United States Department of the Interior

BUREAU OF LAND MANAGEMENT
COOS BAY DISTRICT OFFICE
1300 AIRPORT LANE, NORTH BEND, OR 97459
Web Address: http://www.blm.gov/or/districts/coosbay E-mail: BLM_OR_CB_Mail@blm.gov
Telephone: (541) 756-0100 Toll Free: (888) 809-0839 Fax: (541) 751-4303

In Reply Refer To:
1792/6711/5420 (ORC040)
DOI-BLM-OR-C040-2010-0005-EA
Cherry Vaughn Environmental Assessment

April 12, 2012

Dear Citizen:

As a result of comments received on the Cherry Vaughn Environmental Assessment (EA) and unsigned FONSI (Finding of No Significant Impact), available for review from January 26 to February 27, 2012, we made a few changes to the EA to provide added clarification to project design and additional supporting information to the effects analysis in some sections. These do not constitute substantive changes or result in different outputs or alternatives; therefore, additional effects analysis is not needed. The following is a discussion of these changes:

Road Decommissioning: The BLM failed to identify two roads proposed for full decommissioning only in the project that are within the Cherry Creek Tier 1 Key Watershed. These have been described on page 16 of the EA.

Port-Orford-cedar: There was some confusion about the design features for Port-Orford-cedar, which have now been clarified on page 23 of the EA.

White-footed vole: In response to concerns over this species, we have added analysis on white-footed voles on page 41 of the EA.

Maps: We have clarified on the Map legends the four different treatments and the two components of Treatment 1.

One letter stated confusion about design features for each treatment. The design features for each treatment are specific for that treatment and that treatment only. For example, a design feature, such as canopy cover in Treatment 2, does not apply in any of the other treatments.

None of these changes in the EA invalidated the analysis supporting the FONSI, which I have now signed. The *Final* Cherry Vaughn EA and signed FONSI have been posted to the District's Internet site, http://www.blm.gov/or/districts/coosbay/plans/index.php.

Applicable Decision Documents will be prepared when the decisions are made to go forward with those portions of the Cherry Vaughn project.

Please direct requests for copies, questions, or comments to Coos Bay District BLM, 1300 Airport Lane, North Bend, OR. 97459-2000, ATTN: Aimee Hoefs; call (541) 756-0100; FAX (541) 751-4303, or e-mail to OR_CoosBay_Mail@blm.gov ; ATTN: Aimee Hoefs.

Sincerely,

/s/ Kathy Hoffine
Kathy Hoffine
Myrtlewood Field Manager

United States Department of the Interior

BUREAU OF LAND MANAGEMENT
COOS BAY DISTRICT OFFICE
1300 AIRPORT LANE, NORTH BEND, OR 97459
Web Address: http://www.blm.gov/or/districts/coosbay E-mail: BLM_OR_CB_Mail@blm.gov
Telephone: (541) 756-0100 Toll Free: (888) 809-0839 Fax: (541) 751-4303

In Reply Refer To:
1792/6711/5420 (ORC040)
DOI-BLM-OR-C040-2010-0005-EA
Cherry Vaughn Environmental Assessment

FINDING OF NO SIGNIFICANT IMPACT
for the
Cherry Vaughn Environmental Assessment
DOI-BLM-OR-C040-2010-0005-EA

I. Introduction

An Interdisciplinary Team has prepared an Environmental Assessment (EA), which contains analysis of the effects of implementing density management thinning and hardwood conversion treatments on 1352 acres of overstocked forest stands and non-commercial silvicultural activities on 146 acres. This document contains two alternatives: a no action alternative and a proposed action alternative. The no action alternative describes the effects of not conducting management activities on these lands at this time. The proposed action alternative describes the effects of managing tree densities and encouraging structural complexity on 1498 acres of Late-Successional Reserves and Riparian Reserves. This alternative also includes 2.56 miles of new road construction, 15.74 miles of road renovation, reconstruction or improvement, and 9.31 miles of road decommissioning. Snag and down wood creation are also proposed. These activities would be accomplished through the offering of timber sale contacts or non-commercial service contracts. The technique of sample tree falling would be used in the preparation of timber sale contracts. The locations for the treatment areas are shown in the following table:

Table 1 Legal description for all treatment areas

Township	Range	Sections
27 S.	10 W.	3, 4, 5, 6, 7, 8, 9, 17, 18, 19, 20, 21, 29, and 30
28 S.	10 W.	3

II. Background

This EA was developed under the management direction of the 1995 Coos Bay District Record of Decision and Resource Management Plan (1995 ROD/RMP). The analysis supporting this decision tiers to the *Final Coos Bay District Proposed Resource Management Plan/Environmental Impact Statement* (UDSI 1994). The 1995 Record of Decision is also supported by, and in conformance with, the *Final Supplemental Environmental Impact Statement (EIS) on 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) and its *Record of Decision* (USDA and USDI 1994a) as supplemented and amended.

The Coos Bay District initiated planning and design for this project to conform and be consistent with the Coos Bay District's 1995 RMP. Following the March 31, 2011 decision by the United States District Court for the District of Columbia in *Douglas Timber Operators et al., v. Salazar*, which vacated and remanded the administrative withdrawal of the Coos Bay District's 2008 ROD and

RMP, we evaluated this project for consistency with both the 1995 RMP and the 2008 ROD and RMP. Based upon this review, we have determined that the proposed action is consistent with the Coos Bay District's 1995 RMP and the 2008 ROD and RMP. Although the proposed action contains some design features not mentioned specifically in the 2008 ROD and RMP, these design features are consistent with the 2008 ROD and RMP.

As stated in the Record of Decision for the Northwest Forest Plan, the Aquatic Conservation Strategy (ACS) was developed to restore and maintain the ecological health of watersheds and aquatic ecosystems on public lands within the range of Pacific Ocean anadromy. Consistency of the proposed alternative with the ACS objectives is included in Chapters 3&4 of the EA (pp. 63-73).

III. Finding of No Significant Impact

The EA effects analysis indicates that there would not be a significant impact on the quality of the human environment from the implementation of either alternative. This finding and conclusion is based on my consideration of the Council of Environmental Quality's (CEQ) criteria for significance (40 CFR 1508.27), both with regard to context and intensity of the impacts described in the EA.

Context

The proposed action would occur within the Riparian Reserve and Late-Successional Reserve land use allocations as designated by the 1995 Coos Bay District ROD/RMP. The RMP anticipated the need to conduct silvicultural treatments within: (1) Late-Successional Reserves to promote development of structural characteristics associated with habitat for late-successional forest dependent species, and (2) Riparian Reserves to restore or maintain the objectives of the Aquatic Conservation Strategy.

Intensity

Impacts that may be both beneficial and adverse (40 CFR 1508.27 (b)(1))

Any impacts, both beneficial and adverse, are not significant as they are consistent with the range and scope of those effects of timber management analyzed in the 1994 Final Coos Bay District Proposed Resource Management Plan /Environmental Impact Statement to which the EA is tiered.

Public Health and Safety (40 CFR 1508.27(b)(2))

No aspect of the proposed action would have an effect on public health and safety. Smoke management from pile burning would adhere to the Oregon Smoke Management Plan (EA p. 73). There would be no impact to the water quality of the North Fork Coquille River, which is a drinking water source for the city of Myrtle Point (EA p. 74) nor would there be an impact to water quality of the Coquille River, a drinking water source for the city of Coquille (EA p. 74).

Unique characteristics of the geographic area (40 CFR 1508.27(b)(3))

There are no known parklands, prime or unique farmlands, wetlands, floodplains, Wild and Scenic Rivers, or wilderness values that would be affected in the project area. Many units are located near the Cherry Creek Research Natural Area (RNA), but mainline roads and a buffer separate the RNA from the units (EA p. 73) so there will be no impacts to the RNA.

Degree to which effects are likely to be highly controversial (40 CFR 1508.27(b)(4))

The effects on the quality of the human environment of the proposed activity are not highly controversial. The Coos Bay District has been operating under the management direction of the Resource Management Plan since 1995. Thinning treatments are not considered controversial. Public scoping comments indicated general support for the project, with most comments focused on prescription development and implementation.

Degree to which effects are highly uncertain or involve unique or unknown risks (40 CFR 1508.27(b)(5))
The possible effects of the proposed activities on the quality of the human environment are not highly uncertain and do not involve unique or unknown risk. Thinning is a common practice on lands managed by the BLM in western Oregon. None of the public comments received indicated unique or unknown risks to the human environment.

Consideration of whether the action may establish a precedent for future actions with significant impacts (40 CFR 1508.27(b)(6))
The proposed project does not establish a precedent for future actions or represent a decision in principle about future actions with potentially significant effects. The timber management program on BLM-managed lands in western Oregon is well established and this project would not establish a new precedent.

Consideration of whether the action is related to other actions with cumulatively significant impacts (40 CFR 1508.27(b)(7))
There are no cumulatively significant impacts identified by the environmental assessment. Those reviewed include impacts to forest structure (pp. 25-33), wildlife (pp. 33-42), botany (pp. 42-44) water resources (p. 44-50), fisheries (pp. 50-57), soil resources (pp. 57-59), and climate change and carbon storage (pp. 60-63).

Scientific, cultural, or historical resources, including those listed in or eligible for listing in the National Register of Historic Places (40 CFR 1508.27(b)(8))
The proposed activities would not affect districts, sites, highways, structures or objects listed in, or potentially eligible for listing in the National Register of Historic Places. Nor would the activities cause a loss or destruction of significant scientific, cultural, or historical resources.

Threatened or endangered species and their critical habitat (40 CFR 1508.27(b)(9))

- The Myrtlewood Field Office has completed consultation with the U.S. Fish and Wildlife Service for effects to federally listed species and their critical habitat on lands managed by the Coos Bay BLM. On June 24, 2011, the BLM received a Biological Opinion, which includes a finding that "implementation of the proposed actions would not jeopardize the continued existence of the spotted owl or the murrelet, and will not adversely modify designated critical habitat for the spotted owl or murrelet" (USDI 2011). This opinion covers all commercial and non-commercial treatments, associated roadwork, and sample tree falling
- The Myrtlewood Field Office has determined that the proposed activities would have "no effect" to federally threatened Oregon Coast coho salmon and its associated Critical Habitat; thus, consultation with the National Marine Fisheries Service is not required.
- The proposed action would also not result in adverse effects to Essential Fish Habitat as designated by the Magnuson-Stevens Fishery Conservation and Management Act (MSA; 16 U.S.C. 1855 as amended).
- There are no Threatened or Endangered botany species within the project area.

Any effects that threaten a violation of Federal, State, or local laws or requirements imposed for the protection of the environment (40 CFR 1508.27(b)(10))
The proposed action would not violate Federal, State or local laws imposed for the protection of the environment. These include the Endangered Species Act and the Clean Water Act.

This project complies with the Coastal Zone Management Act, as there would be no adverse effects to Coastal Zone resources from implementing the Cherry Vaughn project because water quality would not be impacted (EA pp. 45-50).

Analysis has also concluded that implementation of the proposed actions will not change the likelihood of and need for listing of any Special Status Species under the ESA as identified in BLM Manual 6840 and BLM OR/WA 6840 policy.

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 Cherry Vaughn project is consistent with the Coos Bay District 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 (EA pp. 39-42, Appendices B and D).

Pursuant to Executive Order 13212, the BLM must consider the effects of this decision on the President's National Energy Policy. As there would be no impact to the exploration, development or transportation of undeveloped energy sources from the proposed action, a Statement of Adverse Energy Impacts is not required.

Conclusion

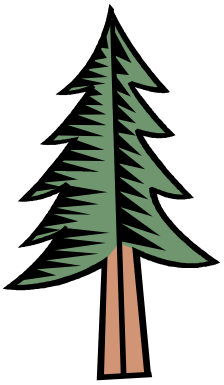
Based on the information contained in the EA (DOI-BLM-OR-C040-2010-0005-EA), and all other information available to me, I have determined that the proposed action would not have a significant impact on the human environment within the meaning of section 102(2) (c) of the National Environmental Policy Act of 1969, and that an Environmental Impact Statement is not required. I have determined that the effects of the proposed activities would be in conformance with the 1995 *Record of Decision/Resource Management Plan* for the Coos Bay District.

/s/ Kathy Hoffine ***April 12, 2012***

Kathy Hoffine
Myrtlewood Field Manager

Date

Cherry Vaughn
Environmental Assessment



FINAL 4/2/2012

DOI-BLM-OR-C040-2010-0005-EA
Myrtlewood Field Office
Coos Bay District
Bureau of Land Management
1300 Airport Lane
North Bend Or. 97459

CHAPTER 1 PURPOSE AND NEED **3**

BACKGROUND 3
NEED FOR THE PROJECT 3
PROJECT OBJECTIVES (PURPOSE) 4
Decision Factors *4*
CONFORMANCE WITH EXISTING LAND USE PLANS 5

CHAPTER 2 ALTERNATIVES **8**

NO ACTION ALTERNATIVE 8
PROPOSED ACTION ALTERNATIVE 8
Silvicultural Treatments – Commercial *10*
Sample Tree Falling *13*
Created Structural Legacies – Snags and Downed Wood *13*
Port-Orford-cedar *13*
Silvicultural Treatments – Non-commercial (Treatment 4) *13*
Road Management *13*
Design Features for the Proposed Action *17*

CHAPTER 3&4 AFFECTED ENVIRONMENT AND ENVIRONMENTAL CONSEQUENCES **24**

ANALYSIS BACKGROUND 24
Reasonably Foreseeable Actions *24*
Cumulative Effects Considerations *25*
RESOURCES 25
Forest Structure *25*
Wildlife *33*
Botany *42*
Water Resources *44*
Water Quality *45*
Fisheries *50*
Soil Resources *57*
Climate Change *60*
Greenhouse Gasses: Carbon Stores and Carbon Flux *61*
COMPONENTS OF THE AQUATIC CONSERVATION STRATEGY 63
RESOURCES NOT ANALYZED IN DETAIL 73

CHAPTER 5 LITERATURE CITED **77**

CHAPTER 6 LIST OF PREPARERS **83**

CHAPTER 7 LIST OF AGENCIES AND PERSONS CONTACTED **83**

APPENDIX A STAND INFORMATION **84**

APPENDIX B SURVEY & MANAGE TRACKING FORM - WILDLIFE **86**

APPENDIX C SPECIAL STATUS SPECIES - BOTANY **87**

APPENDIX D SURVEY & MANAGE TRACKING FORM - BOTANY **88**

APPENDIX E SAMPLE TREE FALLING **90**

MAPS **92**

Chapter 1 Purpose and Need

Background

The Final – Coos Bay District Proposed Resource Management Plan and Environmental Impact Statement (RMP) (USDI 1994) and its Record of Decision (ROD) (USDI 1995) responds to multiple needs; the two primary needs are the need for forest habitat and the need for forest products. The RMP addressed these needs through an ecosystem management strategy under which BLM lands "will be managed to maintain healthy, functioning ecosystems from which a sustainable production of natural resources can be provided."

The Cherry Vaughn project responds to the need for healthy ecosystems by enhancing "habitat that will contribute towards and support population of native species, particularly those associated with late-successional and old-growth forests" (ROD p.1). Since the Cherry Vaughn project is located in LSR 261, the project will incorporate recommendations from the *South Coast – Northern Klamath Late-Successional Reserve Assessment* (LSRA/ USDA and USDI 1998).

Need for the Project

The stands in the analysis area are the result of re-planting previous regeneration harvests, and contain no legacy structures. These second growth stands are currently in an over-stocked condition, include areas where conifer failed to regenerate, and are lacking in structural complexity capable of eventually supporting species associated with late-successional habitats.

Silvicultural stand maintenance treatments did not occur in some portions of the project area and encroaching alder has suppressed areas of re-planted conifers. It may take a century for conifer to replace alder in forest stands (Deal 2006, Newton *et al.* 1968). Where salmonberry is present, conifer establishment may not occur at all (Carlton 1988, MacCracken 2002, Tappeiner *et al.* 1991) except for a very low frequency (<five trees per acre) of suppressed western redcedar and hemlock which became established at the same time as the alder overstory (Carlton 1988, MacCracken 2002). In addition, disturbances from past timber harvest and road building have allowed the alder vegetation communities to spread beyond their typical valley bottom position (Carlton 1988).

As stated above, the action area is entirely contained within LSR 261. LSR 261 includes >40% mature and late-successional habitat (USDA and USDI 1998). This cover by older forests is less than the estimated mean historic old-growth cover for the Oregon Coast Range at this spatial scale (Wimberly *et al.* 2000). Cover by young (sapling) forest types in LSR 261 is twice as high as in historic landscapes (Ripple *et al.* 2000). Late-successional forest types in LSR 261 have little higher interior habitat (14% of total), and include younger seral stands on private land in approximately every third section. Private forest types cover 16,786 acres, almost 20% of the LSR.

The LSRA lists LSR 261 as a high priority for management actions because LSR 261 is large (70,611 acres), is a key link in the LSR network, and the land ownership pattern provides "greater opportunities to either increase or develop large (greater than 640 acre) contiguous stands of interior late-successional habitat" (USDA and USDI 1998). LSR 261 is crucial for LSR network connectivity, providing a provincial link between the Coast Range and Klamath Provinces. It is the second largest reserve in the two provinces, and the most isolated LSR block identified, bounded by the Millicoma Tree Farm (north) and checkerboard private/federal lands (south).

The LSRA also acknowledges that accomplishing most of these treatments will be through economical timber sales when the stands have "tree diameter distributions which can support a commercial harvest operation." Within LSR 261, there are approximately 15,375 acres that meet these criteria.

The recent *2011 Revised Recovery Plan for the Northern Spotted Owl* includes a new Recovery Action (#5). In this Recovery Action, the U.S. Fish and Wildlife Service recommends that "land managers implement silvicultural techniques in plantations, overstocked naturally generated stands and modified younger stands to accelerate the development of structural complexity and biological diversity that will benefit spotted owl recovery" (USDI 2010). The Recovery Plan also states "[m]anagement actions that may have short-term impacts but are beneficial to spotted owl occupied sites and unoccupied, high quality spotted owl habitat on all lands in the long-term meet the recovery intent of habitat conservation. Such actions may include silvicultural treatments that promote ecological restoration."

Project Objectives (Purpose)

Action alternatives must meet the objectives provided in the ROD/RMP for implementing projects within the planning area. The ROD/RMP and applicable statutes specify accomplishing the following objectives in managing lands in the project area:

Late-Successional Reserves/Density Management Thinning

Manage Late-Successional Reserves to enhance conditions of stands that serve as habitat for late-successional and old-growth forest-related species (p. 18) by:

- Conducting thinning operations in forest stands up to 80 years of age. This will be accomplished by ... commercial thinning of stands regardless of origin (e.g. planted after logging or naturally regenerated after fire or blowdown) (p. 19).

Late-Successional Reserves/Silvicultural Restoration

Plan and implement silvicultural treatments inside Late-Successional Reserves to be beneficial to the creation of late-successional habitat (p. 19) by:

- Conducting artificial reforestation and/or subsequent maintenance or release treatments to more rapidly reach late-successional conditions, or to protect site quality (LSRA p. 77).

Riparian Reserves

Manage riparian resources to meet the Aquatic Conservation Strategy Objectives designed to maintain and restore the ecological health of aquatic ecosystems on public lands (p. 6) by:

- Applying silvicultural practices for Riparian Reserves to control stocking, re-establish and manage stands and acquire desired vegetation characteristics (p. 13).

Wildlife Habitat

Enhance and maintain biological diversity and ecosystem health to contribute to healthy wildlife populations (p. 27) by:

- Designing projects to improve conditions for wildlife if they provide late-successional habitat benefits or if their effect on late-successional associated species is negligible (p. 27).

Location

The Cherry Vaughn project area is located approximately 25 miles southeast of Coos Bay Oregon. Most of the proposed harvest activities are located in the North Fork Coquille 5th field watershed, with many units in the Cherry Creek Tier 1 Key Watershed. A few units are located in the East Fork Coquille 5th field watershed. The proposed activities would be located in T. 27 S., R 10 W., sections 3, 4, 5, 6, 7, 8, 9, 17, 18, 19, 20, 21, 29 and 30; and T. 28 S., R 10 W., section 3.

Decision Factors

In choosing an alternative that best meets the Purpose and Need, the Field Manager will consider the extent that each alternative would:

1. Improve Late-Successional Reserve/Riparian Reserve stand structure by thinning out excess trees in overstocked stands to enhance the growth and vigor of the residual trees.
2. Provide for the recovery of threatened or endangered species even if project implementation results in some reduction of habitat quality for other late-successional species.
3. Provide economical commercial harvests through density management thinning operations.

Conformance with Existing Land Use Plans

This project is tiered to and in conformance with the *Final Coos Bay District Proposed Resource Management Plan/Final Environmental Impact Statement* (USDI 1994) and its *Record of Decision* (ROD/RMP; USDI 1995), as supplemented and amended. The Coos Bay District ROD/RMP is supported by and consistent with the *Final Supplemental Environmental Impact Statement (FSEIS) on Management of Habitat for Late Successional and Old Growth Forest Related Species Within the Range of the Northern Spotted Owl* (Northwest Forest Plan [NFP]) (USDA and USDI 1994a) and its *Record of Decision* (USDA and USDI 1994b).

The Coos Bay District initiated planning and design for this project to conform and be consistent with the Coos Bay District's 1995 ROD/RMP. Following the March 31, 2011 decision by the United States District Court for the District of Columbia in *Douglas Timber Operators et al. v. Salazar*, which vacated and remanded the administrative withdrawal of the Coos Bay District's 2008 ROD and RMP, we evaluated this project for consistency with both the 1995 and the 2008 ROD and RMP. Based upon this review, the selected alternative contains some design features not mentioned specifically in the 2008 ROD and RMP. The 2008 ROD and RMP did not preclude use of these design features, and use of these design features is clearly consistent with the goals and objectives in the 2008 ROD and RMP. Accordingly, this project is consistent with the Coos Bay District's 1995 and 2008 ROD/RMP.

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 the 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 Cherry Vaughn project is consistent with the 1995 Coos Bay District Resource Management Plan as emended by the 2001 *Record of Decision and Standards and Guidelines for Amendments to the Survey and Manage, Protection Buffer, and other Mitigation Measurements Standards and Guidelines* (2001 ROD), as modified by the 2011 Settlement Agreement.

Documents Incorporated by Reference

The Interdisciplinary Team (IDT) used the following documents to assist in the analysis of the Weaver-Sitkum project:

East Fork Coquille Watershed Analysis (USDI 2005 *Update*)
North Fork Coquille Watershed Analysis (USDI 2002)
South Coast – Northern Klamath Late-Successional Reserve Assessment (USDA and USDI 1998)
Western Oregon Districts Transportation Management Plan (USDI 2010 *Update*)
Referenced staff reports contained in the Analysis File
Referenced BLM Memoranda

Endangered Species Act

The BLM initiated consultation with the U.S. Fish and Wildlife Service (USFWS) as provided in Section 7 of the Endangered Species Act (ESA) of 1973 (16 U.S.C. 1536(a)(2) and (a)(4) as amended). On June 24, 2011, the BLM received a Biological Opinion, which includes a finding that "implementation of the proposed actions would not jeopardize the continued existence of the spotted owl or the murrelet, and will not adversely modify designated critical habitat for the spotted owl or murrelet" (USDI 2011b). This Biological Opinion covers all commercial and non-commercial treatments, associated roadwork and sample tree falling.

The BLM will not initiate consultation with the National Marine Fisheries Service as the Cherry Vaughn project has been determined to have *"no effect"* to threatened Oregon Coast coho salmon. Additionally, project activities would not adversely affect essential fish habitat under the Magnuson-Stevens Fishery Conservation and Management Act (16 U.S.C. 1855(b)).

Decisions to be Made

The Field Manager of the Myrtlewood Field Office, Coos Bay BLM, must decide whether to conduct density management thinning and hardwood conversion within the Cherry Vaughn project area. A description of the project is located in Section 2.2.

The Field Manager must also determine if implementation of the selected alternative would or would not constitute a major Federal Action significantly affecting the quality of the human environment. If the Manager decides it would not significantly affect the quality of the human environment, then the manager can prepare and sign a FONSI (Finding of No Significant Impact).

If the Manager determines that the selected alternative would significantly alter the quality of the human environment, then the Manager will drop the project, modify the project, or have an EIS (Environmental Impact Statement) and a ROD (Record of Decision) prepared and signed before proceeding.

Public Involvement

The primary purpose of scoping is to identify agency and public concerns relating to a proposed project and helps define the environmental impacts of concern the ID Team will examine in detail in the EA. The BLM notified the public of the proposed project and planned EA through publication of the District's semi-annual Planning Update. Additionally, the BLM sent scoping notices to adjacent landowners, agencies requesting these documents, and other interested parties from the District NEPA mailing list. The scoping period was open from May 13, 2010 to June 11, 2010. We received three comments from four organizations. The Interdisciplinary Team (ID Team) considered substantive comments in development of the project design, particularly towards thinning prescriptions and hardwood conversion. The draft EA and unsigned FONSI were available for comment from January 26 to February 27, 2012 and two comment from four organizations were received.

Project Development

The original proposal contained approximately 2500 acres for treatment. This final Proposed Action contains approximately 1352 acres of commercial treatments and approximately 146 acres of non-commercial treatments. The ID Team dropped 1053 acres because of insufficient stocking levels, young stand age, difficult access and adjacent occupied habitat by threatened species.

One of the Scoping comments suggested not doing any alder conversion. The ID Team carefully looked at the current landscape conditions, areas with previous conifer stumps and wildlife habitat recovery needs. The ID team used the following filter to guide prescription development:

> Where environmental conditions including Topographic Position Index (TPI), plant association, or geomorphic characteristics suggest a high constancy and cover of red alder is appropriate, red alder would generally be left as a

patch type or would be lightly thinned. Historic conditions and the absence or presence of conifer stumps also informs this filter.

The ID team also considered the objectives of restoring late-successional habitats in the project area and used additional filters in determining the locations appropriate for hardwood conversion (see Chapter 2 – Treatment 1 for more information). Therefore, the final acres proposed for hardwood conversion meet the Purpose and Need and LSRA objectives, reflect the natural landscape pattern and would eventually provide habitat for the northern spotted owl.

Chapter 2 Alternatives

This Chapter is a description of each alternative and summarizes the environmental consequences of the alternatives.

This EA contains the analysis of a no action alternative and a proposed action alternative. To consider an action alternative, it must meet the purpose and need while not violating any minimum environmental standards. The alternatives developed are consistent with the RMP and satisfy the purpose and need of implementing the RMP.

The ID Team based all quantifications (i.e. acreages, mileages, etc.) on estimates obtained from geographic information systems (GIS). Because there are inherent differences between a geographic projection and what is finalized on the ground, the BLM assumes there is variability in all estimated calculations based on GIS. Each Decision Document discloses the final acreages and mileages.

No Action Alternative

The No Action Alternative provides a baseline for the comparison of alternatives. This alternative is a description of the existing condition and the continuing trends. Selection of this alternative would not preclude future treatments within the project area that a subsequent EA could analyze. This alternative does not meet the Purpose and Need (pp. 3-4).

The project area would not receive the treatments described in this EA in the near future. Ongoing activities would continue to occur. These include silvicultural activities in young stands, compliance with Oregon fire control regulations, construction of roads across BLM lands under existing right-of-way agreements, routine road maintenance, control of noxious weeds and projects covered by earlier decision records. The Oregon Forest Practices Act regulates timber harvest on private lands that could occur in the analysis area.

Proposed Action Alternative

The proposed action is to implement silvicultural treatments on approximately 1500 acres of mid-seral stands. This action includes density management thinning of conifer stands and hardwood conversion in the Late-Successional Reserve (LSR) and Riparian Reserve (RR) land use allocations. Treatments would occur commercially through timber sales (S Bridge, Vaughn's Jct., East Cherry, Parkview, and Steel Trap) and other non-commercial treatments. The BLM would derive harvest volumes for the density management treatments from cruising methods that would employ sample tree falling techniques.

Table II-1 contains a brief summary of the commercial activities; Table II-2 contains the non-commercial acreages and locations. The non-commercial treatments are separate from the timber sales. As stated above, final acreages may change as projects are finalized on the ground; the variability of these acreage estimates is included in the analysis of effects for this environmental assessment.

Table II-1 Project area acres and locations for each proposed commercial sale. Treatments include density management (DM) and hardwood conversion (HWC).

Sale Name	EA Unit #s	Estimated DM Acres LSR/RR	Estimated HWC Acres LSR/RR	Total Treated Acres	Dropped and No-Treatment acres	Location T. 27 S., R. 10 W.
S Bridge	1, 2	188/126	6/1	321	204	Sec. 7 and 18
Vaughn's Jct.	3, 4, 5	109/90	0/0	199	173	Sec. 5, 6, 7, 8, 17 and 18
East Cherry	9, 10, 13, 15, 16	135/96	48/19	298	271	Sec. 17, 19, 20, 21,and 29
Steel Trap	11, 12	152/89	28/13	282	261	Sec. 18, 19, 20, 29,and 30
Parkview	6, 7, 8	113/108	22/9	252	144	Sec. 3, 4, 5, 8 and 9
Totals		697/509	104/42	1352	1053	

Table II-2 Non-commercial treatment locations and acreages

Location T. 27 S., R. 10 W.	Non-Commercial Treatment acres LSR/RR
Sec. 3	4/9
Sec. 7	3/6
Sec. 9	19/19
Sec. 21	1/5
Location T. 28 S., R. 10 W.	**Non-Commercial Treatment acres LSR/RR**
Sec. 3	53/27
Totals	80/66

Table II-3 summarizes the timber harvest and roadwork activities. Road-related activities include new construction, road renovation, improvement, maintenance, and road decommissioning.

Table II-3 Proposed Action Summary

Activity		Total
Timber Harvest (Acres)	Density Management	697
	Density Management (RR)	509
	Hardwood Conversion	104
	Hardwood Conversion (RR)	42
Timber Yarding (Acres)	Cable yarding	1172
	Ground based yarding	181
Timber Hauling (Miles)	Dry Season / Dirt Roads	5.89 (0.91 RR)
	Dry Season / Gravel Roads	7.06 (2.09 RR)
	All Season / Gravel Roads	5.88 (0.45 RR)

Activity		Total
	All Season / Paved Roads	38.39 (2.18 RR)
Road Activities (Miles)	Construction	2.56 (0.31 RR)
	Reconstruction	2.75
	Renovation	12.39
	Improvement	0.60
	Decommissioning (Total)	9.31
	Decommissioning (Net)*	5.25
	Decommissioning Key Watershed (Net)+	0.01
	Haul Route Maintenance	2.92
Other	Sample Tree Falling	1 tree/2 acres
	Non-Commercial Treatment	80
	Non-Commercial Treatment (RR)	66

* **Net Decomm** does not include new construction to be decommissioned or existing roads currently decommissioned (1.50 miles of decommissioned road + 2.56 miles of NC)

\+ Includes new construction to be decommissioned less existing roads to be fully decommissioned

All proposed units would be harvested using a combination of skyline cable and ground-based equipment (Table II-4). Trees would be cut either manually with chainsaws or with a mechanical harvester. One-end log suspension would be required with full suspension over stream channels during inhaul for the skyline cable system. Specific Project Design Features are located later in this chapter.

Table II-4 Yarding Systems by Units

Sale Name	EA Unit No.	Ground-Based Yarding	Skyline Cable Yarding		Unit Acres	Total Sale Acreage
			Downhill	Uphill		
S Bridge	1	16	0	123	139	**321**
	2	11	12	159	182	
Vaughn's Jct.	3	5	0	112	117	**199**
	4	2	0	29	31	
	5	11	0	40	51	
East Cherry	9	0	7	73	80	**298**
	10	3	0	160	163	
	13	40	0	0	40	
	15	0	0	12	12	
	16	0	3	0	3	
Steel Trap	11	29	0	98	127	**282**
	12	38	0	117	155	
Parkview	6	26	4	156	186	**252**
	7	0	0	42	42	
	8	0	0	24	24	
					Total Project Acreage	**1352**

Silvicultural Treatments – Commercial

The BLM has designed density management treatments to develop structurally complex, conifer-dominated, species-diverse forests. The different treatment types would promote individual tree growth,

release uncommon shade-tolerant tree species, and remove alder from landscape positions where it was historically infrequent. This density management thinning would provide canopy gaps and increase horizontal variability in tree densities (described in Ch. 3&4).

Because the Cherry Vaughn action area is designated as Critical Habitat for the northern spotted owl, the area contains active nest sites and is in an important mapped LSR (LSR 261), additional filters heavily influenced the specific unit prescriptions (described below).

To protect NSO from a "take" under the ESA, the BLM made the following modifications to prescription development:

- NSO nest patches: treatments would be avoided in nest patches.
- NSO core areas: Treated units would maintain >50% canopy cover. Patches that would create gaps through red alder conversion would be no larger than ½ acre in size and less than 25% of the unit.
- NSO home ranges and remainder of the action area:
    1. Operational stands (treatment units) would maintain canopy cover >40%.
    2. For alder-dominated patches[1] within treatment units, gap creation sizes would be <10 acres. Thinned areas between gaps would be ≥200 feet. Created gaps >2 acres would be planted and maintained.
    3. For conifer-dominated patches[2] within treatment units, gap creation sizes would be <1 acre.

Density management treatments in the Cherry Vaughn Action Area would include three prescriptions, described below. These prescriptions are designed primarily to maintain growth rates of conifers and retain or increase conifer species diversity. Treatment 1 would emphasize thinning of densely stocked conifer stands and removing patches of red alder. Treatment 2 would emphasize maintaining canopy cover at levels >50%, limit gap size and controlling gap sizes. Finally, Treatment 3 would target individual conifers for release in mixed stands to establish "an acceptable trajectory to reach late-successional conditions" (LSRA; USDI 1998).

<u>Treatment 1: Density management and creation of conifer understory</u> (DMT_HWC)
Basal area thinning to maintain conifer growth rates and maintain or enhance structural diversity:

- Thin from below. All trees ≥24" DBH (diameter at breast height) would be retained unless operational reasons require cutting the tree.
- Basal area (BA) thinning would be designed to leave a residual relative density (RD) in treated stands below self-thinning levels. Prescribed conifer basal area would be between 120 and 140 ft^2/ac. Relative density would be below self-thinning levels (RD 55) and variable within units ranging between 15 for hardwood patches and 33 in dense conifer stands.
- All minor conifer species would be retained including western redcedar, Pacific yew, grand fir or other species not specifically described below. These minor conifer species would be considered part of the target BA.
- Douglas-fir, if available, would be favored over western hemlock.
- There would be no retention of red alder <24" DBH or any Oregon myrtle. Gaps created by the removal of hardwoods would be planted with a mix of shade-tolerant conifer species.

[1] Delineated from aerial photographs as: a) areas with scattered conifer "islands" <1 ac. in a matrix of hardwood; or b) uniform hardwood stands with scattered individual conifers.
[2] Delineated from aerial photographs as the range in conditions from uniform conifer stands through areas of mixed conifers and hardwoods with conifer patches > scattered individual hardwoods and hardwoods in areas <1 ac. in size.

- Hardwood diversity would be maintained by retaining golden chinquapin and big leaf maple in areas where they occur infrequently and would not interfere with conifer establishment.

This is the only treatment that includes areas of hardwood conversion. As stated above for NSO, no hardwood conversion site would be larger than 10 acres in size and no closer than 200 feet to another conversion area. The LSRA provides suggestions regarding management in LSR 261. These include identifying hardwood conversion sites capable of supporting conifers with a high potential to become old-growth, and eliminating from consideration those sites that are potentially special habitats best managed as hardwoods or meadows (p. 86) and avoiding areas with high water tables, or fluvially disturbed areas (p. 89).

The forest ecologist has observed that using the Topographic Position Index[3] (TPI) in the analysis area is an excellent predictor of topographic moisture, including differentiating between wet alder-dominated sites. Where TPI values indicate mesic (moist) conditions (TPI=2) occurring at operational scales (>5 ac. or otherwise feasible), red alder would generally be left as a patch type or would be thinned. Generally, no thinning would occur where TPI=3 (hydric (wet) conditions). Red alder would be removed in stands with TPI=1 where other filters did not apply.

Where environmental conditions including TPI, plant association, or geomorphic characteristics suggest a high constancy and cover of red alder is appropriate, red alder would generally be left as a patch type or would be lightly thinned. Historic conditions and the absence or presence of conifer stumps also informs this filter.

Treatment 2: Density Management Thinning to Retain Canopy Cover (DMT_CC)
This tree spacing-based thinning would be designed to retain canopy cover >50% at the patch and unit scales.

- Thin from below. The prescription would retain all trees ≥24" DBH unless operational reasons require dropping the tree.
- Residual tree spacing would be 17-20 feet and would retain canopy cover >50% in the treated area. This would leave canopy cover higher at the unit scale.
- All minor conifers would be retained including western redcedar, Pacific yew, grand fir or other species not specifically described below. The target tree spacing would consider these minor conifer species.
- The following is the species preference to meet residual tree spacing requirements: Douglas-fir, western hemlock, big leaf maple, golden chinquapin and red alder. Oregon myrtle would not be retained even to maintain residual tree spacing.
- All minor hardwood species (including clumps) not interfering with the establishment of conifers would be retained.

Treatment 3: Density Management Thinning to Release Individual Conifers (DMT_REL)
Individual conifers would be targeted for release in mixed conifer/hardwood patches. This prescription would apply to patches that meet the following characterization in the LSRA: "Individual tree release may be used to insure conifer survival in mixed stands with overtopped but releasable well-distributed conifers" (1998). For these patches:

- The prescription would remove all competing hardwood trees from the 40 ft. radius surrounding selected individual conifers. This radius is roughly equivalent to the crown radius of a mature Douglas fir tree.

[3] This ArcGIS software extension calculates topographic position index grids from elevation grids and provides a simple and repeatable method to classify the landscape into slope position and landform category using the TPI values (Jenness Enterprises 2006)

- No more than five of these conifers per acre would be identified.
- Conifers identified for release would be >12 inches DBH.
- Species preference for released conifers would be western red cedar, Douglas-fir and then western hemlock.
- Hardwood trees outside of 40 ft. radius release areas would be retained at 18-foot spacing. This prescription may result in some thinned (single-stemmed) hardwood clumps.

Sample Tree Falling

The technique of sample tree falling would be used in preparation of timber sale contracts. This would improve the accuracy of the final cruise of the proposed timber volume that would be sold. Appendix E contains more information about sample tree falling. If a timber sale does not occur after sample trees have been felled, the trees would count toward down wood creation.

Created Structural Legacies – Snags and Downed Wood

Two snags/acre and one piece of downed wood/acre would be created following treatment in conifer-dominated treatment units (majority of project area). Additionally, one snag and one down wood piece per acre would be created in hardwood-dominated areas (Unit 10, and portions of Units 3 and 6). These features would be created from trees remaining in the residual stand, following thinning.

Port-Orford-cedar

As there are infected Port-Orford-cedar (POC) trees within the project area, management practices would be implemented from the *2004 Final Supplemental Environmental Impact Statement (FSEIS) for Management of Port-Orford-cedar in Southwest Oregon* (USDA and USDI 2004) and it's *Record of Decision* (USDI 2004). These include retaining and managing POC where site conditions would make it likely POC would escape infection from the *Phytophthora lateralis* root disease. These locations include, but are not limited to, ridge tops, areas uphill from creeks and well-drained sites. To reduce disease spread, spacing would create discontinuous populations and lessen the possibility of root grafting. Management Practice 16-Roadside Sanitation would not occur.

Silvicultural Treatments – Non-commercial (Treatment 4)

Non-commercial restoration treatments would occur in areas where treatment is beneficial in meeting LSR and RR objectives but is not commercially viable. Treatments would be conducted through small service contracts separate from timber sales.

Non-commercial prescriptions would be very similar to: a) density management thinning and removal of red alder; and b) density management thinning to release individual conifers, as described above. The substantive differences would be:

- All treated (cut) trees within Riparian Reserves would be left on-site.
- All treated (cut) trees to facilitate meeting LSR objectives would be left on-site at or above 30% tolerance levels for down wood and snag characteristics.
- Prescriptions would limit the size of heavily treated areas, keeping densities of dead wood >12 inches DBH below levels predicted to increase risk of bark beetle infestation (Goheen and Hansen 1993).
- Created gaps would be <5 acres in size.
- No treatments would be conducted in NSO core areas currently supporting >50% suitable habitat.

Road Management

Road management for this project consists of developing and maintaining a transportation system that serves the project needs in an environmentally sound manner as directed by the Coos Bay RMP/ROD and the Western Oregon Districts Transportation Management Plan (USDI 2010 *update*). This would involve

construction of new roads, renovation and reconstruction of existing roads, maintenance of roads necessary to facilitate harvest operations, and decommissioning of roads at the completion of the project.

Construction of new roads and use of existing roads in this project have been designed to allow yarding and hauling operations to occur at the most appropriate times of the year after considering adjacent wildlife habitat, existing road conditions, unit size, unit volume and logging cost. For year-round use to occur, roads must have a rocked or paved surface adequate to withstand winter operations. The proposed action includes rocking nine newly constructed spur roads totaling 0.5 miles. Proposed activities would concentrate winter operations in areas that already have adequate all weather haul routes.

New Road Construction

New road construction would consist of approximately 2.03 miles of dirt roads and 0.53 miles of rocked roads (Table II-5). The Best Management Practices (BMPs) listed in the Project Design Features starting on page 16 would guide the type of road construction and road locations. Approximately 0.31 miles of new road construction would occur within the Riparian Reserves. Landing construction would consist of creating wide spots to facilitate safe yarding and loading of logs and are typically about ¼ acre in size, which includes the existing roadbed. As development of each individual timber sale progresses and becomes more refined, some short unplanned spur roads or landings may be required that would better facilitate harvest operations. All the construction BMPs referenced above would be followed.

