layer overstory. The treatment would result in a weak degree in contrast as compared to the current vegetation landscape components of form and texture. The treatment would result in no change in overall color or line of the vegetation within the landscape when viewed from Griffin Lane. The treatment would also result in no change to the land and structure (road) present in the viewed landscape from KOP #2.   The project both as it exists in Alternative 2 and 3 as viewed from KOP #2 would partially retain the existing character of the landscape and would not dominate the view of the casual observer. Both of the action alternatives, Alternative 2 and Alternative 3, of the Sterling Sweeper Forest Management Project meet VRM Class III management objectives in Unit 34-25 from KOP #2.

Figure 3-2. Known Observation Point (KOP) #2.

KOP #3 is located on Road 39-2-9 south of (above) the Sterling Mine Ditch Trail System in the area of Deming Gulch (Figure 3-3). Road 39-2-9 is used by hikers, mountain bikers, and saddle stock users in conjunction with the Sterling Mine Ditch Trail to complete a short loop route. The route is accessed from a parking area on Road 39-2-9. Treatment unit 9-3 was viewed from KOP #3 facing south-southeast. Treatment planned for unit 9-3 is a group selection. The principal purpose for group selection treatment is to create structural diversity among stands that have a monoculture appearance or a one- layer overstory. The treatment would result in a weak degree in contrast compared to the current vegetation landscape components of form, line, and texture. Treatment would result in no change in overall color of the vegetation within the landscape. Planned treatment would also result in no change to the land form present in the viewed landscape from KOP #3. The planned treatment as viewed from KOP #3 would partially retain the existing character of the landscape and would not dominate the view of the casual observer. The Sterling-Sweeper Forest Management Project meets VRM Class III management objectives in Unit 9-3 from KOP #3 in Alternatives 2 and 3.

Figure 3-3. Known Observation Point (KOP) #3

Summary

The both of the action alternatives in the Sterling-Sweeper Forest Management Project would result in a low level of change visually to the characteristic landscape. These changes would not dominate the view of the casual observer. It is determined that both Alternative 2 and Alternative 3 would meet Visual Resource Management objectives under the 1995 Medford District RMP as well as under the 2008 Medford District RMP.

M. RANGELAND RESOURCES/GRAZING

1. Affected Environment

The Rangeland Resources and Grazing Analysis Area includes the Lower Big Applegate grazing allotment, although there are no proposed Sterling Sweeper Project units located within or adjacent to any part of the Lower Big Applegate Allotment. The Lower Big Applegate grazing allotment is managed under the Beaver Silver Cooperative Resource Management Plan (CRMP), covering a much larger portion of the upper-watersheds of the Little Applegate River Watershed, controlled by the USDA Forest Service.

Historically, the Sterling Creek grazing allotment was also located within the proposed project area; however, due to a period of inactivity of more than 10 years, it is no longer considered to be an active allotment and will not be analyzed further.

2. Environmental Consequences

a. All Alternatives

Because the Sterling Sweeper Forest Management Project occurs in the vacant Sterling Creek Allotment, there would be no effect on rangeland resources. Because the Lower Big Applegate Allotment is outside of the project area, there would be no effect associated with proposed project activity to allotment resources or rangeland improvements.

N. CARBON STORAGE

1. Background

The purpose of the this section is to provide a basis for the decision maker to determine whether the proposed action or alternatives are likely to significantly impact the human environment with respect to greenhouse gas levels (i.e., atmospheric carbon levels). Changes in greenhouse gas levels affect global climate (Forster, et al. 2007, pp. 129-234) which is incorporated here by reference, reviewed scientific information on greenhouse gas emissions and climate change and concluded that human-caused increases in greenhouse gas emissions are extremely likely to have exerted a substantial warming effect on global climate. Because forests store carbon, they affect the atmospheric concentrations of carbon dioxide, a greenhouse gas. Forest management can change the amount of carbon stored in a forest.

Scientific knowledge on the interrelationship between greenhouse gas levels and climate change is rapidly changing, and substantial uncertainties and several key limitations remain. One limitation is the inability of current science to identify a specific source of greenhouse gas emissions or sequestration and designate it as the cause of specific climate impacts at a specific location. This limitation was identified by the U.S. Geological Survey in a May 14, 2008 memorandum to the U.S. Fish and Wildlife Service, which summarized the latest science on greenhouse gases. That memorandum is incorporated here by reference.

