Turner Creek Project

Environmental Assessment and
Finding of No Significant Impact

Environmental Assessment Number DOI-BLM-OR-S060-2011-0002-EA
March 2011

Salem District
Yamhill County, Oregon

T. 2 S., R. 5 W. sections 3, 5, 7, 9, 17, 21, 28, 29 W.M.

Responsible Agency:	USDI - Bureau of Land Management
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BLM
Salem District

As the Nation's principal conservation agency, the Department of Interior has responsibility for most of our nationally owned public lands and natural resources. This includes fostering economic use of our land and water resources, protecting our fish and wildlife, preserving the environmental and cultural values of our national parks and historical places, and providing for the enjoyment of life through outdoor recreation. The Department assesses our energy and mineral resources and works to assure that their development is in the best interest of all people. The Department also has a major responsibility for American Indian reservation communities and for people who live in Island Territories under U.S. administration.

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FINDING OF NO SIGNIFICANT IMPACT

Introduction

The Bureau of Land Management (BLM) has conducted an environmental analysis (Environmental Assessment Number DOI-BLM-OR-S060-2011-0002-EA) for a proposal to commercially thin approximately 940 acres located on BLM lands within the Tillamook Resource Area in Yamhill County, Oregon. The *Turner Creek Project Environmental Assessment* documents the environmental analysis of the proposed commercial thinning activity. The EA is attached to and incorporated by reference in this Finding of No Significant Impact determination (FONSI). The analysis in this EA is site-specific and supplements analyses found in the *Salem District Proposed Resource Management Plan/Final Environmental Impact Statement*, September 1994 (RMP/FEIS). The proposed thinning activities have been designed to conform to the *Salem District Record of Decision and Resource Management Plan*, May 1995 (ROD/RMP) and related documents which direct and provide the legal framework for management of BLM lands within the Salem District (*EA section 1.3*).

The project area includes BLM-managed lands within sections 3, 5, 7, 9, 17, 21, 28 and 29 of Township 2 South, Range 5 West, in Yamhill County, Oregon. The proposed action is to implement a variable-density thinning prescription on approximately 940 acres of 35- to 71-year-old timber stands. Approximately 688 of these acres are in the Adaptive Management Area land use allocation (LUA), and 252 are in the Riparian Reserve LUA.

The EA and FONSI will be made available for public review from ***March 5, 2011*** **to** ***April 4, 2011*** on the Salem District internet site (http://www.blm.gov/or/districts/salem/plans/index.php). The notice for public comment will be published legal notices by the **McMinnville News-Register** newspaper. Comments received by the Tillamook Resource Area of the Salem District Office, 4610 Third Street, Tillamook, Oregon, 97141, on or before ***April 4, 2011*** will be considered in making the final decision for this project.

Finding of No Significant Impact

Based upon review of the Turner Creek Project EA and supporting project record, I have determined that this project is not a major federal action and would not significantly affect the quality of the human environment, individually or cumulatively with other actions in the general area. No environmental effects meet the definition of significance in context or intensity as defined in 40 CFR 1508.27. There are no site specific impacts that would require supplemental/additional information to the analysis done in the *Salem District Proposed Resource Management Plan/Final Environmental Impact Statement*, September 1994 (RMP/FEIS). Therefore, an environmental impact statement is not needed. This finding is based on the following discussion:

Context. The proposed project is a site-specific action directly involving a total of approximately 940 acres of BLM administered land, along with actions occurring on various roads in and near the project area. These actions by themselves do not have international, national, region-wide, or state-wide importance.

The discussion of the significance criteria that follows applies to the intended actions and is within the context of local importance. The EA details the effects of the action alternative; none of the effects identified, including direct, indirect and cumulative effects, are considered to be significant and do not exceed those effects described in the RMP/FEIS.

Intensity. The following discussion is organized around the Ten Significance Criteria described in 40 CFR 1508.27. The discussions below apply to all three projects contained within the Turner Creek Project Environmental Assessment.