Table II-5 New Road Construction Estimates by Unit

Sale Name	EA Unit	EA Spur No.	Miles in RR	Surface Type	Haul Season	Closure Type	Miles
S Bridge	1	1-1 NC	0.00	Dirt	Summer	Decomm	0.16
		1-2 NC	0.00	Dirt	Summer	Decomm	0.14
	2	2-1 NC	0.00	Dirt	Summer	Decomm	0.04
		2-2 NC	0.05	Dirt	Summer	Full Decomm	0.11
		2-3 NC	0.00	Rock	All	Decomm	0.08
		2-5 NC	0.00	Rock	All	Decomm	0.05
			0.05				**0.58**
Vaughn's Jct.	3	3-1 NC	0.00	Rock	All	Decomm	0.09
		3-2 NC	0.00	Rock	All	Decomm	0.02
	5	5-2 NC	0.00	Rock	All	Decomm	0.03
			0.00				**0.14**
East Cherry	10	10-1 NC	0.00	Dirt	Summer	Full Decomm	0.20
		10-2 NC swing	0.00	Dirt	Summer	Full Decomm	0.06
		10-2 NC	0.00	Rock	All	Full Decomm	0.03
	13	13-1 NC	0.11	Dirt	Summer	Full Decomm	0.11
	15	15-1 NC	0.00	Dirt	Summer	Full Decomm	0.12
		15-1 NC swing	0.00	Dirt	Summer	Full Decomm	0.10
			0.11				**0.62**
Steel Trap	11	11-1 NC	0.00	Rock	All	Full Decomm	0.02
		11-2 NC	0.00	Rock	All	Full Decomm	0.14
		11-3 NC	0.07	Dirt	Summer	Full Decomm	0.07
		11-4 NC	0.00	Dirt	Summer	Full Decomm	0.11
	12	12-1 NC	0.08	Dirt	Restricted	Full Decomm	0.11
		12-2 NC	0.00	Rock	All	Full Decomm	0.05
		12-2 NC	0.00	Rock	All	Decomm	0.02
		12-3 NC	0.00	Dirt	Restricted	Decomm	0.28
			0.15				**0.80**
Parkview	6	6-1 NC	0.00	Dirt	Summer	Decomm	0.15
		6-2 NC	0.00	Dirt	Summer	Decomm	0.17
		6-3 NC	0.00	Dirt	Summer	Decomm	0.05
		6-4 NC	0.00	Dirt	Summer	Decomm	0.05
			0.00				**0.42**
			0.31				**2.56**

Road Renovation/Reconstruction/Improvement

Road renovation involves bring an existing road back up to the original design standard. For a natural surfaced road, work includes clearing brush within the road prism, cleaning or replacing ditch relief/stream crossing culverts, restoring proper road surface drainage, grading, or other maintenance. For a gravel road, it also may include adding rock so the road is adequate for winter operations. Road reconstruction includes work on those roads that have generally been neglected, may not have been used in several decades, are closed with vegetation or debris, and/or would require substantial work within the road prism to return the roads back to their original condition. The vegetation within the road prism may consist of trees rather than just brush. One could consider reconstruction "heavy" renovation work.

Road improvement for this project consists of increasing the existing road standard to a higher design standard by surfacing existing dirt roads.

Rocked surfaced roads would extend cable harvesting and hauling during the winter season to allow work outside of murrelet and owl seasonally restricted periods and to reduce yarding damage in stands where hemlock would be a major component of the residual stands. Table II-6 displays each road, spur or road number, roadwork type, haul season, closure type and mileage length.

Table II-6 Road Renovation/ Reconstruction and Improvement Estimates by Unit

Sale Name	EA Unit	EA Spur No.	Road Number	Road Work	Current Surface Type	Haul Season	Closure Type	Miles
S Bridge	1	1-1R	27-10-7.3	Reno	Aggregate	Summer	Open	0.18
		1-1R	27-10-7.4	Reno	Aggregate	Summer	Open	0.10
		1-1RR	27-10-7.3	Re-Const.	Dirt	Summer	Decomm	0.15
		1-2RR	27-10-7.2	Re-Const.	Dirt	Summer	Decomm	0.64
		1-3RR	None	Re-Const.	Dirt	Summer	Decomm	0.05
		1-4RR	None	Re-Const.	Dirt	Summer	Decomm	0.08
	2	2-1R	27-10-7.1	Reno	Aggregate	All	Open	0.50
		2-2R	27-10-18.1	Reno	Dirt	Summer	Decomm	0.44
		2-2RR	None	Re-Const.	Dirt	Restricted	Decomm	0.10
		2-3R	None	Reno	Dirt	Summer	Decomm	0.09
		2-3RR	None	Re-Const.	Dirt	Restricted	Decomm	0.16
		2-4R	27-10-18.2	Reno	Aggregate	All	Decomm	0.10
	3	3-1R	27-10-17	Reno	Aggregate	All	Open	0.59
		(blank)	27-10-7	Reno	Aggregate	Summer	Open	0.85
								4.03
Vaughn's Jct.	3	3-1I	27-10-8.2	Imp	Dirt	All	Decomm	0.09
		3-2I	27-10-8.3	Imp	Dirt	All	Decomm	0.10
		3-3I	None	Imp	Dirt	All	Decomm	0.05
		3-2R	27-10-8.1	Reno	Sandstone	All	Decomm	0.08
	4	4-1RR	None	Re-Const.	Dirt	Restricted	Full Decomm	0.37
	5	5-1I	None	Imp	Dirt	All	Decomm	0.07
		5-2I	None	Imp	Dirt	All	Decomm	0.16
								0.92
East Cherry	9	9-1I	None	Imp	Dirt	All	Decomm	0.13
		9-1R	27-10-20.3	Reno	Sandstone	All	Decomm	0.15
	10	10-1R	27-10-20.4	Reno	Aggregate	Summer	Decomm	0.14
		10-2R	27-10-20.2	Reno	Aggregate	All	Open	0.75
	13	13-1RR	None	Re-Const.	Dirt	Summer	Full Decomm	0.25
								1.42
Steel Trap			27-11-23.0	Reno	Aggregate	All	Open	1.54
	11	11-1R	28-11-3.0	Reno	Aggregate	Restricted	Decomm	0.37
		11-2R	27-10-30.0	Reno	Aggregate	All	Decomm	0.13
		11-2R	27-10-30.0	Reno	Aggregate	All	Open	0.44
		11-1RR	27-10-29.3	Re-Const.	Dirt	Summer	Decomm	0.33
		11-2RR	None	Re-Const.	Dirt	Summer	Full Decomm	0.06
	12	12-1R	27-10-19.5	Reno	Dirt	Restricted	Decomm	0.25
		12-2R	27-10-19.1	Reno	Dirt	Summer	Decomm	0.48
		12-3R	27-10-19.2	Reno	Dirt	Summer	Decomm	0.21
		12-1RR	None	Re-Const.	Dirt	Summer	Decomm	0.18
								3.99

Sale Name	EA Unit	EA Spur No.	Road Number	Road Work	Current Surface Type	Haul Season	Closure Type	Miles
Parkview	6	6-1R	27-10-6.1	Reno	Aggregate	Summer	Open	1.56
		6-1RR	None	Re-Const.	Dirt	Summer	Decomm	0.23
		6-2R	27-10-5	Reno	Aggregate	Summer	Decomm	0.41
		6-2R	27-10-5	Reno	Aggregate	Summer	Open	0.80
		6-2RR	None	Re-Const.	Dirt	Restricted	Decomm	0.06
		6-3R	27-10-8	Reno	Aggregate	Summer	Open	0.54
		6-3RR	None	Re-Const.	Dirt	Summer	Full Decomm	0.09
		6-4R	None	Reno	Not Known	Summer	Decomm	0.05
		8-1R	27-10-4	Reno	Aggregate	Summer	Open	1.64
								5.38
								15.74

Road Decommissioning

The project would decommission/fully decommission a total of 9.31 miles of road, resulting in a net decrease of 5.25 miles of open road in the watershed. This equates to a reduction in the open road density on BLM lands in the Analysis Area of 0.03 miles/sq. mile.

Roads to be "Decommissioned" would be closed to vehicles on a long-term basis (>5 years). However, these roads may be opened and maintained for future administrative use. These roads would be left in an erosion–resistant condition by installing waterbars, eliminating diversion potential at stream channels, stabilizing or removing fills on unstable areas, and treating exposed soil areas. Additionally, barriers would be installed to prevent vehicular traffic (including OHVs). All decommissioned roads would have no connectivity to the hydrologic network. The ID Team has determined that there are future administrative uses for these roads.

Roads to be "Fully Decommissioned" would also be left in an erosion–resistant condition; however, to enhance surface infiltration, decompaction of the road bed and landings may be required dependent upon site-specific conditions. To introduce organic matter into the soil and control erosion, slash would be incorporated into the decompacted surface of the road. The ID Team has determined that there is no future administrative need for these roads.

Cherry Creek Tier I Key Watershed and Road Construction/Decommissioning

The RMP states that there can be no net increase in road mileage unless the BLM has made efforts to reduce existing road mileage. Since 1994, there have been 0.32 miles of roads that have been fully decommissioned in this watershed. For the Cherry Vaughn project, there would be no increase in road mileage within this watershed. New construction would be approximately 1.37 miles of which 1.07 would be fully decommissioned. Another 0.31 miles of existing road (roads identified as 1-1 DCM and 1-2 DCM on **Map 3a**) would also be fully decommissioned, bringing the final full decommissioning total for the watershed of 1.38 miles. This is a decrease in road mileage of 0.1 miles, bringing the total net decrease to 0.33 miles for the Tier I watershed. The updated Western Oregon Transportation Management Plan states "Only the full decommission and obliteration categories are appropriate to meet the Management Direction of a reduction or no net increase in the amount of roads within Key Watersheds" (USDI 2010 *Update*). The BLM has already decommissioned another 0.48 miles and hydrologically removed them from the stream network. The Cherry Vaughn project would bring this total to 4.35 miles by decommissioning an additional 3.87 miles.

Haul Route Maintenance

Maintenance of roughly 2.9 miles (Road No. 27-10-6.3 and por. 27-10-6.1) of roads would occur. Maintenance consists of, but is not limited to, brushing to control vegetation, cleaning of drainage ditches, maintaining the road surface (such as grading), and removal of road debris creating safety hazards (slough material, fallen trees, etc.).

Design Features for the Proposed Action

This section describes measures designed to avoid, minimize or rectify impacts on resources and are included as part of the proposed action. Design features are site-specific measures, restrictions, requirements, or mitigations included in the design of a project in order to reduce adverse environmental impacts.

Commercial Units

No-Treatment Zones (Includes Riparian Reserves)

- A minimum 50-foot no-treatment zone adjacent to perennial streams would be maintained; intermittent streams would have minimum 30-foot no-treatment zones.
- Stream no-treatment zone distances would be measured starting from a stream bank, an identifiable topographic break near the bank (generally, the top of a steep inner gorge), or from the streamside edge of vegetation, whichever is greater.
- Full suspension would be required across all stream channels and all identified wetlands if feasible.
- Additional areas would have no-treatment zones based on Topographic Position Index, plant association, historic conditions (absence/presence of conifer stumps) and/or where geomorphic characteristics suggest a high constancy and cover of red alder. These no-treatment zones would extend an additional 0-600 feet from the stream no-treatment zones based on landscape position (**Map 4**).
- All trees felled in the no-treatment zones to facilitate yarding corridors would remain on site. Trees would be felled towards stream channels for stream bank protection if harvest operations cannot achieve full suspension.
- If operationally feasible, yarding corridors would be placed to avoid cutting trees ≥24" DBH.
- Ground-based equipment would stay out of the 30/50 ft. stream no-treatment zones, as measured from the edge of the inner gorge. This equipment would not cross the stream channel.

General Harvest Operations

- Mechanical harvesters or chainsaws would be used for tree felling.
- Trees would be felled away from all unit boundaries, reserves and property lines.
- Existing snags are reserved from cutting except those that must be felled to meet safety standards. Any felled or accidentally knocked over snags would be retained on-site.
- Existing down logs in decay classes 3, 4, and 5 and down logs in decay classes 1 and 2 greater than 20-inches in diameter on the large end would be reserved from cutting/removal. These down logs would be protected from damage during logging operations to the extent possible.
- The maximum diameter limit (MDL) is 24" DBH. This applies to all land use allocations. If a ≥24" DBH tree would be cut to facilitate yarding corridors, it would be left on-site.

Ground-Based Areas

- Ground-based equipment would be restricted to the dry season when soil moistures are below the 25% threshold. The BLM defines this threshold as when soil moisture content measurements, taken 2 to 4 inches below the organic layer, are below 25%. This is typically May through October. Soil moisture contents above 25% may require the discontinuation or limitation of ground-based operations in order to prevent excessive compaction. Forwarder, log loader, tractor, or rubber tire skidder capable of achieving one-end suspension may be used to yard logs within the ground-based yarding areas. Ground-based equipment would not operate within the no-treatment zones and this equipment would be restricted to areas with slopes less than 35%.
- Skidding trails would be designated with the objective of having less than 12% of a harvest area affected by compaction. Existing skid roads/trails would be used to the extent practical.
- Ground-based logging operations would utilize slash layers created by the harvesting process to limit bare soil exposure.

- Drainage and erosion control measures, including water barring of skid trails, would be applied to bare soil areas following use and prior to winter rains (ROD, D-5 #8f).
- Access points for skid trails would be blocked with logging debris to prevent vehicle access after harvest operations are completed.
- A skyline cable system capable of achieving one-end suspension would be permitted to operate during the wet season in ground-based areas; however, road surface condition may restrict timber haul.

Cable-Yarding Areas

- A skyline cable system with 75-foot lateral yarding capability would be required.
- A minimum of one-end log suspension in all cable-yarding areas would be required.
- Full log suspension would be utilized when feasible across streams. Units with yarding corridors across streams include 1, 2, 3, 5, 6, 9, 11, 12 and 16.
- Full log suspension or seasonal yarding restrictions (dry season only) would be required as operationally feasible on the following fragile soil areas as designated in the TPCC system:
    - FGR2 – Units 2, 6, 8, 10, 11, 12, 14, 15 and 16
    - FGNW – Units 9, 11 and 12
- The location, number and width of corridors would be specified prior to yarding, and use natural openings as much as possible (ROD, D-5 #2) as approved by the contract administrator.
- Skyline corridors would be a maximum of 12 feet wide. Distance between skyline corridors would be a minimum of 150 feet apart at the widest point where feasible.
- Skyline corridors would be perpendicular to streams as much as possible to minimize the total length of openings created by yarding corridors along stream channels.

Sample Tree Falling

- Felled sample trees would be a subset of those already designated for removal.
- No more than one sample tree per 2.5 acres would be selected.
- Trees larger than 24" DBH would not be selected.
- Sample trees would not be selected within 110 feet of stream channels.
- Trees would not be selected within the immediate vicinity of snags.
- All seasonal and daily timing restrictions for T&E species would be applied.
- If timber sales would not occur after cruisers have felled the sample trees, the trees would remain on-site to provide down woody material.
- The BLM would provide 100% contract administration throughout the sample tree falling process.

Fuel Treatments

- Hazardous fuel reduction measures would be conducted within Units 1, 2, 3, 4, 5, 10, 11, 12, 13, 15, and 16 along those roads that are not identified for closure or decommissioning after harvest operations. These measures would include pulling back all slash greater than two feet in length and up to six inches in diameter to within 20 feet of each road.
- Heavy concentrations of slash would be piled and burned on landings and roads resulting from cable yarding operations. Piles would be minimal in number and free of soil and rock material. Placement of landing piles closer than 15 feet to reserved trees, snags or suitable coarse woody debris would be avoided. Piles would be covered with 4 ML black plastic. Piles would not exceed 100 square feet (10' × 10') in size. Fire personnel usually conduct burning during the late fall and winter months.
- Site prep and planting would be conducted in areas identified to be under-stocked after logging. Site prep could include slashing, lop and scatter, hand piling, and if necessary, contractors would cover piles in support of a hand pile burn.
- In lieu of burning the landing piles, this logging debris could be available for biomass utilization. Piled material would be processed within one year after the piling occurs.

- Alternative to biomass utilization or burning, landing piles of slash would be broken up and scattered evenly throughout the harvest unit before equipment vacates the site.
- All burning will follow applicable Oregon State Fire Laws. Burning of slash piles would comply with the Oregon Smoke Management Plan (2007 OAR 629-43-043).

Tree Planting

- Surveys would be conducted post-harvest to identify under-stocked areas and to determine seedling assignments.
- The planting stock would be western redcedar, Port-Orford-cedar, western hemlock and Douglas-fir. When available, genetically improved stock would be used.
- To create more conifer species diversity within units, the planting mix would give greater emphasis to western redcedar.

Roads

New Construction

New construction would use the applicable "Conservation Practices for Road and Landing Construction" Best Management Practices (pp. D3-D4) found in the RMP. These include:

- Road and landing construction activities would be limited to the dry season, generally from May to October.
- Roads and landings would be designed and constructed to BLM standards, but be the narrowest and smallest sizes that would meet safety standards, objectives of anticipated uses, and resource protection. For this project, rocked and natural surface roads would typically have a running surface of 14 – 16 feet.
- New road construction would be located on stable locations, such as ridge tops, stable benches or flats, and gentle-to-moderate side-slopes.
- Stable end-haul (waste) sites would be located prior to end-hauling. Maintenance would keep these sites properly shaped, drained and vegetated.
- Road drainage would be designed to minimize soil erosion and stream sedimentation. Energy dissipators, culvert down pipes, or drainage dips would be used where culverts discharge water onto loose material and onto erodible or steep slopes.
- Road surface shape (e.g. crowning, insloping, and outsloping) that meets planned use and resource protection needs would be used.

- When possible, road drainage would be directed onto convex slopes (ridges) and not onto concave slopes (troughs) to prevent adding more water to typically wet, slide-prone areas.
- Bare soil areas created from landing and road construction would be mulched with appropriate weed-free straw (or equivalent) and seeded with a native or BLM-approved mix.
- Right-of-way clearing limits including the roadbed would be approximately 35' in width (Figure II-1).

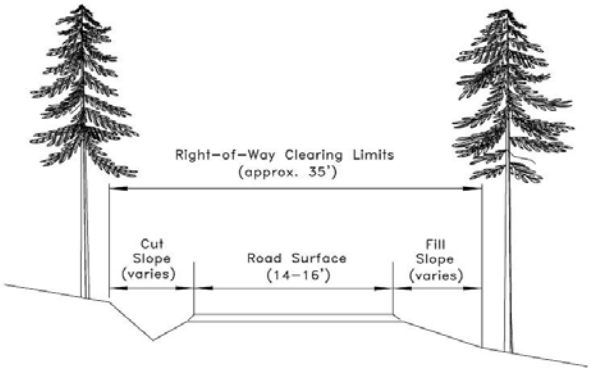


Figure II-1 Illustration of road widths and clearing limits for visibility.

- Natural surface roads and landings would be seasonally maintained prior to winter rains if road/landing use is required the following year. This maintenance may include, but is not limited to, the addition of water bars, mulching with wood chips or straw, and seeding with the seed mix described above.

Road Maintenance, Renovation and Improvement[4]

- The following table summarizes specific road improvements:

Table II-7 Road Improvement Work by Road Number.

Road Number	Culvert Work Type	Drainage Feature Type	Stream Energy Dissipators
27-10-6.1	Replace 6 Cross Drains	Ditchlines	Yes - 4
27-10-5.0	Replace 2 Stream Culverts, Install 1 Stream Culvert	Intermittent Streams	No
27-10-7.0	Replace 2 Stream Culverts	Intermittent Streams	No
27-10-18.0	None	Intermittent Streams	Yes – 1
27-10-29.0	None	Intermittent Streams	Yes – 1

- Road maintenance/renovation activities would be planned to minimize soil erosion and subsequent stream sedimentation (ROD, D-4 #18). These would include, but are not limited to, grading to remove ruts, removal of bank slough and adding gravel lifts where needed in the road surface. Activities would not disturb existing drainage ditches that are functioning and have a protective layer of non-woody vegetation.
- When replacing stream culverts, stream flow would be diverted around the work area, sediment would be contained using appropriate filters or barriers and turbid water would be pumped from the excavation site onto a vegetated terrace or hillslope. Stream culvert replacements would follow ODFW in-stream timing guidelines, which is from July 1 – September 15.
- Other stream culverts or cross-drains may be installed in areas with deficient drainage during road maintenance or renovation. Table II-8 would be used as the guide for road drainage spacing if needed. In addition, a road drainage feature may be installed upslope of each stream crossing in order to route most of the ditch flow away from the stream and onto forest soils where it can re-infiltrate. Depending on slope and other site conditions, this distance would generally be about 100 feet from the drainage feature outlet to the channel.

[4] These are in addition to applicable New Road Construction BMPs.

Table II-8 Guide for Drainage Spacing by Soil Erosion Classes and Road Grade.

Gradients (%)	Road Surface	
	Natural	Rock or Paved
3-5	200	400
6-10	150	300
11-15	100	200
16-20	75	150
21-35	50	100
36+	50	50
Spacing is in feet and is the maximum allowed for the grade. Drainage features may include cross drains, waterbars, ditch-outs, or water dips.		

Haul

- The BLM would prohibit hauling on dirt-surfaced roads during the wet season, generally November through April.
- Sediment filters would be placed at designated locations on the following two roads: 27-10-4.0 and 27-10-6.1. Depending on road conditions after renovation and maintenance, placement of additional sediment filters to prevent sediment from entering stream channels from road ditchlines may be required. Sediment filters would allow free passage of water without detention or plugging. The filters would receive frequent maintenance; this would consist of the removal of retained sediment and disposal of this sediment. The sediment would be disposed away from delivery to stream channels.
- Road conditions would be monitored during winter use to prevent rutting of the rock surface.
- An additional lift of rock may be applied to the area of a road that can influence the stream if erosion and sediment delivery is evident from the road tread near live stream crossings.
- If winter rains have saturated the ground and forecasters predict more than 1 inch of precipitation in the project area over the next 24 hours, then the BLM would suspend winter haul as deemed necessary. Operations would resume after the 24-hour suspension, except when forecasters predict another storm (exceeding 1 inch). Currently, the BLM bases precipitation predictions on the Quantitative Precipitation Forecast (QPF) maps from The Hydrometeorological Predication Center internet site: http://www.hpc.ncep.noaa.gov/html/fcst2.html. A similar predictive model internet site would be used if this site should be unavailable in the future.

Decommissioning

- Soil-stabilization techniques such as seeding, mulching and fertilizing exposed soils would be used. Other activities may include installation of water bars/dips to route surface runoff to vegetated areas depending on site-specific conditions.
- Final decommissioning would occur prior to winter rains of all natural surface roads and landings.
- Closure of decommissioned roads would include the installation of a barrier to prevent vehicular traffic. Barriers could include, but are not limited to, tank traps and boulder barriers.

Full Decommissioning (These are in addition to the decommissioning design features)

- Where necessary to restore hydrologic function, road surfaces would be subsoiled/tilled to a depth between 8 and 16 inches.
- If available, slash material would be scattered over the subsoiled/tilled road surface to protect exposed soil and reintroduce organic material to the soil. Slash material would also be used to prevent vehicle access.
- If slash were not available, soil stabilization techniques would be used and the road would be blocked to vehicular access using earthen berms.

Special Status Species - Including T & E Species

- Use of tailhold or guyline anchors within the NSO nest patches would be avoided.

- In EA Unit 9, harvest operations would use tailhold trees within occupied marbled murrelet habitat. All seasonal and daily timing restrictions would be followed during harvest to prevent disturbance in this location.
- BLM/USFWS guidance for guyline/tailhold tree selection in suitable habitat for marbled murrelets and northern spotted owls would be followed.
- Seasonal restrictions (No activity March 1 – June 30) for NSO would be applied. Table II-9 lists the units and acres where this would occur.

Table II-9 NSO Seasonal Restrictions by sale and acres where the restriction applies.

Sale Name	EA Unit #	Seasonal Restriction Acres
S Bridge	2	32
Vaughn's Jct.	3	23
	4	8
East Cherry	9	35

- Daily Timing Restrictions (DTRs) would be implemented limiting harvest activities from two hours after sunrise to two hours before sunset on applicable units to minimize disturbance to nesting murrelets. In some cases, restrictions would apply only to portions of units because of topographic breaks or other landscape features. Table II-10 describes these restrictions. Restrictions only apply within the disruption zone within the units.

Table II-10 Marbled Murrelet Seasonal and Daily Timing Restriction (DTR) Acres by Unit

Sale Name	EA Unit #	No Activity April 1-Aug. 5; DTR Aug. 6- Sept. 15	DTR April 1-Sept 15
S Bridge	1	6	0
	2	48	0
Vaughn's Jct.	3	32	0
	4	7	3
	5	16	0
East Cherry	9	35	0
	10	44	8
	13	23	0
	15	0	10
	16	1	0
Steel Trap	11	43	1
	12	39	0
Parkview	6	19	12
	7	4	1
	8	9	0
TOTALS		**326**	**35**

- If a special status species were found after awarding the contract, management guidelines included in the contract would be followed to protect the species. These species include Threatened & Endangered species, occupied marbled murrelet sites, active raptor nests, federal proposed and candidate species, and Bureau Sensitive or State listed species protected under BLM Manual 6840.
- Botanists have found one site of the Bureau sensitive lichen species *Bryoria subcana*. The BLM would protect this site, located in Unit 15 to ensure persistence of the species at the site.

Noxious Weeds

- To prevent the introduction and spread of noxious weeds during the contract period, all equipment would be washed prior to entering the project area.
- Vehicles and equipment would be required to stay on road and landing surfaces, except equipment specifically designated to operate off roads and landings (e.g. mechanical harvesters).
- To the extent practical, equipment would avoid or minimize travel through weed-infested areas.

Port-Orford-cedar

- Marking would leave Port-Orford-cedar at spacing no closer than 25’ × 25’ within units.
- Port-Orford-cedar would be spaced 50 feet from each other in density management areas and approximately 50 feet from roads and 25 feet from streams. This marking prescription for the removal of merchantable POC trees in a commercial thinning or density management treatment near roads provides a discontinuous population of POC trees and removes the future seed source along roadside cut banks (similar to Management Practice #13 in the Port-Orford-Cedar SEIS). Our experience shows that removing the roadside seed source diminishes the need for POC sanitation treatments.
- All equipment would be washed before arriving on BLM lands and all ground-based equipment would be exit washed prior to moving to a new unit with POC presence.
- Roadside sanitation along haul routes is NOT proposed.

Cultural Resources

- If any objects or sites of possible cultural value such as historical or prehistoric ruins, fossils or artifacts were found during project implementation, the BLM would suspend all activities near these objects and notify the Authorized Officer of the findings.

Non-Commercial Units (Treatment 4)

- There would be no road-related activities to conduct treatments. This includes new construction, renovation, maintenance, improvement and decommissioning.
- Activities would not be conducted during the breeding seasons for northern spotted owls and marbled murrelets (03/01 – 09/15).
- All stream channels would have a minimum 50 ft. no-treatment zone. No activities would occur within these no-treatment zones.
- At least 25% of each unit would remain untreated. These areas would occur within the unit and not towards the edges.
- The maximum size of a created gap would be 3 acres. Species planted in these areas would include shade tolerant species such as western red cedar and western hemlock. Where practible, larger planting stock of western redcedar would be used.
- The maximum diameter limit (MDL) of selected trees would be 16” DBH.
- Trees selected for treatment would be felled and left on-site. Other activities include slabbing, topping and other snagging techniques.
- There would be no removal of any debris. This includes logs, tree tops etc. Biomass or firewood would not be available from these activities.
- In general, hardwood tree species other than Oregon myrtle and red alder would not be cut, except where densities inhibit or preclude the development of late-successional forest structure.
- Depending on site-specific conditions, retention of western hemlock would occur where uncommon (<20 ft^2 basal area). Where western hemlock densities prevent development of dominant Douglas-fir boles at scales >3 acres, treatments would reduce western hemlock densities to $\leq$20 ft^2 basal area.

Analysis Background

This Chapter combines the affected-environment (typically EA Chapter 3) and effects-analysis discussion (Chapter 4) and has been arranged by resources that may be impacted. It identifies the direct, indirect and cumulative environmental effects that may result from implementation of either of the two alternatives described in Chapter 2. It also addresses the interaction between the effects of the proposed density management with the current environmental baseline, describing effects that might be expected, how they would occur and the incremental effect that could result. The description of the current conditions inherently includes and represents the cumulative effects of past and current land management activities undertaken by the BLM, other federal, and tribal and private entities.

Reasonably Foreseeable Actions

Annual recurring activities are likely to occur within the project area. These include, but are not limited to, fire suppression activities, routine road maintenance, treatment of noxious weeds and silvicultural activities in young stands.

Table III/IV-1 displays the timber sale acres and new construction miles for sales that are active or will be active in the analysis area over the next five years.

Table III/IV-1 Proposed or Active federal timber sales within the Cherry Vaughn analysis area (AA).

EA Name/number	Timber Sale Name	Contract Number	Type of Treatment	Acres in AA
Brummit Creek DM OR128-03-24	Brummed Out	OR120-TS08-30	DM	331
	Cherry Wall	OR120-TS08-31	DM	97
	Skattered Skeeter	OR120-TS09-30	DM	262
Weaver-Sitkum DOI-BLM-OR-C040-2010-0001-EA	East Yankee	OR120-TS11-31	CT	174
Middle Creek CTs II OR125-04-17	Bitter Cherry	OR120-TS08-02	CT	158
	McLee	OR120-TS11-08	CT	83
	High Voltage	OR120-TS11-07	CT	60
Wagon Road Pilot DOI-BLM-OR-C040-2010-0008-EA	Wagon Road Pilot	OR120-TS12-35	Variable Retention Regeneration	136

The BLM assumes intensive management of private forests on a 40-year harvest rotation under the guidelines of the State of Oregon Forests Practices Act (ORS 2011).

On December 17, 2009, the Federal Regulatory Commission issued a certificate of public convenience and necessity to Pacific Gas Connector Pipeline, LP for construction of a natural gas pipeline from Coos Bay to Malin (FERC 2009b). This project is still pending a decision by the BLM to issue a Right-of-Way (ROW) grant for this project before it can proceed. As portion of the route goes through the terrestrial action area, it is analyzed as part of the baseline (the no action alternative) from which the Cherry Vaughn effects would be added. The following table, Table III/IV-2, contains a summary of the effects of the pipeline project concerning forest removal.

Table III/IV-2 BLM-managed lands that the construction of the pipeline would clear and the permanent acreage that would remain in the permanently maintained ROW by age class.

	Age Class Grouping (in Acres)			
	> 35 years	35-80 years	80+ years	Operation Totals
Initial 'clearing' operations for construction[5]	6.53	0	11.67	18.2
Permanent conditions – low herbaceous cover maintained (30' ROW)	5.21	0	10.02	15.23

Cumulative Effects Considerations

The Council on Environmental Quality (CEQ) provided guidance on June 24, 2005, as to the extent to which agencies of the Federal Government are required to analyze the environmental effects of past actions when describing the cumulative environmental effect of a proposed action in accordance with Section 102 of the National Environmental Policy Act (NEPA). CEQ noted the "[e]nvironmental analysis required under NEPA is forward-looking," and "[r]eview of past actions is only required to the extent that this review informs agency decision making regarding the proposed action." This is because a description of the current state of the environment inherently includes effects of past actions. Guidance further states that "[g]enerally, agencies can conduct an adequate cumulative effects analysis by focusing on the current aggregate effects of past actions without delving into historic details of individual past actions."

The information on individual past actions is merely subjective, and would not be an acceptable scientific method to illuminate or predict the direct or indirect effects of the action alternative. The basis for predicting the direct and indirect effects of the action alternative should be based on generally accepted scientific methods such as empirical research. The cumulative effects of this project upon the environment did not identify any need to exhaustively list individual past actions or analyze, compare, describe the environmental effects of individual past actions in order to complete an analysis which would be useful for illuminating or predicting the effects of the proposed action.

Resources

Forest Structure

Forest Structure in the action area (treatment units)

Plant associations in the western hemlock series of southwestern Oregon (Aztet *et al.* 1996)[6], most commonly the sword fern and the salmonberry associations, primarily describe the forested upland stands in the action area. Strictly riparian associations (as described by McCain (2004)) account for very little of the area proposed for treatment.

Treatment units were all classified as being in the Biomass Accumulation/Competitive Exclusion (BACE) structural stage following Franklin *et al.* (2002), using field-collected observations and data on stand characteristics (age, tree heights, tree diameters, others): structural stages are characterized/defined in Figure III/IV-1. Forest vegetation system (FVS) software (USDA 2010 - http://www.fs.fed.us/fmsc/fvs/) classified treatment units as Stand Establishment stage based on the same data set; this is a comparable (but less developed) classification.

[5] Clearing operations include a 95' ROW, storage areas and temporary workspaces.
[6] TSHE series is also described in McCain and Diaz (2002) . However, the analysis area is south of the range covered by McCain and Diaz (2002). Associations described by McCain and Diaz (2002) and Atzet *et al.* (1996) relevant to the analysis area are quite similar.

Figure III/IV-1 Structural stage comparison. Reprinted from USDI 2008

Typical stand age[b] (years)	Oliver (1981) stand development stages	Franklin et al. (2002) structural stage	1994 RMP/EIS Seral stage	Structural stages (This RMP/EIS)
0	Disturbance and legacy creation			
20	Stand Initiation	Cohort establishment	Early seral	Stand Establishment
30	Stem Exclusion	Canopy Closure	Mid seral	Young
50		Biomass accumulation/ competitive exclusion	Late seral	
80	Understory Reinitiation	Maturation		Mature
150	Old Growth	Vertical diversification	Mature seral	Structurally Complex
300		Horizontal diversification	Old-growth	
800-1200		Pioneer cohort loss		

[a]A more extensive comparison of classification schemes can be found in Franklin et al. 2002.
[b]Stand ages are provided as references. However, stands can achieve structural classes at different stand ages, depending on disturbance and site conditions.

These BACE-stage units are <50 years old and have been intensively managed (Hayes *et al*. 2005). Units have small mean tree diameters, moderate densities of small snags and very low densities of larger snags and downed wood (Table III/IV-3). Treatment units currently support densities of small (≤23" DBH) snags above 50% tolerance levels in comparable unmanaged stands, and would be predicted to support species associated with smaller snags above the 50% tolerance level (Marcot *et al*. 2004). Treatment units support large (>23" DBH) snag densities far below 30% tolerance levels in comparable unmanaged stands, and would provide negligible support for species associated with larger snags. Due to the intensive silvicultural management practiced during the disturbances (harvests) which initiated these stands, field surveys have not identified residual overstory trees or tall sound snags in treatment units.

Table III/IV-3 Action Area Summary. All values are for DBH classes measured in stand exams. The Proposed Action values include NTZ areas within treatment units.

Scenario	n	Structure (SD)	RD	BA (ft^2/ac.)	TPA	QMD (in.)	Snags > 23 in. DBH/ac.	DW/ac.	Canopy Cover (%)
Current conditions	15	2 (0)	61	201	328	10.7	0.2	1.4	85
Post_thin (2013)	15	2 (0)	27	156	159	13.9	0.2	1.9	64
No Action - 2060	15	5 (0)	73	321	156	19.5	6.8	8.3	81
Proposed Action - 2060	15	5.67 (0.49)	59	269	127	20.6	6.8	6.9	69

Notes: SD=Standard of Deviation, RD=Residual Density, TPA=Trees per acre, QMD=Quadratic mean diameter, DW densities = all pieces >12 in. diameter.

Using age-based definitions in the 1994 FEIS (USDI 1994) as well as interpreted field data, the BLM would not classify any of the units in the action area as "late-successional" forest. None of the units in the action area would meet definitions of "old-growth" forest (FEMAT 1993, Spies and Franklin 1991, USDA 1993).

The majority of the action area supports coniferous forest structure in the absence of repeated disturbance. Evidence supports this, which includes: a) historic references; b) remnants of the previous stand; and c) plant association. Historic air photos and the presence of residual conifer stumps in many units suggest

that conifers dominated treatment units prior to disturbance (harvest), with red alder restricted to fluvially-disturbed areas. Cover by red alder has increased dramatically in the treatment units following recent (last 40 years) harvest disturbance. Alder is an early seral tree species associated with disturbed, moist conditions (Harrington 2006). Management influences including intensive road building, in combination with ample red alder seed sources (from nearby early seral stands), have undoubtedly increased red alder densities in the analysis area. Plant association provides a more accurate indicator of species predicted to dominate a site in the absence of such disturbance (e.g., in late-successional condition), and can be valuable in directing management goals. Upland portions of Cherry Vaughn treatment units are predominately hemlock/sword fern associations (Atzet *et al.* 1996), with inclusions (estimated at <15% of treatment units) of hemlock/salmonberry associations. Red alder is a minor (≤5% cover but 36% occurrence) component in hemlock/sword fern associations (Atzet *et al.* (1996) as well as McCain and Diaz (2002)), but a larger component in hemlock/salmonberry associations (18% cover). This suggests that in the absence of disturbance, red alder would be a very minor (≤1%) component of upland (non-fluvially-influenced) portions of treatment units. These upland areas comprise the majority of the treated portions of treatment units.

Estimates of cover by hardwood-dominated patches in the analysis area vary by estimation method[7]. Remotely-sensed (IVMP 2001) data suggest that hardwood patches make up <10% of the action area (treatment units) and consist mostly of small, relatively isolated patches (Table III/IV-4). Aerial photo interpretation suggests that approximately 29% (535 ac.) of the action area supports hardwood-dominated areas.

Table III/IV-4 Hardwood, mixed and conifer patch characteristics in the Cherry Vaughn action area. Results provided for the entire action area and for a representative unit with the second highest cover by red alder patches (Unit 6).

	HW structure	% cover	Patch size (ac.) (95% CI)	Patch size range (ac.)	AREA_CV	COHESION
Action area	HW-dominated	7.1	0.68 (-2.18 ; 3.54)	15.2	214.7	68.6
	Mixed	36.6	2.88 (-5.55 ; 7.88)		293.8	91.0
	Conifer-dominated	56.3	7.69 (-25.37 ; 31.59)		467.0	96.5
Unit 6	HW-dominated	8.8	0.76 (-0.59 ; 1.2)	4.94	148.7	70.1
	Mixed	43.4	3.9 (-8.35 ; 11.51)		321.1	95.2
	Conifer-dominated	47.8	6.06 (-6.88 ; 11.79)		194.2	93.7

Note 1: IVMP "user's" accuracy was estimated at 57% for deciduous cells (Moeur *et al.* 2005). Fieldwork in the action area suggested approximately 60% accuracy in Unit 6 (n=12) at the same (grain or cell) scale.
Note 2: Patch size range equals the difference between the maximum and minimum observed values for patches of the corresponding patch type.

Forest Structure in the analysis area and at larger spatial scales

The Cherry-Vaughn terrestrial analysis area is here defined as a rectangular area including all known northern spotted owl home ranges possibly influenced by the treatment units, approximately 68,700 ac. in size and touching on two watersheds (East Fork and North Fork Coquille Rivers). Forested portions of the analysis area are located primarily in the Mid-Coastal Sedimentary (Level-IV) ecoregion (EPA 2010) within the Coast Range (Level-III) ecoregion, also described as part of the South Coast- Northern Klamath Province (LSRA; 1998). Prior to mechanized logging disturbances, fires acting at large spatial (basins) and temporal (200 to 500 year) scales, was the principal disturbance maintaining the moderately high average cover by structurally-developed forests in the analysis area. Estimates of pre-European late-

[7] Differences attributable to different methods (remotely-sensed vs. aerial interpretation) include: a) scale differences; b) different thresholds for "HW-dominated" and "mixed" categories; and c) differences in the abilities of these two techniques to identify hardwood patch characteristics.

successional forest cover in the Oregon Coast range as a whole are between 52 and 85%; by 1936, late-successional forest covered 42% of the Coast Range, and by 1996 covered 18% of the Province (Wimberly 2002). For the analysis area, timber type maps from the 1930's (Harrington 2003) depict approximately 75% of the analysis area as covered by large second-growth or old-growth forest.

The effects of fire and forest harvest have resulted in the analysis area (including all ownerships) currently supporting roughly 33% late-successional and old-growth (LSOG) forest[8]. Over 40% of the federally-managed portions of the NF Coquille Watershed and over 28% of the federally-managed portions of the EF Coquille Watershed support late-successional forest (LSOG), well above the 15% required under the 1995 RMP (USDI 1995).

The South Coast-North Klamath Late-Successional Reserve Assessment (LSRA; 1998) describes the influence of landform on late-successional characteristics and cover, describing a general trend in which aspect and slope position influence forest structure (Appendix A-1). In the portions of LSR 261 comprising the analysis area, aspect seems to be a very weak driver of old-growth structure, while slope position (including the presence of wetter areas) appears to exert a significant but small influence on old-growth structure.

Densely stocked young stands dominate private ownerships in the analysis area. Cover by young, densely-stocked stands is far higher than conditions depicted in 1930's historic cover type maps for the analysis area (Harrington 2003) or for the historic coast range as a whole (Tappeiner 2002).

All late-successional forest cover in the analysis area accounts for <1% of all late-successional cover in the Coast Range Province. At a larger scale, western Oregon (including all ownerships) supports approximately 35% cover by LSOG forest (USDI 2008b).