Treatments of the project action alternatives were compared to treatments in another recent project and found to be similar. Carbon storage and carbon emissions of the project action alternatives are compared to similar units that have calculations to determine the net contributions of greenhouse gases resulting from the treatments. Those carbon calculations were based on assumptions in the 2008 FEIS (USDI/BLM 2008 Appendix C) and subsequent improvements to those assumptions, as set forth in R. Hardt, personal communication, November 6, 2009 (on file in the Medford District BLM Office, and incorporated here by reference). Carbon storage was analyzed by quantifying the change in carbon storage in live trees, storage in forests other than live trees (dead wood and roots, non-tree vegetation, litter and soil organic matter), and storage in harvested wood products. Changes in forest ecosystem carbon over time were calculated using site specific data and the ORGANON Growth Model (Hann et al.

2007). Stand volume in cubic feet per acre per year was used to calculate tonnes of carbon stored per year (1 tonne = 2200 pounds). Carbon emissions (carbon dioxide) were calculated from timber harvest activities (including fuel consumption) and post-harvest fuel treatments. Net carbon storage was calculated by subtracting carbon emitted from carbon stored.

The 2008 FEIS described current information on predicted changes in regional climate (pp. 488-490), and is incorporated here by reference. That description concluded that the regional climate has become warmer and wetter with reduced snowpack, and continued change is likely. That description also concluded that changes in resource impacts as a result of climate change would be highly sensitive to specific changes in the amount and timing of precipitation, but specific changes in the amount and timing of precipitation are too uncertain to predict at this time. Because of this uncertainty about changes in precipitation, it is not possible to predict changes in vegetation types and condition, wildfire frequency and intensity, stream flow, and wildlife habitat. The analysis in this EA therefore does not attempt to predict changes in the project area due to existing or potential future changes in regional climate.

2. Affected Environment

In the Sterling Sweeper Project Area, Douglas-fir and ponderosa pine stands that are 30 to 160 years old are proposed for treatment. Within these forests, the quantity of stored carbon varies from stand to stand and is influenced by site quality and the amount, type, and size of vegetation present. The current amount of vegetation defines the existing levels of on-site carbon and is considered the baseline amount that would be affected by management actions.

3. Environmental Consequences

a. Alternative 1—No Action Alternative

This alternative would not implement the Medford District RMP management direction for general forest and riparian management areas. No timber management actions would occur.

No forest vegetation would be removed; the current amount of on-site carbon would not be affected. In the long term it is expected that continued growth of forest vegetation would result in the increase of stored carbon. Limited reductions in carbon would happen as periodic mortality or decomposition from natural processes occurs. In the absence of catastrophic disturbance events, it is expected that continued forest growth would capture and store more carbon than would be lost from natural processes.

b. Alternatives 2 and 3

Live Tree Carbon Storage
Similar to treatments in the Pilot Joe Project, Sterling Sweeper Timber Project treatments would reduce carbon stores temporarily, but would result in net increases over time. In the Pilot Joe Project, units similar to the Sterling Sweeper Disease Management, Density Management and Select Thinning units continued forest growth following management, and are predicted to increase carbon storage approximately 605 cubic feet per acre per decade (Hann 2003), which is equal to about 7.4 tonnes of stored carbon per acre per decade (0.74 tonnes/ year). Within 5 years after thinning, the carbon emission level (3.1 tonnes/acre) for the 20 year analysis period would be offset by carbon storage in tree growth. Total live tree carbon would equal pre-treatment levels after roughly 12 years of tree growth (Pilot Joe EA p. 3-114).

The Group Select units would be similar to the variable density management units in the Pilot Joe Project. Continued forest growth following harvest would increase carbon storage approximately 582 cubic feet per acre per decade (Hann 2003), which is equal to about 7.1 tonnes of stored carbon per acre per decade (0.71 tonnes/ year). Within 6 years after harvest, the carbon emission level (3.7 tonnes/acre) for the 20 year analysis period would be offset by carbon storage in tree growth. Total live tree carbon would equal pre-treatment levels after approximately 38 years of tree growth.