1. **Impacts may be both beneficial and adverse.** Due to the proposed projects' design features, the most noteworthy predicted effects include: (1) increased growth rates of residual trees in thinning areas; (2) increased tree species diversity in the project area; (3) consistency with the ACS (Aquatic Conservation Strategy) objectives; (4) no loss in population viability of special status or special attention species (also see significance criteria #9 below); (5) slight, short-term increases in sediment are anticipated from road construction, road improvement, culvert replacement and removal, timber harvest, and log haul; (6) no impacts to water temperature, or streamflow; (7) slight, short-term impacts to stream channel stability are expected at the two sites that will have culverts removed; and (8) social and economic benefits to the local communities through the supply of timber to local mills.

The environmental effects disclosed above and discussed in detail in *EA Section 3* are not considered significant, nor do the effects exceed those described in the RMP/FEIS.

2. **The degree to which the selected alternative will affect public health or safety.** Public health and safety was not identified as an issue. The proposed project is comparable to other commercial timber sales and road projects which have occurred within the Salem District with no unusual health or safety concerns.

3. **Unique characteristics of the geographic area such as proximity to historic or cultural resources, park lands, prime farm lands, wetlands, wild and scenic rivers, or ecologically critical areas**. There are no prime farm lands, park lands or wilderness areas located within the project area (*EA section 3.13*). No cultural resource sites have been identified within the project area. There are no federally designated Wild and Scenic Rivers within the project area. Under the design features for the commercial thinning treatment, all identified wetland and riparian areas would be buffered to protect resource values. There are no Areas of Critical Environmental Concern or other known ecologically critical areas within or adjacent to the project area.

4. **The degree to which the effects on the quality of the human environment are likely to be highly controversial.** Extensive scoping of the proposed project resulted in only three project specific comment emails. The disposition of public comments is contained in *EA section 1.4.1*.

The effects of the proposed project on the quality of the human environment were adequately understood by the interdisciplinary team to provide an environmental analysis. A complete disclosure of the predicted effects of the proposed project is contained within *EA section 3*.

5. **The degree to which the possible effects on the human environment are highly uncertain or involve unique or unknown risks.** The proposed project is not unique or unusual. The BLM has experience implementing similar projects in similar areas and have found effects to be reasonably predictable. The environmental effects to the human environment are fully analyzed in the EA. There are no predicted effects on the human environment which are considered to be highly uncertain or involve unique or unknown risks.

6. **The degree to which the action may establish a precedent for future actions with significant effects or represents a decision in principle about a future consideration.** The proposed project does not set a precedent for future actions that may have significant effects, nor does it represent a decision in principle about a future consideration. Any future projects will be evaluated through the NEPA (National Environmental Policy Act) process and will stand on their own as to environmental effects.

7. **Whether the action is related to other actions with individually insignificant but cumulatively significant impacts.** The interdisciplinary team evaluated the proposed project in context of past, present and reasonably foreseeable actions. No cumulative effects have been identified. A complete disclosure of the effects of the action alternative is contained in *EA section 3*.

8. **The degree to which the action may adversely affect districts, sites, highways, structures, or other objects listed in or eligible for listing in the National Register of Historic Places or may cause loss or destruction of significant scientific, cultural, or historical resources.** The proposed projects will not adversely affect districts, sites, highways, structures, or other objects listed in or eligible for listing in the National Register of Historic Places, nor will the proposed projects cause loss or destruction of significant scientific, cultural, or historical resources (*EA section 3.13*).

9. **The degree to which the action may adversely affect an endangered or threatened species or its designated critical habitat under the Endangered Species Act of 1973.** The spotted owl would be affected by this project only through the modification of dispersal habitat and approximately 70 acres of low quality suitable habitat. While modification would occur, all acres would continue to function in the same capacity after treatment as before. Due to the minor impact to components of spotted owl habitat, informal consultation with the U.S. Fish and Wildlife Service is warranted and would be completed programmatically within the appropriate years (year of sale if the proposed action is selected) Biological Assessment in the "Light to Moderate Thinning" category.

Consultation with the National Marine Fisheries Service on the potential effects of the proposed action on Oregon Coast coho salmon will be completed with project specific consultation (Section 7 Streamlined Consultation) or one of the programmatic consultation processes available at the time of implementation for actions that require consultation. Required consultation for Magnuson-Stevens Fisheries Conservation and Management Act Essential Fish Habitat for the proposed action is included in *EA section 3.4.3*. Section 7 Endangered Species Act Consultation will be completed prior to the Field Manager authorizing an action if required.