Approximately 11% of the analysis area surrounding the treatment units supports hardwood-dominated patches[9], estimated using remotely-sensed data. This estimate is comparable to modern hardwood cover estimated by Wimberly and Ohman (2004) for the Coquille Basin. Historic (1936) estimated hardwood cover for this basin was <2%, although adjacent basins had higher hardwood cover in that period. Changes in disturbance regime in the Oregon Coast Range immediately following the arrival of Europeans have at least doubled cover by hardwoods over recent historic conditions; pollen records suggest that the amount of red alder in the Pacific Northwest is higher now than at any time in the past few centuries (Harrington 2006).

Since 1994, the Coos Bay District has thinned approximately 5,600 ac. within LSR 261 to enhance development of LSOG: this represents approximately 8% of the BLM administered lands within LSR 261, and 16% of BLM administered lands under 80 years old within LSR 261. The District has pre-commercially thinned a similar amount within this LSR.

No Action

No Action within the action area: Effects on Forest Structure

Specifically within the action area (Cherry Vaughn treatment units), the No Action Alternative would entail continued slow growth and suppression mortality in approximately 1,500 ac. of LSR and RR land use allocations. Table III/IV-3 presents predicted densities of large snags, downed wood, canopy cover, and model-estimated successional stage as stand averages for representative units and in Appendix A for all units. Based solely on stand age, all reserved portions of the action area would meet definitions of

[8] LSOG forest as defined by the 1994 RMP FEIS (USDI 1994) is estimated as the sum of mature and structurally complex forest classes quantified in the 2008 RMP FEIS (USDI 2008) analysis.
[9] Defined as broadleaf cover ≥60%, as quantified by IVMP (1996) data.

late-successional (USDI 1994) in approximately 50 years. However, most treatment units would require some stand-modifying disturbance to facilitate development of multiple tree canopies and tolerant understories (Poage and Tappeiner 2002). FVS modeling suggests that treatment units under the No Action scenario would achieve large tree size in 50 years, but would not develop multiple conifer canopy layers (Table III/IV-3[10], Figure III/IV-1).

Under the No Action Alternative, by 2060 units in the action area would be predicted to support large (> 23" DBH) snag densities at or above 50% tolerance levels of conditions in unmanaged older forest[11], but below the 30% tolerance level for snag densities associated with the full range of snag-associated species in older forest analyzed in Marcot *et al.* (2004). Suppression mortality acting alone (as modeled here) would provide a steady but modest supply of moderate-to-large snags and downed wood components (Table III/IV-3), but would not provide the patchily-distributed high densities of snags and downed wood associated with allogenic[12] disturbance (Franklin *et al.* 2002, Franklin and VanPelt 2004, Garman *et al.* 2003, Rapp 2003).

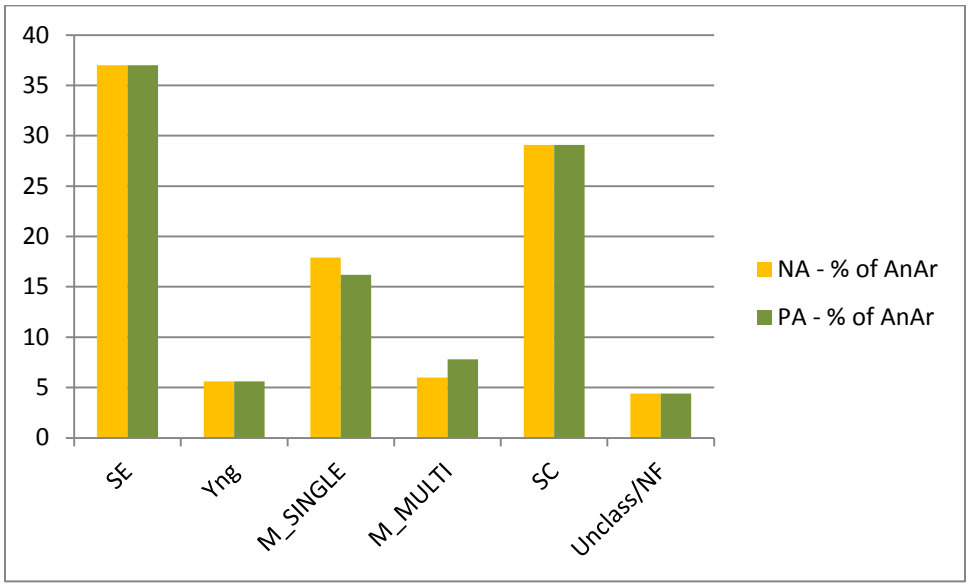
No Action within the Analysis Area scale and larger scales– Effects on Forest Structure
The No Action would have no direct effects on LSOG forest resources in the action area or federal portions of the analysis area in the short-term. The cumulative, long-term effects of the No Action Alternative within the analysis area would include:

- Succession in the action area (treatment units) and federally-administered reserved areas;
- Density management thinning on some federally-administered areas;
- Harvest on a roughly 100-year rotation on federal GFMA Matrix land use areas, and on a 150-year rotation in Connectivity land use areas; and
- Harvest on a 40-year rotation on privately-managed forests.

Figure III/IV-2 depicts the results of applying these management regimes to the analysis area. Under this alternative, Mature and Structurally Complex forest cover would increase from approximately 33% of the area to 53% by 2060. USDI (2008) estimated that forest-capable ownerships in western Oregon would retain approximately 48% in LSOG (Mature and Structurally Complex) forest cover by 2106 following a similar No Action scenario, or 52% LSOG cover by 2106 managed under a "No Harvest" scenario.

[10] FVS predicted 2060 No Action stand structure as "old forest, *single stratum*". Note that FVS-modeled structural stages are based on limited stand data (principally tree data), and are less accurate than the whole-stand characterizations (labeled "Struct-Frnkln") in Table III/IV-3. However, general trends in successional development are probably accurate.
[11] Described in DECAID (Marcot *et al.* 2004) as "Larger Trees Structural Condition Class".
[12] Originating from outside the stand. Allogenic disturbances include wind, fire and harvest.

Figure III/IV-2. Cover by structural classes in the Cherry Vaughn Analysis Area (AnAr) in 2060. This figure depicts both the No Action (NA) and Proposed Action (PA) alternatives. Structural classes: SE (Stand establishment), Yng (Young), M_Single (Mature, single canopy layer, M_MULTI (Mature, multiple canopy layers), SC (Structurally Complex).



Proposed Action

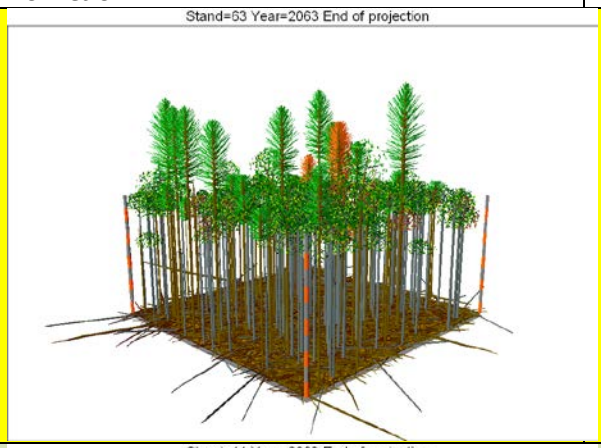
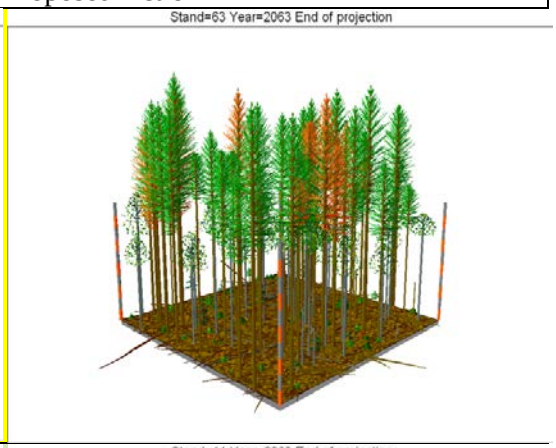
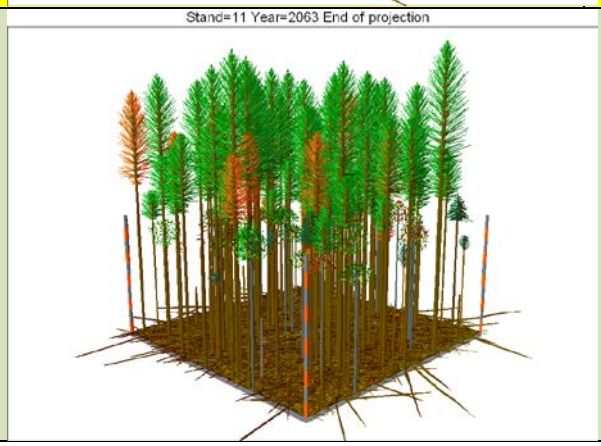
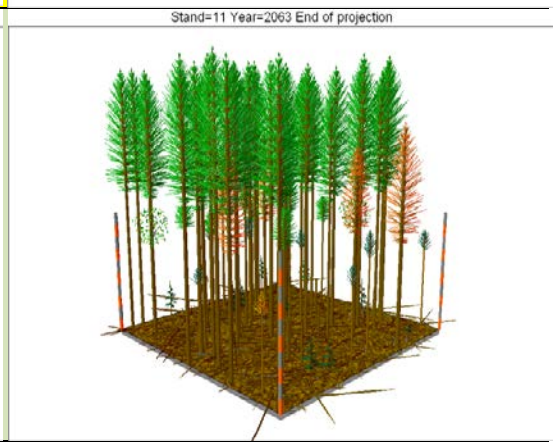
Action area

The Proposed Action would include density management thinning (DM) in approximately 1,350 ac. of LSR and RR allocations to meet objectives for these allocations, approximately 73% of the defined treatment units. Suppression mortality would still occur in untreated areas (27%) within treatment units, including areas adjacent to streams. Snag and downed wood creation would occur in all treatment units. Created snags and downed wood would be in addition to suppression-induced snags quantified in Table III/IV-3.

DMT would increase treatment unit-scale mean diameters (Table III/IV-3; Appendix A), and would be predicted to promote the development of individual larger green trees faster than the No Action alternative (unpublished DMS data (http://ocid.nacse.org/nbii/density/), (Davis *et al.* 2007, Garman *et al.* 2003)). DMT would have complex effects on stand structural diversity including:

- Decreased variability in "treatment patch" densities and diameters post-thinning, as thinning-from-below removes dense understory trees, leaving mostly co-dominant and dominant trees. Note that diameter variability in old stands comes from multiple tree cohorts including tolerant shade trees, following secondary disturbances or suppression mortality. Initial stages of this structural development are evident in final time step of FVS modeling (Figure III/IV-3).
- Increased variability in tree densities and diameters within units, as overstory tree densities in hardwood-dominated treatment patches were greatly decreased and tolerant conifers were planted in these patches (Figure III/IV-3). Created low-density areas would be predicted to lead to a response in understory and shrub diversity (Harrington *et al.* 2005), development of larger limbs and crowns, epicormic tree branch response. Retention of >20% of units as untreated would further increase variability at this scale, and maintain patchily-distributed suppression mortality.

Figure III/IV-3. SVS model visualization of results of the No Action (succession) and Proposed Action (density management thinning) on a mixed hardwood/conifer stand (above) and conifer-dominated stand (below) in the Cherry Vaughn action area.

	No Action	Proposed Action
Mixed		
Conifer		

Density management to promote multiple conifer cohorts would require reduction in hardwood tree density through commercial removal and slashing of hardwoods interfering with planting. Based strictly on aerial photographic classification, patches with hardwood removal would be <10 acres in size and would affect 0% to 25% of the area in each treatment unit (Table III/IV-5). Satellite imagery suggests density management in hardwood-dominated areas would affect patches averaging 0.7 ac. in size (95% CI: -2.18; 3.54: Table III/IV-4), and would lead to gaps (areas with reduced canopy cover) up to 6 ac. in size (Table III/IV-5). This project would maintain hardwood diversity in all treatment units through: a) inclusion of density management for canopy cover retention areas (Units 6, 10, 12, 15); b) no-treatment zones; c) retention of some big leaf maple and all minor hardwood species other than red alder and Oregon myrtle in prescriptions; and d) the current patchy mosaic of hardwood conditions.

Conditions in patches treated through density management to promote multiple conifer cohorts with slashing would include reduced canopy cover (modeled as 47% in treated areas), and an overstory of widely spaced conifers, big leaf maple and other hardwoods directly following management. Planting would provide a second cohort which would in coming decades increase patch and unit structural diversity (addressed below).

Table III/IV-5. Patches affected by hardwood reduction. These areas represent hardwood-dominated portions of units treated with density management thinning to promote multiple cohorts.

	Based on aerial photo			Based on IVMP and aerial photo		
EA Unit	**Hardwood area affected (ac.)**	**Affected unit area (%)**	**Range in patch sizes (ac.)**	**Hardwood area affected (ac.)**	**Affected unit area (%)**	**Range in patch sizes (ac.)**
01	3.8	2.4	(0.37 - 1.88)	0.3	0.2	-
02	14.0	6.7	(0.03 - 6.8)	-	-	-
03	6.2	3.3	(0.07 - 1.37)	-	-	-
04	0.1	0.4	(0 - 0.13)	-	-	-
05	1.8	3.3	(0.22 - 0.62)	-	-	-
06	33.4	11.9	(0 - 9.9)	5.1	1.8	(0.3 - 2.7)
07	1.8	2.8	(0.08 - 1.31)			
08	7.1	13.2	(0.26 - 2.57)	1.5	2.8	(0.3 - 1.3)
09	4.7	3.8	(1.03 - 2.08)	0.4	0.3	-
10	66.9	10.8	(0.45 - 9.9)	11.7	1.9	(0.26 - 5.9)
11	38.4	24.5	(0.08 - 9.39)	2.6	1.6	(0.26 - 0.84)
12	34.8	11.0	(0.04 - 6.13)	0.3	0.1	-
13	2.4	4.2	(2.44 - 2.44)	-	-	-
15	5.9	18.1	(0.82 - 5.04)	-	-	-

Modeled DM treatment effects suggest that treatment units would reach more advanced forest structural stages than under the No Action scenario in 50 years (Table III/IV-3/Appendix A). DM associated with the Proposed Action would facilitate faster achievement of interior structurally complex forest condition and connectivity between older forest types in LSR 261 (LSRA; 1998). Development of a more advanced structural condition in RR land use allocations would facilitate meeting management direction to "promote development of large conifers, to recruit large woody debris, to improve diversity of species composition and stand density" (ROD, E-8) in these areas. This would also meet specific ACS Objectives including to "maintain and restore the species composition and structural diversity of plant communities in riparian zones" and to "maintain and restore habitat to support well-distributed native populations of plant, invertebrate and vertebrate riparian-dependent species" (USDI 1995).

Thinning would decrease the amount of suppression mortality in treated areas compared to the No Action Alternative (Table III/IV-3, Appendix A). Densities of large snags (snags >23" DBH) in treatment units in 2060 under the Proposed Action would be comparable to densities under the No Action Alternative; small snag densities would be lower in treated areas (Appendix A). As in the No Action Alternative, by 2060 treatment units in the Proposed Action Alternative would support large snag densities at or above 50% tolerance levels for unmanaged older forest but below 30% tolerance levels for full support of key older forest snag-associated species (Marcot *et al.* 2004).

Although the Proposed Action would not lead to high suppression-induced snag densities in the treated areas of the remaining units, the Proposed Action would facilitate other ecological benefits (described above). In the short-term, the Proposed Action would include creation of two snags and one piece of downed wood per acre in units. Additionally, the Proposed Action would lead to development of higher densities of large standing trees in the future. Suppression would occur in No Treatment Zones (NTZs) left in treatment units (Chapter 2) providing suppression-induced snags/downed wood at the densities comparable to those described for the No Action scenario.

Analysis Area scale and larger scales

Cumulative effects of the Cherry Vaughn Proposed Action on forest structure would include the effects of implementation of the 1995 RMP on BLM administered portions of the analysis area, continued harvest on 40-year rotations in privately-administered lands, and construction of the Williams Pipeline (the No Action Alternative). The only difference between the Proposed Action and the No Action in terms of forest structure would be DM followed by succession in the action area (treatment units).

The Proposed Action would thin approximately 1,350 ac. (2%)[13] of the analysis area. DM would lead to the following changes in forest structure in the analysis area by 2060:

- Cover by young, dense stands in the analysis area (all ownerships) would decrease by approximately 3% (from 62% to 59%).
- DM-treated portions of BLM-administered lands less than 80 years old within LSR 261 would increase from 16% to almost 20%.
- The total cover by Young and LSOG forest would remain the same for both the Proposed Action and the No Action Alternatives, approximately 53%. These LSOG levels are comparable to mean historic old forest cover for the Oregon Coast Range.
- Cover by Mature forest structure, a component of LSOG, would differ slightly between alternatives (Figure III/IV-2). The Proposed Action would lead to approximately 1.8% more Mature, multi-storied forest cover in the analysis area, with a concomitant 1.8% reduction in Mature, single-storied forest cover by 2060.

When expressed as changes in amount of forest structural classes in the analysis area over 50 years (as above), there is little difference between alternatives (Figure III/IV-2). This is not surprising, since; a) forest structural stages are relatively gross classes that do not capture all within-stand changes; and b) thinnings tend principally to shorten competitive exclusion stages at stand scales (Anderson, pers. comm.), a relatively short period of stand development. FVS modeling predicted that within-stand structural conditions, including development of large tree boles, gap development and development of multiple canopy layers, would be more advanced in treated stands (see above).

Cumulative patterns in forest structure observed for the analysis area also hold for larger spatial scales. At the scale of western Oregon, implementation of the 1995 RMP would be predicted to retain and develop approximately 48% late-successional forest cover by 2106, with >90% of BLM-administered forest lands supporting late-successional forest (USDI 2008).

Wildlife

Analysis Area

Within the 68,668-acre wildlife analysis area, the BLM manages about 39,063 acres (57%); BIA manages about 655 acres (1%); and the remaining 28,950 acres (42%) are in private ownership. The analysis area is based on and delineated around spotted owl home ranges that fall within 1.5 miles of proposed Cherry Vaughn units. Elevations range from 200 to 2,500 feet.

The analysis area is within the boundary of LSR #261. The South Coast – Northern Klamath Late-Successional Reserve Assessment lists this LSR as a High Priority for management actions because LSR #261 is large (70,611 acres) and is a key link in the LSR network. In addition, the land ownership pattern provides "greater opportunities to either increase or develop large (greater than 640 acre) contiguous stands of interior late-successional habitat" (LSRA; 1998). Finally, the Cherry Creek Research Natural Area (RNA) is centrally located in the action area. This RNA (597 acres) is managed primarily for research and educational purposes. This RNA contains a 430-year-old Douglas-fir stand that falls entirely within the home range of one owl site and partially within another two sites.

Threatened & Endangered Species

Northern Spotted Owl

The analysis area includes the proposed treatment units and any suitable or dispersal habitat within the home rage (1.5 miles) of a historic northern spotted owl (owl) site or alternate site with a likelihood of

[13] Treated areas do not include No Treatment Zones (NTZs) for this discussion.

being impacted by the project. Eight known sites (with several alternates) are within 1.5 miles of the Cherry Vaughn project. For this analysis, the BLM assumes the best site is the primary site for owl reproduction and bases the discussion of effects on these eight "best" sites.

The effects of habitat modification to owl sites in the Coast Range Province are assessed by evaluating habitat availability in generalized nest patches, core areas and home ranges with a radii of 300 meters, 0.5 miles and 1.5 miles respectively (LSRA; 2008). Fifty percent of the core in NRF and forty percent of the home range in suitable habitat (nesting, roosting, foraging (NRF)) are the USFWS suggested minima thresholds preventing impairment of owl life history functions. Table III/IV-6 shows the current habitat conditions for the eight owl sites, BLM ownership and the USFWS minima thresholds. There is no threshold established for nest patches.

Table III/IV-6 Northern Spotted Owl activity sites within the Cherry Vaughn analysis area, BLM ownership within those sites and current conditions of each owl habitat classification within the sites.

Owl Site (IDNO)	Total Federal Acres	Percent of Total Home Range Acres	Owl Habitat Classification	Acres Suitable (%)	Acres Dispersal (%)	Meet USFWS Minima
Cherry Creek (0069B)	4303	95%	Nest Patch	37 (53%)	70 (100%)	-
			Core	308 (61%)	441 (88%)	Yes
			Home Range	1969 (44%)	3214 (71%)	Yes
Alder Creek (0547A)	2797	62%	Nest Patch	65 (93%)	66 (95%)	-
			Core	336 (67%)	383 (77%)	Yes
			Home Range	1240 (27%)	2036 (45%)	No
Park Creek (2168O)	3576	79%	Nest Patch	70 (100%)	70 (100%)	-
			Core	304 (61%)	391 (78%)	Yes
			Home Range	1643 (36%)	2552 (56%)	No
Peevee Creek (2169O)	3816	84%	Nest Patch	54 (77%)	70 (100%)	-
			Core	227 (45%)	457 (91%)	No
			Home Range	1648 (36%)	3329 (74%)	No
Vaughn's Creek (2171O)	3508	78%	Nest Patch	43 (61%)	50 (71%)	-
			Core	288 (58%)	300 (60%)	Yes
			Home Range	1643 (36%)	2652 (59%)	No
Cherry Cr. Ridge (2352A)	3265	72%	Nest Patch	40 (57%)	41 (59%)	-
			Core	249 (50%)	348 (70%)	Yes
			Home Range	1065 (24%)	2289 (51%)	No
West Vaughn's (3154O)	4163	92%	Nest Patch	45 (64%)	70 (100%)	-
			Core	212 (42%)	387 (77%)	No
			Home Range	1862 (41%)	3069 (68%)	Yes
Alder Middle (4637O)	2648	59%	Nest Patch	41 (59%)	57 (81%)	-
			Core	182 (36%)	352 (70%)	No
			Home Range	1127 (25%)	1982 (44%)	No

Suitable Habitat (NRF)

There is no NRF habitat within the proposed treatment units (1,498 acres; includes non-commercial treatments). There are no residual structures within the stands.

Critical Habitat

All of the proposed treatment units (1,498 acres) are located in the Southern Oregon Coast Range Critical Habitat Unit 8 (2008, 73 FR 47326).

Surveys

The BLM conducted owl surveys during the 2011 breeding season for three sites: Cherry Creek (0069B), Vaughn's Creek (2171O) and West Vaughn's (3154O). Surveyors chose these sites because they contain

the largest percentage of the proposed action of the eight home ranges. The following is a summary of the results:

- Cherry Creek – Barred owl pair in the nest patch. Surveyors did not detect any NSO.
- Vaughn's – Single female detected in the SW corner of the RNA approximately 1 mile from historic nest patch. Barred owls detected.
- West Vaughn's – NSO pair nested and likely failed.

Current Habitat Conditions – Dispersal Habitat

The BLM has classified all of the proposed treatment units (1,498 acres) as dispersal habitat. The conifer or conifer/hardwood stands are currently near 100% canopy cover, have small diameters (Table III/IV-3, Appendix A), are very dense and contain very little structural diversity. There are no remnants comprising an older stand cohort. These stands are functioning as marginal dispersal habitat because the density of trees limits owl mobility and there is a lack of complex structure on the ground for prey.

The proposed hardwood conversion stands are marginal dispersal habitat because they are hardwood-dominated, contain small diameters, lack dead wood, multiple canopies and prey species. In addition, hardwoods are not preferred, and are usually avoided by owls (Hamer *et al.* 2007). Therefore, these stands are classified as low-functioning owl dispersal habitat.

The Forest Structure section (pp. 25-28) describes unit structure and conditions in more detail.

Recovery Action 32

As the Cherry Vaughn unit stands are not structurally complex and do not contain multi-layered canopies, they do not meet the criteria for RA32 retention. There has been intensive management of these stands, they are less than 50 years old and do not contain large snags or down wood. Stand exam data and field review corroborates this conclusion.

No Action

The alder-dominated areas would likely take a century to become conifer-dominated (Deal 2006, Newton *et al.* 1968). Where salmonberry is present (a larger portion of these stands) conifer re-establishment may not occur (Carlton 1988, Tappeiner *et al.* 1991, MacCracken 2001). Without treatment, these alder-dominated stands would continue to degrade over the next twenty to forty years as the alder die out and the sites convert to salmonberry brush fields.

Alder deterioration would affect six of the eight home ranges within fifty years – degrading current low-functioning dispersal acres to non-habitat incapable of supporting spotted owls or their associated prey base. Table III/IV-7 shows the home ranges for the eight owl sites with the resulting habitat acres forecasted for 2060. This date is the same as used in the forest ecology effects analysis and would represent the time for which the alder stands would fully decay and become incapable of supporting spotted owls. While there would be some ingrowth and suppression in the unthinned stands, they would not have enough structural characteristics or multi-layered canopies to be considered owl suitable habitat within in this period. As stated in the forest ecology analysis, these stands "would achieve large tree size in 50 years, but would not develop multiple conifer canopy layers (Table III/IV-3, Figure III-IV-1)" (see Forest Structure p. 29). There would be a small supply of snags and down wood, but not the patchily-distributed high densities of snags and down wood that are associated with suitable habitat.

Table III/IV-7 Owl sites and associated owl habitat acres with the No Action alternative. Note – this table does not include ingrowth of younger stands or other disturbance events – it is a representation of the acreages included in the Cherry Vaughn proposal.

Owl Site Name	Owl Habitat Classification	Hardwood Acres*	No Action 40 Years			
			Suitable	% Change	Dispersal	% Change
Cherry Creek	C (core)	1	308	-	440	
	HR (home range)	84	1969	-	3130	-1.8
Alder Creek	C		336	-		
	HR	13	1240	-	2023	-0.3
Park Creek	C		304	-		
	HR		1643	-		
Peevee Creek	C		227	-		
	HR	2	1648	-	3327	-0.4
Vaughn's Creek	C		288	-		
	HR	22	1643	-	2630	-0.9
Cherry Ridge	C		249	-		
	HR	4	1065	-	2285	-0.5
West Vaughn's	C		212	-		
	HR	41	1862	-	3028	-1.1
Alder Middle	C		182	-		
	HR		1127	-	1982	

*Approximately 21 acres overlap more than one owl site.

There would be no changes to the Park Creek or Alder Middle sites. This alternative would degrade less than 1% of the home range BLM-managed acreage within the Alder Creek, Peevee Creek, Vaughn's Creek or Cherry Ridge sites. The Cherry Creek and West Vaughn's sites would have the largest degradation change to brush fields at 1.8% and 1.1% of the home range within this period. While these acreages are a small portion of each home range (<2%), they are still important because they would not contribute to the recovery of the spotted owl. Additionally, four of these sites are already below the suggested dispersal acreage thresholds; degradation of these acres would not contribute to the recovery of the spotted owl within these sites by inhibiting attainment of these minimum thresholds.

The No Action alternative would not meet any of the recovery actions included in the *Revised Recovery Plan for the Northern Spotted Owl* (USDI 2011c). In particular, it would not meet the following:

- *Recovery Action 6: In moist forests managed for spotted owl habitat, land managers should implement silvicultural techniques in plantations, overstocked stands and modified younger stands to accelerate the development of structural complexity and biological diversity that will benefit spotted owl recovery* (p. III-19).

While the recovery plan does suggest that managers should restore "lost species and structural diversity (including hardwoods) within the historical range of variability" (USDI 2011), the BLM has demonstrated that these hardwood stands are outside this historical range (see Forest Structure p. 29) within the action area.

Proposed Action

Density Management Thinning

The Proposed Action includes the implementation of density management thinning treatments designed to improve future habitat conditions for northern spotted owls by increasing within-stand diversity and enhancing structural characteristics as suggested in the LSRA. Additionally, these treatments would incorporate the following recommendations/suggestions in the Recovery Plan in the various treatments designs:

- *Vegetation management should be designed to include a mix of disturbed and undisturbed areas, retention of woody debris and development of understory structural diversity;*

- *Some treatments accelerate the development of spotted owl nesting habitat, even if they temporarily degrade dispersal habitat; and*
- *Long-term spotted owl recovery could benefit from forest management where the basic goals are to restore or maintain ecological processes and resilience.*

This proposal includes enhancing development of larger trees with potential nesting, roosting and foraging structure in the long-term (50 years) as well as creating snags and down logs in the short-term. The BLM would not conduct treatments within nest patches; treatments would occur within cores and home ranges only.

Treatments within spotted owl core areas would maintain >50% canopy cover at the unit scale. Gaps created due to red alder removal would be limited to <½ acre and comprise no more than 25% of a unit. Maintaining 50% and greater canopy cover within these owl cores would maintain spotted owl life history functions (*Recovery Plan* - USDI 2008). Canopy cover would rapidly increase over 5-10 years after harvest. Chan *et al*. (1996) and Chan and Cole (2002) found that stands similar to those in the project area which were thinned to 60 trees per acre had a canopy closure of 49% post-treatment and 75% after 5 years. This project would have an average 64% canopy closure (Table III/IV-3) after treatments.

The Recovery Plan acknowledges the scientific uncertainty about thinning effects to spotted owl prey base, particularly flying squirrels. However, for the two sites that have the most amount of owl activity, Cherry Creek and West Vaughn's, the home ranges overlap and are directly adjacent to the Cherry Creek RNA. This RNA contains 597 acres of the highest quality roosting and foraging habitat within the action area, so it is likely that owls would be able to sufficiently forage and roost in that area during the years the prey base returns to the thinned stands.

Sample Tree Falling
Implementation of sample tree falling would follow all of the design features listed in Chapter 2, including seasonal restrictions to avoid disturbance to nesting owls and murrelets. At an average of one tree every 2.5 acres; there would be no impact to habitat at the stand scale. If the associated timber sale does not occur, these fallen trees would contribute to the down wood creation component of the Proposed Action. These trees would contribute approximately 40% of the proposed down wood creation (approximately 540 trees of an estimated 1350).

Hardwood Conversion/Critical Habitat
The USFWS considers the hardwood conversion (146 acres) treatments removal of dispersal habitat within critical habitat (Table III/IV-8). However, the actual effects to individual owls would be diminished because "the 146 acres represents a small percentage (less than 1%) of the available dispersal-only habitat (26,676 acres) within CHU 8, and spotted owl use of pure hardwoods is relatively minor" (USDI 2011a). For the watershed, these acres represent an even smaller proportion (0.33%) of the total amount of dispersal acres (46,027). As the hardwood conversion units are also scattered across the action area, no one area would be larger than ten acres in size, and all but one acre occur within the outer edges of home ranges (Table III/IV-9), these treatments would not limit movement by spotted owls across the landscape. Within fifty years, these acres would begin to function as higher quality dispersal than the current condition.

Table III/IV-8 Land ownership and spotted owl habitat within the analysis area and conditions post-treatment.

Analysis Area Acres	Total BLM Acres	Spotted Owl Habitat (BLM Acres Only)					
		Current NRF[1]	NRF Post-treatment	Current Dispersal[2]	Dispersal Treat and Maintain	Dispersal Removed	Dispersal Post- treatment
68,668	39,063	17,100	17,100	28,927	1,352	146	28,781

[1]NRF = Nesting, roosting, and foraging habitat (suitable owl habitat).
[2]Dispersal = forested lands at least 40 years of age (includes NRF).

Cumulative

Over time, these treatment units would provide a beneficial effect to spotted owls by accelerating development of late-successional characteristics such as large diameter trees, multiple canopy layers and foraging perches. Creating snags and down wood would provide a short-term input of these habitat features relied upon by owl prey species, such as the northern flying squirrel. Thinning these stands would also grow large live trees more quickly for future large snag creation and down wood recruitment (Appendix A).

Using the projected information for 2060 under *Forest Structure*, which would allow these treated stands to grow and develop into likely roosting and foraging habitat (possibly nesting), Table III/IV-9 shows the change in habitat following density management thinning treatments. For hardwood conversion areas, the developing conifer stands would begin to function as dispersal habitat. The treated thinning stands would reach more advanced structural stages (Appendix A) and facilitate faster achievement of structurally complex forest condition and connectivity between older forest types. For the short-term, snag and down wood creation would provide habitat for prey species.

Table III/IV-9 Changes in suitable and dispersal habitat within the eight owl sites under the proposed Action Alternative. This accounts for DM acres becoming suitable habitat and HWC acres becoming dispersal habitat.

Owl Site Name	Owl Habitat Classification	Hardwood Acres	DM Acres	Proposed Action 40 Years			
				Acres Suitable	% Change	Acres Dispersal	% Change
Cherry Creek	C (core)	1	86.5	344.5	+17.9	442	+0.4
	HR (home range)	84	858.8	2827.8	+18.5	3298	+1.9
Alder Creek	C						
	HR	13	97.9	1337.9	+2.6	2049	+2.2
Park Creek	C						
	HR		9.0	1652	+0.5	2552	+0.4
Peevee Creek	C						
	HR	2	6.5	1645.5	+0.4	3331	-
Vaughn's Creek	C		0.5	288.5	-	300	-
	HR	22	111.5	1754.5	+2.7	2674	+0.1
Cherry Ridge	C						
	HR	4	106.8	1171.8	+1.9	2292	-
West Vaughn's	C		113.6	352.6		387	+0.4
	HR	41	810.9	2672.9	+18.1	3110	+0.8
Alder Middle	C						
	HR			1128	-	1983	-

While these are relatively small changes (<3%) in the total amount of suitable habitat in the home range, they do bring some owl home ranges closer to meeting the suggested minima for maintaining owl life history requirements. For example, the Vaughn's Creek site increases from 36% suitable to 38.7% suitable, only 1.3% from the suggested minima.

The biggest impacts would be to the Cherry Creek and West Vaughn's sites that would average an 18% increase in suitable habitat over the next fifty years. For the Cherry Creek site, this is within both the core and home range, while the West Vaughn site increases in the home range only. With both of these sites located adjacent to the Cherry Creek RNA, which provides high quality nesting roosting and foraging

habitat, these two sites would have the highest probability for spotted owl reproductive success within this action area over the long-term.

Disturbance
Within the action area, there are approximately 1,721 acres of unsurveyed suitable or occupied spotted owl habitat within 65 to 440 yards of unit boundaries (disturbance distance). The BLM would restrict activities from occurring within the critical breeding season, avoiding adverse effects to spotted owls from disturbance.

Marbled Murrelet

Suitable Habitat
The BLM would not conduct activities within suitable habitat for the marbled murrelet.

Critical Habitat
All proposed treatment units are located within Critical Habitat Unit (CHU) OR-06-b (1996; 71 FR 53838).

No Action
While there would be some ingrowth and suppression in the unthinned stands, they would not have enough structural characteristics or multi-layered canopies to be considered marbled murrelet suitable habitat within this period. As stated in the forest ecology analysis (p. 29), these stands "would achieve large tree size in 50 years, but would not develop multiple conifer canopy layers (Table III/IV-3, Figure III-IV-1)." The recovery plan identified that "simply growing large trees is not sufficient to obtain marbled murrelet habitat" (USDI 1997b).

Proposed Action
Disturbance
Within the action area, there are approximately 1,653 acres of unsurveyed suitable or occupied murrelet habitat that occur within 100 to 440 yards of project unit boundaries (disturbance distance). The BLM would restrict activities within the critical breeding season for murrelets and implement daily timing restrictions during the later breeding period, avoiding adverse effects to murrelets from disturbance.

Critical Habitat
The action area occurs within the boundaries of murrelet critical habitat unit OR-06-b. However, the BLM does not anticipate that any of the activities associated with the proposed action would affect suitable habitat for the murrelet. Critical habitat would remain unchanged.

Cumulative
As the BLM has designed these treatments to provide late-successional habitat on a faster trajectory than current conditions, marbled murrelets would begin to use these stands for nesting (as suitable habitat) earlier. With treatments designed to provide complex structure including larger limbs, nesting platforms would be available earlier as well. This alternative would meet recovery action 3.2.1.3 "Use silvicultural techniques to increase speed of development of new habitat" (USDI 1997b). As all of this project would occur within critical habitat unit OR-06-b and LSR 261, this action would contribute to the long-term recovery of the marbled murrelet.

Special Status Species
There are several special status species documented within the terrestrial action area; however, they would not be impacted by implementation of either alternative. These include the foothill yellow-legged frog, bald eagle, American peregrine falcon, fringed myotis bat, Townsend's big-eared bat or pacific

fisher. There is no habitat within the treatment units for these species. There are no suitable large snags for bats (see p. 26), nesting habitat for peregrines/bald eagles, ≤ 4th order streams for frogs or large woody debris for fishers. Table B in the Wildlife Report (incorporated by reference) contains the full list of special status species on Coos Bay District that are rare or have not been documented within the analysis area.

The spotted tail-dropper slug could occur within treatment areas; however, since the treatments would maintain over 40% canopy cover, habitat for these species would not be diminished (USDI 2005).

Survey and Manage

The thinning treatments of the Cherry Vaughn project apply a 2006 Exemption from a stipulation entered by the court in litigation regarding Survey and Manage species and the 2004 Record of Decision related to Survey and Manage mitigation measure in *Northwest Ecosystem Alliance v. Rey*, No. 04-844-MJP (W.D. Wash., Oct. 10, 2006). Previously, in 2006, the District Court (Judge Pechman) invalidated the agencies' 2004 RODs eliminating Survey and Manage due to NEPA violations. Following the District Courts' 2006 ruling, parties to the litigation entered into a stipulation exempting certain categories of activities from the Survey and Manage standards and guidelines, including both pre-disturbance surveys and known site management. Also known as the Pechman exemptions, the Court's Order from October 11, 2006 directs:

"Defendants shall not authorize, allow, or permit to continue any logging or other ground-disturbing activities on project to which the 2004 ROD applied unless such activities are in compliance with the 2001 ROD (as the 2001 ROD was amended or modified as of March 21, 2004, except that this order will not apply to:

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

Per the 2011 Settlement Agreement, the 2006 Pechman Exemptions remain in force:

"The provisions stipulated to by the parties and ordered by the court in Northwest Ecosystem Alliance v. Rey, No. 04-844-MJP (W.D. Wash. Oct. 10, 2006), shall remain in force. None of the following terms or conditions in this Settlement Agreement modifies in any way the October 2006 provisions stipulated to by the parties and ordered by the court in Northwest Ecosystem Alliance v. Rey, No. 04-844-MJP (W.D. Wash. Oct. 10, 2006)."

The Cherry Vaughn thinning treatments meet Exemption A because it consists of thinning only in stands less than 80 years old (BLM stand exam data).

The 146 acres of hardwood conversion treatments do not meet the Pechman Exemptions within the 2011 Settlement Agreement. 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 Cherry Vaughn project applies the Survey and Manage Species list in the Settlement Agreement (Table, Settlement Agreement Attachment 1) for hardwood conversion treatments 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 the Mitigation Measures Standards and* Guideline, as modified by the 2011 Settlement Agreement. Appendix B contains the checklist of Survey & Manage wildlife species and the compliance tracking form.

Forested Land Birds

In the recently signed Memorandum of Understanding to Promote the Conservation of Migratory Birds between the Bureau of Land Management and the U.S. Fish and Wildlife Service, the BLM would evaluate the effects of planned actions on migratory bird populations. The 2008 Birds of Conservation Concern for the Northern Pacific Forest (http://www.fws.gov/migratorybirds/NewReportsPublications/SpecialTopics/BCC2008/BCC2008.pdf) includes the following species that the project could affect: Northern goshawk, olive-sided flycatcher and rufous hummingbird.

Northern goshawks are associated with late-seral stands. Because thinned stands in the analysis area are expected to achieve old-growth structure sooner than unthinned stands (Bailey *et al.* 1998, Bailey and Tappeiner 1998), thinning is likely to benefit this species over the long-term.

Olive-sided flycatchers are associated with conifer forest, especially where burns have left scattered large snags and live trees. It is unclear why this species is declining in an era of increasingly fragmented forests when it prefers edge habitat, but some types of harvested forests could be acting as "sinks" where nesting success is poor. However, in one study, this species responded positively to thinning, possibly because thinning creates the uneven canopy needed for foraging (Hagar and Howlin 2001).

Reasons for population declines in the rufous hummingbird are unclear. This species was one of a group of neotropical birds that did not respond to thinning as a whole (Hagar and Howlin 2001). Because rufous hummingbirds seem to prefer a high canopy and well-developed understory for breeding (Patterson 2003,2006), they would likely benefit from thinning over the long-term. Thinning would increase light to the understory, promoting shrub growth and increasing nectar availability from flowering plants.

White-footed vole

White-footed voles are not listed as a S&M species or a BLM Special Status Species; no pre-clearance surveys are required. While there are limited studies on the species, white-footed voles have been known to be associated with red alder presence. However, Manning *et al*. (2003) concluded, "capture of white-footed voles in the southern Oregon cascades supports a stronger association of this species with alder trees and hazel shrubs." Therefore, removal of 146 acres of red alders could directly affect individuals of this species population within the project area, if they are present. However, as stated on p. 27, the habitat association within the project area "suggests that in the absence of disturbance, red alder would be a very minor (≤1%) component of upland (non-fluvially-influenced) portions of treatment units. These upland areas comprise the majority of the treated portions of treatment units." As these stands were historically

conifer-dominated, they would not have provided habitat for the white-footed vole. Untreated red alder stands would ensure population persistence within the project area.