Carbon Dioxide Emission
Group Select treatments would result in the emission of about 3.7 tonnes of carbon per acre, or about 13 tonnes of carbon dioxide per acre during the 20 year analysis period. Thinning 299 acres would result in the emission of 3,887 tonnes of carbon dioxide, representing 0.0000006 percent of current U.S. emissions.

In Disease Management, Density Management and Select Thinning units, treatments would result in the emission of about 3.1 tonnes of carbon per acre, or about 5 tonnes of carbon dioxide per acre during the 20 year analysis period. Thinning 590 acres would result in the emission of 2,950 tonnes of carbon dioxide, representing 0.0000005 percent of current U.S. emissions.

The total carbon dioxide emitted during the 20 year analysis period is considered negligible in the context of total U.S. carbon dioxide emissions of 6 billion metric tons (US DOE 2009).

O. OTHER EFFECTS

1. Cultural Resources

In accordance with the Protocol for Managing Cultural Resources on Lands Administered by the Bureau of Land Management (BLM) in Oregon, and the National Historic Preservation Act of 1966 (specifically section 106), as amended, a literature review and archaeological reconnaissance was conducted for the Sterling Sweeper project area. A total of 99.6 acres (25 acres of new survey, 74.6 acres of past survey) within the project units, or 26% of the total 379 treatment acres, have been completely surveyed for cultural resources. No new sites were recorded during this survey. An additional 1,000 acres, within the project boundary but outside of any proposed treatment areas, has been previously surveyed under two past landscape level projects (AH96-03, AH99-55). Past survey resulted in recording 7 sites and 2 isolated finds within the project boundary, but outside of any treatment units.

Actions which could potentially damage cultural resources include timber removal, road building, controlled burning, fuel hazard reduction and riparian restoration projects. The Sterling Mine Ditch (35JA557) is located within unit 9-3. The ditch will be given a no-treatment buffer of 25 feet on each side of the ditch and trees will be directionally felled away from the site buffer for up to one tree length (~160 feet).

No other cultural sites have been identified within the units proposed for treatment. When coupled with the Project Design Features in Chapter 2, no cumulative impacts are expected for cultural resources within the Sterling Sweeper Project.

2. Air Quality

Prescribed burns are conducted within the limits of a Burn Plan, which describes prescription parameters so that acceptable and desired effects are obtained. Smoke produced from prescribed burning is the major air pollutant of concern.

Fuels management activities generate particulate pollutants in the process of treating natural and activity related fuels. Smoke from prescribed fire has the potential to effect air quality within the project area as well as the surrounding area. The use of prescribed fire for ecosystem restoration can produce enough fine particulate matter to be a public health and/or welfare concern.

Fine particulates in smoke can travel many miles downwind impacting air quality in local communities, causing a safety hazard on public roads, impairing visibility in class I areas, and/or causing a general nuisance to the public. If properly managed, most negative effects of prescribed fire smoke can be minimized or eliminated.

The National Ambient Air Quality Standards (NAAQS), set by the authority of the Clean Air Act (CAA), cover six "criteria" airborne pollutants: lead, sulfur dioxide, carbon monoxide, nitrogen oxides, ozone and particulate matter. The lead and sulfur content of forest fuels is negligible, so these two forms of air pollution are not a consideration in prescribed burning.

Prescribed burning does emit some carbon monoxide (CO), from 20 to 500 lb. per ton of fuel consumed. This would be a concern if there were other persistent large CO sources in the immediate vicinity. CO is such a reactive pollutant, however, that its impact is quickly dissipated by oxidation to carbon dioxide where emissions are moderate and irregular and there is no atmospheric confinement.

Burning also emits moderate amounts of volatile organic compounds (VOC) and minor amounts of nitrogen oxides (NOx). These are precursors to formation of ground level ozone. Here, fire-related emissions may be seen as important only when other persistent and much larger pollution sources already cause substantial nonattainment of NAAQS.

Particulate matter smaller than 10 micrometers (PM 10) is a term used to describe airborne solid and liquid particles. Because of its small size, PM 10 readily lodges in the lungs, thus increasing levels of respiratory infections, cardiac disease, bronchitis, asthma, pneumonia, and emphysema.