Snags and Down Wood

These stands are currently providing for <30% cavity nester potential because they are lacking large snags mainly due to the past harvest. The Proposed Action includes the creation of approximately 2500 snags (≥11" DBH) and 1350 down wood pieces. For the short-term, these complex structures would provide habitat for owl prey species, particularly the northern flying squirrel as well as benefit cavity nesters. Snags ≥11" DBH would be suitable for woodpecker foraging (Wildlife report, Appendix WL-B).

Botany

There are no T&E species known or suspected to occur within the project area.

There are 21 special status species suspected of occurring within the Cherry Vaughn analysis area for which surveys are practical (Appendix C). The BLM has made this determination based on this project overlapping the known or suspected range of a species as well as the likelihood that potential habitat is present. Aerial photographic interpretation, review of information on each species habitat requirements, and proximity of known site locations determines potential habitat. While the BLM does not conduct surveys for Bureau strategic species, surveyors do collect occurrence data if they incidentally encounter these species during formal surveys.

Using the 2011 Settlement Agreement for Survey and Manage, there is no requirement to survey in thinning stands under age 80. However, there are portions of the Cherry Vaughn project for which surveys are required. These include the hardwood conversion areas and several areas where non-commercial silvicultural treatments, primarily hardwood removal, would create gaps of up to a few acres. There are five S&M Category "A" and "C" species suspected of possibly occurring in these areas. These include the lichens *Cladonia norvegica, Leptogium cyanescens, Lobaria linita,* and *Pseudocyphellaria perpetua* and the bryophyte *Tetraphis geniculata*.

The overall bryophyte and lichen diversity is low due to the densely stocked canopy in these units. All of these units were burned after they were harvested and the remaining stumps, snags and down wood are visibly charred in most units. These charred surfaces are not as densely covered with lichens and bryophytes as uncharred wood. Down, uncharred large logs, creek areas, openings, rocky outcrops, and hardwood trees harbor the majority of the bryophyte diversity. Lichens are typically more abundant on the edges of these units, in areas where there is a hardwood component, and where there are canopy gaps that allow sunlight to penetrate into the lower canopy and onto the forest floor. Green-algal and alectorioid lichens dominate the lichen community in all these units. Cyanolichens are rare and are most abundant in drainages and on edges of units adjacent to late-successional forests.

No Action

The Weaver-Sitkum EA area lies within the Cherry Vaughn analysis area. Botanists surveyed all thinning units in the Weaver-Sitkum project area for special status species and did not find any sites. However, the BLM did not conduct surveys for S&M species as part of that project, as they were not required under the Pechman exemption.

Surveyors did not find any T&E or special status species on BLM lands along the proposed natural gas pipeline corridor for the Jordan Cove Energy and Pacific Connector Pipeline Project. The pipeline corridor would clear 55 acres of 80+ year old forest, which would permanently convert 12 acres to early-successional conditions. These 12 acres represent approximately 0.03% of the total acres of 80+ yr. old forest on Coos Bay BLM lands in the Cherry Vaughn analysis area (from Coos Bay GIS data). In consultation with the USFS and BLM, Pacific Connector has developed a draft mitigation Plan (FERC

2009a) to compensate for unavoidable effects for impacts on species resulting from clearing of mid- and late-seral forested habitats.

Proposed Action

Special Status Species

Surveys conducted from October 2010 through August 2011 did not find any special status species. Surveyors did find a S&M Category "B" species, lichen *Bryoria subcana*.

The botanist found a single *Bryoria subcana* specimen incidentally while conducting lichen/bryophyte surveys in EA Unit 15. It is located in a Douglas fir tree on top of a ridgeline in the southwest corner of the unit. Implementing the *Management Recommendations for Survey and Manage Lichens* after utilizing the *Conservation Assessment for 11 Species of Coastal Lichens* (USDA and USDI 2005) the BLM delineated a 50-foot no-cut buffer to the north and east. This buffer also includes the entire unit to the south and west. Botanists found this species right on top of the ridgeline, a habitat preference the BLM has noted at other site locations on the Coos Bay District. As the buffer includes all of the habitat preference, this species would likely persist at this site.

Survey & Manage

As described on page 40, the Cherry Vaughn thinning treatments meet Exemption A of the Pechman Exemptions within the 2011 Settlement Agreement because they entail no regeneration harvest and consist of thinning in stands less than 80 years old (BLM stand exam data).

The 146 acres of hardwood conversion treatments do not meet the Pechman Exemptions within the 2011 Settlement Agreement. Therefore, the Cherry Vaughn project applies the Survey and Manage Species list in the Settlement Agreement (Table, Settlement Agreement Attachment 1) for hardwood conversion treatments 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 the Mitigation Measures Standards and Guidelines*, as modified by the 2011 Settlement Agreement. Appendix D contains the checklist of Survey & Manage Botany species and the compliance tracking form. Surveyors did not find any S&M species from extensive surveys conducted in the hardwood conversion areas.

Survey & Manage Fungi

As S&M fungi are not practical to survey for, the BLM used the *Conservation Assessment for Fungi Included in Forest Service Regions 5 and 6 Sensitive and BLM California, Oregon and Washington Special Status Species Programs* (Cushman and Huff 2007) to assess effects. The Cherry Vaughn treatments are in early to mid-successional aged forest stands, which are not the older-aged habitat these S&M fungal species are closely associated with so it is unlikely that surveyors would find any S&M fungi species in these young stands. As the density management prescriptions would maintain canopy cover above 40% and protect all large down woody material, fungi (if present) would persist on-site.

While hardwood conversions and non-commercial silvicultural treatment areas would create gaps with less than 40% canopy cover, these S&M fungal species are thought to be closely associated with late-successional and old-growth forests (USDA and USDI 2000). In addition, the hardwood conversions and non-commercial silvicultural treatment areas are composed primarily of red alder and myrtlewood. None of the Bureau Sensitive fungal species within the range of the project area has specific habitat requirements closely associated with early and mid-successional hardwood stands. Thus, it is highly unlikely there would be any effects to Bureau Sensitive fungal species in either hardwood conversions or non-commercial silvicultural treatment areas.

The BLM would treat density management thinning units where the prescriptions would create gaps are all within LSRs to promote and enhance development of old-growth characteristics. Therefore, these density management thinnings would ultimately benefit species associated with late-successional forests. In addition, the Northwest Forest Plan sets aside 81% of all federally managed lands in reserves, with 87% of all late-successional forests in these reserves. These late-successional reserves, including those on Coos Bay BLM lands, would help minimize the likelihood of and need for listing any of these special status fungal species under the ESA.

Water Resources

The harvest units are located in the East Fork and North Fork Coquille River Watersheds. Watershed is defined as the 5th field hydrologic unit level. Sub-watershed refers to a smaller, 6th field hydrologic unit which varies from about 25 - 50 square miles for the affected sub-watersheds. In portions of this analysis, the BLM used the sub-watershed scale to better detect potential effects of the project near the site of proposed actions. The rationale is that adverse (or beneficial) effects to water resources are easier to detect in smaller catchments (Bosch and Hewlett 1982) and as one nears the treatment site. Table III/IV-11 below shows the location and scale of the project by sub-watershed. These four sub-watersheds comprise the analysis area (**Map 1**). Approximately 92% of the treatment area is located in the Middle Creek Sub-watershed.

Table III/IV-11 Location and Area of treatment units by watershed

Watershed (5th Field)	Sub-watershed (6th Field)	Area* (mi^2)	Area (Acres)	Treatment Acres	Percent of Sub-watershed
East Fork Coquille River	Brummit Creek	24.4	15,590	37	0.2
	Brewster Canyon	26.6	17,050	64	0.4
	Yankee Run	25.7	16,430	18	0.1
North Fork Coquille River	Middle Creek	50.7	32,450	1371	4.2
Totals		**127.4**	**97,950**	**1490**	**1.5**

*Approximate values based on GIS data

Stream Flow

The analysis area is within the Southern Oregon Coastal Basin and has a Mediterranean type of climate characterized by cool, wet winters and warm, dry summers. The majority of precipitation is in the form of rain; however, some snow is likely at higher elevations in most years. Precipitation across the analysis area ranges from about 50 inches/yr. in the lower elevations of the Yankee Run Sub-watershed to over 80 inches/yr. in the upper elevations of the Brummit Creek Sub-watershed. Most of the yearly precipitation total occurs between November and March. The volume of stream flow closely parallels the precipitation pattern. Peak stream flows occur from November to March, and low stream flows occur from July to October. Small 1st and 2nd order headwater streams are generally intermittent and have no surface flow during the dry season in most years. Intermittent and small perennial streams are located within or adjacent to several of the treatment units (see maps).

Peak Flows and Roads

Roads have the potential to increase peak flows (Beschta 1978, Wemple *et al.* 1996). Mid-slope roads can intercept surface and subsurface water and divert it into the road drainage system. This can effectively extend the stream channel network and speed up delivery of water to streams. Most roads in the analysis area are mid-slope roads and many of these roads have sections where their drainage systems connect directly to stream channels.

A method for assessing the potential risk of the road network to cause an impact on stream flow was developed for the Governors Watershed Enhancement Board (GWEB). The assessment assigns a "threshold of concern" for hydrologic impacts based on the percentage of area covered by roads. The threshold levels are 0-4% low risk, 4-8% moderate risk, and above 8% high risk ((WPN 1999) p. IV-15).

Based on GIS data, there are about 620 miles of road in the analysis area. Using an average road width of 30 feet (0.0057 miles), there are approximately 3.5 mi^2 covered by roads (0.0057 miles width x 620 miles length). This equates to about 2.8% of the total area covered by roads (3.5 mi^2 road area /127.4 mi^2 total area). Therefore, according to the GWEB method, the analysis area currently has a low risk (<4% road area) of hydrologic impacts due to roads. However, as stated by the authors, the condition of roads and the design of drainage systems may be just as important in determining the impact of roads on stream flow.

No Action

In total, the BLM expects that the road network will be further disconnected from stream channels because of other planned projects. Other roads would be constructed in the analysis area to access private forest lands. It is unknown whether there would be enough road construction to exceed the GWEB threshold described above to cause impacts to flow regimes. The Oregon Department of Forestry (2011) has greatly improved requirements for new road design and construction practices since construction of the legacy roads in the 1960s and 1970s. These new roads would be less likely to be connected to streams or to increase peak flows.

Other planned federal projects (Table III/IV-1) include road construction and renovation. These proposed projects include design features that would reduce road connection with the stream network.

Proposed Action

Project implementation would slightly reduce road effects on streamflow in the analysis area. The project would result in a net decrease of approximately 5.2 miles of the total open road network in the analysis area (9.3 decommissioned – 2.6 miles new construction – 1.5 miles previously decommissioned). The decommissioning would disconnect this mileage from the stream network. Therefore, according to the GWEB analysis, there would still be a low risk of hydrologic impacts due to roads. Additionally, by improving road drainage, project implementation would effectively disconnect some roads for renovation from the stream network. Roadwork is analyzed in more detail below under Water Quality/Sediment/*Proposed Action*.

Water Quality

Sedimentation and stream temperature are the primary water quality parameters that forest management is likely to affect. The Oregon Department of Environmental Quality (ODEQ) develops water quality standards that protect beneficial uses of rivers, streams, lakes, and estuaries. Beneficial uses for streams that timber harvest could affect include domestic water supply and fish/aquatic life. ODEQ places water bodies that do not meet water quality standards on the States' 303(d) list as Water Quality Limited (ODEQ 2006). In the analysis area, ODEQ has listed Middle Creek, Alder Creek, and parts of the East Fork Coquille River for high stream temperature. All units are located farther than 300 feet from these three streams.

Stream Temperature

A lack of stream shading due to timber harvest adjacent to stream channels can cause elevated water temperature. A reduction in shade increases the amount of solar radiation reaching the stream surface (Brazier and Brown 1973).

Approximately 92% of the treatment area is located in the North Fork Coquille Watershed (Table III/IV-11). The BLM developed the North Fork Coquille River Water Quality Restoration Plan (WQRP) to address water quality limited water bodies on federally administered lands in the watershed. A modeling study of riparian conditions for the WQRP showed that shade was at or near target levels (maximum shade) on federally administered lands (USDI 2001). Existing modeled shade on BLM lands was above

90% on most streams. Some streams, Park Creek for example, were at target shade. The difference between existing and target shade ranged from zero to 4% with an average of 2%. Note that this difference is probably below any current models confidence limits. Overall, the model results indicated that there is little potential for improvement in average shade conditions on BLM lands.

Recent shade measurements taken for this analysis were similar to the modeled results in the WQRP. Small streams within or adjacent to the treatment units are currently well shaded by dense stands of conifers, some hardwoods and overhanging brush. The table below shows reach-average shade measurements taken with a Solar Pathfinder along three of the larger perennial streams near the units. Surveyors took measurements at random spacing in August 2010 along stream reaches adjacent to units. Shade from overhanging brush was not included in shade measurements when possible.

Table III/IV-12 Shade measurements along perennial streams near units.

Stream	Adjacent Units	Average Shade (%)	*n
Vaughn's Creek	5 & 6	97	20
South Fork Cherry Tributary	10	93	9
Cherry Creek, S.F. Cherry	13	93	20

*n = number of measurements

Reach average shade was above 90% which is typical of the small streams near units. Almost all of the shade-providing trees (and brush) were located within 30 feet of the stream banks.

No Action

Other planned federal timber sales in the analysis area (Table III/IV-1) incorporate Riparian Reserves under the Northwest Forest Plan. The BLM does not expect effects to stream temperature for these projects.

The Oregon Forest Practices Act does not require retention of shade buffers along non-fish-bearing streams (ORS 2011). Therefore, private landowners could remove some shade-providing trees along non-fish-bearing perennial streams where harvest occurs on private lands in the analysis area. Temperature increase would be dependent on the length of stream affected, stream width, topography, orientation and other factors.

In the areas proposed for density management, the unthinned stands would continue to have unfavorable height to diameter ratios that increase the risk of blow down (Smith 1962), and subsequent exposure of the stream to solar heating. In addition, the unthinned condition would delay establishment of understory trees and shrubs with their associated multi-canopy layers that could provide shade in the event that some or all of the overstory shade is lost due to a catastrophic event ((Levno and Rothacher 1969); cited in (Adams and Ringer 1994)).

Research also indicates that stands that develop at very high densities have a limited variation in tree size, which makes them susceptible to diameter growth stagnation and instability (Wilson and Oliver 2000). Without treatment at the appropriate time, these dense stands rapidly decline in growth and vigor resulting in a stagnant stand that becomes more susceptible to wind, insects, disease, and fire disturbances.

Proposed Action

There would be no effect to stream temperatures in intermittent streams from density management thinning of trees outside the 30-foot no-harvest buffer. By definition, intermittent streams have little or no surface flow during the summer when elevated stream temperatures can occur.

The Cherry Vaughn project would not reduce shade along perennial streams and, therefore, there would be no effect to stream temperature. On perennial streams, the minimum 50-foot no-harvest buffers would

maintain existing shade. The no-harvest buffer adjacent to Unit 10 would be approximately 100 feet due to stand conditions. As noted above, based on sample measurements with the Solar Pathfinder, almost all of the shade-providing trees (and brush) were located within 30 feet of the stream banks. Additionally, thinned areas for density management and hardwood conversion outside the buffers would maintain approximately 60% or greater canopy closure, and would provide adequate, redundant shade until the canopy closes again in 5-10 years. Stands with greater than 60% hardwood trees, mostly alder, were classified as hardwood patches. Hardwood conversion areas outside no-harvest stream buffers would be small gaps that range from approximately 0.3 to 1.3 acres. The prescription retains conifers in these gaps.

In order to improve or maintain stream temperatures in the watershed, The North Fork Coquille River Water Quality Restoration Plan (USDI 2001) proposes two main management actions: (1) passive restoration to allow riparian vegetation to grow to target shade values; and (2) active restoration to maintain and increase shade and achieve other Aquatic Conservation Strategy objectives. Active restoration actions would include:

- Thinning stands in Riparian Reserves to maintain or enhance the growth of conifers, and the development of deep crowns.
- Thinning stands in Riparian Reserves that are overstocked to reduce the risk of blowdown and the risk of crown fire, which is associated with high canopy continuity.
- Thinning followed by under planting or natural seeding to develop complex multi-species and multi-canopy stands.
- Planting under-stocked Riparian Reserves.
- Converting hardwood stands to conifer.

As described above, density management thinning near streams would result in favorable height to diameter ratios of the remaining trees and would decrease the risk of blow down and subsequent exposure of the stream to solar heating. In addition, thinning would encourage establishment of understory trees and shrubs with their associated multi-canopy layers that could provide shade in the event that some or all of the overstory shade is lost due to a catastrophic event. Growth would improve vigor in the thinned stands making them less susceptible to wind, insects, disease, and fire disturbances.

Sediment

Sediment input to stream channels is a result of both natural and management related processes. Primary sediment sources include episodic landslides and debris flows usually associated with intense winter storms (Townsend *et al.* 1977), hillslope erosion, stream bank erosion, and roads. Forest management related increases in sedimentation are most often the result of poorly designed and/or poorly maintained forest roads. These roads can be a major contributor of fine sediment to streams (Reid and Dunne 1984).

There are no streams in the analysis area currently listed by ODEQ as impaired by excess fine sediment. Approximately 38 miles of the haul route is paved and most of the roads for renovation were in a hydrologically stable condition. A field inspection of the haul route showed very few areas of potential sediment delivery. However, some roads in the analysis area show evidence of surface erosion, inadequate drainage, inadequate stream crossings, or unstable cut-banks and fill slopes. These roads are likely to provide excess fine sediment to adjacent streams. The 27-10-6.01 road for access to Unit 6, for example, has several failed or failing cross drains adjacent to Vaughn's Creek. The road has no crown in many areas and there is evidence of surface water running down the road prism.

No Action

Natural sedimentation levels within the watershed would remain constant over the long-term but may vary considerably from year to year. Management related sediment sources, primarily from roads, might decrease in the future. Even while some new roads are constructed, engineers have greatly improved road

design and construction practices since the legacy roads were constructed in the 1960s and 1970s. As compared to these legacy roads, new road construction practices require greater protection of water quality. At the same time, older legacy roads are likely to be improved or decommissioned.

The No Action alternative would not renovate or decommission roads identified in the analysis area as potentially adding sediment to streams. Some roads for renovation or decommissioning would continue to deliver fine sediment to stream channels. Future road decommissioning and closures within the affected area would depend on the availability of funding from other sources.

Proposed Action

Overall, the Proposed Action would result in a net decrease of approximately 5.2 miles of open roads after decommissioning (9.3 decommissioned – 2.6 miles new construction – 1.5 miles previously decommissioned). Road renovation/decommissioning would slightly reduce the volume of fine sediment entering stream channels. The effects of roadwork and treatment activities are analyzed below by category.

Road Construction

The 2.56 miles of new road construction would have no effect on sediment delivery to stream channels and would not affect water quality. There would be no new stream crossings. The new roads would be primarily located on or near ridge tops and would incorporate design features that include avoiding fragile or unstable areas, minimizing excavation and height of cuts, end haul of waste material where appropriate, and construction during the dry season (ROD/RMP; D3 – D4).

All new construction of natural surface roads and landings would be seasonally maintained prior to winter rains if they need these roads in the following year. Seasonal maintenance may include but is not limited to providing adequate water bars, mulching with wood chips or straw, and seeding with a district approved erosion-control seed mix. The BLM would decommission (1.23 miles) or fully decommission (1.34 miles) all of the newly constructed roads when project activities associated with each road are completed.

With the implementation of the road management Project Design Features, these roads would not increase sediment delivery to stream channels due to their locations, intervening forest buffers, and distances to streams. Road drainage features would be designed so that any sediment-laden surface water would quickly infiltrate into forest soils. Therefore, the roads and landings would not affect water quality.

Road Renovation/Improvement

Road renovation and improvement would slightly reduce sediment delivery to stream channels. Renovation, reconstruction or improvement of approximately 16 miles of the existing haul route would occur. This includes renovation and decommissioning of 1.5 miles of road previously decommissioned. Depending on haul season, some spur roads would be renovated and surfaced with rock to meet winter haul standards. Dry season only spurs would have dirt surfaces. Renovation of these roads to standards required for new construction (ROD/RMP; D3 – D4) would divert road drainage away from stream channels and toward the forest floor where it could re-infiltrate. Renovation may include, but is not limited to surfacing with rock, stabilizing cutbanks and fill slopes, restoring outslope or crown sections and providing adequate drainage.

Three 24” diameter stream culverts would be replaced on the 27-10-5.0 road to access portions of Unit 6. They would also replace several failed or failing cross drains on the 27-10-6.01 road. The road crown would be re-established to prevent concentration of flow down the road prism, and a sediment filter would be installed in the ditchline above a cross drain on the road to prevent sediment from entering

Vaughn's Creek. Other stream culverts or cross drains may be installed if found to be deficient during road maintenance or renovation.

Road renovation and improvement would occur in the dry season for any activities requiring soil displacement. Additional sediment filters would be installed after renovation and before onset of winter rains, if needed, to prevent sediment delivery to streams. Therefore, renovation or improvement would have a negligible potential for short-term (1-2 years) increased sediment delivery to stream channels. In contrast, road renovation and improvement would provide a long-term (many years) benefit to flow routing and water quality in the affected areas.

Decommissioning
A net total of approximately 5.5 miles (9.3 decommissioned – 2.6 miles new construction – 1.2 miles previously decommissioned) of road would be decommissioned (6.9 miles) or fully decommissioned (2.4 miles) as a result of this project. Decommissioning may include, but is not limited to, installation of water bars and a suitable barrier to block access. Full decommissioning would be designed to restore "natural hydrologic flow" (USDI 2010 *Update*) and may include limited sub-soiling or tilling, removal of unstable fills and addition of slash to the road surface. Decommissioning of these roads would reduce their potential to deliver sediment to stream channels or alter flow routing in the analysis area.

Haul Activities and Road Maintenance
The amount of fine sediment introduced to streams during haul activities would be indiscernible beyond natural erosion processes occurring during winter rains and would have negligible impacts to downstream resources. Approximately 57 miles of forest road would be used for timber haul. Of this total, approximately 38 miles of the haul road is paved. The remainder of the haul route is gravel or natural surface roads. Hauling would be restricted to the dry season where road surfaces have an inadequate rock surface for wet season haul.

The haul route crosses several streams. During the dry season, since there is little or no flowing water on road surfaces, there would be a negligible change in sediment delivery to streams because of haul. During the wet season, there would be no sediment delivery from the paved haul routes because paved roads are not likely to produce sediment (Reid and Dunne 1984).

Wet season haul on gravel roads has the largest potential to deliver sediment to stream channels. Approximately 5.9 miles of gravel-surfaced road would be used for all season haul. However, a field survey of these roads showed few sites of potential sediment delivery from winter haul. In addition, several design features listed in Chapter 2 would minimize the potential for increased sediment delivery from haul activities and road maintenance. These design features would be in place before winter haul and may include: 1) applying an additional lift of rock to stream crossings if there is a potential for road sediment delivery to a stream, 2) containing any offsite movement of sediment from the road or ditch flow near streams with a suitable sediment filter, 3) monitoring road conditions during winter use to prevent rutting of the rock surface and 4) suspending haul during very wet conditions. Road maintenance during the life of the project would minimize road drainage problems and reduce the possibility of road failures and increased sediment delivery to streams.

Private timber companies use the majority of gravel-surface haul routes in the analysis area extensively throughout the year. The winter use of roads for this project would be a few trips per day. The use of these roads is expected to be short-term and limited by weather conditions as specified in the site-specific project design features. Though some minor sedimentation may result from the additional haul activities, occurrence would only take place during prolonged rainfall events (until haul is suspended as noted above). Additional sediment from winter haul would be negligible and not outside levels that presently occur during such rainfall events.

Treatment in Riparian Reserves
Approximately 41% (612 acres out of 1,490 acres total) of the treatment area is within Riparian Reserves. This includes the no-harvest buffers. The 30-foot no-harvest buffers on intermittent streams and 50-foot no-harvest buffers on perennial streams would protect shade, bank stability, and prevent sediment delivery to streams from adjacent harvest operations. Rashin *et al.* (2006) found that stream buffers were most effective at preventing sediment delivery when timber falling and yarding activities were kept at least 10 meters from streams and outside of steep inner gorge areas. The buffers would provide an adequate sediment filter strip because non-compacted forest soils in the Pacific Northwest have very high infiltration capacities and are not effective in transporting sediment by rain splash or sheet erosion (Dietrich *et al.* 1982). In the long-term, large wood contributed to the stream channel because density management has the potential to create additional capacity for sediment storage when those trees fall into stream channels.

Yarding Corridors
Yarding corridors would be placed to minimize disturbance of the stream channel and prevent sediment delivery. Design features include requiring full suspension of logs when feasible, using natural openings to the extent possible, minimizing the width (est. <12 feet) and number of corridors and crossing channels at a perpendicular angle when possible. In addition, within the no-harvest area to provide yarding corridors, cutters would fell trees parallel to the stream channel and leave those trees on-site to provide bank armoring. Therefore, due to the implementation of these design features and the small area disturbed, there should be no increase in sediment because of these yarding corridors.

Fisheries
The analysis area is located within the federally listed threatened Oregon Coast coho, *Oncorhynchus kisutch*, evolutionarily significant unit (ESU). The National Marine Fisheries Service (NMFS) published the listing determination and coho critical habitat (CCH) designation for Oregon Coast coho February 11, 2008 effective May 12, 2008 (73 FR 7816). Additionally, the Magnuson-Stevens Fishery Conservation and Management Act designated streams used by coho and/or chinook salmon within the analysis area as essential fish habitat (EFH). The Magnuson-Stevens Act defines EFH as "...those waters and substrate necessary to fish for spawning, breeding, feeding, or growth to maturity (67 FR 2343)."

Aquatic Sensitive species on the Bureau SSS list found in the analysis area include Oregon Coast coho (federal threatened), Oregon Coast steelhead (Sensitive), Pacific Coast chum salmon (Sensitive), and the foothill yellow–legged frog (Sensitive). The wildlife section on page 39 covers yellow-legged frogs.

Natural barriers or steep stream gradients within the analysis area limit anadromous fish distribution. An eight-foot waterfall on Vaughn's Creek is most likely a barrier to coho and steelhead (BLM GIS data and (Van Slyke 2010). CCH is designated upstream of the waterfall in Vaughn's Creek. A fish ladder, constructed in 1962, provides passage over a 26-foot waterfall in lower Middle Creek (USDI 2001). The ladder has given coho, chinook, and steelhead access to approximately 15 miles of habitat once inhabited only by cutthroat trout and other native resident fish (USDI 2002). A portion of the analysis area is located upstream of Brewster Gorge, a natural barrier in the East Fork Coquille River located in T28S R10W section 9. The gorge is a passage barrier to coho and chinook. Steelhead can move upstream through the gorge during certain flow conditions (USDI 2005 *Update*).

The proposed action has the potential to affect the following streams used by coho and/or designated as CCH/EFH: Steel Creek, Little Cherry Creek, Cherry Creek, South Fork Cherry Creek, North Fork Cherry Creek, an unnamed tributary to North Fork Cherry Creek with the confluence in T27S R10W section 17, Middle Creek, Vaughn's Creek, an unnamed tributary to Vaughn's Creek with the confluence in T27S R10W section 6, Park Creek, and Moore Creek (StreamNet GIS data 2003 and BLM GIS data).

Steelhead occur in all of the streams mentioned above under coho/CCH/EFH as well as West Fork Brummit Creek and an unnamed tributary to Park Creek with the confluence in T27S R10W section 9 (StreamNet GIS data 2003 and BLM GIS data). Biologists do not know chum distribution in the analysis area; however, a safe assumption is that chum could also use any streams used by chinook/coho.

Fish Habitat

The term fish habitat as used below includes CCH, habitat for Bureau Sensitive fish species, and EFH.

Human activities have influenced fish habitat within the analysis area. Many stream channels in the lower valleys are down-cut and not connected with a floodplain. Road development near streams has caused channelization and reduced stream meander. Past timber harvest practices near streams have caused a loss of in-stream large wood and a diminished recruitment of future large wood. For a detailed description of fish habitat in the analysis area, refer to the East Fork Coquille Watershed Analysis (USDI 2005 *update*, pp. IV4 – V44, Appendices H and G) and the North Fork Coquille Watershed Analysis (USDI 2002, Ch. 8 pp. 1-8).

The Water Quality Restoration Plan (USDI 2001) lists Middle Creek, Cherry Creek, and other streams in the watershed as deficient in large wood and down-cut to bedrock along several reaches. The lack of large wood and disassociation from the floodplain has caused increased stream velocities to continually scour stream channels and remove substrate during high flows. Large wood serves an important role in creating and maintaining stable and functional stream channels, reducing stream energy, retaining stream sediments, maintaining lower width/depth rations, and allowing floodplain development. A stable stream channel is one that maintains its pattern, profile, and dimension over time and neither aggrades nor degrades (USDI 2002). The interaction of large wood with streams is essential for creating juvenile and adult fish habitat.

Landslides are an important source of wood for streams and fish habitat. Logging and road construction altered landslide rates by destabilizing steep slopes within the analysis area. Instead of a single short period of intense landsliding that would have normally been associated with large-scale fires, repeated sliding results from moderately severe storms. Landslides generated in logged areas mainly introduce sediment without large logs. Instead of complex step/pool profiles with multiple side channels produced by logjams, many stream channels in heavily logged watersheds have become simple bedrock chutes (LSRA; 1998).

BLM and the Coquille Watershed Association, through log and boulder placement in fish-bearing streams on private and BLM land, have increased the amount of instream wood in the analysis area. Streams within the analysis area that received treatment include Vaughn's Creek, Park Creek, Middle Creek, Cherry Creek, and Little Cherry Creek. The placed instream logs will improve fish habitat, but the riparian areas are lacking long-term large wood recruitment (see Riparian Reserve condition discussion below). Boyer *et al.* (2003) suggest wood placement can expedite improvement of degraded streams, although these approaches are likely to prove even more effective when designed to complement long-term riparian forest management objectives that focus on recovery of a sustainable source of wood for streams.

Water quality parameters such as temperature, dissolved oxygen, and sediment can affect fish survival. Middle Creek is the only water body within this analysis area listed on the Oregon Department of Environmental Quality 303(d) list for elevated water temperatures (ODEQ 2006). Streams within or adjacent to the units are shaded by conifers, hardwoods, and brush. Streams in the analysis area meet all other water quality parameters such as dissolved oxygen or sedimentation.

Natural surface and rocked roads within the analysis area with surface erosion, inadequate drainage, inadequate stream crossings or unstable cut banks and fill slopes contribute sediment to stream channels and potentially fish habitat where there is a connection between the road and a stream channel. Adjacent streams have been subject to episodic and/or chronic fine sediment input due to poor road design and lack of maintenance. Properly designed, surfaced, and maintained roads in the analysis area do not contribute sediment to stream channels. Roads with proper drainage features (such as cross drains) direct sediment laden water onto forest soils and not directly into streams and fish habitat.

Riparian Reserve Condition Including Large Wood Recruitment
Riparian Reserve stands within the units range from 31-50 years old. Past management practices and other disturbance events have, in some cases, resulted in stands that are lacking the desirable species components that will lead to the development of late-successional habitat (LSRA; 1998). Riparian Reserve stands in units range from conifer-dominated to alder-dominated. The conifer-dominated stands have uniform structure, low species diversity, slow growth rates, low stand vigor, small diameters and are in an over-stocked condition. The total QMDs (quadratic mean diameters) in the units range from 9.9 to 11.7 inches. Stands with these characteristics take a longer time (i.e. decades) to grow large conifers (24" DBH) available for in-stream wood recruitment.

Red alder currently dominates many riparian areas in the region managed under the Northwest Forest Plan (Cunningham 2002). The alder-dominated units had a large conifer component prior to a disturbance event (LSRA; 1998). Poor establishment of conifer regeneration and severe suppression by the hardwood canopy has put these stands on a different trajectory than was present prior to disturbance. Alder-dominated Coast Range riparian areas have limited opportunity for natural regeneration of trees because of high shrub cover, especially salmonberry (Hibbs and Giordano 1996). The probability of recruiting large wood to streams is low in areas dominated by alder (MacCracken 2002). One reason for this is that the source distance for in-stream wood recruitment in mature hardwoods stands is less than conifer stands due to the shorter hardwoods (McDade *et al.* 1990). The benefits alder provide to streams in terms of leaf litter, increased abundance of insects, or nitrogen input may be outweighed by decreases in large wood input and wood residence times resulting in overall loss of fish habitat in alder dominated areas (Johnson and Edwards 2002).

"Decomposition rates of large wood in streams vary widely and depend on tree species, piece size, wood quality and condition, and location within the riparian/aquatic system" (Boyer *et al.* 2003). "…Conifers provide the most desirable structural elements in streams and rivers because they are resistant to movement and decompose slowly" (Boyer *et al.* 2003). Alder can function as in-stream wood but it is short lived and due to its small size is more susceptible to washing downstream. Keim *et al.* (2000) found tree-length alder with rootwads anchored to the bank was effective in trapping woody debris and forming accumulations, however its effectiveness was short-lived. By the third year after treatment, the pulled-over alders were losing structural integrity due to advancing decay and breakage. Conifers are longer lasting in streams as compared to hardwoods (Naiman *et al.* 2000). Compared to conifers, red alder is short-lived, does not attain as large a size, cannot withstand hydrological forces at high flows and decomposes rapidly (MacCracken 2002).

<u>Environmental Consequences</u>
The analysis below will group all harvest prescriptions (density management thinning and removal of red alder, density management thinning to retain minimal canopy cover, density management thinning to release individual conifers, and non-commercial vegetation treatment) and refer to them as vegetation treatment, unless otherwise stated.

No Action
Without treatment, the conifer dominated stands would decline in growth and vigor resulting in stagnant stands more susceptible to wind, fire, insects, and disease. Low species diversity generally results in less nutrient availability to streams. Suppression mortality would eventually release conifers for growth but at a delayed timeframe. Recruitment of large diameter logs to stream channels would remain deficient for a longer time if left untreated. Wood recruitment would remain at its current level until trees in riparian stands grow to larger sizes and eventually fall into stream channels. Untreated stands would produce dead trees because of suppression mortality; however, these trees would be too small to be suitable for long-lasting large logs in stream channels.

Hardwood dominated stands would continue to exclude most conifer species including Douglas fir from becoming the dominate species until a single large disturbance or the accumulation of small-scale disturbances create opportunities for conifer establishment. The alder stands with a salmonberry understory, will become salmonberry brush fields, not conifer stands, when the alders die (Cunningham 2002, Hibbs and Giordano 1996, USDI 2002). Salmonberry brush fields are "climax communities" that are unable to contribute wood to the streams. Trees cannot establish in a salmonberry brush field without a disturbance that frees growing space (USDI 2002). "As alder dominated stands senesce, only a significant natural or man-made disturbance will allow reestablishment of a tree overstory" (Hibbs and Giordano 1996).

Road maintenance, renovation, reconstruction, and decommissioning would not occur under the No Action alternative. Sediment delivery to streams and fish habitat from some roads would continue without the road activities. The stream culverts and cross drains proposed for replacement would remain a risk for failure. Chronic sediment input to streams reduces spawning production, juvenile rearing survival, and insect production (Everest *et al.* 1987, Hicks *et al.* 1991, Meyer *et al.* 2005, Waters 1995).

Proposed Action

Riparian Reserve Condition Including Large Wood Recruitment

Vegetation Treatments (DMT/HWC, STF, and non-commercial treatments)
The vegetation treatments in Riparian Reserves (RRs) would begin to restore historic landscape-level vegetation patterns. Increasing stand and species diversity as well as placing the stands on a trajectory towards developing late-successional characteristics would be attained through the treatment prescriptions, snag and down wood creation, retaining hardwoods in some units, retaining minor conifer species, and leaving no-harvest buffers adjacent streams. The no-harvest buffers would serve to maintain stream bank stability, shade, provide nutrient input to streams, and provide a concentrated, short-term source of smaller woody material available to enter stream channels. No-harvest buffers adjacent to some streams are as wide as 230 feet based on a Topographic Position Index (TPI) analysis and project design features for soils. The TPI analysis identified mesic and wet conditions in RRs where historically alder had a high likelihood of occurrence. Post vegetation treatment canopy cover across all prescriptions would range from 59% to 77% in RRs and 60% to 92% in perennial RRs. Late-successional characteristics include multi-level canopies, future recruitment of large in-stream wood, and diverse species composition. Areas subject to frequent fluvial disturbances such as floods and landslides would be excluded based on the soil scientist's review. These areas are generally dominated by moisture-tolerant and disturbance/colonizer species such as shrubs, low-growing woody vegetation (willow, vine maple etc.) and hardwoods (alder, ash, maple and myrtle) (LSRA; 1998)

Thinning in RRs would result in increased growth rates in trees, which would produce larger down logs in the long-term. Thinning riparian forest trees can accelerate the time required to reach desired stand conditions by concentrating growth on fewer stems (Boyer *et al.* 2003). Larger trees would be available

for recruitment in a shorter period than would occur without thinning. Converting alder stands to conifers can accelerate the processes that result in large conifers in streams (MacCracken 2002). Density management thinning would increase brush and deciduous tree growth, which would increase nutrient availability to stream channels.

The no-harvest buffers would remain unthinned thereby retaining the original number of trees per acre (TPA) available for recruitment into streams. The current TPA in the units ranges from 306 to 370. Following vegetation treatment the TPA in the units would range from 137 to 228. Trees in the treated portions of RRs would remain available for in-stream wood recruitment by the same processes as before treatment with the addition of damage induced tree mortality. Post vegetation treatment tree height in RRs would range from 107 to 133 feet. Trees falling greater than 133 feet from streams would not reach the channel at their current height.

The vegetation treatments would reduce suppression mortality. Dead trees resulting from suppression mortality would have been smaller which have a decreased value in terms of their function in streams. Smaller logs decompose faster, are more likely to be moved downstream or repositioned on the stream banks, and do not form large pools. Suppression mortality would still occur within the no-harvest buffers resulting in dead trees available for in-stream wood recruitment. Tree mortality could occur over time within the thinned portion of RRs due to wind, insects, or disease.

Instream wood sources from slide prone areas would remain available because of the no-harvest buffers. Trees felled within the no-harvest buffers for yarding corridors would remain on site. The no-harvest buffers include stream buffers, areas excluded from vegetation treatment based on a TPI analysis, and slide prone areas excluded from treatment based on field review. The vegetation treatments would not increase the likelihood of slides occurring; however, if slides did occur they could deliver the trees occupying the site to streams.

Creating snags and down wood in RRs would improve structural diversity in the short and long-terms and increase late successional characteristics. Snag and down log creation would not occur within 30 feet of intermittent streams and 50 feet of perennial streams.

Sample tree falling would occur in the units, including in RRs. Approximately one tree would be felled every two acres. Project Design Features (PDFs) guiding harvest in RRs would apply to sample tree falling. Sample tree falling would not affect current or future large wood recruitment because trees selected would be located outside of no-harvest buffers and would be a subset of those already identified in the prescription for removal. Felled trees would contribute to down wood because they would remain onsite even if the timber sale did not proceed.

The proposed action includes constructing one yarding corridor across a perennial stream and approximately 46 across intermittent streams. The closest corridor to fish habitat would be approximately 400 feet to Park Creek. All other corridors would be 0.2 to 6.6 miles from fish habitat. Yarding corridors would not cause a reduction in current or future recruitment of wood to fish habitat because the corridors would not be located directly over fish habitat and BLM would leave trees felled within the no-harvest buffers on-site. Additionally, trees ≥24" DBH felled in RRs would be left on-site, corridors would only be 12 feet wide, and corridors would be dispersed across three 6th field sub-watersheds located in two 5th field watersheds.

Road Construction

The proposed action includes constructing approximately 0.31 miles of new roads in RRs. The new road construction in RRs would consist of four separate road segments (13-1NC, 12-1NC, 11-3NC, and 2-2NC). Spur road 13-1NC would be the closest to fish habitat. The start of the road would be located on

the uphill side of a paved road approximately 40' from fish habitat in Cherry Creek. The other three road segments are 0.2 to 1.2 miles from fish habitat. Constructing new roads in RRs would not reduce current or future wood recruitment to fish habitat because the roads would be short road segments widely dispersed and would not include stream crossings. In addition, new roads would be located on stable non-slide prone slopes that would not deliver wood to fish habitat and trees would remain between the roads and the stream channels.

Sediment

Vegetation Treatments (DMT/HWC, STF, and non-commercial treatments)
Ground based equipment would not cross stream channels and would not operate within 30 feet of intermittent streams and 50 feet of perennial streams. Non-compacted soils have the capacity to filter fine sediment. The vegetation treatment activities would not result in sediment delivery to fish habitat because of the implementation of these design features and no-harvest buffers along stream channels.

Sample tree falling would not result in sediment entering stream channels because trees selected for falling would be located outside of no-harvest buffers and PDFs guiding harvest in RRs would apply to sample tree falling.

The majority of yarding corridors would achieve full suspension over steam channels. Approximately one corridor across a perennial stream and two corridors across an intermittent stream in unit 16 would not achieve full suspension. Vegetation treatment activities could occur during the winter in this unit when water is present in the intermittent portion of the stream. The construction and use of these corridors would not result in sediment delivery to fish habitat because: 1) corridors would be approximately 1.3 miles to steelhead in West Fork Brummit Creek and 6.6 miles to CCH in East Fork Coquille, 2) existing brush and the duff layer would filter sediment, and 3) stream banks would be protected because trees within the no-harvest buffers would be felled toward the channel and left on-site.

Vegetation treatments would not increase the likelihood of slides occurring and subsequent sediment delivery to fish habitat. Field review and TPI analysis identified slide prone areas. Expanded no-harvest buffers encompass the identified slide prone areas.