The fate of PM emissions from prescribed burning is twofold. Most (usually more than 60%) of the emissions are 'lifted" by convection into the atmosphere where they are dissipated by horizontal and downward dispersion. The "unlifted" balance of the emissions (less than 40%) remain in intermittent contact with the ground. This impact is dissipated by dispersion, surface wind turbulence and particle deposition on vegetation and the ground. The risk of impact on the human environment differs between the two portions of smoke plume.

Smoke Aloft

Until recent decades, the impact of the lifted portion of smoke was ignored because it seemed to "just go away." These impacts are generally not realized until the mechanisms of dispersal bring the dispersed smoke back to ground level. Because the smoke has already dispersed over a broad area, the intensity of ground-level exposure is minimal. The duration of exposure may include the better part of a day, however, and the area of exposure may be large.

Ground Level Smoke

Unlike smoke aloft, the potential for ground level smoke to create a nuisance is immediate. This part of the smoke plume does not have enough heat to rise into the atmosphere. It stays in intermittent contact with the human environment and turbulent surface winds move it erratically. Also in comparison to smoke aloft, human exposure is more intense, relatively brief (a few hours) and limited to a smaller area. Smoke aloft is already dispersed before it returns to the human environment while ground level smoke must dissipate within that environment. Dissipation of ground level smoke is accomplished through dispersion and deposition of smoke particles on vegetation, soil and other objects.

Smoke Sensitive Receptor Area (SSRA)

The population centers of Grants Pass, Medford/Ashland (including Central Point and Eagle Point), and Klamath Falls in the past were in violation of the national ambient air quality standards for PM 10 and are classified as nonattainment for this pollutant. The nonattainment status of these communities was not attributable to prescribed burning. Major sources of particulate matter within the Medford/Ashland SSRA are smoke from woodstoves and dust and industrial sources.

The contribution to the nonattainment status of particulate matter from prescribed burning is less than 4% of the annual total for the Medford/Ashland air quality management area. Over the past ten years the population centers of Grants Pass and Medford/Ashland have been in compliance for the national ambient air quality standards for PM 10.

The pollutant most associated with the Medford District's resource management activities is PM 10 found in smoke produced by prescribed fire. Monitoring in southwest Oregon consists of nephelometers (instrument designed to measure changes in visibility) in Grants Pass, Provolt, Illinois Valley, Ruch and eventually in Shady Cove. One medium volume sampler is collocated with the nephelometer at the Provolt site. The medium volume sampler measures the amount of PM 10 and smaller at ground level.

Administration of Smoke Producing Projects

The operational guidance for the Oregon Smoke Management Program is managed by the Oregon State Forester. The policy of the State Forester is to:

1. Regulate prescribed burning operations on forest land…
2. Achieve strict compliance with the smoke management plan…
3. Minimize emissions from prescribed burning…

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

ORS468A.005 through 468A.085 provides the authority to DEQ to establish air quality standards including emission standards for the entire State or an area of the State. Under this authority the State Forester coordinates the administration and operation of the plan. The Forester also issues additional restrictions on prescribed burning in situations where air quality of the entire State or part thereof is, or would likely become adversely affected by smoke.

In compliance with the Oregon Smoke Management Plan, prescribed burning activities on the Medford District require pre-burn registration of all prescribed burn locations with the Oregon State Forester. Registration includes specific location, size of burn, topographic and fuel characteristics. Advisories or restrictions are received from the Forester on a daily basis concerning.

3. 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 December 16, 2011. The scoping letter requested that people contact the BLM using an attached Interest Response Form, or by sending a comment letter if they wanted to be updated as the project progressed. A copy of this Environmental Assessment was sent to those individuals and organizations who responded to the scoping notice. The following organizations were among those who received a copy of the Sterling Sweeper Forest Management Project Environmental Assessment.

<u>Organizations and Agencies</u>
American Forest Resource Council
Applegate Fire Plan
Cascadia Wildlands Project
Cow Creek Band of Umpqua Tribe of Indians
Klamath Siskiyou Wildlands Center

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