Road Construction
The proposed action includes constructing four separate road segments totaling approximately 0.31 miles in RRs. The road construction would not include any new stream crossings. Road 13-1NC would be the closest to fish habitat. The road would be located on the uphill side of a paved road across from fish habitat in Cherry Creek. The other three road segments are 0.2 to 1.2 miles from fish habitat. Sediment would not reach stream channels or fish habitat from the road construction because the forested area between the roads and stream channels would filter sediment and there would be no stream crossings. New roads would be located on stable, non-slide prone areas. New road construction includes drainage features designed to direct sediment-laden surface water onto forest soils to infiltrate. Bare soil would be seeded and mulched prior to the rainy season. The proposed action for new roads in RRs is to fully decommission and leave them in an erosion resistant condition.

Timber Haul
Timber haul on paved roads would not result in sediment movement because of the asphalt surface material. Gravel roads for haul with the closest proximity to fish habitat include roads 27-10-6.1 and 27-10-4.0. The proposed action is to use these roads for dry season haul only. Haul would only occur during the summer on natural surface roads. During the dry season when there is no water flowing on the road surface or in ditchlines, sediment delivery to streams would not occur. Sediment generated from haul roads could move off-site during winter rains. Project Design Features, BMPs, adequately surfaced roads, and vegetated ditchlines would reduce if not eliminate sediment transport to stream channels. Sediment

derived from haul would not affect fish habitat. Road maintenance and renovation completed prior to and after haul would further reduce the amount of off-site sediment movement during and after haul. Ditch relief culverts would direct the majority of sediment derived from winter hauling to the forest floor via ditch lines. Sediment directed to hillsides by ditch-relief culverts would filter into the soil before reaching stream channels. Brake *et al*. (1997) found that on established logging roads within the Oregon Coast Range, the maximum observed distance sediment traveled below a ditch relief culvert with vegetation filtering or a stream crossing culvert with stream material present (LWD, boulders, debris, etc.) was typically not more than 6.21 meters.

Road Maintenance, Renovation, Improvement, Reconstruction and Decommissioning
Maintenance, renovation, reconstruction, decommissioning, and improvement would result in bare soil, which could cause sediment to enter streams during the first winter. Sediment entering streams would be short-term and indistinguishable from background levels. Following the first winter after road activities, the amount of sediment reaching stream channels would become negligible. Best Management Practices and PDFs for road related activities would reduce and in some cases eliminate sediment from entering stream channels. The sediment derived from roadwork would primarily end up on the forest floor as it moves through ditch lines and out of ditch relief culverts. Well-vegetated ditch lines would reduce the amount of sediment entering stream channels where roads are connected to streams. The closest road activity to fish habitat would occur on roads 27-10-4.0 and 27-10-6.1. Sediment control devices installed on these roads would prevent sediment delivery to fish habitat in Vaughn's and Park Creek. The BLM may require the installation of additional sediment traps depending on road conditions during the timber sale. The road activities would not affect fish habitat in the short-term. While sediment would enter stream channels, it would not cause changes to fish habitat. The roadwork would reduce the amount of sediment entering streams in the long-term and reduce the risk of culvert and road failures.

Decommissioning and full decommissioning would leave roads in an erosion resistant condition and reduce the risk of road failures. Decommissioning would disconnect stream networks from roads where there is a stream connection. Two culverts on intermittent streams would remain on the 27-10-5.0 road following decommissioning. Constructing rolling water dips would eliminate the potential for steam diversions onto the road. Except for the 27-10-5.0 road, no other road proposed for decommissioning or full decommissioning has any stream crossings.

The proposed action includes replacing four stream culverts and installing a culvert where a spring flows across a road. The culverts are located on intermittent streams, which flow approximately 0.3 to 1.0 mile to fish habitat in Middle Creek, Park Creek and a tributary to Vaughn's Creek. Placing these culverts would not result in sediment reaching fish habitat because construction would occur during the in-water work period when little or no flow would be present in the streams and the distance from fish habitat would allow sediment to settle. Replacing these plugged and/or rusted culverts would reduce the risk of failure and subsequent sediment delivering to fish habitat. BLM may identify additional culverts at the time the timber sale contracts are prepared.

Conclusion
Sediment generated from road related activities would not have direct or indirect short-term effects to fish habitat because of the implementation of PDFs and BMPs and the proximity of fish habitat in relation to the road activities. The amount of sediment reaching headwater channels would not cause a reduction in macroinvertebrate production, which is a food source for fish. Road-related activities would not cause a change in embeddedness, interstitial spaces, or pool depth. A long-term reduction in sediment entering streams would occur following road maintenance, renovation, reconstruction, and decommissioning because these road activities would improve road drainage and therefore reduce surface erosion.

Cumulative effects of past land management practices on private and BLM lands have contributed to the current degraded fish habitat within the analysis area. Areas of short-term localized sediment input to steams would occur because of the road related activities, however it would not affect fish habitat. Long-term sediment reduction due to the roadwork would improve localized stream conditions and benefit fish habitat within the analysis area, although at a site-specific scale. Vegetation treatments would increase future large wood recruitment to fish habitat. There would be no cumulative effects to coho, CCH, SSS habitat, or EFH from vegetation treatment or road activities at the 6th or 5th field watersheds. The proposed action would not increase the likelihood for the need to list the Sensitive species found in the analysis area under the Endangered Species Act. The potential increase of sediment from the road-related activities, when added to non-federal actions, would not affect fish habitat at the 6th or 5th field watershed scale. The cumulative effects are within the scope of anticipated effects to aquatic resources including fisheries analyzed in the Coos Bay District PRMP EIS (USDI 1994 pp. 4-60 to 4-61).

Soil Resources

The BLM use data derived from the Natural Resources Conservation Service (NRCS) soil surveys[14] for Coos County in conjunction with GIS ArcMap capabilities to determine the character of the Coquille watershed and develop the soil limitations and soil properties for the particular soil units in this Proposed Action.

The physical soil environment of the action area can be characterized in general as a coarse, loamy, moderately steep (30-65%) to steep (65-90% slope) watershed that supports forest vegetation and receives 75-90 inches of precipitation per year. Using NRCS rating criteria (http://soils.usda.gov/), erosion potential ratings range from "moderate" to "very severe." Approximately 1,320 acres are in the severe categories (i.e. erosion would occur with ground-disturbing activities). These erosion ratings refer to the erosion potential of bare soils when exposed at 50-75% levels to the open sky.

All soils have high soil permeability ratings with values from 35 to 66 micrometers/second. The percentage amount of organic matter in the upper 4 inches of soil ranges from 3.5 (low) to 75 (high) percent. Most of the treated units (1,072 acres) have the highest value. The NRCS considers soils that have medium to high rates of organic matter resilient to management actions. The treatment units are split between soils that can tolerate either a low or high amount of soil loss (T Factors 1 and 2 or 4) before they incur long-term productivity losses.

No Action

The current level of sedimentation will continue to occur whether from private lands, road surfaces or federal lands. Within the analysis area, the BLM will correct several stretches of BLM controlled road that are currently contributing very low levels of sediment from the running surfaces within the analysis area in the near future under other NEPA decisions. The 0.75-miles of the 27-10-6.1 and 27-10-5.0 roads are two such examples. Replacement of ditch relief crossing culverts and the improvement of the surface and drainage of the 27-10-4.0 road would reduce the threat to water quality with potential stored sediment delivery. Overall, the analysis area has a very low production of sediment from road surfaces because mainline haul roads are paved, the number of stream crossings is low, and most of the gravel roads are on ridge top locations. Most roads that are dirt sub-grades are closed by private or federal landowners and do not incur traffic from vehicles especially during the rain months.

Future timber harvest from federal lands (Table III/IV-1) would occur. Harvest from private timberlands and the road construction or reconstruction of old roads may occur. In some instances, the older, vegetated roads on private lands that were closed to traffic would be left open to allow management activities (primarily planting and monitoring) to occur. The number and location of such roads would

[14] http://soildatamart.nrcs.usda.gov/Survey.aspx?County=OR011

vary according to the market conditions and the rotation age determined by the various landowners. In the last several years, this age for harvest has been around 40 years of age. The BLM usually implements some road maintenance on BLM controlled roads in association with private harvesting at the time of timber haul.

Proposed Action

Harvest Units
The NRCS erosion hazard ratings on approximately 1,324 acres of the action area are severe or very severe. These ratings are based primarily on percent slope class, the K Factor of the individual soil units, and the expectation that 50-70% of the soil will be bare and exposed to normal climatic events. Harvest activities would not bare areas to this level (excluding new road construction). Road construction activities would place a lift of rock on the open areas or activities would include treating the road surfaces to manage infiltration and runoff when the roads are decommissioned or when allowed to overwinter. In those areas where hardwood conversion opens the stand to the open sky there would still be ground cover to protect the soil from the impacts of precipitation. These areas would not reach the 50-70% bare soil exposure indicator. In past conversion areas, monitoring has shown the exposure tends to be closer to 30-35% of the harvest area.

For the proposed action area, no soil map units appear to have the potential to deliver sediment for long distances. The NRCS rates unit soils "well drained" for drainage class, and permeability is moderate for 1,056 acres of the treatment area. All well drained soils in the proposed action area have the capacity to capture fine sediment through infiltration and prevent transportation of sediment to stream networks. The primary mechanisms that prevent or eliminate sediment delivery from the treatment areas are those design features that reduce soil exposure, such as using skyline harvest systems and those that leave debris and vegetation on the soil surface. Therefore, the BLM does not expect that fine sediment delivery would occur from implementation of the Proposed Action.

Capture of eroded sediment occurs through two principle processes in the affected sixth field watersheds, infiltration and filtering by ground vegetation or woody material. Of the severe and very severe erosion rated soils mentioned above, the remaining ground vegetation within the treated units and the riparian areas prior to the streams would remain intact to filter any sediment derived from bare soils. The distance between any harvested areas to a perennial stream would be at least fifty feet, and the vegetation would allow complete infiltration of runoff. Within the units, after treatments, the remaining woody material or slash would provide the filtering mechanism to prevent offsite movement of the fine sediment particles. Piles burned around landing areas would occur during wet weather conditions and only consume the piled slash materials. Any deep burning under the piles would reduce the organic matter levels of the native soil. However, these areas are generally part of the landing areas and not considered part of the lands meant for long-term productivity.

Ground-Based and Skyline Harvesting
Harvest operations would include both cable and ground-based harvest systems. The ground-based equipment would range from shovels harvesters to skidders. Due to the small size of the units, operators would likely use shovels or excavators. Because of the design features, which include equipment operating on a slash layer and one-end suspension of logs, impacts would be within the RMP limits for compaction and disturbance. Monitoring of similar projects has not shown any need for full suspension.

Yarding away from Riparian Reserves and providing full suspension of logs across stream channels would prevent sediment delivery to the stream network. Infiltration of surface runoff would be rapid because of the texture of the soil, the layer of organic matter retained on-site and the no-treatment buffers

would capture any sediment. Monitoring of similar projects has shown these buffers successfully prevent sediment from reaching stream channels.

Using LiDAR coverage modeling, the BLM would accurately restrict ground-based equipment to areas with slopes less than 30%. While these areas have a severe rating for soil rutting when soils are wet and have a low resistance to compaction, implementation of design features would prevent adverse impacts. These design features include limiting operations to the dry season, operating machinery on a slash layer, and limiting the extent of the disturbance area. Additionally, these ground-based areas have the highest resiliency potential ratings and highest site indexes within the action area. Both of these indicators demonstrate these soils have the ability to recover quickly following disturbance and the ability to support this type of harvest. Harvesting with tracked equipment or shovel methods would not degrade soils beyond the limits allowed for in the RMP or reduce their productive capacity.

New Road Construction

The BLM proposes new road construction for approximately 5.5 miles within the various sixth field watersheds. Of these roads, there are no new stream crossings and therefore have no direct sediment delivery potential. All roads are on stable soils, with none on steep slopes (>65%) or have large cutbanks (>20') that would have the potential to produce large quantities of fine sediment (landslide events). Field verification confirmed that all new road construction would be on stable ridges, benches or away from steep headwalls. All roads cross on the contour rather than up or down at steep grades on the mid-slopes. Therefore, the BLM considers all new construction would be on stable landforms with little potential for sediment delivery or road failures.

Road Renovation, Reconstruction and Improvement

To transport the harvested timber and provide access for other land management activities, the BLM would require approximately 15 miles of roadwork associated with restoring old roads to serviceable condition for summer use or improving them for winter use. This includes road shaping and blading, brushing and applying rock where subgrades or surfacing is in poor condition. Implementation of project design features (such as new culverts and sediment control structures) would provide proper drainage of runoff during the winter and would eliminate or minimize the delivery of fine sediment from the road surfaces during winter haul. Installation and maintenance of sediment-trapping mechanisms for site-specific stream crossings would be used when sediment-generating actions occur.

There are three stream crossings proposed as part of the reconstruction or renovation activities. As work would occur in the dry season, with design features for routing water around the worksite if streams are perennial, operations would keep sediment delivery to an acceptable minimum. All disturbed soil would be seeded and mulched prior to the onset of winter rains thus the delivery from such installations will be minor from the first rains as that is normal for all streams on the coast range. The additional sediment from the construction would not be outside of the normal range of delivery for storm events and would be an immeasurable increase.

Decommissioning

Closure of any road surface in these watersheds allows needle cast, leaves, and other organic matter to cover the surface and provide sediment capture and surface protection from precipitation. Any long-term closure such as with a berm or culvert removal allows vegetation to establish on the surface within a couple years, especially dirt surfaces, and provides a greater level of sediment capture and filtering. The BLM expects implementing these closures would limit the delivery of fine sediment and thus there are no impacts anticipated from road decommissioning.

Climate Change

Substantive new information has been produced regarding climate change since publication of the 1994 PRMP (USDI 1994), to which this EA tiers. Considering information produced since the completion of the 1994 PRMP, it is unequivocal[15] that global temperatures have increased (approximately 1°C since late 1800's); it is also likely that temperatures in the PNW have increased (CIG 2004, Clark *et al.* 2004, IPCC 2007) by a similar amount (OCCRI 2010). Human influence on this climatic change, through production of greenhouse gasses, disturbance and land cover change, is thought likely (IPCC 2007). Temperature increases in the west over the next century may range from 2°C at the low end of the uncertainty range to 6°C at the upper end of the uncertainty range (IPCC 2007, Miles and Lettenmaier 2007, OCCRI 2010). This increase is well (>2 standard deviations (SD)) outside of historic conditions. For context, the shift from the last ice age to the current climate was approximately 9°C. There have also been increases in winter precipitation since 1930 over much of the western United States (US), although patterns vary in different regions within the west (Clark *et al.* 2004, Salathe *et al.* 2009). Precipitation changes in the western US over the next century are complex and more uncertain than temperature changes. Western states precipitation may increase by as much as 6% by 2100 (CIG 2004, Hidalgo *et al.* 2009). This increase would be well within 20th century variability in precipitation (<1 SD from historic mean), and would again be expected to differ widely by region within the western US.

Indirect changes in western US ecosystems attributable to changes in temperature and precipitation cycles have also been predicted. Most modeled changes describe potential broad shifts in vegetation types (Lenihan *et al.* 2006, Millar *et al.* 2006), fire behavior (CIG 2004, Mote 2003) or hydrological cycle (Furniss *et al.* 2008, Hidalgo *et al.* 2009). These shifts would have to be considered speculative at the scale of western Oregon and would almost surely be obscured by local conditions at the scale of the analysis area.

There is uncertainty in climate change model predictions due to uncertainty in how the climate actually works as well as uncertainty in future socio-economic and political responses (CIG 2004). Uncertainty in global climate model predictions attributable to physical processes increases at smaller spatial scales, due to the importance of regional climatic patterns (such as ENSO[16]) and local topography (such as the Coast Range) (CIG 2009). Predictive models of temperature and precipitation have been developed (down-scaled) for the Pacific Northwest, but have not been developed specifically for the Coast Range Province or for the Cherry Vaughn analysis area. Application of larger-scale model results to the analysis area directly would be predicted to induce bias, and to have low accuracy. Extrapolating such models to predict future vegetation or animal response would increase bias even further, and would probably have limited utility in describing the cumulative effects of the Action or in differentiating between Alternatives.

Secretarial Order #3226 (2001, amended 2009) directs all Departments to "consider and analyze potential climate change impacts when undertaking long-range planning exercises." The 1994 PRMP FEIS (Appendix V) considered climate change effects as part of long-term planning efforts at the plan-scale (western Oregon). Although the 1994 PRMP FEIS recognized the possibilities of increased incidence of wildfire, insect outbreaks, shifting range of species including Douglas-fir, and forest species composition, it found "no scientific consensus about the extent or rate of global warming nor the probable effect on forest ecosystems in western Oregon" (USDI 1994). Although new information has been produced since this FEIS, it is still not possible to reasonably foresee or quantify the specific nature or magnitude of changes in the affected environment. Although it is not speculative that changes in the affected environment will occur due to climate change, it is not possible to reasonably foresee the specific nature or magnitude of the changes (2008 RMP FEIS). Consideration of predicted changes in vegetation, fire,

[15] Discussion in this section uses terminology for certainty developed in IPCC (2007, p. 27).
[16] ENSO is the El Nino southern oscillation.

hydrological cycles, or other responses due to climate change would be speculative at the plan scale; predictions at the scale of the analysis area would be more uncertain. Therefore, potential changes in the analysis area attributable to climate change were not incorporated in the Cherry Vaughn EA.

The Proposed Action would result in a cumulative flux of greenhouse gasses (GHGs) to the affected environment about 77,035 tonnes (megagrams (MG)) of CO_2 by 2060: at the scale of western Oregon, carbon stores are predicted to increase by 169 million MG under the NWFP by 2106 (USDI 2008b). Action area carbon flux estimates are quantified and described fully below. However, it is not possible with current science to estimate the effects of these GHG fluxes on the Cherry Vaughn affected environment. The USGS summarized science regarding the effects of local actions on climate change and concluded "Difficulties remain in simulating and attributing observed temperature changes at smaller than continental scales…It is currently beyond the scope of existing science to identify a specific source of CO_2 emissions and designate it as the cause of specific climate impacts at an exact location" (USDI 2008a). This memorandum is incorporated by reference.

Greenhouse Gasses: Carbon Stores and Carbon Flux

As an aid to decision-making, this analysis estimates carbon flux to the analysis area associated with the Proposed Action. Carbon flux is the rate of exchange of carbon between pools, the net difference between carbon removal and carbon addition to a system. For the atmosphere, this refers to carbon removed by plant growth, mineralization, dissolving in the ocean and other processes, balanced by carbon added through plant respiration, harvest/volatilization, concrete production, fossil-fuel burning, volcanic activity, and other processes. Forest harvest may lead to flux of greenhouse gasses (GHGs) in addition to CO_2, principally N_2O and CH_4 (Jassal *et al.* 2008, Sonne 2006). N_2O flux from forestry activities may account for ≈20% of GHG emissions (Sonne 2006), this is primarily due to fertilization. Though 1600 pounds of fertilizer would be applied in association with the seeding and mulching of decommissioned roads, it is much less than the 200 lbs. per acre typically involved with forestry applications, or about the forestry equivalent of fertilizing 8 of the 1352 acres (0.6%) of the Proposed Action. CH_4 may account for an additional 10% of total forest management GHG production (Sonne 2006). Due to lack of scientific information and lack of adequate models on the effects of forest activities in the Pacific Northwest on non-carbon GHGs, and the (presumably) minor contribution of these other gases to GHG flux associated with the Proposed Action in relation to total flux estimation error, they are not here addressed. (For example, not attempting to model a 20% increase in N_2O for 0.6% of the Proposed Action) The indirect effects of carbon flux following timber harvest have been addressed below. Indirect effects of this carbon flux on climate change and the affected environment is addressed in the **Climate Change** section.

Carbon Flux of the Proposed Action

Estimates of carbon stores in the analysis area as a whole would be fraught with error, could complicate contrast between the alternatives, and would not facilitate decision-making. Instead, this analysis quantifies the net effect of the Proposed Action on greenhouse gas levels by comparing changes in carbon storage that would occur under the Proposed Action to the carbon storage that would occur under the No Action alternative, as suggested in IM-2010-012 (USDI 2010). Specifically, this analysis estimates the carbon flux associated with implementation of the Proposed Action roughly fifty years from the present, incorporating: **a)** differences in carbon storage in live, dead, and organic soil carbon pools; **b)** the mid-term flux from wood products produced by the Proposed Action through this period; and **c)** "secondary" C fluxes associated with logging and hauling systems.

Analysis of carbon flux associated with changes in live and dead pools attributable to the Proposed Action ("a", above) used relatively simple tree-/stand-scale models available with the Forest Vegetation Simulator (FVS) modeling package (http://www.fs.fed.us/fmsc/fvs/). This method considers changes due to succession and forest management in all major live and dead carbon pools within the treated action area. This FVS model does not directly incorporate microclimatic effects, dynamics of herb and shrub

understory layers, stable soil pools, or the C flux associated with actual harvest equipment. Herb and shrub carbon pools are relatively small when compared to total stores, and are similar between young and mature stands (USDI 2008, p. App-29). Soil carbon represents 9-20% of total site carbon but is the most stable C store and the least likely to respond to thinning disturbance. For example, 60-year old forests and 450-year-old forests have similar soil carbon storage ((Harmon *et al.* 1990). Flux of carbon from merchantable wood products ("b", above) produced from the Proposed Action during the 50 year analysis window was estimated following synthesis in USDI (2008, p. App-30). GHG emissions from forestry activities necessary to harvest these units ("secondary emissions", "c" above) were estimated following (WRI 2010), and added to FVS estimates (see below).

Proposed Action

There would be no carbon flux difference between the Proposed Action and the No Action alternative other than that due to thinning of treatment units. The Proposed Action would treat approximately 1,680 acres of forest from BACE structural stages[17], volatilizing some carbon, moving carbon from live tree pools to detritus and wood products pools, and storing some carbon in forest products. Making a set of very broad assumptions and using the FVS carbon model and assumptions similar to those developed in the 2008 RMP FEIS (USDI 2008); compared to the No Action alternative the Proposed Action would result in a C flux of 72,987 MG over the time period from thinning until approximately 2061. GHG emissions from forestry activities necessary to harvest these units ("secondary emissions"[18]) have been estimated at 0.1429 MG CO_2/ MBF (WRI 2010). Applying this equation to the Proposed Action suggests an additional 4,049 MG CO_2 release attributable to the Proposed Action; this is consistent with Sonne (2006) who predicted a relatively small C flux associated with harvest equipment.

The total carbon flux of the Proposed Action compared to the No Action would not produce measurable change in global climates considering current detection and modeling technologies. To place this carbon flux in context, the total carbon flux associated with the Proposed Action would represent approximately:

- 47 times a single American individual's lifetime carbon flux, based on information in MIT (2008).
- 8 times the carbon flux of an American and all of her descendants, based on data in Murtaugh and Schlax (2009).
- <0.02% of carbon stored on BLM-managed lands in western Oregon (USDI 2008)[19]. BLM-managed lands in western Oregon support approximately 1% of the carbon stored in the western U.S., and 0.02% of global carbon stores in vegetation, soil, and detritus (USDI 2008).

It should be emphasized that, as in most non-empirical carbon modeling exercises, estimates of carbon sequestration or flux are useful mostly for broad generalizations or comparisons, appropriate to convey relative sizes, but not very accurate for specific places and situations (Sharrow 2008). This analysis also does not address substitution that says that without change in global demand for wood products, the No Action would necessitate harvest in another location resulting in a comparable (or larger) carbon flux. Further, the entire action area is managed as a reserve. Although the Proposed Action would be predicted to result in a mid-term flux of carbon to the atmosphere, carbon stores in the action area under the Proposed Action scenario would be predicted to approach a steady state by 2101 at or above 250 MG/ac. C, comparable to storage under the No Action alternative (barring disturbance).

This EA is tiered to the 1994 PRMP FEIS, which considered carbon flux and climate, change at the plan scale. The 1994 PRMP FEIS considered speculative and did not consider the indirect effects of carbon flux associated with the plan on aspects of the affected environment including wildlife, economies, human

[17] FVS calculations include NTZ areas within treatment units.

[18] Secondary emissions are here defined as emissions from equipment consuming fuel employed to harvest, yard, load, and haul logs to the mill, similarly to WRI (2010).

[19] Note that the C flux associated with Proposed Action includes not just change in stores but flux due to harvest equipment.

health, and other resources (Appendix V, p. 217). The 1994 PRMP FEIS concluded that with implementation of any of the alternatives at the plan level, "the overall impact on the global atmospheric carbon dioxide balance would be much less than 0.01 percent of the total" (p. 4-1). Based on the small estimated permanent flux of carbon that would be associated with the cumulative effects of the Proposed Action following the 1994 PRMP, the high uncertainty in any such estimate of carbon flux (and other sources of GHGs), and the response of global climate to these GHG's, conclusions in the 1994 FEIS remain valid and applicable to the cumulative effects of the Cherry Vaughn Proposed Action.

Cumulative Effects
At the scale of western Oregon, considering the cumulative effects of both forest succession (a carbon sink) and harvest (a carbon source) under the NWFP, carbon stores would be predicted to increase by 2106, from 427 to 596 million MG. This sequestration is less than under a "No Harvest" scenario, but does represent a gain in carbon storage. U.S. annual CO_2 emissions (*circa* 2008) were approximately 6 billion MG. The flux of 77,035 MG of carbon associated with the Proposed Action (over 50 years) would represent far less than 0.0002% of this yearly flux. The difference in carbon storage in 50 years between alternatives would be too small to lead to a detectable change in global carbon storage, and existing climate models do not have sufficient precision to reflect the effects on climate from such a small fractional change in global carbon storage (2008 RMP FEIS, p. 543). Currently, the federal government has not established thresholds for carbon flux related to individual actions. Uncertainty associated with all estimates of carbon flux in this analysis would be predicted to be quite high (circa 30%: 2008 RMP FEIS, p. 538). However, estimates of the magnitude and direction in carbon response are probably accurate, and these results may be instructive for comparing the effects of the alternatives on local (watershed-scale) carbon stores.

Components of the Aquatic Conservation Strategy

There are four components to the Aquatic Conservation Strategy (ACS): Riparian Reserves (RRs), Key Watersheds, Watershed Analysis, and watershed restoration. A "fifth" component is the standards and guidelines for management activities located in the Coos Bay District RMP.

1) Riparian Reserves:
The RR widths within the analysis area are two site-potential tree heights for fish bearing streams and one site-potential tree height for perennial and intermittent streams. A site-potential tree height in the East Fork Coquille 5th field watershed is 220 feet and 240 feet in the North Fork Coquille 5th field watershed.

2) Key Watersheds:
A portion of the proposed action is located in the North Fork Coquille, Cherry Creek Tier 1 Key Watershed.

There would be no net increase of new road construction in the Cherry Creek Key Watershed. The Proposed Action includes the new construction of approximately 1.37 miles of new roads in the Key Watershed of which 0.3 miles would be decommissioned and 1.07 miles would be fully decommissioned. Approximately 0.31 miles of existing roads in the Key Watershed would be fully decommissioned. The Proposed Action includes fully decommissioning a total of 1.38 miles of road in the Key Watershed (1.07 miles new construction and 0.31 miles of existing roads). In addition, 2.19 miles of existing roads would be decommissioned, but would not count toward the net reduction of roads within the Key Watershed because they would not be fully decommissioned. The Western Oregon Transportation Management Plan states "Only the full decommission and obliteration categories are appropriate to meet the Management Direction of a reduction or no net increase in the amount of roads within Key Watersheds" (USDI 2010 *Update*).

This project includes road renovation or renovation/reconstruction that are currently closed (decommissioned or short-term closure status) in the BLM roads database. These would be decommissioned after use.

3) Watershed Analysis:
Applicable Watershed Analyses include the East Fork Coquille (USDI 2005 *Update*) and the North Fork Coquille (USDI 2002). Incorporated into the proposed action are recommendations from these analyses and they include silvicultural treatments within the RRs and road management.

4) Watershed Restoration:
The Coos Bay RMP states the most important components of watershed restoration are control and prevention of road-related run-off and sediment production, restoring the condition of riparian vegetation, and restoring in-stream habitat complexity. Vegetation treatment in RRs, road maintenance, renovation, improvement, reconstruction, decommissioning and full decommissioning would accomplish watershed restoration.

5) Management Actions/Direction:
The following is a list of management actions/directions within RRs applicable to the proposed action.

Roads Management:

- Completing Watershed Analysis including appropriate geotechnical analysis prior to construction of new roads or landings.
- Minimizing road and landing locations.
- Preparing road design criteria, elements, and standards that govern construction and reconstruction.
- Preparing operation and maintenance criteria that govern construction and reconstruction.
- Minimizing disruption of natural hydrologic flow paths, including diversion of streamflow and interception of surface and subsurface flow.
- Restricting side casting as necessary to prevent the introduction of sediment to streams.
- Reconstructing roads and associated drainage features that pose a substantial risk.
- Closing and stabilizing roads based on ongoing potential effects to the ACS objectives and considering short-term and long-term transportation needs.

Timber Management:

- Applying silvicultural practices for RRs to control stocking, re-establish and manage stands, and acquire desired vegetation characteristics needed to maintain ACS objectives.

Existing Watershed Condition
Existing conditions in the East Fork Coquille 5th field watershed include (USDI 2005 *Update*):

- The BLM administers 45,448 acres out of 85,785 acres or 53% of land within this 5th field watershed.
- Approximately 25,047 acres or 55.11% of BLM land in the 5th field watershed is in RRs.
- The watershed contains approximately 44 miles of anadromous and resident fish-bearing streams and an additional 105 miles of resident only fish-bearing streams. Brewster Gorge is located on the mainstem of the East Fork Coquille (T28S R10W section 9) and is a long-standing natural barrier, which limits anadromous use in the watershed.
- 47.8% of stands within RRs are 0-40 years old.

Existing conditions in the North Fork Coquille 5th field watershed include (USDI 2002):

- The BLM administers 36,861 acres out of 98,467 acres or 37.4% of the land within this 5th field watershed.
- Approximately 19,275 acres or 52.3% of BLM land is in RRs.

See the fisheries and water resources affected environment on pages 50 and 44 respectively for more detailed information.

Aquatic Conservation Strategy Objectives
The site scale for this analysis is the stream reaches within or adjacent to treatment unit or road activity. The watershed scale is the 5th field watershed, which would be the East Fork Coquille and the North Fork Coquille watersheds.

The analysis below will group all vegetation prescriptions (density management thinning and removal of red alder, density management thinning to retain minimal canopy cover, density management thinning to release individual conifers, and non-commercial vegetation treatment) and refer to them as vegetation treatments, unless otherwise stated.

1. Maintain and restore the distribution, diversity, and complexity of watershed and landscape-scale features to ensure protection of the aquatic systems to which species, populations, and communities are uniquely adapted.

Microclimate, water quality, stream bank stability, sediment regimes and habitat provided for riparian associated species are the watershed and landscape-scale features used for this analysis. Microclimate will be addressed under ACS objective 1; water quality under objectives 3 and 5; streambank stability and sediment regimes under objectives 4, 6, and 7; and providing habitat for riparian associated species under objectives 2, 8, and 9.

Site Scale: Short and Long-Terms
Microclimates found in riparian areas are important components of watershed and landscape-scale features needed to ensure the protection of the aquatic systems. Microclimates adjacent to streams would remain unchanged or within the range of natural variability at the site scale because of the stream, no-harvest buffers and HWC would result in relatively small openings within RRs (see Table III/IV-13). Sample tree falling would not occur in the no-harvest buffers and those trees selected would be a subset of trees identified for removal. Post vegetation treatment canopy cover across all prescription types would range from 59% to 77% in RRs and 60% to 92% in perennial RRs. MacCracken (2002) found treatment effects on microclimate variables analyzed were small and extremes in air temperature at conversion sites were similar. The stream no-harvest buffers would generally encompass the slope break and riparian vegetation. Anderson *et al.* (2007) found buffer widths (determined by either the change in riparian to upland vegetation or by the topographic slope breaks) were sufficient in maintaining microclimate post-harvest. These authors also found that microclimate gradients in headwater riparian zones were strongest within 10 meters of the stream center, “a distinct area of stream influence within broader riparian areas.” Chan *et al.* (2004) found the greatest change in microclimate occurs between stream center and 15 meters regardless of buffer size or upland treatment.

Table III/IV-3 Hardwood patches >0/25 acres that would become openings post-vegetation treatments.

Unit	Total HWC acres within RRs	HWC open areas (acres) within RRs
06	1.6	0.4 – 0.8
08	1.5	0.3 – 1.3
09	0.4	0.4
10	2.4	0.3 – 1.2
11	2.0	0.4 – 0.8
12	0.3	0.3

The yarding corridors in RRs would not measurably alter the microclimate at the site scale because the width of each corridor would be minimal (12 feet) and the distance between skyline corridors would be a minimum of 150 feet apart at the widest point where feasible. Corridors would be perpendicular to streams as much as possible to minimize the total length of openings created by yarding corridors along stream channels. Finally, the locations would be spread out across three 6th field sub-watersheds located in two 5th field watersheds, corridors would be discontinuous and the majority (46) would be located across intermittent streams with one yarding corridor across a perennial stream.

The Proposed Action includes constructing approximately 0.31 miles of new roads in RRs, consisting of four separate road segments. Road construction in RRs would not measurably alter microclimates because they would be located outside of areas where the stream channel affects microclimates as discussed above (riparian vegetation/slope break), would not include any stream crossings and be fully decommissioned after use.

5th Field Watershed Scale: Short and Long-Terms

There would be no changes to microclimate in riparian areas at the watershed scale because there would be no measurable changes at the site scale.

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-dependant species.*

Site Scale: Short and Long-Terms

The vegetation treatments would maintain the functions of RRs as migration corridors for riparian and aquatic dependent species in the short-term at the site scale because of: 1) snags and down wood creation, 2) the no-harvest buffers adjacent to streams, 3) post vegetation treatment canopy cover across all prescription types would range from 59% to 77% in intermittent and perennial RRs and 60% to 92% specifically in perennial RRs, 4) minor conifer and some hardwood species would be retained, and 5) trees 24" DBH and greater would be retained. Trees felled in the no-harvest buffers and trees ≥24" DBH in RRs felled to facilitate yarding corridors would be left on site, providing down wood for riparian and aquatic dependent species.

The vegetation treatments would improve the functions of the RRs in the units as migration corridors in the long-term at the site scale by advancing late-successional characteristics. Specifically in the long-term, the RRs would have increased structural and species diversity, an understory shrub layer, large conifers available for instream wood, upslope down wood and large snags. Incorporated by reference is the forest ecology report located in the analysis file. The conclusion in the report found the vegetation treatments would increase the stand mean diameter and promote the development of individual larger trees faster when compared to a no treatment scenario (p. 6). The analysis also found the vegetation

treatments would increase the structural diversity including overstory variability within the units (p. 6). An increase in overstory variability would to lead to a response in understory and shrub diversity, development of larger limbs and crowns, epicormic tree branch response and patchily distributed suppression mortality. Suppression mortality would occur in the no-harvest buffers that would naturally provide snags and down wood.

The vegetation treatments in RRs would maintain riparian-dependent species. For example, retention of both dense patches of forest with fungi and suppression-induced downed wood, as well as areas retaining hardwood trees and shrubs such as hazel (*Corylus cornuta*) would be predicted to support life history requirements for the white-footed vole, *Arborimus albipes* (Manning *et al.* 2003). The retention and creation of downed woody debris as well as buffered microclimates would maintain well-distributed populations of plethodontid salamanders (Pilliod and Wind 2008).

The increase in LWD would lead to the eventual reconnection of stream channels to floodplains in the long-term at the site scale. Hill slope confined streams or those confined by roads limit floodplain connectivity for some streams within the treatment units.

The Proposed Action would not alter migration routes at the site scale in the short-or long terms because no effects to water quality, including temperature, would occur. The new road construction does not include new stream crossings; therefore, the streams would remain physically unobstructed and available for migration routes.

5th Field Watershed Scale: Short and Long-Terms

The spatial and temporal connectivity within and between watersheds at the 5th field in the short and long-terms would remain unchanged following the Proposed Action. The relatively small treatment area would not result in a measurable beneficial change to these components at the 5th field scale. The proposed vegetation treatments consist of 1,352 acres spread across two 5th field watersheds. The East Fork Coquille 5th field watershed is 85,785 acres and the North Fork Coquille 5th field watershed is 98,467.

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

Site Scale:

Short-Term

The Proposed Action would not adversely modify stream channels or aquatic habitat, nor remove any wood from stream channels. The sample tree falling and vegetation treatments combined with the project design features (PDFs) would maintain bank stability, shorelines and bottom configurations. The stream no-harvest buffers would encompass the trees providing bank stability due to root strength. Activities more than half a crown width from the edge of the stream bank are unlikely to reduce the effectiveness of root strength on stream bank stability (USDI 2002).

The majority of yarding corridors would achieve full suspension over steam channels, however approximately one corridor across a perennial stream and two corridors across an intermittent stream in Unit 16 would not achieve full suspension. Trees felled toward the channel and left on-site within the no-harvest buffers where yarding corridors cross streams would protect stream banks. These trees would armor and protect stream banks where yarding corridors do not achieve full suspension.

As new road construction would not cross streams, stream banks would remain intact. The new roads would include proper drainage features such as out sloped roadbeds or properly spaced cross drains. New

roads would not increase the amount of water in stream channels and would not cause an increase in bank erosion.

The Proposed Action includes replacing four stream culverts on existing roads. Renovation on an existing road would include installing a fifth culvert where a spring currently flows across the road. The appropriately sized culverts would not affect stream bank stability.

Long-Term
Development of late-successional characteristics in RRs would increase the potential for LWD recruitment to stream channels at the site scale in the long-term. LWD in stream channels provides channel structure and complexity, which improves bank stability. Increased amounts of large wood, which reduce flow velocity and bank shear stress, would improve stream bank stability in the long-term (USDI 2001).

A reduction in bank erosion would occur in the long-term at the site following road maintenance, renovation, improvement, decommissioning, and reconstruction because improved road drainage would decrease the amount of water directed to stream channels.

5th Field Watershed Scale: Short and Long-Terms
As there would be no noticeable impact to the physical integrity of the aquatic system, including shorelines, banks, and bottom configurations at the site scale, there would be no change at the 5th field scale in the short or long-terms. The beneficial effects to stream banks of LWD recruitment would not be measurable at the 5th field scale because of the relatively small amount of acres treated. Approximately 618 acres would be treated in RRs spread across two 5th field watersheds. The East Fork Coquille 5th field watershed is 85,785 acres and the North Fork Coquille 5th field watershed is 98,467.

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.*

Site Scale: Short and Long-Terms
Water quality would remain within the range that maintains the biological, physical, and chemical integrity of streams. The proposed action would not result in chemical input to streams.

Incorporated by reference is the water resources report located in the analysis file. The analysis in this report concluded the vegetation treatments would not increase stream temperature at the site scale in the short or long-terms (p. 6). The yarding corridors in RRs would not result in an increase in stream temperature because of the minimal width of the dispersed corridors with the majority proposed across intermittent streams. Road construction in RRs would not increase stream temperature because they would not include stream crossings and would not be parallel to streams.

This analysis also concluded there would be a long-term improvement to temperature resulting from the vegetation treatments (p. 7). Long-term improvements to riparian stand conditions and instream large wood from the vegetation treatments would decrease water temperature because:

- Improved pool frequency conditions would help restore the groundwater and floodplain connection and increase the groundwater and stream interaction with an expected increase in cool water refugia (USDI 2001).
- Aggradation of the channel due to large wood also has the potential to increase summer stream flows, which would contribute to lower stream temperatures (USDI 2001).

- Improved width to depth ratios resulting in narrower channels would result in decreased stream temperatures (USDI 2001).

Slight increases in turbidity would occur in the short-term in localized areas because of road activities. The road-related PDFs and best management practices would reduce or eliminate the amount and duration of sediment entering stream channels. Any increase in turbidity would not change the biological, physical or chemical integrity of streams. The Proposed Action would maintain the aquatic and riparian-dependent species' survival, growth, reproduction and migration at the site scale in the short and long-terms. Road renovation, improvement, reconstruction, decommissioning and maintenance would improve road drainage and reduce turbidity in the long-term.

5th Field Watershed Scale: Short and Long-Terms
There would be no change to water quality at the 5th field scale in the short or long-terms because there would be no noticeable changes at the site scale.

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

Site Scale:
Short-Term
The Proposed Action would maintain, at the site scale in the short-term, the sediment regime under which aquatic ecosystems evolved. Furthermore, the proposed action would maintain the timing, volume, rate and character of sediment input, storage and transport.

Ground-based equipment would not cross stream channels and would not operate within 30 feet of intermittent streams and 50 feet of perennial streams. The stream no-harvest buffers would protect bank stability and prevent sediment delivery to streams from adjacent harvest operations. The analysis in the water resources report concluded these buffers would provide an adequate sediment filter strip because non-compacted forest soils in the Pacific Northwest have very high infiltration capacities and are not effective in transporting sediment by rain splash or sheet erosion (p. 10). Trees selected for sample tree falling would be located outside of no-harvest buffers and PDFs guiding harvest in RRs would apply to sample tree falling. Based on the above discussion, the vegetation treatments and sample tree falling would not result in sediment delivery to streams.

The majority of yarding corridors would achieve full suspension over steam channels, however approximately one corridor across a perennial stream and two corridors across an intermittent stream in Unit 16 would not achieve full suspension. The construction and use of yarding corridors would maintain the sediment regime because full suspension of logs would occur when feasible, natural openings would be used to the extent possible, corridors would cross channels at a perpendicular angle when possible, and the proposed action would minimize the width (<12 feet) and number of corridors. The existing brush and the duff layer would filter sediment. Trees felled parallel to the stream within the no-harvest buffers to facilitate yarding corridors would armor stream banks.

Short-term sediment movement would occur because of the road-related activities; however, PDFs and best management practices would minimize or eliminate sediment from reaching stream channels. The short-term localized sediment input to streams resulting from road activities would be indiscernible beyond natural erosion processes expected to occur during winter rains. The sediment analysis in the water resources (p. 44) and fish sections (p. 50) have more detailed discussions.

Long-Term
Road renovation, improvement, reconstruction, decommissioning, and maintenance would result in a net reduction in sediment delivery to stream channels at the site scale in the long-term. Existing natural-surface and rocked roads within the analysis area with surface erosion, inadequate drainage, inadequate stream crossings or unstable cut banks and fill slopes are currently contributing sediment to stream channels. The Proposed Action would reduce sediment delivery to streams by improving road drainage.

The harvest activities would not result in sediment delivery to stream channels at the site scale in the long-term. The vegetation treatments would improve large wood recruitment in the long-term leading to additional sediment storage capacity and routing (USDI 2001). Stream channels in the Coast Range are typically gravel-poor, which makes them dependent on large wood for retaining substrate (LSRA; 1998).

5th Field Watershed Scale: Short and Long-Terms
As there would be no noticeable impact to the sediment regime at the site scale from vegetation treatments, there would be no change at the 5th field watershed scale in the short or long-terms.

The expected sediment delivery at the site scale in the short-term from road activities would not be measurable at the 5th field scale in the short- or long-terms. The road activities would provide a negligible benefit of reduced sediment delivery to stream channels at the 5th field scale because of the relatively small amount of BLM roads compared to the total road miles. The Proposed Action consists of reconstructing 2.78 miles, renovating 12.39 miles, improving 0.59 miles, maintaining 2.92 miles, and decommissioning 9.31 miles. The total road miles in the East Fork Coquille 5th field watershed is 645. The total road miles in the North Fork Coquille 5th field watershed is 784.

6. *Maintain and restore in-stream flows sufficient to create and sustain riparian, aquatic, and wetlands habitats 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.*

Site Scale: Short and Long-Terms
The Proposed Action would maintain the site scale short and long-term sufficient instream flow to create and sustain riparian, aquatic and wetland habitat. The Proposed Action would also maintain the patterns of sediment, nutrient and wood routing in addition to the timing, magnitude, duration and spatial distribution of peak, high, and low flows at the site scale in the short and long-terms.

The water resources analysis concluded there would be no effect to peak flows or annual yield from the vegetation treatments (pp. 2-3).

The water resources report included an analysis of the potential risk to stream flow from existing roads and road construction. The conclusion was that the analysis area currently has a low risk of hydrologic impacts from existing roads (p. 4). The road construction would not increase the risk of hydrologic impacts because the roads 1) would not include any new stream crossings, 2) would be decommissioned or fully decommissioned following use, and 3) would be constructed and designed with proper road drainage on stable slopes. Road renovation, reconstruction, improvement, maintenance, and decommissioning would improve road drainage and reduce the amount of water roads direct to stream channels.

An increase in summer stream flows could occur in the long-term due to an increase of instream large wood. Aggradation of the channel due to large wood has the potential to increase summer stream flows (USDI 2001).

5th Field Watershed Scale: Short and Long-Terms
The maintenance of instream flows as well as the timing, magnitude, duration and spatial distribution of peak, high, and low flows at the site scale in the short- and long-terms would ensure no changes at the 5th field scale.

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

Site Scale: Short and Long-Terms
The Proposed Action would not affect the timing, variability and duration of floodplain inundation and water table elevation in meadows and wetlands at the site scale in the short or long-terms. The interaction of water with wetlands and meadows would be unaffected at the site scale in both the short and long-terms. The BLM would buffer out meadows and wetlands from the units. The Proposed Action does not include water diversions or well drilling, activities usually associated with lowering water tables.

A long-term site scale improvement to the groundwater table and floodplain water storage would occur following the vegetation harvest because of an increase in pool frequency and aggradation of the channel due to an increased amount of in-stream large wood (USDI 2001).

5th Field Watershed Scale: Short and Long-Terms
Because there would be no noticeable impact to the timing, variability, or duration of floodplain inundation and water table elevation in meadows or wetlands at the site scale there would be no change at the 5th field watershed scale in the short or long-terms.

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.

Site Scale: Short and Long-Terms
The Proposed Action would maintain the species composition and structural diversity of plant communities in riparian areas and wetlands at the site scale in the short and long-terms. Vegetation treatments in RRs would promote forest health, promote development of large conifers, increase structural diversity and improve species composition. The analysis in the forest ecology report concluded the vegetation treatment would lead to a response in understory and shrub diversity, development of larger limbs and crowns, epicormic tree branch response and patchily distributed suppression mortality (p. 6).

The hardwood conversion and planting would return stands to a historically appropriate species composition. The no-harvest buffers encompass mesic and wet conditions in RRs as determined by the TPI analysis. Alder historically found in these areas would remain in the no-harvest buffers. As described in the forest ecology report, approximately 20% of each unit would consist of no-harvest buffers, which would maintain species composition, structural diversity, and would maintain patchily distributed suppression mortality.

The no-harvest buffers and the number of trees left per acre within the treated portion of the units would maintain the short-term supply of in-stream wood at the site scale. The vegetation treatments would reduce suppression mortality, which would result in fewer snags and down logs in the short-term. These snags and down logs would have been smaller which have a decreased ecological value as described in the fisheries section of this EA. The vegetation treatments would lead to an improved source of large

wood recruitment at the site scale in the long-term. The fisheries section contains a detailed analysis on pages 53.

Sample tree falling would not affect current or future large wood recruitment because trees selected would be located outside of no-harvest buffers and would be a subset of those already identified in the prescription for removal. If the timber sale is not implemented the trees would contribute to down wood because they would be left on site.

The yarding corridors and road construction in RRs would not decrease species composition or structural diversity of plant communities to the extent that the values listed in ACS objective eight provide riparian areas. Factors leading to this conclusion include: 1) roads and corridors would be relatively short segments dispersed across two 6th field sub-watersheds (three sub-watersheds for corridors) located in two 5th field watersheds, 2) newly constructed roads would be decommissioned or fully decommissioned following use, 3) yarding corridors would be 12 feet wide, 4) trees felled to facilitate yarding corridors within the no-harvest buffers would be left on site, and 5) trees ≥24" DBH felled in RRs to facilitate yarding corridors would be left onsite.

The DM would increase brush and deciduous tree growth, which would improve nutrient availability in RRs. Thinning would increase light levels received by vegetation and result in greater understory vegetation vigor and growth. "Thinning treatments that lead to greater stand complexity next to a stream will increase the array of niches for insects and other arthropods, and for epiphytes. This in turn leads to a greater variety in types of organic matter that can fall into the stream" (USDI 2005 *Update*).

The HWC would maintain nutrient supply to streams from adjacent riparian vegetation including alder because of the no-harvest buffers.

5th Field Watershed Scale: Short and Long-Terms
Because there would be no adverse impacts to species composition or structural diversity of plant communities in riparian and wetland areas at the site scale there would be no change at the 5th field scale in the short- or long-term. Benefits would not be measurable at the 5th field scale because of the relatively small amount of acres treated. Approximately 618 acres would be treated in RRs spread across two 5th field watersheds. The East Fork Coquille 5th field watershed is 85,785 acres and the North Fork Coquille 5th field watershed is 98,467.

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

Site Scale: Short and Long-Terms
Habitat needed to support riparian-dependent species (including plants, invertebrates, and vertebrates) would be maintained at the site scale in the short and long-terms. A more diversified array of microclimates, structures, species, and habitat would result following the vegetation treatments. The no-harvest buffers would maintain areas of undisturbed litter, structure, vegetation, and microclimates. Density management thinning would provide conditions favorable for the development of diversified layers of herbs, shrubs and pockets of shade tolerant trees. Creating snags and down wood in RRs would improve the structural diversity in the short and long-terms at the site scale and increase late-successional characteristics in RRs. An increase in stand complexity would increase insect abundance and diversity at the site scale in the short and long-terms. The hardwood conversion and planting would return stands to a historically appropriate species mix.

Zobrist and Hinckley (2005) conducted a literature review of thinning and compiled the following discussion of the effects of thinning to understory plant species: "Thinning opens up the stand and allows

light to reach the forest floor. This provides for better-developed understories with greater richness, diversity, and cover (Bailey et al. 1998, Curtis et al. 1997, Thomas et al. 1999, Thysell and Carey 2000). Studies have found that thinned stands have greater herbaceous cover (Carey and Wilson 2001, Muir et al. 2002), greater understory trees and shrubs (Bailey and Tappeiner 1998, Muir et al. 2002, Tappeiner and Zasada 1993), and greater density, survival, and growth of conifer seedlings (Bailey and Tappeiner 1998, Brandeis et al. 2001, DeBell et al. 1997, Muir et al. 2002)".

5th Field Watershed Scale: Short and Long-Terms

Because there would be no noticeable adverse impacts to habitat for riparian-dependent species at the site scale, there would be no change at the 5th field watershed scale in the short or long-terms. Benefits would not be measurable at the 5th field scale because of the relatively small size of the project. Approximately 618 acres would be treated in RRs spread across two 5th field watersheds. The East Fork Coquille 5th field watershed is 85,785 acres and the North Fork Coquille 5th field watershed is 98,467.

Resources Not Analyzed in Detail

Due to a lack of concern expressed by scoping respondents, adequacy of best-management practices and policy and the limited intensity and scope of effects on the affected resource, the items below are excluded from detailed comparative analysis as directed by CEQ regulation § 1500.0(b), 1500.2(b) and other sections. The analysis file includes the analyses pertaining to these conclusions, which is hereby incorporated by reference.

Air Quality

Smoke from prescribed fire burning of landing piles and hand piles along road systems would contribute minor short-term increases in particulate matter in the air shed near the project area. With the prescribed fire activities in the region being conducted in compliance with the Oregon Smoke Management Plan, (OAR 629-43-043) burning activities are not expected to result in adverse effects over a widespread area. Based on guidance from Oregon Smoke Management, the BLM would only permit burning of slash when atmospheric conditions would allow for quick dissipation of smoke away from smoke sensitive receptor areas (local communities).

Annual Yield and Forest Harvest

The density management and hardwood conversion would not have an effect on annual yield. Satterlund and Adams found that the effect of timber harvest on streamflow is generally proportional to the amount of vegetation removed. They found that "lesser or non-significant responses occur [to water yield] ...where partial cutting systems remove only a small portion of the cover at any one time." Where individual trees or small groups of trees are harvested, the remaining trees will generally use any increased soil moisture that becomes available following harvest. Converting hardwood patches (mostly red alder) to conifer would theoretically increase water yield in summer because hardwoods use more water than conifers during the growing season (Moore *et al.* 2004); however, there would be no effect at the sub-watershed scale due to the small area involved (small patch cuts in less than 5% of the effected watersheds (Table III/IV-11).

Area of Critical Environmental Concern/Special Areas

The Proposed Action area contains the Cherry Creek Research Natural Area (RNA). This RNA is also designated as a Wilderness Study Area (WSA) and an Area of Critical Environmental Concern (ACEC). All of units are separated from the RNA by a buffer and mainline roads; there would be no effects to the RNA from implementation of the Proposed Action.

Cultural Resources

A Class I inventory (literature and records search) of cultural resource locations did not find any known cultural resources either in or near any of these units. The affected environment in these units consists of

low probably landforms that were previously disturbed by timber harvest and subsequent replanting/seeding operations.

However, if any objects or sites of possible cultural value such as historical or prehistoric ruins, fossils or artifacts were found, the BLM would suspend all activities near these objects and notify the Authorized Officer of the findings.

Drinking Water Protection Areas

Under the requirements and guidelines of the Federal Safe Drinking Water Act, ODEQ prepares Source Water Assessments for public water supplies in Oregon. One drinking water source for the City of Coquille is the Coquille River. All of the project units are located within the headwaters of the Coquille River and are, therefore, part of the Drinking Water Protection Area (DWPA) for Coquille.

One drinking water source for the City of Myrtle Point is the North Fork Coquille River. Most of the project units are located in the headwaters of the East Fork/North Fork Coquille River and are, therefore, part of the DWPA for Myrtle Point.

Managed forest lands in the DWPAs are listed as one of the potential contaminant sources in the Source Water Assessments for both cities (ODEQ a&b 2003). Activities listed that could have potential impacts are cutting and yarding of trees, improper use of pesticides or fertilizers, road building and maintenance, and road usage. Some fertilizer would be used to prevent soil erosion in disturbed areas; "However, there would be a negligible effect to water quality or drinking water" (water resources addendum). The other potential impacts are analyzed by alternative under *Water Quality/Sediment*.

Environmental Justice

For the areas of activity in connection of the Cherry Vaughn project, the BLM does not know this area to be used by, or proportionately used by minority or low-income populations for specific cultural activities at greater rates than the general population. This includes their relative geographic location and cultural, religious, employment, subsistence or recreational activities that may bring them to the action areas. Thus, BLM concludes that no disproportionately high or adverse human health or environmental effects would occur to Native Americans and minority or low-income populations from implementation of the Proposed Action.

Forest Fuels/Fire Regime Condition Class

A fire regime condition class (FRCC) is a classification of the amount of departure from the natural (historical) regime (Hann and Bunnell 2001, Hardy *et al*. 2001, Schmidt *et al*. 2002). The departure is measured in three classes and are based on low (FRCC 1), moderate (FRCC 2), and high (FRCC 3). Within the analysis area, most of the area show moderate degree of departure, and are classified as FRCC 2. Mechanical treatments such as thinning and density management in conjunction with activity fuel treatments would assist in maintaining the same FRCC and/or help shift the analysis area towards a FRCC 1 condition.

Reducing the tree densities would remove portions of the ladder fuels, and greatly decrease the primary source for future ground fuels. Thinning stands would lessen the inherent risk of a damaging wildfire by removing or modifying horizontal and vertical arrangements of both live and dead fuel loadings. Though thinning will create a short-term increase in smaller dead fuels the removal of trees would open the ground to sunlight that would stimulate brush species to grow at more rapid rate and occupy a larger percentage of the site. As the live fuel component builds within the fuel base, the subsequent shade would reduce surfaces temperatures and increases fuel moistures, therefore promoting decomposition of hazardous fuels. In this condition of decomposition, the fuels retain water longer, which would strengthen the resistance to a fire start in early to mid-summer. In addition, the treatments could facilitate

fire suppression activities by providing safe ingress and egress for wildfire suppression resources and for counter fire suppression strategies if an extreme fire occurs (Omi and Martinson 2002).

In preparation for an unlikely occurrence of a wildfire within a commercially thinned area, firefighters could establish hazardous fuel reduction zones (HFRZ) to ensure quick access to and suppression of any unplanned fire activity. These areas would be strategically located along ridge lines and/or adjacent to heavily-used road systems. All HFRZ treatments would be on the surface only and would not be a soil disturbing activity.

Hazardous Materials

Activity resulting from the Proposed Action would be subject to State of Oregon Administrative Rule No. 340-108, *Oil and Hazardous Materials Spills and Releases*. This specifies the reporting requirements, cleanup standards and liability that attaches to a spill or release or threatened spill or release involving oil or hazardous substances. Normal contract administration would also include site monitoring for solid and hazardous waste. When applicable, the BLM would apply the Coos Bay District Hazardous Materials Contingency Plan and Spill Plan for Riparian Operations a release threatens to reach surface waters or is in excess of reportable quantities.

Long-Term Site Productivity

Using the Kings Site index as a measure to assess long-term site productivity, the harvest methods and design features to limit soil compaction would not degrade the long-term site productivity of these units (soil resources report pp. 6-7).

Peak Flows and Forest Harvest

The density management and hardwood conversion would not affect peak flows. The greatest potential for forest harvest to change peak flows is by altering the amount of snow accumulation and subsequent rates in the rain-on-snow zone (>2,000 feet in elevation). However, the project is located below 2,000 feet in elevation, in the rain-dominated zone. There would be no effects to peak flows from rain-on-snow events.

Port-Orford-cedar

The Cherry Vaughn analysis area is within the range of Port-Orford-cedar; therefore, all management activities would conform to the guidelines specified in the 2004 Final Supplemental Environmental Impact Statement (FSEIS) for Management of Port-Orford-Cedar in Southwest Oregon where applicable (USDI 2004).

Areas within 50 feet of streams or roads were determined to be at high risk of infection, and those areas greater than 50 feet away from roads and streams were determined to be at low risk of infection by Port-Orford-cedar root disease (*Phytophthora lateralis*) (p. 3&4-42). The answer to all three questions in the Risk Key provided in the 2004 FSEIS (p. 2-18) which gives direction for assessing risk and controlling spread of *P. lateralis*, was “no.” Because of this low risk, there is no requirement for additional Port-Orford-cedar management practices.

Noxious Weeds

The BLM is required to develop a Noxious Weed Risk Assessment when it is determined that an action may introduce or spread noxious weeds or when known habitat exists (USDI 2007). The Analysis File contains the completed Cherry Vaughn assessment. Prevention measures identified as a result of this assessment not already applied on District lands as part of routine activities (USDI 1997a), have been incorporated into the Project Design Features to minimize the potential for introducing weeds to the project area and/or spreading existing weed infestations.

Unaffected Resources

None of the following critical elements of the human environment is located in the project area or within a distance to be affected by implementation of either alternative:

- Farmlands, Prime or Unique
- Flood Plains (as described in Executive Order 11988)
- Wild and Scenic Rivers

Chapter 5 Literature Cited

Adams, P. W., and J. O. Ringer. 1994. *The Effects of Timber Harvesting & Forest Roads on Water Quantity & Quality in the Pacific Northwest: Summary & Annotated Bibliography*. Oregon State University - Forest Engineering Dept., Corvallis OR.

Anderson, P. D., D. J. Larson, and S. S. Chan. 2007. Riparian buffer and density management Influences on microclimate of young headwater forests of western Oregon. Forest Science **53**(2): 254-269.

Aztet, T., D. E. White, L. A. McCrimmon, P. A. Martinez, P. R. Fong, and V. D. Randall. 1996. Field Guide to the Forested Plant Associations of Southwestern Oregon. Technical Paper R6-NR-ECOL-TP-17-96, U.S. Dept. of Agriculture - Forest Service.

Bailey, J. D., C. Mayrsohn, P. S. Doescher, E. St. Pierre, and J. C. Tappeiner. 1998. Understory vegetation in old and young Douglas-fir forests of western Oregon. Forest Ecology and Management **112**: 289-302.

Bailey, J. D., and J. C. Tappeiner. 1998. Effects of thinning on structural development in 40- to 100-year-old Douglas-fir stands in western Oregon. Forest Ecology and Management **108**(1): 99-113.

Bell, J. F., and J. R. Dilworth. 1997 (Revised). *Log Scaling and Timber Cruising*. John Bell & Associates, Corvallis OR.

Beschta, B. L. 1978. Long-term patterns of sediment production following road construction and logging in the Oregon Coast Range. Water Resources Research **14**(6): 1011-1016.

Bosch, J. M., and J. D. Hewlett. 1982. A Review of catchment experiments to determine the effects of vegetation changes on water yield and evapotranspiration. Journal of Hydrology **55**: 3-23.

Boyer, K. L., D. R. Berg, and S. V. Gregory. 2003. Riparian management for wood in rivers. Pages 407-420 *in* S. V. Gregory, K. L. Boyer, and A. M. Gurnell, editors. *The ecology and management of wood in world rivers.* American Fisheries Society, Bethesda, MD. Symposium 37.

Brake, D., M. Molnau, and J. King, G. 1997. Sediment transport distances and culvert spacings on logging roads within the Oregon coast mountain range. Pages Paper No. IM-975018 *in* Proceedings, Annual International Meeting. Minneapolis, MN. American Society of Agricultural and Biological Engineers (formerly American Society of Agricultural Engineers).

Brazier, J. R., and G. W. Brown. 1973. Buffer Strips for Stream Temperature Control. Oregon State University, Corvallis OR.

Carlton, G. C. 1988. The Structure and Dynamics of Red Alder Communities in the Central Coast Range of Western Oregon. MS. Oregon State University, Corvallis OR.

Chan, S., K. Maas-Hebner, and W. Emmingham. 1996. Thinning hardwood and conifer stands to increase light levels: have you thinned enough? *COPE Report **9**(4)*. Coastal Oregon Productivity Enhancement Program. *http://www.cof.orst.edu/coops/cope/newsletr/9_4/9_4.pdf*

Chan, S. S., P. Anderson, J. Cissel, L. Larson, and C. Thompson. 2004. Variable density management in Riparian Reserves: lessons learned from an operational study in managed forests of western Oregon, USA. Forest Snow and Landscape Research **78**(1/2): 151-172. http://ocid.nacse.org/nbii/density/pdfFiles/Chan_et_al_2004.pdf

CIG. 2004. Overview of climate change impacts in the U.S. Pacific Northwest. Climate Impacts Group. University of Washington, Seattle, WA. *http://www.ef.org/westcoastclimate/D_PNW%20impacts.pdf*

CIG. 2009. Forecasts and Planning Tools. Climate Impacts Group. University of Washington, Seattle, WA. *http://cses.washington.edu/cig/fpt/fpt.shtml*

Clark, P., T. Cowles, R. Hildreth, M. Hixon, D. Lytle, J. Lubchenco, L. Mahrt, R. Mitchell, A. Mix, B. Steel, D. Turner, R. Vong, E. Goodstein, K. Falkner, M. Abbot, J. Barth, P. Bartlein, S. Bloomer, J. Coakley, S. Coakley, K. N. Johnson, B. Law, N. Mantua, E. Miles, P. Mote, R. Neilson, R. Samelson, P. T. Strub, A. Hamlet, H. Salwasser, S. Heppell, A. Blaustein, J. Bolte, R. Cuenca, S. Ebensen, M. Freilich, S. Gregory, D. Hartmann, M. Kosro, R. Letelier, E. Maloney, S. Radosevich, R. Smith, A. Snover, and M. Unsworth. 2004. Scientific Consensus Statement on the Likely Impacts of Climate Change in the Pacific Northwest. Pages Appendix E *in* C. Jolly, R. Shultz, D. Van't Hof, S. Schneider, B. Therkelsen, and A. Baker, editors. *West Coast Governors' Global Warming Initiative Staff Recommendations to the Governors* http://www.ef.org/westcoastclimate/E_OSU%20Consensus%20Statement.pdf

Cunningham, P. G. 2002. A survey of research on riparian responses to silviculture. Pages 73-79 *in* A. C. Johnson, R. T. Haynes, and R. A. Monserud, editors. *Congruent management of multiple resources: proceedings from the wood compatibility initiative workshop.* U.S. Dept. of Agriculture - Forest Service - Pacific Northwest Research Station, Portland, OR. *General Technical Report* PNW-GTR-563. http://www.fs.fed.us/pnw/publications/pnw_gtr563/pnw_gtr563a.pdf

Cushman, K., and R. Huff. 2007. The Conservation Assessment for Fungi Included in Forest Service Regions 5 and 6 Sensitive and BLM California, Oregon and Washington Special Status Species Programs. *Conservation Assessment*. U.S. Dept. of Agriculture - Forest Service Regions 5 and 6, Oregon and Washington, U.S. Dept. of the Interior - Bureau of Land Management, California, Oregon and Washington, Portland, OR. *http://www.fs.fed.us/r6/sfpnw/issssp/documents/planning-docs/ca-fu-text-2007-07-10-doc.doc*

Davis, L. R., K. J. Puettman, and G. F. Tucker. 2007. Overstory response to alternative thinning treatments in young Douglas-fir forests of western Oregon. Northwest Science **81**(1): 1-14.

Deal, R. L. 2006. Red alder stand development and dynamics. Pages 45-54 *in* R. L. Deal and C. A. Harrington, editors. *Red Alder - A State of Knowledge*. U.S. Dept. of Agriculture - Forest Service - Pacific Northwest Research Station, Portland, OR. *General Technical Report* PNW-GTR-669. http://www.fs.fed.us/pnw/publications/gtr669/

Dietrich, W. E., T. Dunne, N. Humphrey, and L. Reid. 1982. Construction of sediment budgets for drainage basins. Pages 2-23 *in* F. J. Swanson, R. J. Janda, T. Dunne, and D. N. Swanston, editors. Workshop on sediment budgets and routing in

forested drainage basins. Portland, OR. U.S. Dept. of Agriculture - Forest Service - Pacific Northwest Forest and Range Experiment Station. *http://www.fs.fed.us/pnw/publications/pnw_gtr141/*.

EPA. 2010. Ecoregion Maps and GIS Resources. U.S. Environmental Protection Agency. *http://www.epa.gov/wed/pages/ecoregions.htm*

Everest, F. H., B. L. Beschta, J. C. Scrivner, K. V. Koski, J. R. Sedell, and C. J. Cedarholm. 1987. Fine sediment and salmonid production: a paradox. Pages 98-142 *in* E. O. Salo and T. W. Cundy, editors. *Streamside Management: Forestry and Fishery Interactions*. University of Washington - Institute of Forest Resources, Seattle, WA

FEMAT. 1993. Forest Ecosystem Management: An Ecological, Economic, and Social Assessment. GPO 1993-793-071, FEMAT, Forest Ecosystem Management Assessment Team (FEMAT), Washington DC. *http://www.or.blm.gov/nwfpnepa/FEMAT-1993/1993_%20FEMAT_Report.pdf*

FERC. 2009a. Final Environmental Impact Statement Jordan Cove Energy and Pacific Connector Gas Pipeline Project. FERC/EIS - 0223F Docket Nos. CP07-444-000 CP07-441-000, Federal Energy Regulatory Commission, Washington, D.C. *http://www.ferc.gov/industries/gas/enviro/eis/2009/05-01-09-eis.asp*

FERC. 2009b. Order Granting Authorization Under Section 3 of the Natural Gas Act and Issuing Certificates. Federal Energy Regulatory Commission. *http://www.ferc.gov/whats-new/comm-meet/2009/121709/C-1.pdf*

Franklin, J. F., T. A. Spies, R. VanPelt, A. B. Carey, D. A. Thornburgh, D. R. Berg, D. B. Lindenmayer, M. E. Harmon, W. S. Keeton, D. C. Shaw, K. Bible, and J. Chen. 2002. Disturbances and structural development of natural forest ecosystems with silvicultural implications, using Douglas-fir forests as an example. Forest Ecology and Management **155**: 399-423.

Franklin, J. F., and R. VanPelt. 2004. Spatial aspects of structural complexity. Journal of Forestry **102**(3): 22-28.

Furniss, M. J., L. M. Reid, and B. Staab. 2008. Water Resources and Climate Change. U.S. Dept. of Agriculture - Forest Service, Climate Change Resource Center. *http://www.fs.fed.us/ccrc/topics/water.shtml*

Garman, S. L., J. H. Cissel, and J. H. Mayo. 2003. Accelerating Development of Late-Successional Conditions in Young Managed Douglas-fir Stands: a Simulation Study. PNW-GTR-557, *General Technical Report*. U.S. Dept. of Agriculture - Forest Service - Pacific Northwest Research station, Portland, OR.

Goheen, D. J., and E. M. Hansen. 1993. Effects of pathogens and bark beetles on forests. Pages 175-196 *in* T. D. Schowalter and G. M. Filip, editors. *Beetle-Pathogen Interactions in Conifer Forests*. Academic Press, London

Hagar, J., and S. Howlin. 2001. Songbird Community Response to Thinning of Young Douglas-fir Stands in the Oregon Cascades - Third Year Post-treatment Results for the Willamette N.F., Young Stand Thinning and Diversity Study. Cascade Center for Ecosystem Management, Corvallis OR. *http://www.fsl.orst.edu/lter/research/related/ccem/yst/pubs/POSTYR3.pdf*

Hamer, T. E., E. D. Forsman, and E. M. Glenn. 2007. Home range attributes and habitat selection of barred owls and spotted owls in an area of sympatry. The Condor **109**(4): 750-768. http://www.bioone.org/doi/pdf/10.1650/0010-5422(2007)109%5B750:HRAAHS%5D2.0.CO%3B2

Hann, W. J., and D. L. Bunnell. 2001. Fire and land management planning and implementation across multiple scales. International Journal of Wildland Fire **10**(4): 389-403. http://www.fs.fed.us/fire/fuelman/h_b.pdf

Hardy, C. C., K. M. Schmidt, J. M. Menakis, and N. R. Samson. 2001. Spatial data for national fire planning and fuel management. International Journal of Wildland Fire **10**(4): 353-372.

Harmon, M. E., W. K. Ferrell, and J. F. Franklin. 1990. Effects of carbon storage of conversion of Old-Growth forests to young forests. Science **247**(4943): 669-702. http://www.sciencemag.org/cgi/content/short/247/4943/699

Harrington, C. A. 2003. The 1930s Survey of Forest Resources in Washington and Oregon. PNW-GTR-584, *General Technical Report*. U.S. Dept. of Agriculture - Forest Service - Pacific Northwest Research Station, Portland, OR.

Harrington, C. A. 2006. Biology and Ecology of Red Alder. Pages 150 *in* R. L. Deal and C. A. Harrington, editors. *Red Alder: A State of Knowledge*. U.S. Dept. of Agriculture - Forest Service - Pacific Northwest Research Station, Portland, OR. *General Technical Report* PNW-GTR-669.

Harrington, C. A., S. D. Roberts, and L. C. Brodie. 2005. Tree and Understory Responses to Variable-Density Thinning in Western Oregon. Pages 97-106 *in* C. E. Peterson and D. A. Maguire, editors. *Balancing ecosystem values: innovative experiments for sustainable forestry - proceedings of a conference*. U.S. Dept. of Agriculture - Forest Service - Pacific Northwest Research Station, Portland, OR. *General Technical Report PNW-GTR-635* http://www.fs.fed.us/pnw/publications/pnw_gtr635/pnw_gtr635b.pdf

Hayes, J. P., S. H. Schoenholtz, M. J. Hartley, G. Murphy, R. F. Powers, D. R. Berg, and S. R. Radosevich. 2005. Environmental consequences of intensively managed forest plantations in the Pacific Northwest. Journal of Forestry **103**(2): 83-87.

Hibbs, D. E., and P. E. Giordano. 1996. Vegetation characteristics of alder-dominated riparian buffer strips in the Oregon Coast Range. Northwest Science **70**(3): 213-222. http://www.vetmed.wsu.edu/org_NWS/NWSci%20journal%20articles/1996%20files/Issue%203/v70%20p213%20Hibbs%20and%20Giordano.PDF

Hicks, B. J., H. J.D., P. A. Bisson, and J. R. Sedell. 1991. Response of salmonids to habitat changes. Pages 483-518 *in* W. R. Meehan, editor. *Influence of forest and range management on salmonid fishes and their habitats*. American Fisheries Society Spec. Publ., Bethesda, MD 19.

Hidalgo, H. G., T. Das, M. D. Dettinger, D. R. Cayan, D. W. Pierce, T. P. Barnett, G. Bala, A. Mirin, A. W. Wood, C. Bonfils, B. D. Santer, and T. Nozawa. 2009. Detection and attribution of streamflow timing changes to climate change in the western United States. Journal of Climate **22**(13): 3838-3855. http://journals.ametsoc.org/doi/abs/10.1175/2009JCLI2470.1

Howard, J. O., and D. J. DeMars. 1985. Comparison of logging residue from lump sum and log scale timber sales. Res. Pap. PNW-33Z. U.S. Dept. of Agriculture - U.S. Forest Service - Pacific Northwest Forest and Range Experiment Station, Portland, OR.

Iles, K. 2003. *A Sampler of Inventory Topics*, First edition. Kim Iles & Associates, Nanaimo, B.C.

IPCC. 2007. Contribution of Working Group I to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change. *Intergovernmental Panel on Climate Change*. S. D. Solomon, D. Quin, M. Manning, Z. Chen, M. Marquis, M. Averyt, M. Tignor, and H. L. Miller, Cambridge University Press, Cambridge, United Kingdom and New York, New York. *http://www.ipcc.ch/publications_and_data/publications_ipcc_fourth_assessment_report_wg1_report_the_physical_science_basis.htm*

IVMP. 2001. Interagency Vegetation Mapping Project. *Oregon Coast Province*. J. O'neil, K. C. Kroll, C. Grob, C. Ducey, K. Fassnacht, J. Alegria, J. Nighbert, M. Moeur, J. Fetterman, and D. Weyermann, Averstar, Inc. for the U.S. Dept. of Agriculture - Forest Service and U.S. Dept. of Interior - Bureau of Land Management, Portland, OR. *http://www.blm.gov/or/gis/data-details.php?data=ds000103*

Jassal, R. S., T. A. Black, B. Chen, R. Roy, Z. Nesic, D. L. Spittlehouse, and J. A. Trofymow. 2008. N_2O emissions and carbon sequestration in a nitrogen-fertilized Douglas fir stand. Journal of Geophysical Research **113**(G04013): 10. http://www.agu.org/pubs/crossref/2008/2008JG000764.shtml

Johnson, A. C., and R. T. Edwards. 2002. Physical and chemical processes in headwater channels with red alder. Pages 101-108 *in* A. C. Johnson, R. T. Haynes, and R. A. Monserud, editors. *Congruent management of multiple resources: proceedings from the wood compatibility initiative workshop*. U.S. Dept. of Agriculture - Forest Service - Pacific Northwest Research Station, Portland, OR. *General Technical Report* PNW-GTR-563. http://www.fs.fed.us/pnw/publications/pnw_gtr563/pnw_gtr563a.pdf

Keim, R. F., A. E. Skaugset, and D. S. Bateman. 2000. Dynamics of coarse woody debris placed in three Oregon streams. Forest Science **46**(1): 13-22.

Lenihan, J. M., D. Bachelet, R. Drapek, and R. P. Neilson. 2006. The Response of Vegetation Distribution, Ecosystem Productivity, and Fire in California to Future Climate Scenarios Simulated by the MC1 Dynamic Vegetation Model. Pages Appendix 5 *in Climate Action Team Report*. California Climate Action Team http://www.energy.ca.gov/2005publications/CEC-500-2005-191/CEC-500-2005-191-SF.PDF

Levno, A., and J. Rothacher. 1969. Increases in maximum stream temperatures after slash burning in a small experiment watershed. Resource Note. PNW-RN-110, *Research Note*. U.S. Dept. of Agriculture - Forest Service - Pacific Northwest Forest and Range Experiment Station, Portland, OR.

MacCracken, J. G. 2002. Response of forest floor vertebrates to riparian hardwood conversion along the Bear River, southwest Washington. Forest Science **48**(2): 299-308. http://www.ingentaconnect.com/content/saf/fs/2002/00000048/00000002/art00013

Manning, T., C. C. Maguire, K. M. Jacobs, and D. Luoma. 2003. Additional habitat, diet and range information for the white-footed vole *(Arborimus albipes)*. American Midland Naturalist **150**(1): 116-123.

Marcot, B. G., G. Gunderson, K. Mellen, and J. L. Pohmann. 2004. DecAID advisor: a tool for managing snags, down wood and wood decay in PNW forests. Western Forester **12-13**: 2. http://www.treesearch.fs.fed.us/pubs/20353

McCain, C. 2004. Riparian Plant Communities of Northwest Oregon: Streamside Plant Communities. R6-NR-ECOL-TP-10-04, U.S. Dept. of Agriculture - Forest Service, U.S. Dept. of the Interior - Bureau of Land Management, Portland, OR.

McCain, C., and N. Diaz. 2002. Field Guide to the Forested Plant Associations of the Northern Oregon Coast Range. R6-NR-ECOL-TP-03-02.

McDade, M. H., F. J. Swanson, W. A. McKee, J. F. Franklin, and J. Van Sickle. 1990. Source distances for coarse woody debris entering small streams in western Oregon and Washington. Canadian Journal of Forest Research **20**: 326-330.

Meyer, C. B., M. D. Sparkman, and B. A. Klatte. 2005. Sand Seals in Coho Salmon Redds: Do They Improve Egg Survival? North American Journal of Fisheries Management **25**(1): 105-121.

Miles, E. L., and D. P. Lettenmaier. 2007. HB 1303 Interim Report: A comprehensive assessment of the impacts of climate change on the State of Washington. University of Washington JISAO CSES Climate Impacts Group.

Millar, C. I., R. Neilson, D. Batchelet, R. Drapek, and J. Lenihan. 2006. Climate Change at Multiple Scales. Pages 31-62 *in* H. Salwasser and M. Cloughesy, editors. *Forests, Carbon, and Climate Change: a Synthesis of Findings*. Oregon Forests Resources Institute, Portland, OR http://www.fs.fed.us/psw/publications/millar/psw_2006_millar028.pdf

MIT. 2008. Carbon footprint of best conserving Americans is still double global average. ScienceDaily. Massachusetts Institute of Technology. *http://www.sciencedaily.com/releases/2008/04/080428120658.htm#*

Moeur, M., T. A. Spies, M. Hemstrom, J. Alegria, J. Browning, J. H. Cissel, W. B. Cohen, T. E. Demeo, S. Healey, and R. Warbington. 2005. Northwest Forest Plan-The first ten years (1994-2003): Status and trends of late-successional ad old-growth forests. PNW GTR-646, U.S. Dept. of Agriculture - Forest Service - Pacific Northwest Research Station, Portland, OR. *http://www.fs.fed.us/pnw/publications/pnw_gtr646/*

Moore, G. W., B. J. Bond, J. A. Jones, N. Phillips, and F. C. Meinzer. 2004. Structural and compositional controls on transpiration in a 40- and 450-yr-old riparian forest in western Oregon, USA. Tree Physiology **24**: 481-491.

Mote, P. 2003. Trends in Temperature and Precipitation in the Pacific Northwest During the Twentieth Century. Northwest Science **77**(4): 271-282.

Murtaugh, P. A., and M. G. Schlax. 2009. Reproduction and carbon legacies of individuals. Global Environmental Change **19**: 14-20. http://blog.oregonlive.com/environment_impact/2009/07/carbon%20legacy.pdf

Naiman, R. J., R. E. Bilby, and P. A. Bisson. 2000. Riparian ecology and management in the Pacific coastal rain forest. Bioscience **50**(11): 996-1011.

Newton, M., B. A. El Hassan, and J. Zavitkovski. 1968. Role of red alder in western Oregon forest succession. *in* J. M. Trappe, editor. *Biology of Alder*. U.S. Dept. of Agriculture - Forest Service - Pacific Northwest Forest and Range Experiment Station, Portland, OR

OCCRI. 2010. Oregon Climate Assessment Report. eds., K. D. Dello, and P. W. Mote, Oregon State University, College of Oceanic and Atmospheric Sciences, Corvallis, OR. *http://occri.net/ocar*

ODEQ. 2006. Oregon's 2004/2006 Integrated Report Database. *http://www.deq.state.or.us/wq/assessment/rpt0406.htm*

Omi, P. N., and E. J. Martinson. 2002. Effect of Fuels Treatment on Wildfire Severity. Final Report to the Joint Fire Science Program Governing Board. Colorado State University, Fort Collins, CO. *http://www.ntc.blm.gov/krc/uploads/399/Effects%20of%20Fuels%20Treatment%20on%20Wildfire%20Severity.pdf*

ORS. 2011. Oregon Forests Practices Act.(ORS 527.610 to 527.992). Oregon Department of Forestry. *http://www.leg.state.or.us/ors/527.html*

Patterson, M. 2003,2006. Rufous Hummingbird. Pages 346-348 *in* D. B. Marshall, M. G. Hunter, and A. L. Contreras, editors. *Birds of Oregon: A General Reference*. Oregon State University Press, Corvallis OR

Pilliod, D. S., and E. Wind, editors. 2008. Guidelines for Managing Habitats to Conserve Amphibians and Reptiles of the Northwestern United States and Western Canada: Technical Publication HMG-4. Partners in Amphibian and Reptile Conservation, Birmingham, Al.

Poage, N. J., and J. C. Tappeiner. 2002. Long-term patterns of diameter and basal area growth of old-growth Douglas-fir in western Oregon. Canadian Journal of Forest Research **32**: 1232-1243.

Rapp, V. 2003. New Findings About Old-growth Forests. *Science Update*. Dept. of Agriculture - Forest Service, Pacific Northwest Research Station. *http://www.fs.fed.us/pnw/pubs/science-update-4.pdf*

Rashin, E. B., C. J. Clishe, A. T. Loch, and J. M. Bell. 2006. Effectiveness of timber harvest practices for controlling sediment related water quality impacts. Journal of the American Water Resources Association **42**(5): 1307-1327. http://www.ecy.wa.gov/pubs/0603046.pdf

Reid, L. M., and T. Dunne. 1984. Sediment production from forest road surfaces. Water Resources Research **20**(11): 1753-1761.

Ripple, W. J., K. T. Hershey, and R. Anthony. 2000. Historical forest patterns of Oregon's central Coast Range. Biological Conservation **93**: 127-133.

Salathe, E. P. J., R. Leung, Y. Qian, and Y. Zhang. 2009. Regional climate model projections for the State of Washington. Climatic Change(*In Press*): 37. http://www.atmos.washington.edu/~salathe/papers/Salathe_et_al_2009_RCM_cc.pdf

Schmidt, K. M., J. M. Menakis, C. C. Hardy, W. J. Hann, and D. L. Bunnell. 2002. Development of coarse-scale spatial data for wildland fire and fuel management. RMRS-GTR-87, *General Technical Report*. U.S. Dept. of Agriculture - Forest Service - Rocky Mountain Research Station, Fort Collins, CO. *http://www.fs.fed.us/fire/fuelman/popden/docs/fuelman.pdf*

Sharrow, S. H. 2008. Carbon Farming- the Global Carbon Cycle. Oregon State University, Corvallis OR. *http://www.doctorrange.com/PDF/carboncycle.pdf*

Smith, D. M. 1962. *The Practice of Silviculture*, 7th edition. John Wiley & Sons, Inc., New York, NY.

Sonne, E. 2006. Greenhouse gas emissions from forestry operations: a lifecycle assessment. Journal of Environmental Quality **35**(4): 1439-1450.

Spies, T. A., and J. F. Franklin. 1991. The structure of natural young, mature and old-growth Douglas-fir forests in Oregon and Washington. Pages 93-122 *in* L. F. Ruggiero, K. B. Aubry, A. B. Carey, and M. H. Huff, editors. *Wildlife and Vegetation of Unmanaged Douglas-fir Forests*. U.S. Dept. of Agriculture - Forest Service - Pacific Northwest Research Station, Corvallis, OR. *General Technical Report* PNW-GTR-285.

Tappeiner, J. C. 2002. Forest stand development. Biological Science Report. USGS/BRD/BSR-2002-0006, *Managing for biodiversity in young Douglas-fir forests of Western Oregon*. M. e. al, U.S. Dept. of the Interior - U.S. Geological Survey, Forest and Rangeland Ecosystem Science Center (FRESC), Corvallis, OR.

Tappeiner, J. C., J. Zasada, P. Ryan, and M. Newton. 1991. Salmonberry clonal and population structure: the basis for a persistent cover. Ecology **72**(2): 609-618.

Townsend, M. A., J. A. Pomerening, and B. R. Thomas. 1977. Soil inventory of the Coos Bay District. U.S. Dept. of the Interior - Bureau of Land Management, North Bend, OR.

USDA. 1993. Region 6: Interim Old-Growth Definitions. U.S. Dept. of Agriculture - Forest Service - Pacific Northwest Research Station, Portland, OR.

USDA, and USDI. 1994a. Final - Supplemental Environmental Impact Statement on Management of Habitat for the Late-Successional and Old-Growth Forest Related Species Within the Range of the Northern Spotted Owl. *SEIS*. U.S. Dept. of Agriculture - Forest Service, U.S. Dept. of the Interior - Bureau of Land Management, Portland, OR. *http://www.or.blm.gov/nwfp.htm*

USDA, and USDI. 1994b. Record of Decision for Amendments to Forest Service and Bureau of Land Management Planning Documents within the Range of the Northern Spotted Owl; Standards and Guidelines for Management of Habitat for Late-successional and Old-growth Forest Related Species within the Range of the Northern Spotted Owl. *Record of*

Decision. U.S. Dept. of Agriculture - Forest Service, U.S. Dept. of the Interior - Bureau of Land Management, Portland, OR. *http://www.or.blm.gov/nwfp.htm*

USDA, and USDI. 1998. South Coast - Northern Klamath Late-Successional Reserve Assessment. LSR Assessment. *LSRA*. U.S. Dept. of Agriculture - Forest Service, U.S. Dept. of the Interior - Bureau of Land Management, North Bend, OR.

USDA, and USDI. 2000. Final Supplemental Environmental Impact Statement for Amendments to the Survey and Manage, Protection Buffer, and other Mitigation Measures Standards and Guidelines. *SEIS*. U.S. Dept. of Agriculture - Forest Service, U.S. Dept. of the Interior - Bureau of Land Management, Portland, OR.

USDA, and USDI. 2004. Final - Supplemental Environmental Impact Statement Management of Port-Orford-Cedar in Southwest Oregon. *SEIS*. U.S. Dept. of Agriculture - Forest Service, U.S. Dept. of the Interior - Bureau of Land Management, Portland, OR.

USDA, and USDI. 2005. Conservation Assessments for 11 species of Coastal Lichens. U.S Dept. of Agriculture - Forest Service Region 6 U.S. Dept. of Interior - Bureau of Land Management, Oregon and Washington. *www.fs.fed.us/r6/.../ca-li-11-coastal-lichens-w-o-graphics-2009-02.doc*

USDI. 1989. *H-5310-Timber Cruising Handbook*. U.S. Dept. of the Interior- Bureau of Land Management, Portland, OR.

USDI. 1994. Final: Coos Bay District Proposed Resource Management Plan Environmental Impact Statement. U.S. Dept. of the Interior - Bureau of Land Management, North Bend, OR. *http://www.or.blm.gov/coosbay/rmp/index.htm*

USDI. 1995. Coos Bay District Record of Decision and Resource Management Plan. *Resource Management Plan*. U.S. Dept. of the Interior - Bureau of Land Management, North Bend, OR. *http://www.or.blm.gov/coosbay/rmp/index.htm*

USDI. 1997a. A Proposal to Conduct an Integrated Noxious Weed Program on the Coos Bay District of the Bureau of Land Management. EA. OR120-97-11, *Environmental Assessment*. U.S. Dept. of the Interior - Bureau of Land Management, North Bend, OR.

USDI. 1997b. Recovery Plan for the Threatened Marbled Murrelet *(Brachyramphus marmoratus)* in Washington, Oregon, and California. U.S. Dept. of the Interior - U.S. Fish and Wildlife Service, Portland, OR. *http://ecos.fws.gov/docs/recovery_plans/1997/970924.pdf*

USDI. 2001. North Fork Coquille River Water Quality Restoration Plan. U.S. Dept. of Interior - Bureau of Land Management, North Bend, OR.

USDI. 2002. North Fork Coquille Watershed Analysis. U.S. Dept. of the Interior - Bureau of Land Management - Coos Bay District - Umpqua Resource Area, North Bend, OR.

USDI. 2004. Record of Decision and Resource Management Plan Amendment for Management of Port-Orford-Cedar in Southwest Oregon, Coos Bay, Medford, and Roseburg Districts. *Record of Decision.* U.S. Dept. of the Interior - Bureau of Land Management, Portland, OR.

USDI. 2005. BLM sensitive species mollusks website. N. Duncan, editor. U.S. Dept. of the Interior - Bureau of Land Management - Roseburg District, Roseburg, OR. *http://web.or.blm.gov/mollusks/blm_sensitive_species.htm*

USDI. 2005 *Update*. East Fork Coquille Watershed Analysis. Watershed Analysis. U.S. Dept. of the Interior - Bureau of Land Management, North Bend, OR. *http://www.or.blm.gov/coosbay/watershed_%20Analysis/East_Fork_Coquille/efc_final.pdf*

USDI. 2007. Final Programmatic Environmental Impact Statement Vegetation Treatments Using Herbicides on Bureau of Land Management Lands in 17 Western States. FES 07-21, U.S. Dept. of the Interior - Bureau of Land Management, Washington DC.

USDI. 2008a. The Challenges of Linking Carbon Emissions, Atmospheric Greenhouse Gas Concentrations, Global Warming, and Consequential Impacts. Memorandum # 2008438-DO, U.S. Dept. of Interior - U.S. Geological Survey.

USDI. 2008b. Final Environmental Impact Statement for the Revision of the Resource Management Plans of the Western Oregon Bureau of Land Management. U.S. Dept. of the Interior - Bureau of Land Management, Portland, OR. *http://www.blm.gov/or/index.php*

USDI. 2010 *Update*. Western Oregon District's Transportation Management Plan. U.S. Dept. of the Interior - Bureau of Land Management, Portland, OR.

USDI. 2011a. Biological Opinion on the Cherry Vaughn Density Management Thinning and Hardwood Conversion Project. 13420-2011-F-0157, U.S. Dept. of Interior - U.S. Fish and Wildlife Service - Roseburg Field Office, Roseburg, OR.

USDI. 2011b. Biological Opinion on the Wagon Road Pilot Project. U.S. Dept. of Interior - U.S. Fish and Wildlife Service - Roseburg Field Office, Roseburg, OR.

USDI. 2011c. Revised Recovery Plan for the Northern Spotted Owl (*Strix occidentalis caurina*). U.S. Dept. of Interior - U.S. Fish and Wildlife Service, Portland, OR. *http://www.fws.gov/species/nso*

Van Slyke, D. District Fish Biologist *Personal Communication to* S. Messerle

Waters, T. F. 1995. *Sediment in Streams: Sources, Biological Effects, and Control*. American Fisheries Society Monograph 7, Bethesda, MD.

Wemple, B. C., J. A. Jones, and G. E. Grant. 1996. Channel network extension by logging roads in two basins, Western Cascades, Oregon. Water Resource Bulletin **32**(6).

Wilson, J. S., and C. D. Oliver. 2000. Stability and density management in Douglas-fir plantations. Canadian Journal of Forest Research **30**: 910-920.

Wimberly, M. C. 2002. Spatial simulation of historical landscape patterns in coastal forest of the Pacific Northwest. Canadian Journal of Forest Research **32**: 1316-1328.

Wimberly, M. C., and J. L. Ohman. 2004. A multi-scale assessment of human and environmental constraints on forest land cover change on the Oregon (USA) Coast Range. Landscape Ecology **19**: 631-646.

Wimberly, M. C., T. A. Spies, C. J. Long, and C. Whitlock. 2000. Simulating historical variability in the amount of old forests in the Oregon Coast Range. Conservation Biology **14**(1): 167-180.

WPN. 1999. Oregon Watershed Assessment Manual. Governor's Watershed Enhancement Board - Watershed Professional Network (WPN), Salem, OR.

WRI. 2010. The Greenhouse Gas Protocol Initiative. World Resources Institute. *http://www.ghgprotocol.org/calculation-tools/wood-products*

Zobrist, K. W., and T. M. Hinckley. 2005. A literature review of management practices to support increased biodiversity in intensively managed Douglas-fir plantations. Final Technical Report to the National Commission on Science for Sustainable Forestry (NCSSF): 1-14.

Chapter 6 List of Preparers

Paul Leman	Project Lead/ Forester
Aimee Hoefs	Team Lead/ Environmental Protection Specialist (Planning)
Jim Heaney	Wildlife Biologist
Jim Kirkpatrick	Forester (Silviculture)
Stephanie Messerle	Fish Biologist
Chris Sheridan	Forest Ecologist
Dale Stewart	District Soil Scientist
Jim Heaney	Wildlife Biologist
Eva Bailey	Forester
Jered Bowman	Forester
Jay Flora	Natural Resource Specialist (GIS)
Dennis Higgs	Civil Engineering Technician
Barry Hogge	Fuels Management Specialist
Joy Menguita	Civil Engineering Technician
Tim Rodenkirk	Botanist
Stephan Samuels	District Archaeologist
Chris Schumacher	Forester
Larry Standley	Hydrologist

Chapter 7 List of Agencies and Persons Contacted

The BLM informed the public of the planned EA through the publication of the Coos Bay District's planning update, a scoping notification on the District web site, and advertisement of scoping in *The World* newspaper.

The BLM directly notified the following public agencies and interested parties:

American Forest Resources Council
Association of O&C Counties
Cascadia Wildlands
Coast Range Association
Confederated Tribes of Coos, Lower Umpqua and Siuslaw
Coos County Commissioners
Coquille Indian Tribe
Division of State Lands
Douglas Timber Operators
Friends of the Coquille
Governor's Natural Resource Office
Klamath-Siskiyou Wildlands Center
NOAA National Marine Fisheries Service
NW Environmental Defense Council
Ocean Coastal Program
Oregon Department of Environmental Quality
Oregon Department of Fish and Wildlife
Oregon Department of Forestry
Oregon Water Resources Department
Oregon Wild
Plum Creek Timberlands
U.S. Fish & Wildlife Service
Umpqua Watersheds
Numerous Private Citizens
All Adjoining Landowners

Appendix A Stand Information

This table shows the current condition within the stands and models the result for immediately post-treatment, the No Action alternative within 50 years and the Proposed Action alternative within 50 years (Scenario). The other column heading abbreviations are:

Structure (Max) –model-estimated forest structural stage
TPA – Trees per acre
RD – Residual Density
Total QMD – The estimated quadratic mean diameter of the stand
SE – stem exclusion; OS – Old but single story; OM – Old and multistory

EA Unit	Scenario	Structure (Max)	TPA	RD	Total QMD	Canopy Cover	Down Wood/ acre	All Snags/ acre	Large Snags/acre >23 in. DBH
01	Current	2=SE	306	61	11.2	82	1.6	37.9	0.2
	Post_thin	2=SE	137	28	14.9	60	2.3	42.1	0.2
	NA_2060	5=OS	149	74	20.4	78	9.5	161.6	8.5
	PA_2060	5=OS	104	58	22.5	67	8.1	78.4	8.0
02	Current	2=SE	327	61	10.7	84	1.6	36.8	0.1
	Post_thin	2=SE	146	29	14.1	62	2.1	41.0	0.1
	NA_2060	5=OS	157	75	19.9	80	8.9	164.1	7.9
	PA_2060	**6=OM**	115	60	21.5	68	7.5	83.3	7.9
03	Current	2=SE	313	61	11.0	84	1.5	35.5	0.2
	Post_thin	2=SE	182	26	14.1	68	2.2	51.7	0.3
	NA_2060	5=OS	153	73	19.7	80	8.6	148.6	7.0
	PA_2060	**6=OM**	122	61	21.2	72	7.7	94.6	6.8
04	Current	2=SE	351	61	10.1	85	1.5	34.3	0.0
	Post_thin	2=SE	181	30	13.3	69	2.0	45.6	0.0
	NA_2060	5=OS	165	77	19.3	82	8.3	170.2	7.5
	PA_2060	5=OS	124	64	21.0	73	7.2	97.7	7.7
05	Current	2=SE	281	61	11.7	80	1.8	39.0	0.3
	Post_thin	2=SE	117	27	15.6	55	2.4	40.6	0.3
	NA_2060	5=OS	142	73	20.8	77	10.0	153.9	8.6
	PA_2060	5=OS	95	55	23.1	64	8.5	69.1	8.0
06	Current	2=SE	309	61	11.1	84	1.4	37.3	0.3
	Post_thin	2=SE	144	26	14.5	60	1.9	44.3	0.3
	NA_2060	5=OS	147	71	19.9	79	8.6	148.1	7.1
	PA_2060	**6=OM**	124	57	20.7	67	7.1	83.5	6.9
07	Current	2=SE	313	61	11.0	83	1.5	36.6	0.2
	Post_thin	2=SE	155	27	14.4	63	2.1	43.8	0.2
	NA_2060	5=OS	154	74	20.1	79	8.9	157.5	7.8
	PA_2060	**6=OM**	120	60	21.5	69	7.5	85.5	7.6
08	Current	2=SE	364	62	9.9	90	1.1	29.5	0.1
	Post_thin	2=SE	228	23	12.2	76	1.5	55.8	0.1
	NA_2060	5=OS	166	71	18.2	85	6.5	142.0	4.6
	PA_2060	**6=OM**	152	63	18.4	77	5.6	105.3	4.8
09	Current	2=SE	336	62	10.5	85	1.5	35.8	0.2
	Post_thin	2=SE	195	28	13.5	70	2.1	51.8	0.2
	NA_2060	5=OS	161	75	19.4	81	8.4	156.6	7.0
	PA_2060	**6=OM**	130	63	20.7	73	7.4	101.6	6.9
10	Current	2=SE	353	62	10.2	89	1.1	31.3	0.2
	Post_thin	2=SE	143	22	13.4	59	1.4	38.7	0.2
	NA_2060	5=OS	161	69	18.4	84	6.7	139.0	4.6
	PA_2060	**6=OM**	146	55	18.7	68	4.8	81.5	4.9
11	Current	2=SE	332	62	10.6	86	1.3	33.5	0.2
	Post_thin	2=SE	155	26	13.6	62	1.8	42.0	0.2
	NA_2060	5=OS	162	73	19.1	82	7.7	144.4	6.1
	PA_2060	**6=OM**	137	59	19.7	69	6.1	83.9	6.1
12	Current	2=SE	363	62	10.0	88	1.3	34.1	0.1
	Post_thin	2=SE	175	29	12.8	67	1.6	43.0	0.1
	NA_2060	5=OS	166	74	18.7	83	7.4	158.6	6.1
	PA_2060	**6=OM**	143	63	19.2	72	5.9	97.3	6.6

EA Unit	Scenario	Structure (Max)	TPA	RD	Total QMD	Canopy Cover	Down Wood/ acre	All Snags/ acre	Large Snags/acre >23 in. DBH
13	Current	2=SE	296	61	11.3	83	1.7	37.1	0.3
	Post_thin	2=SE	160	27	14.6	64	2.5	47.9	0.3
	NA_2060	5=OS	151	73	19.9	80	9.2	142.4	7.1
	PA_2060	5=OS	114	59	21.7	70	8.2	87.9	7.0
15	Current	2=SE	370	62	9.9	90	0.8	32.5	0.1
	Post_thin	2=SE	145	26	12.4	61	0.8	33.3	0.1
	NA_2060	5=OS	154	65	18.1	83	6.1	144.2	4.3
	PA_2060	**6=OM**	191	61	15.2	68	3.2	101.7	5.3
16	Current	2=SE	341	62	10.4	88	1.1	29.9	0.2
	Post_thin	2=SE	211	19	13.8	73	1.7	60.2	0.3
	NA_2060	5=OS	155	67	18.5	83	6.7	131.4	4.3
	PA_2060	5=OS	141	61	19.2	79	6.3	105.8	4.1

Appendix B Survey & Manage Tracking Form - Wildlife

Project Name: Cherry Vaughn
Prepared By: Jim Heaney, Wildlife Biologist
Project Type: Hardwood Conversion
Date: September 23, 2011
Location: T27S R10W Sec. 3-9, 17-21, 29-30 & T27S R10W Sec. 3
S&M List Date: 2011 Settlement Agreement

The Coos Bay District compiled the species list below from the 2011 Settlement Agreement Attachment 1. The list includes those vertebrate and invertebrate species with pre-disturbance survey requirements (Category A, B or C species) whose known or suspected range includes the Coos Bay BLM District.

Table III/IV-10 Survey & Manage Wildlife Species

Species	S&M Category	Survey Triggers			Survey Results			Site Management
		Within Range of the Species?	Project Contains Suitable habitat?	Project may negatively affect species/habitat?	Surveys Required?	Survey Date (month/ year)	Sites Known or Found?	
Vertebrates								
Oregon Red Tree Vole (mesic) (*Arborimus longicaudus*)	C	Yes	No	No	No	NA	NA	NA
Great Gray Owl (*Strix nebulosa*)	A	Yes	No	No	No	NA	NA	NA

The Oregon red tree vole is endemic to moist conifer habitats with a large component of Douglas-fir. These red alder stands do not support habitat for the red tree vole.

Pre-disturbance survey for Great Gray Owls is not required since there is no suitable nesting habitat within or within proximity of the hardwood conversion area that would be impacted by disturbance. The required habitat characteristics of suitable habitat include: (1) large diameter nest trees, (2) forest for roosting cover, and (3) proximity [within 600 feet] to openings that could be used as foraging areas ((USDA and USDI 2004) and mitigation language in the 2011 Settlement Agreement Species List). The hardwood stands in Cherry Vaughn project do not have proximity to natural-openings $\geq$ 10 acres (Jim Heaney, staff review, July 2011) and pre-disturbance surveys are not suggested in suitable nesting habitat adjacent to man-made openings at this time (USDA and USDI 2004).

Statement of Compliance: The Coos Bay BLM applied the 2011 Settlement Agreement Species List to the hardwood conversion portion of the Cherry Vaughn project. There are no pre-disturbance surveys required and no known sites to manage within stands affected by the project.

Jim Heaney — Signature

September 23, 2011 — Date

Appendix C Special Status Species - Botany

List of Botany special status species possibly occurring within the analysis area. Low ≤ 2 known sites, Moderate 3-9 sites, and High ≥10 sites on District. For species with known sites nearby the project area likelihood is increased; species with sites away from the area and primarily coastal zone, likelihood has been decreased

Scientific and Common Name	Documented (D) or Suspected (S) on Coos Bay District	Likelihood of Occurring in the Project Area*
VASCULAR PLANTS		
Adiantum jordanii (California maidenhair fern)	D	Low. Known from Bear Creek Rec. Site
Erigeron cervinus (Siskiyou daisy)	S	Low. Preferred habitat is scarce in the project area.
Iliamna latibracteata (California globe mallow)	D	Low. One known site on District prefers areas with more light- openings in the forest, recent burns, roadsides, etc.
Pellaea andromedifolia (Coffee fern)	D	Moderate. Has been found very close to the project area.
Polystichum californicum (California sword fern)	D	Low. Rare on district but could potentially show up almost anywhere in the project area.
Romanzoffia thompsonii (Thompson's mist maiden)	D	Low. Preferred habitat is scarce in the project area.
Scirpus pendulus (drooping bulrush)	S	Low. Preferred habitat is scarce in the project area.
Sidalcea malviflora ssp. *patula* (coast checker bloom)	D	Low. Historic site near Edson Butte
Trillium kurabayashii (=*T. angustipetalum*)(giant purple trillium)	D	Low. Only one site on District.
NON-VASCULAR PLANTS (SURVEYS PRACTICAL)		
Bryoria subcana	D	High. One site found within the project area.
Calicium adspersum	S	Low. Few legacy trees in project area.
Heterodermia leucomela	D	Low. All sites found on immediate coast.
Leptogium cyanescens	S	Low. No known sites on District.
Niebla cephalota	D	Low. All sites on immediate coast.
Codriophorus depressus (*Racomitrium depressum*)	S	Low. Few legacy trees in project area.
Cryptomitrium tenerum	S	Low. No known sites on District.
Hypotrachyna revoluta	D	Moderate. Several sites on District.
Metzgeria violacea	D	Moderate. Several sites on District.
Porella bolanderi	S	Low. No known sites on District.
Schistostega pinnata	S	Low. No known sites on District.
Tetraphis geniculata	S	Low. No known sites on District.
NON-VASCULAR PLANTS/FUNGI (SURVEYS NOT PRACTICAL)		
Arcangeliella camphorata	D	Moderate. Three sites have been found on District.
Boletus pulcherrimus	S	Low. Recent site from Blacklock Point area of Curry County.
Cortinarius barlowensis (=C. azureus)	S	Low. No known sites on District.
Phaeocollybia californica	D	Moderate. Nine sites found on District.
Rhizopogon exiguus	S	Low. Habitat is present – site near Mapleton on Siuslaw N.F.

Appendix D Survey & Manage Tracking Form - Botany

Project Name: Cherry Vaughn EA
Prepared By: Tim Rodenkirk, Botanist
Project Type: Hardwood Conversions & Non-Commercial Treatment Areas
Date: 8 September 2011
S&M List Date: 2011 Settlement Agreement
Location: T27S R10W Sec. 3-9, 17-21, 29-30 & T27S R10W Sec. 3

Species listed below were compiled from the 2011 Settlement Agreement and include those species whose known or suspected range includes the Coos Bay District according to:

- "Survey Protocols for Survey and Manage Component 2 Bryophytes, Version 2.0" (BLM-Information Bulletin No. OR-98-051);
- "Survey Protocols for Seven Protection Buffer Fungi, Version 1.3" (BLM-Instruction Memorandum Number OR-2000-018);
- "Survey Protocols for Component 2 Lichens, Version 2.0" (BLM-Instruction Memorandum Number OR-98-38), and
- BLM Conservation Assessments and Species Fact Sheets.

Survey methodology involves using the intuitive controlled method where botanists survey high likelihood habitats more intensively than other areas within the project. The above publications describe this protocol in more detail. No Survey and Manage Plant Species were found in any of the areas requiring surveys (hardwood conversions and non-commercial treatment areas).

Table III/IV-11 Survey & Manage botany species

Species	S&M Category	Within Range of the Species?	Project Contains Suitable habitat?	Project will affect species/ habitat?	Surveys Required?	Survey Dates	Sites Found?	Site Management
Fungi								
Bridgeoporus nobililssimus	A	Yes	No	N/A	No	N/A	0	N/A
Lichens								
Bryoria pseudocapillaris	A	No	N/A	N/A	No	N/A	0	N/A
Bryoria spiralifera	A	No	N/A	N/A	No	N/A	0	N/A
Cladonia norvegica	C	Yes	Yes	Yes	Yes	Oct 2010- Aug 2011	0	N/A
Hypogymnia duplicata	C	No	N/A	N/A	No	N/A	0	N/A
Leptogium cyanescens	A	Yes	Yes	Yes	Yes	Oct 2010- Aug 2011	0	N/A
Lobaria linita	A	Yes	Yes	Yes	Yes	Oct 2010- Aug 2011	0	N/A
Niebla cephalota	A	No	N/A	N/A	No	N/A	0	N/A
Pseudocyphellaria perpetua	A	Yes	Yes	Yes	Yes	Oct 2010- Aug 2011	0	N/A
Teloschistes flavicans	A	No	N/A	N/A	No	N/A	0	N/A
Bryophytes								
Schistostega pennata	A	No	N/A	N/A	No	N/A	0	N/A
Tetraphis geniculata	A	Yes	Yes	Yes	Yes	Oct 2010- Aug 2011	0	N/A
Vascular Plant[1]								
Bensoniella oregana	A	No	N/A	N/A	No	N/A	0	N/A
Eucephalis vialis	A	No	N/A	N/A	No	N/A	0	N/A

Although none of the hardwood conversions contain habitat and/or are in the range of any S&M vascular plant species, vascular plant surveys were completed on all units from October 2010 through August of 2011. The target species during these surveys were several special status plant species that are not included in the S&M program. No special status or S&M vascular plant species were found on any of the surveys.

Statement of Compliance

The Coos Bay BLM District applied the 2011 Settlement Agreement Species List to the Cherry Vaughn EA project area, completing pre-disturbance surveys and management of known sites, required by Survey Protocols and Management Recommendations to comply with the *2001 Record of Decision and Standard and Guidelines for Amendments to the Survey and Manage, Protection Buffer, and other Mitigation Measure Standards and Guidelines*.

<u>/s/ Tim Rodenkirk</u>	*<u>January 19, 2012 (updated)</u>*
Signature	Date

Appendix E Sample Tree Falling

Background
The Code of Federal Regulations requires the BLM to sell timber on a tree cruise basis (43 CFR 5422.1) and to have an accurate appraisal at the time BLM offers the sale (43 CFR 5420.0-6). The Cherry-Vaughn projects would be sold as lump-sum timber sales. In a lump-sum sale, timber cruisers assess the standing timber and give it a specific value. This value becomes the BLM cruise estimate and is the minimum bid for the removal of the timber in the advertised sale. The winning bidder pays the exact amount of the winning bid to the BLM.

Conversely, the Forest Service in Western Oregon normally uses a log-scale sale process. The Forest Service does provide perspective purchasers an appraisal of the timber; however, they make a bid on the average stumpage. The logs removed from the sale are scaled and assessed a value using the average stumpage bid by the purchaser. The final price of the sale is determined after cutting the trees (Howard and DeMars 1985).

The Forest Service does not use sample tree falling, because they do not need as accurate a cruise before the sale is offered since they use log-scaling. However, the Forest Service has used validation falling in the past. The BLM needs a more accurate cruise to prepare the best appraisal for the minimum lump-sum bid price, **before** the sale advertisement.

It is in the public interest that the BLM maintains accurate and reliable timber cruises. This practice maintains accurate and reliable timber cruises. This practice provides statistically reliable data available in no other way. It helps ensure the public receives fair market value for the timber sold as required by Congress through FLPMA.

Other Cruise Methods
The BLM has frequently used visual timber cruises but this technique does not allow the BLM to check the accuracy of the final cruise. The pure ocular cruising method makes many assumptions about the trees being measured:

- The cruiser selects the correct form class/bark thickness ratio/volume equation.
- The cruiser accurately measures the tree height and DBH.
- The form of the tree and merchantable height fit the measured form class/volume equation.
- Tree defect is apparent by visible indicators.
- The cruiser assumes the correct amount of hidden defect and breakage.

Although form class and bark thickness can be obtained by climbing the tree, these other variables are estimated which are subject to inherent measurement bias.

Accuracy of Sample Tree Falling
Conducting sample tree falling removes the measurement bias inherent in making visual estimates. Through checking measurements directly by felling a sample tree, cruisers can make corrections to their estimates. This is because sample tree falling provides the direct measurement of form class, bark thickness, taper, defect, breakage, volume and value without bias. This is a statistically valid sampling methodology (Bell and Dilworth 1997 (Revised), Iles 2003, USDI 1989) where cruisers select a portion of the cruise trees to be felled, bucked (cut-to-length) and scaled. By felling a sample tree and substituting the scale of the tree for the cruise in the volume calculations, it eliminates the measurement bias created through ocular estimation. Cruisers can apply the measurements gained by felling, such as form class, bark thickness, and stump to DBH ratio, to the remaining standing trees and incorporate that information into district databases.

The BLM Manual Supplement Handbook 5310-1, 1989 states, "In addition to meeting sample error standards, the volume estimates of all 3P and variable plot methods must be checked by felling a portion of sample trees. The following minimum number of sample trees must be felled, bucked and scaled to minimize technique error through an on-site check of merchantable tree height, form class/bark thickness, defect deduction and grade estimation." Thinning in young stands (such as these) has 85-99% log recovery; therefore, cruisers need to fell only 10% of sample trees to minimize sampling variability and maintain a low sampling error.

Because of the statistically valid cruise design, cruisers can reliably extrapolate the sample results to the rest of the unit.

STF as a connected action
The BLM includes sample tree falling in the Cherry Vaughn EA as a project design feature and thus analysis of the Proposed Action includes the impacts of sample tree felling (EA pp. 37, 53-56 and 63-72). There is no CEQ requirement that a federal agency must issue a single decision for actions considered and analyzed in the same EA document. Sample tree felling is a ground-disturbing activity that must occur prior to the offering of a timber sale.

All of the proposed timber sales could proceed without sample tree falling. In addition, sample tree falling does not depend on the larger action (the timber sales) for its justification. Sample tree falling can proceed without taking other actions. The BLM might not choose to offer these sales. However, the volume tables gained from conducting sample tree falling could be used to assess the final cruise volume in sales that occur within the same watershed and have similar stand characteristics.

Other timber sale preparation activities occur before a timber sale decision is made. These include tree marking, flagging of sale boundaries, surveying property lines and biological surveys. Unlike sample tree falling, these activities are not ground-disturbing and occur as part of routine timber sale preparation. Nor do these activities justify that a timber sale goes forward. The BLM has conducted many of these activities for a sale and the sale has never gone forward. Therefore, issuing a decision to conduct sample tree falling does not constitute a decision to offer a timber sale.

STF in the LSR
The LSRA recommends the following: "Potential stands for commercial thinning have tree diameter distributions which can support a commercial harvest operation under market conditions. They are generally even-age, single canopy stands" (p.80). LSR stands proposed for treatment in the Cherry Vaughn EA meet this definition.

Density management is also described in the LSRA:

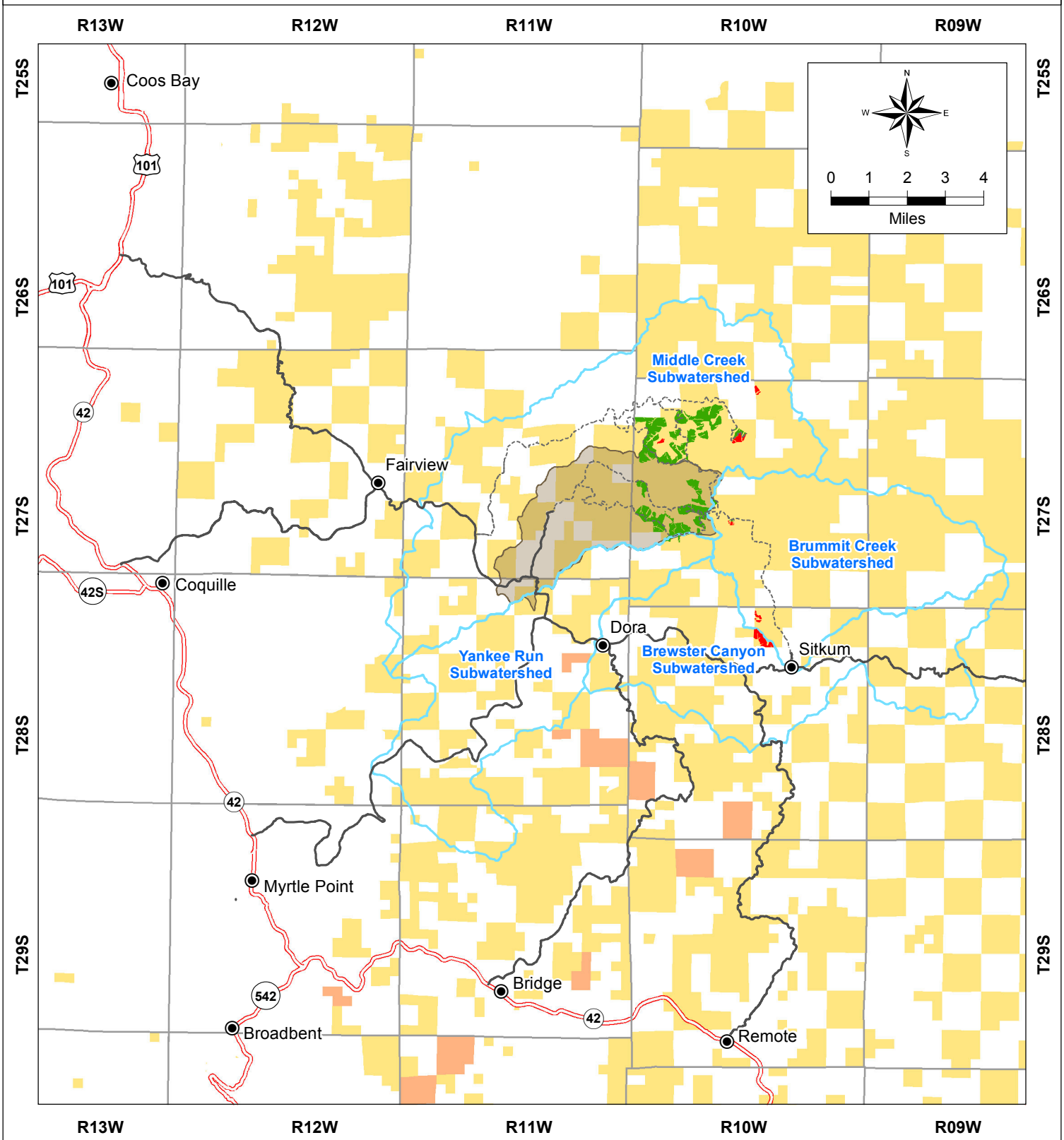
"The purpose of commercial thinning is to maintain or improve growth rates and vigor, manipulate species composition, and spatial arrangement. This is accomplished primarily by reducing stand density. Where necessary, active recruitment of snags/CWD and planting of an understory of appropriate tree species can be done concurrently. This treatment will usually be implemented via an economical commercial harvest operation" (p.80).

Even if a proposed timber sale does not go forward, the BLM is still not precluded from cutting trees within the LSR. Other non-commercial activities are allowed such as habitat restoration: "Coarse wood and snags provide habitats for a large number of biotic species. ...Coarse wood may be obtained through the falling of trees. ...An assessment of current and potential future conditions of coarse wood and snag levels should be completed in order to determine the appropriate amount of management" (LSRA p.89).

The EA included an assessment of current down wood levels and the Interdisciplinary team recommended 7 out of 10 units within the LSR to include down wood creation.

Maps

Map 1: Cherry Vaughn EA - Vicinity Map



Treatment Areas
Non-Commercial Areas
BLM Administered Land
Bureau of Indian Affairs
Private or Other Lands
Cherry Creek Key Watershed
Subwatershed Boundarys
Primary Sale Area Road
Primary Access Road
Highway

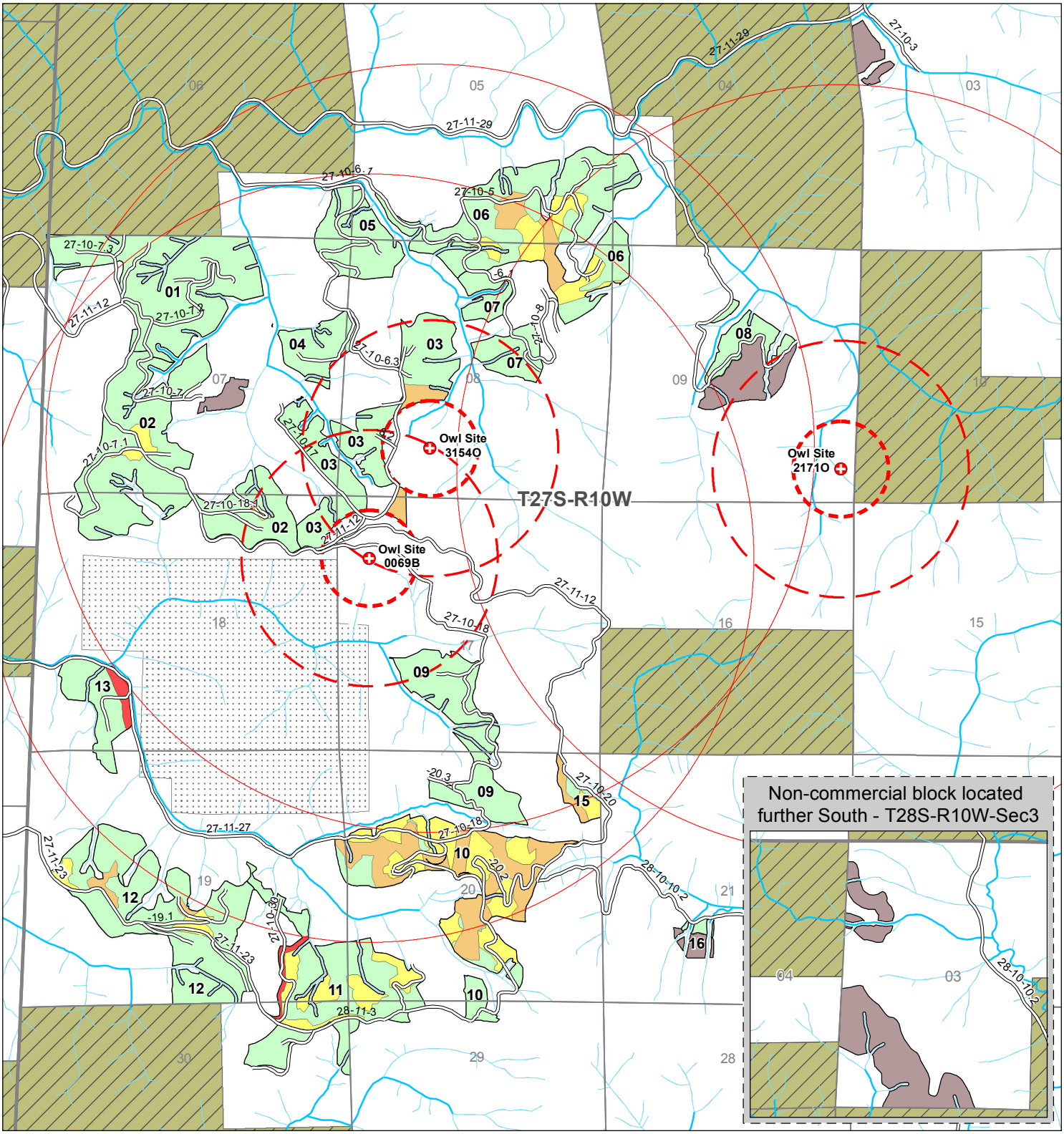
US DEPARTMENT OF THE INTERIOR
Bureau of Land Management

Coos Bay District Office
Myrtlewood Resource Area
1300 Airport Lane
North Bend, OR 97459

Phone: (541) 756-0100
email: BLM_OR_CB_Mail@blm.gov

No warranty is made by the Bureau of Land Management as to the accuracy, reliability, or completeness of these data for individual or aggregate use with other data.

Map 2: Cherry Vaughn EA - Project Area, Stand Treatments & NSO Buffers



Map Features

- Treatment Type 1 (DMT)
- Treatment Type 1 (HWC)
- Treatment Type 2 (DMT_CC)
- Treatment Type 3 (DMT_REL)
- Treatment Type 4 (Noncommercial)
- BLM Administered Land
- Other Ownership
- Cherry Creek Research Natural Area
- Known NSO Site
- 300 meter NSO Nest Patch
- 0.5 mile NSO Core
- 1.5 mile NSO Home Range
- Perennial Stream
- Intermittent Stream
- Primary Existing Sale Area Roads

N

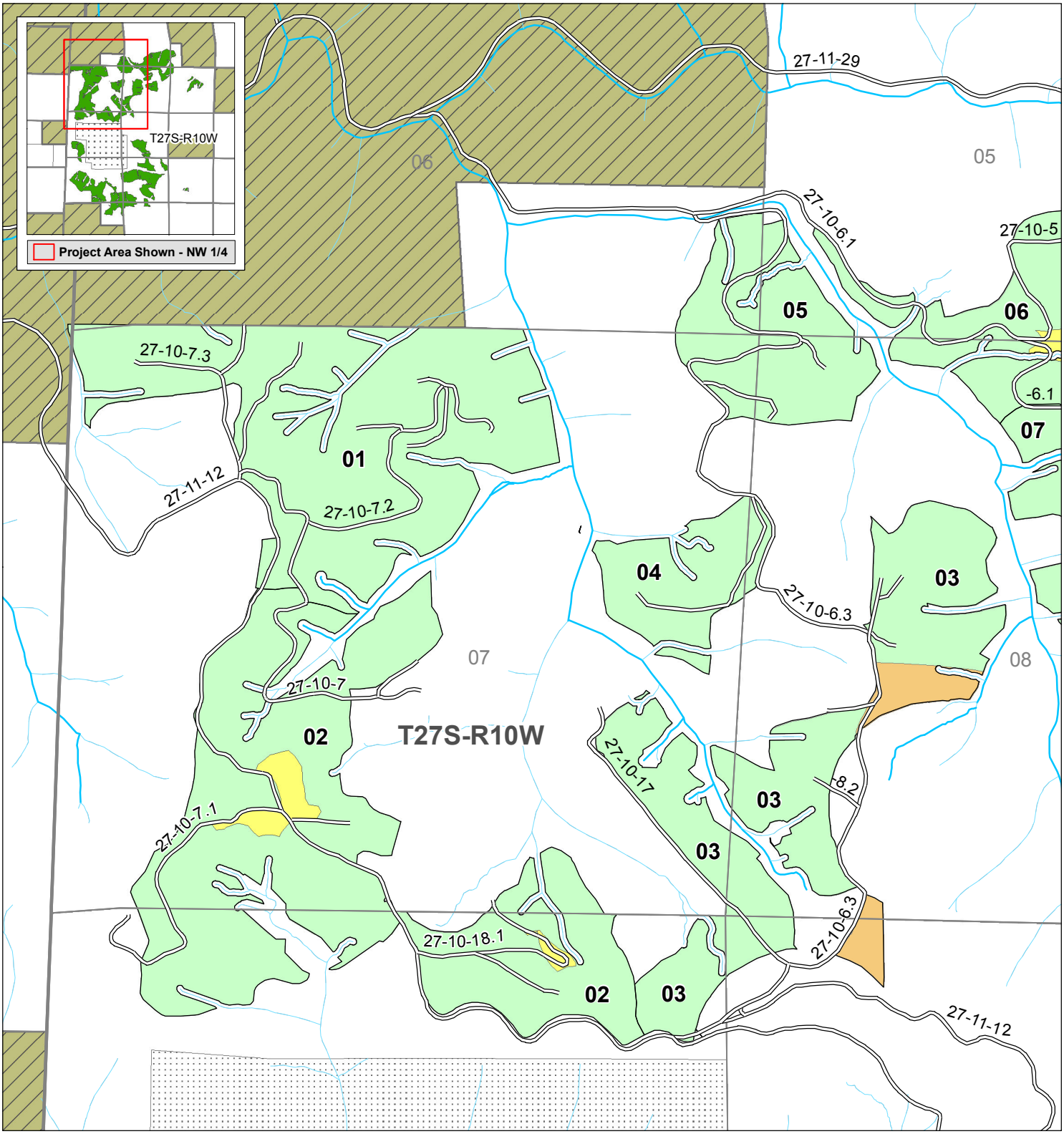
US DEPARTMENT OF THE INTERIOR
Bureau of Land Management

Coos Bay District Office
Myrtlewood Resource Area
1300 Airport Lane
North Bend, OR 97459

0 0.5 1
Miles

No warranty is made by the Bureau of Land Management as to the accuracy, reliability, or completeness of these data for individual or aggregate use with other data.

Map 2a: Cherry Vaughn Stand Treatments - Zoomed to the NW 1/4 of the Project Area



Map Features (Not all map features necessarily occur in the area mapped above.)

- Treatment Type 1 (DMT)
- Treatment Type 1 (HWC)
- Treatment Type 2 (DMT_CC)
- Treatment Type 3 (DMT_REL)
- BLM Administered Land
- Other Ownership
- Cherry Creek Research Natural Area
- Perennial Stream
- Intermittent Stream
- Primary Existing Sale Area Roads

(Non-commercial treatment areas are shown only on Maps 1 and 2)

N

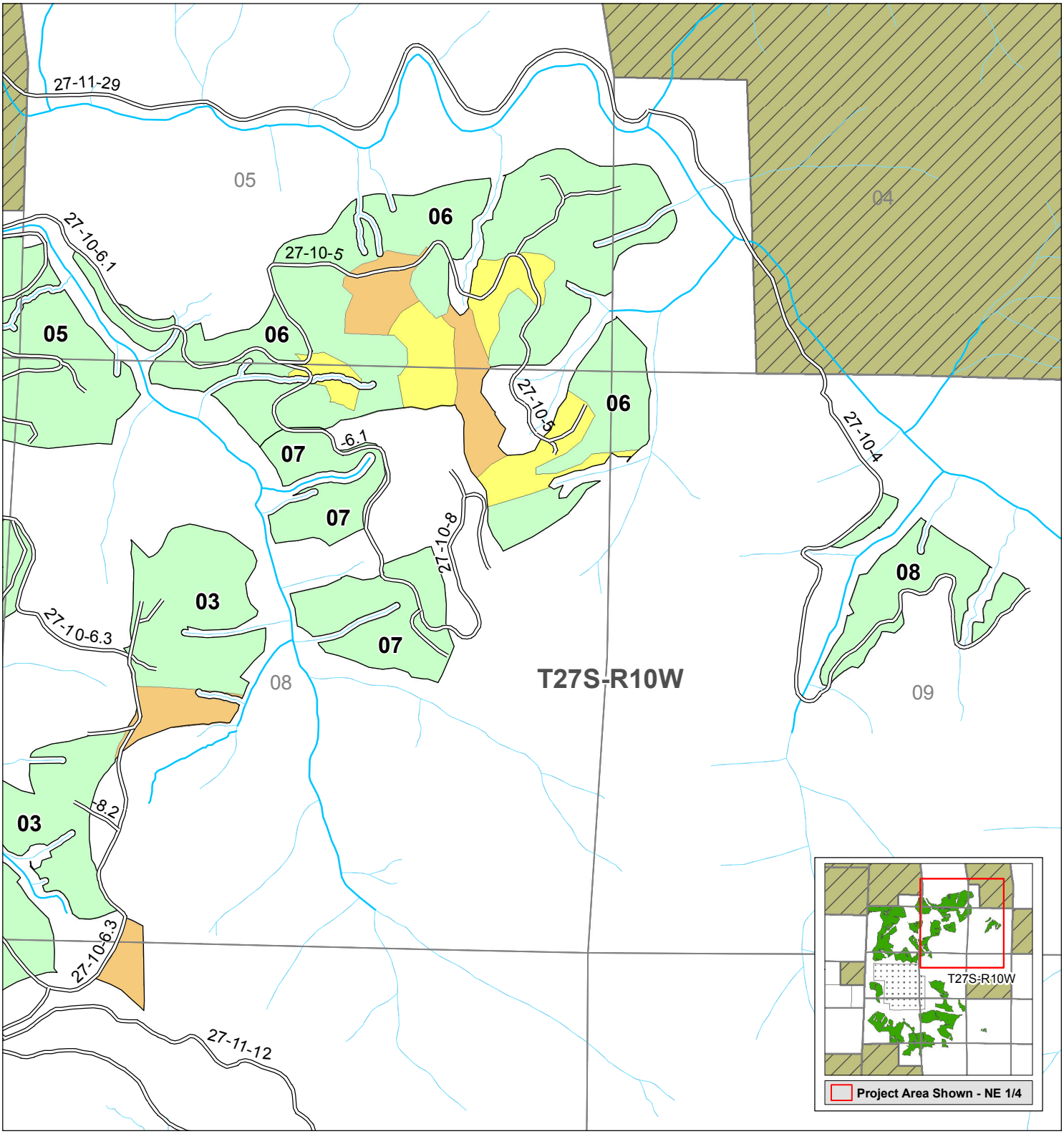
US DEPARTMENT OF THE INTERIOR
Bureau of Land Management

Coos Bay District Office
Myrtlewood Resource Area
1300 Airport Lane
North Bend, OR 97459

0 0.25 0.5
Miles

No warranty is made by the Bureau of Land Management as to the accuracy, reliability, or completeness of these data for individual or aggregate use with other data.

Map 2b: Cherry Vaughn Stand Treatments - Zoomed to the NE 1/4 of the Project Area



Map Features (Not all map features necessarily occur in the area mapped above.)

- Treatment Type 1 (DMT)
- Treatment Type 1 (HWC)
- Treatment Type 2 (DMT_CC)
- Treatment Type 3 (DMT_REL)
- BLM Administered Land
- Other Ownership
- Cherry Creek Research Natural Area
- Perennial Stream
- Intermittent Stream
- Primary Existing Sale Area Roads

(Non-commercial treatment areas are shown only on Maps 1 and 2)

N

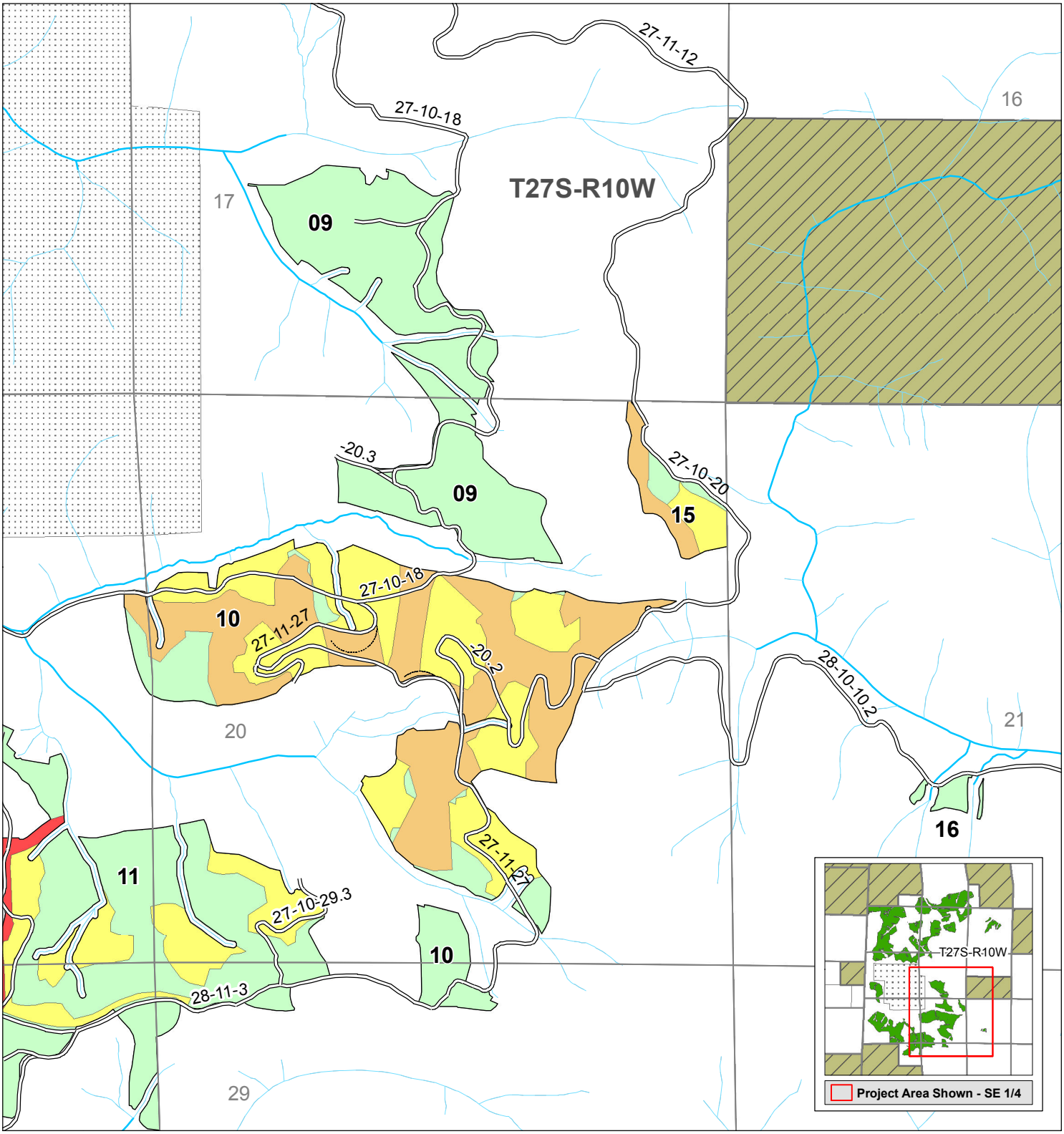
US DEPARTMENT OF THE INTERIOR
Bureau of Land Management

Coos Bay District Office
Myrtlewood Resource Area
1300 Airport Lane
North Bend, OR 97459

0 0.25 0.5
Miles

No warranty is made by the Bureau of Land Management as to the accuracy, reliability, or completeness of these data for individual or aggregate use with other data.

Map 2c: Cherry Vaughn Stand Treatments - Zoomed to the SE 1/4 of the Project Area



Map Features (Not all map features necessarily occur in the area mapped above.)

- Treatment Type 1 (DMT)
- Treatment Type 1 (HWC)
- Treatment Type 2 (DMT_CC)
- Treatment Type 3 (DMT_REL)
- BLM Administered Land
- Other Ownership
- Cherry Creek Research Natural Area
- Perennial Stream
- Intermittent Stream
- Primary Existing Sale Area Roads

(Non-commercial treatment areas are shown only on Maps 1 and 2)

N

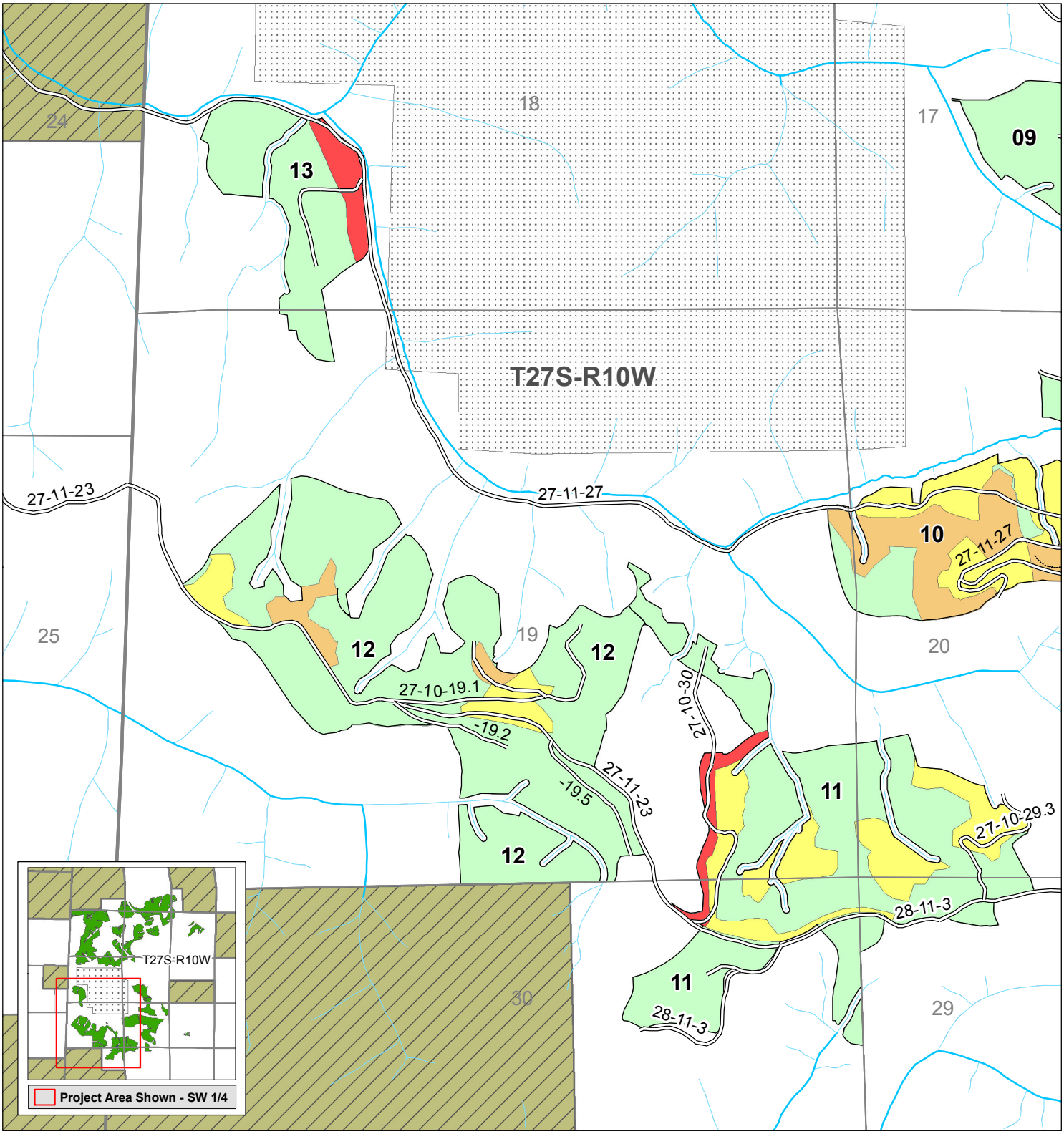
US DEPARTMENT OF THE INTERIOR
Bureau of Land Management

Coos Bay District Office
Myrtlewood Resource Area
1300 Airport Lane
North Bend, OR 97459

0 0.25 0.5
Miles

No warranty is made by the Bureau of Land Management as to the accuracy, reliability, or completeness of these data for individual or aggregate use with other data.

Map 2d: Cherry Vaughn Stand Treatments - Zoomed to the SW 1/4 of the Project Area



Map Features (Not all map features necessarily occur in the area mapped above.)

- Treatment Type 1 (DMT)
- Treatment Type 1 (HWC)
- Treatment Type 2 (DMT_CC)
- Treatment Type 3 (DMT_REL)
- BLM Administered Land
- Other Ownership
- Cherry Creek Research Natural Area
- Perennial Stream
- Intermittent Stream
- Primary Existing Sale Area Roads

(Non-commercial treatment areas are shown only on Maps 1 and 2)

N

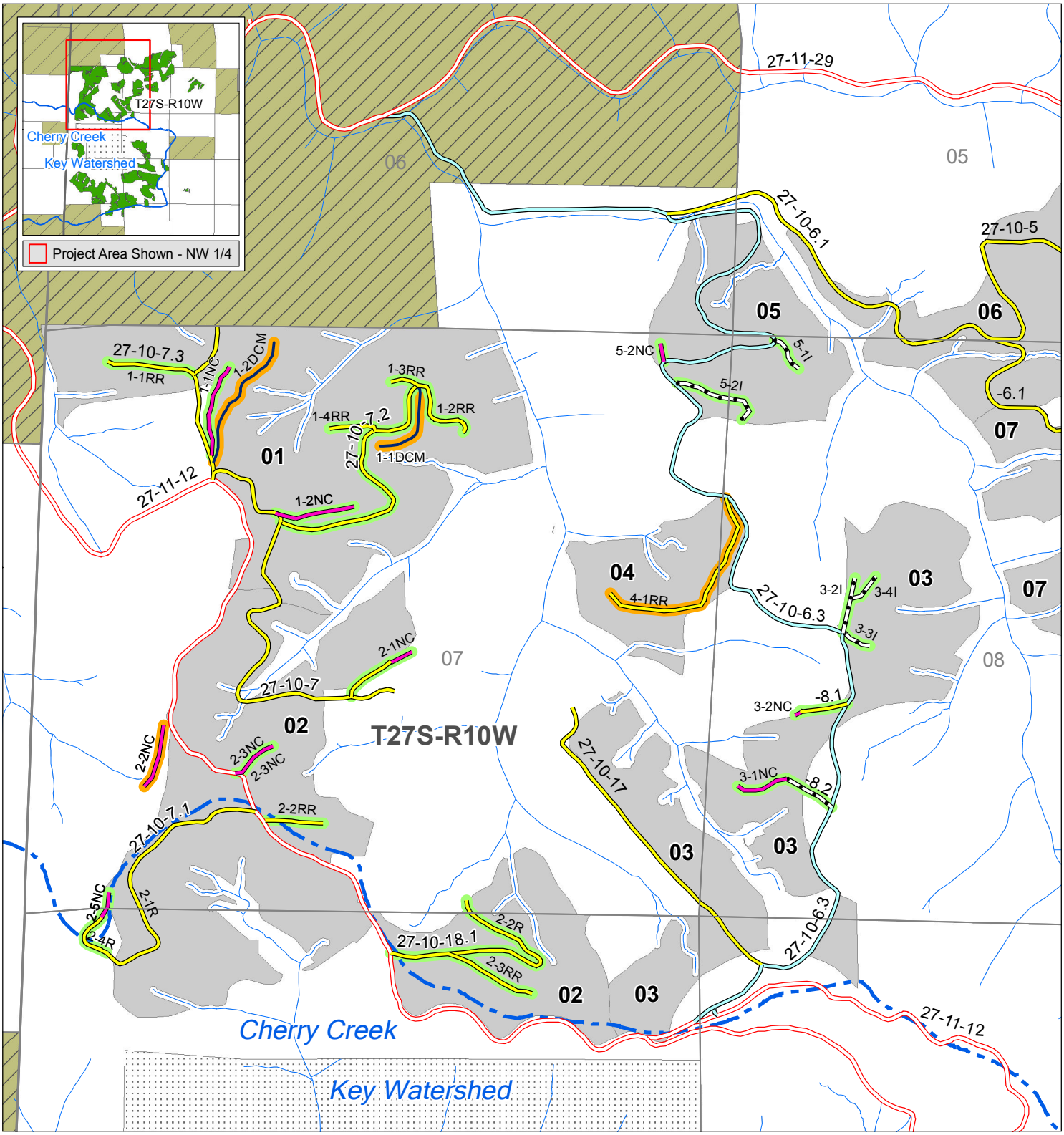
US DEPARTMENT OF THE INTERIOR
Bureau of Land Management

Coos Bay District Office
Myrtlewood Resource Area
1300 Airport Lane
North Bend, OR 97459

0 0.25 0.5
Miles

No warranty is made by the Bureau of Land Management as to the accuracy, reliability, or completeness of these data for individual or aggregate use with other data.

Map 3a: Cherry Vaughn Road Work - Zoomed to the NW 1/4 of the Project Area



Map Features (Not all map features necessarily occur in the area mapped above.)

- New Construction
- Improvement
- Renovation and/or Reconstruction
- Haul Maintenance
- Haul Only
- Decommission Only
- Full Decommissioning
- Decommissioning
- Cherry Creek Key Watershed
- Cherry Creek Research Natural Area
- Harvest Areas
- BLM Administered Land
- Other Ownership
- Stream

(Non-commercial treatment areas are shown only on Maps 1 and 2)

N

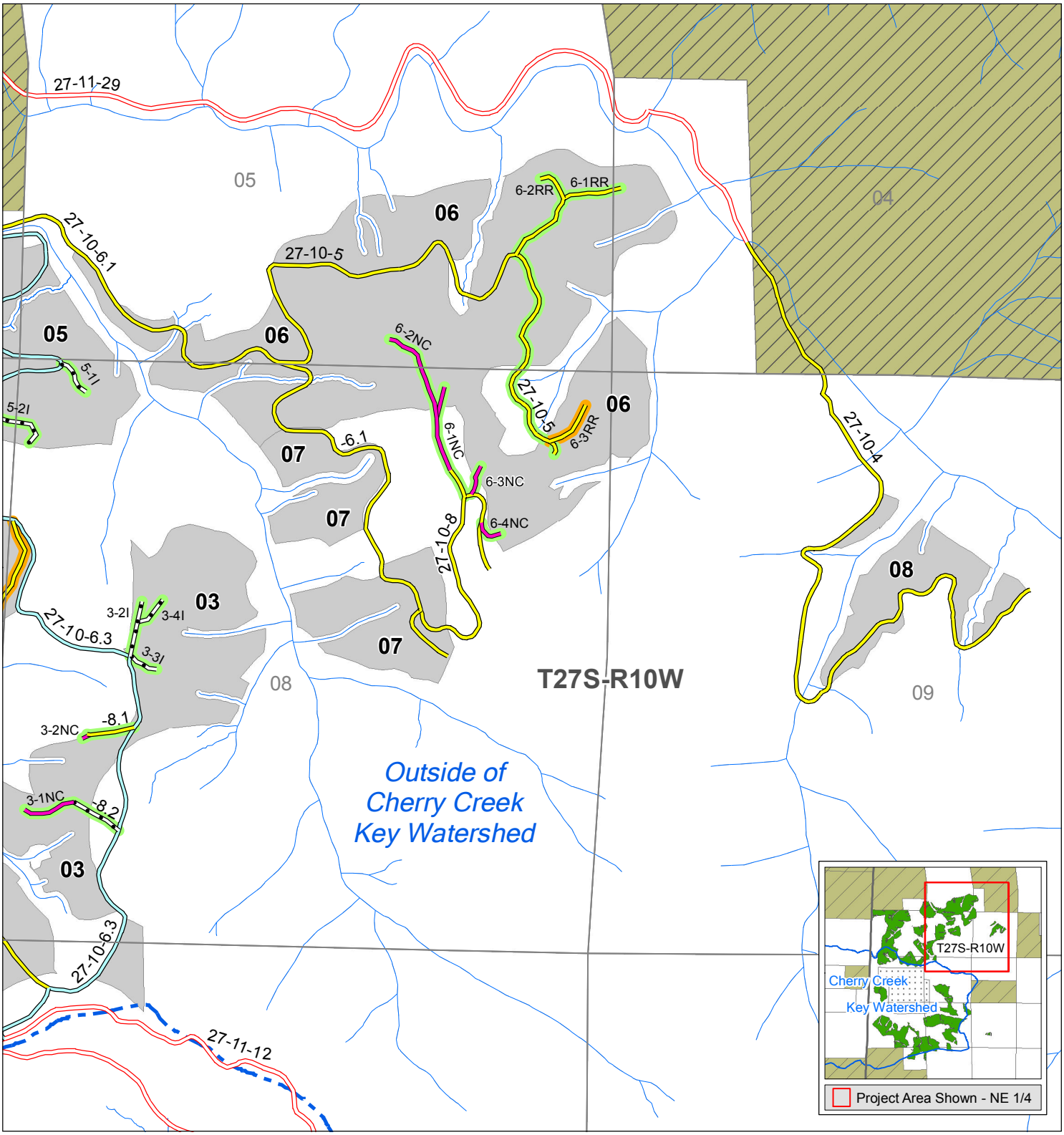
US DEPARTMENT OF THE INTERIOR
Bureau of Land Management

Coos Bay District Office
Myrtlewood Resource Area
1300 Airport Lane
North Bend, OR 97459

0 0.25 0.5
Miles

No warranty is made by the Bureau of Land Management as to the accuracy, reliability, or completeness of these data for individual or aggregate use with other data.

Map 3b: Cherry Vaughn Road Work - Zoomed to the NE 1/4 of the Project Area



Map Features (Not all map features necessarily occur in the area mapped above.)

- New Construction
- Improvement
- Renovation and/or Reconstruction
- Haul Maintenance
- Haul Only
- Decommission Only
- Full Decommissioning
- Decommissioning
- Cherry Creek Key Watershed
- Cherry Creek Research Natural Area
- Harvest Areas
- BLM Administered Land
- Other Ownership
- Stream

(Non-commercial treatment areas are shown only on Maps 1 and 2)

N

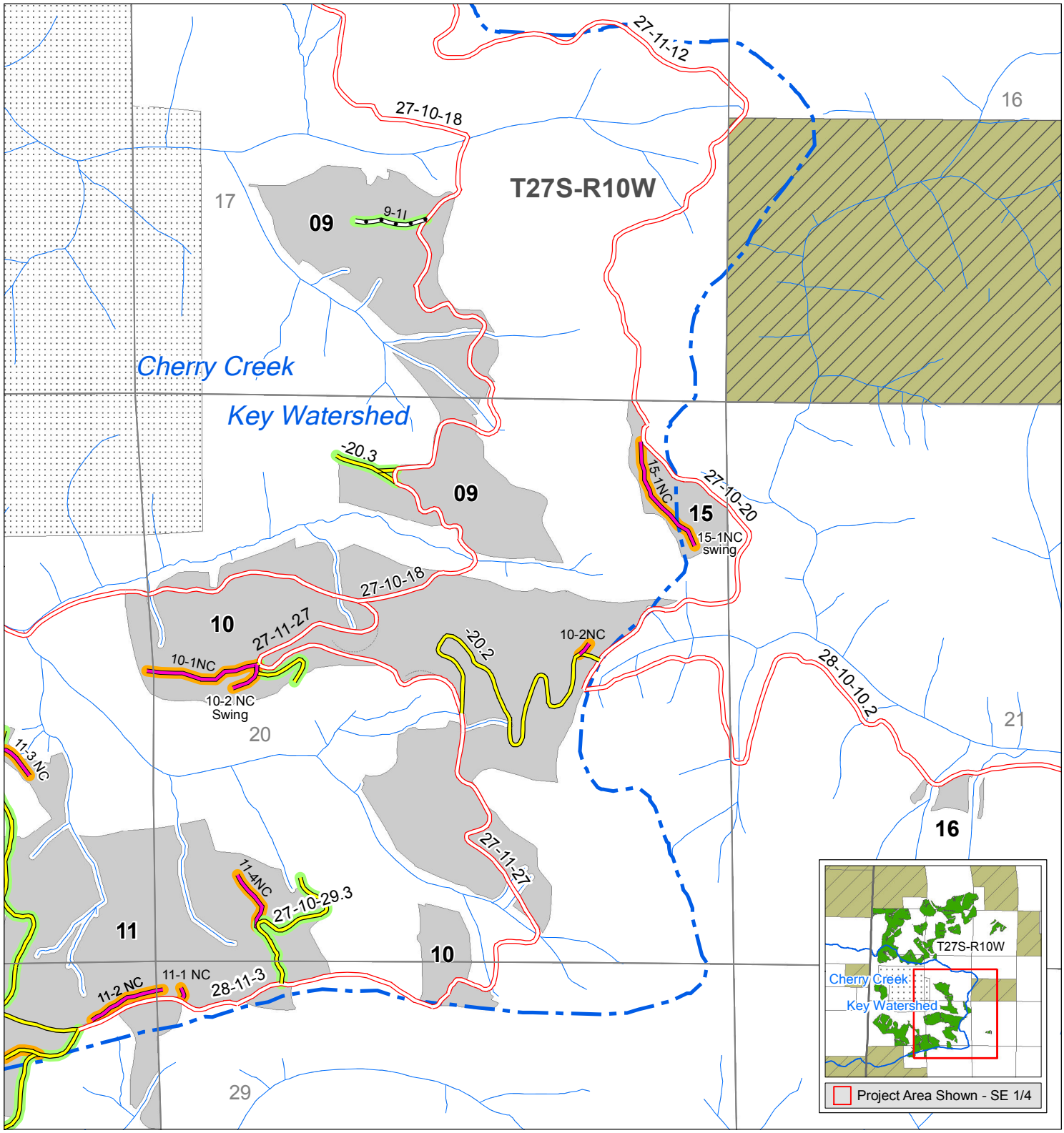
US DEPARTMENT OF THE INTERIOR
Bureau of Land Management

Coos Bay District Office
Myrtlewood Resource Area
1300 Airport Lane
North Bend, OR 97459

0 0.25 0.5
Miles

No warranty is made by the Bureau of Land Management as to the accuracy, reliability, or completeness of these data for individual or aggregate use with other data.

Map 3c: Cherry Vaughn Road Work - Zoomed to the SE 1/4 of the Project Area



Map Features (Not all map features necessarily occur in the area mapped above.)

- New Construction
- Improvement
- Renovation and/or Reconstruction
- Haul Maintenance
- Haul Only
- Decommission Only
- Full Decommissioning
- Decommissioning
- Cherry Creek Key Watershed
- Cherry Creek Research Natural Area
- Harvest Areas
- BLM Administered Land
- Other Ownership
- Stream

(Non-commercial treatment areas are shown only on Maps 1 and 2)

N

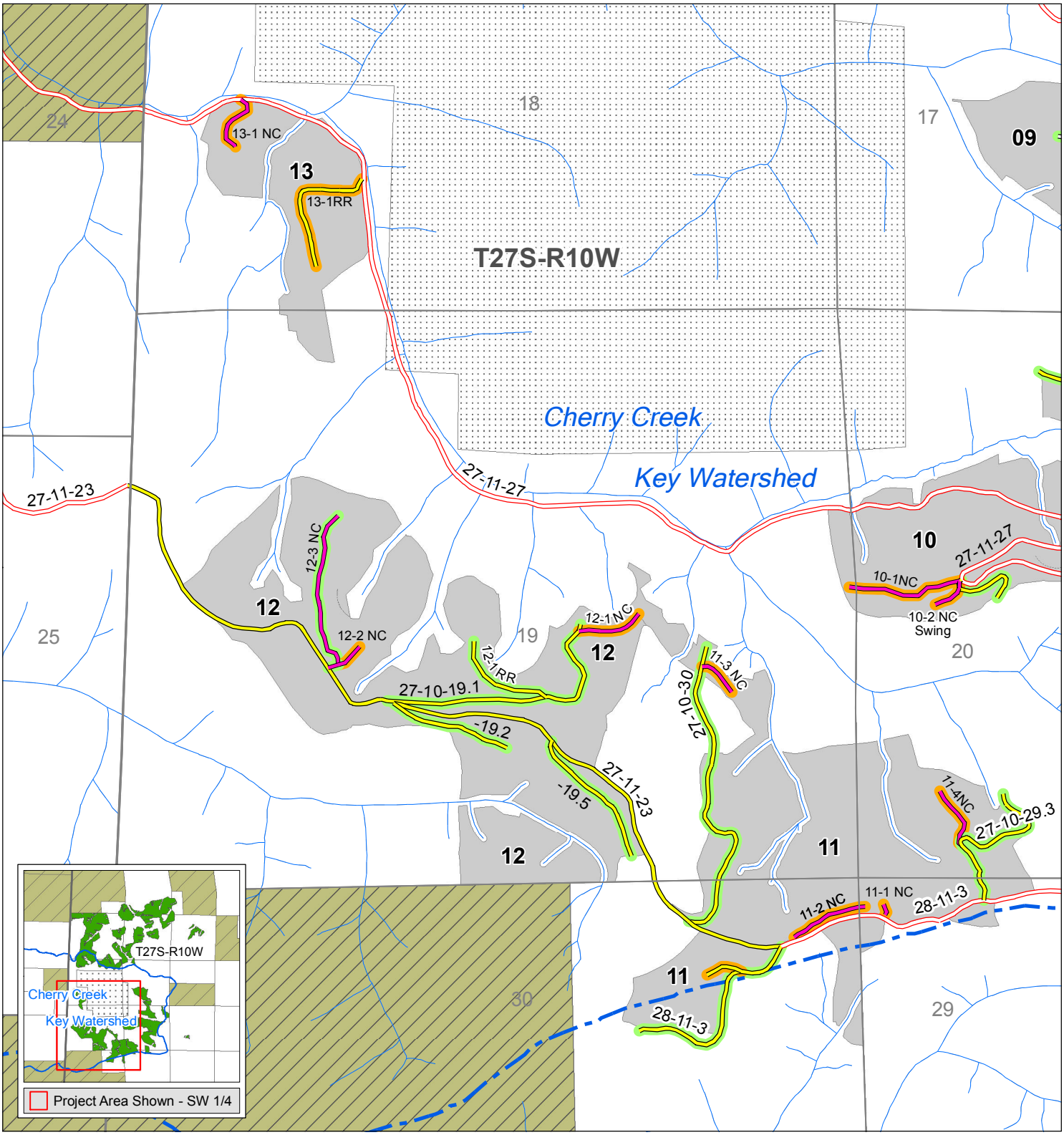
US DEPARTMENT OF THE INTERIOR
Bureau of Land Management

Coos Bay District Office
Myrtlewood Resource Area
1300 Airport Lane
North Bend, OR 97459

0 0.25 0.5
Miles

No warranty is made by the Bureau of Land Management as to the accuracy, reliability, or completeness of these data for individual or aggregate use with other data.

Map 3d: Cherry Vaughn Road Work - Zoomed to the SW 1/4 of the Project Area



Map Features (Not all map features necessarily occur in the area mapped above.)

- New Construction
- Improvement
- Renovation and/or Reconstruction
- Haul Maintenance
- Haul Only
- Decommission Only
- Full Decommissioning
- Decommissioning
- Cherry Creek Key Watershed
- Cherry Creek Research Natural Area
- Harvest Areas
- BLM Administered Land
- Other Ownership
- Stream

(Non-commercial treatment areas are shown only on Maps 1 and 2)

N

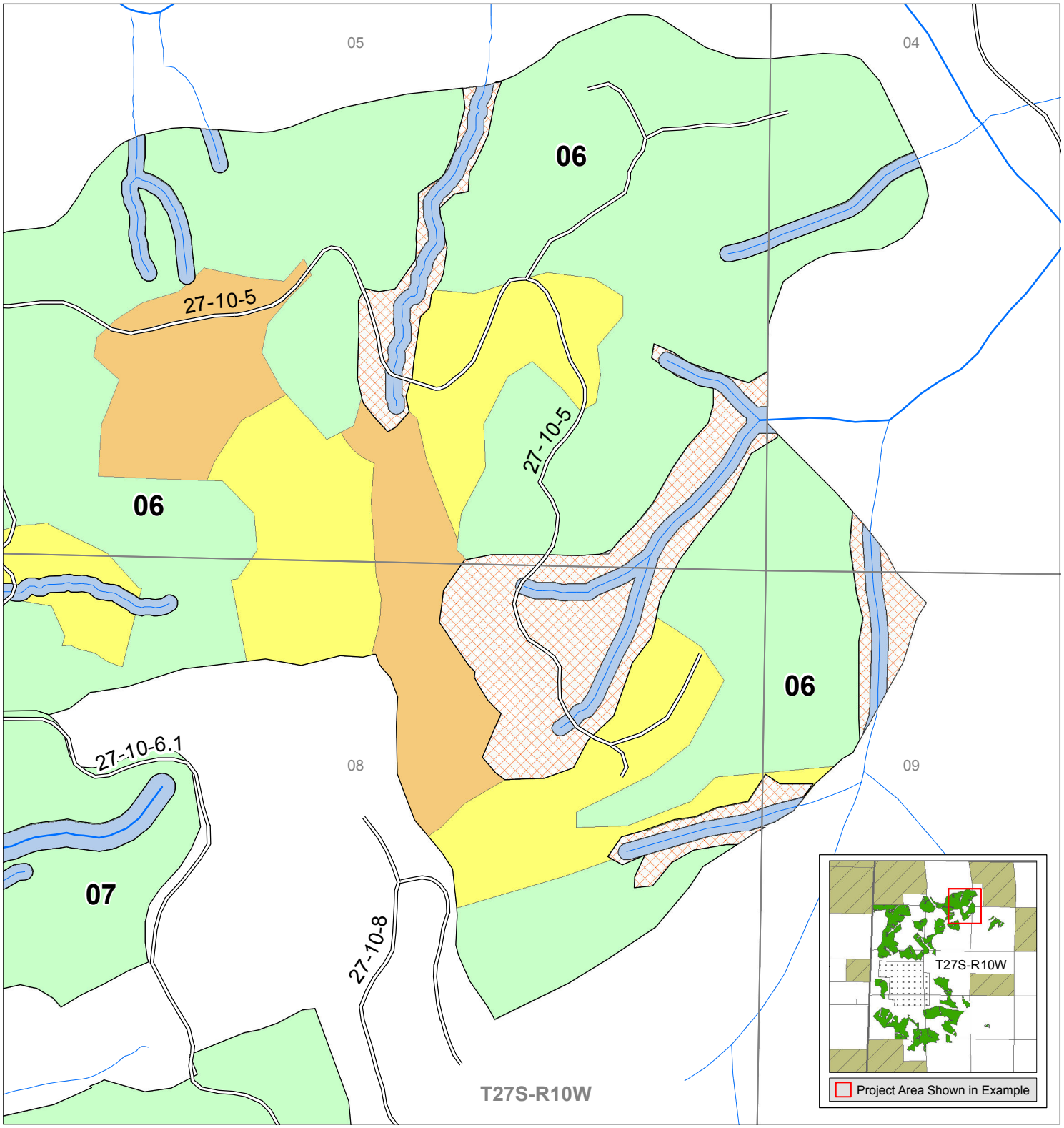
US DEPARTMENT OF THE INTERIOR
Bureau of Land Management

Coos Bay District Office
Myrtlewood Resource Area
1300 Airport Lane
North Bend, OR 97459

0 0.25 0.5
Miles

No warranty is made by the Bureau of Land Management as to the accuracy, reliability, or completeness of these data for individual or aggregate use with other data.

Map 4: Cherry Vaughn EA - Zoomed-In Example of the Riparian and Topographic Position Index No Treatment Zones



Map Features (Not all map features necessarily occur in the area mapped above.)

- Treatment Type 1 (DMT)
- Treatment Type 1 (HWC)
- Treatment Type 2 (DMT_CC)
- Treatment Type 3 (DMT_REL)
- Riparian 30' and 50' NTZ's
- Topographic Position Index NTZ's
- BLM Administered Land
- Other Ownership
- Cherry Creek Research Natural Area
- Perennial Stream
- Intermittent Stream
- Primary Existing Sale Area Roads

US DEPARTMENT OF THE INTERIOR
Bureau of Land Management

Coos Bay District Office
Myrtlewood Resource Area
1300 Airport Lane
North Bend, OR 97459

0 500 1,000
Feet

No warranty is made by the Bureau of Land Management as to the accuracy, reliability, or completeness of these data for individual or aggregate use with other data.