10. **Whether the action threatens a violation of Federal, State, or local law or requirements imposed for the protection of the environment**. The proposed project does not violate any known Federal, State, or local law or requirement imposed for the protection of the environment. The EA and supporting Project Record contain discussions pertaining to the Endangered Species Act, National Historic Preservation Act, Clean Water Act, Clean Air Act, Coastal Zone Manage Act, Migratory Bird Treaty Act, Magnuson-Stevens Fisheries Conservation and Management Act, Executive Order 12898 (Environmental Justice), Oregon Scenic Waterways Act, and Executive Order 13212 (Adverse Energy Impact). State, local, and tribal interests were given the opportunity to participate in the environmental analysis process. Furthermore, the proposed project is consistent with applicable land management plans, policies, and programs.

Approved by: _____ _____

Stephen M. Small Date

Tillamook Resource Area Field Manager

TURNER CREEK PROJECT ENVIRONMENTAL ASSESSMENT

1. INTRODUCTION

This EA will analyze the impacts of proposed density management thinning operations and connected actions on the human environment. The EA will provide the decision maker, the Tillamook Resource Area Field Manager, with current information to aid in the decision-making process. It will also determine if there are significant impacts not already analyzed in the Environmental Impact Statement for the Salem District's Resource Management Plan (RMP) (1995) and whether a supplement to that Environmental Impact Statement is needed or if a Finding of No Significant Impact is appropriate. Section 1 of this EA for the proposed Turner Creek Project provides a context for what will be analyzed in the EA, describes the kinds of actions we will be considering, defines the project area, describes what the proposed action needs to accomplish, and identifies the criteria that we will use for choosing the alternative that will best meet the purpose and need for this proposal.

1.1 Proposed Action

The Tillamook Resource Area, Salem District Bureau of Land Management (BLM), proposes to implement forest management activities within the Upper North Yamhill River, Turner Creek and Middle Fork of North Fork Trask River 6th-field watersheds. The proposed action is density management thinning applied in a variable-spaced manner to approximately 940 acres of predominantly Douglas-fir stands. Connected actions include such activities as removal and replacement of undersized and failing culverts, and building, renovating and decommissioning roads (*EA sections 2.0 and 3.0)*.

1.1.1 Project Area[1] Location and Vicinity

The Turner Creek Project area is approximately 15 miles southwest of the town of Forest Grove, Oregon, in the Upper North Yamhill River and Turner Creek subwatersheds of the Yamhill River watershed and the Middle Fork of North Fork Trask River subwatershed of the Trask River watershed (Table 1). The project area includes BLM-managed lands within sections 3, 5, 7, 9, 17, 21, 28 and 29 of Township 3 South, Range 5 West, Willamette Meridian (WM) (Figure 1).

The proposed project area is located on Oregon and California Railroad Lands (O & C Lands) within the Adaptive Management Area (AMA) and Riparian Reserve (RR) land-use allocations (LUAs). BLM-administered land is intermixed with privately owned industrial timberland, creating an assortment of ownership patterns.

[1] Project Area is defined as that area that is directly affected by project operations (e.g. thinning units, area cleared for landings, roads and rights-of-way). The area around the Project Area, especially BLM managed lands in the same contiguous block of ownership, is referred to as the project area vicinity or similar term.

Table 1: Watershed and Proposed Treatment Acres

6th Field Subwatershed Name	6th Field Sub-Watershed Acres	5th Field Watershed Name	Total 5th Field Watershed Acres	Proposed Project Acres within the Subwatershed	Percent of Subwatershed Treated
Turner Creek	9,863	Yamhill River	113,396	427	4.3
Upper North Yamhill River	19,311	Yamhill River	113,396	485	2.5
Middle Fork of North Fork Trask River	27,603	Trask River	111,498	28	0.1

1.2 Purpose of and Need for Action

1.2.1 Need for the Action

Data analysis and field examinations by BLM staff have identified specific stands in which density management would be beneficial in redirecting the current stand developmental trajectory towards a more complex structure characteristic of older forests, increase the stand resiliency to the impacts of *Phellinus weirii* root disease and provide a supply of timber for local mills.

1.2.2 Purpose (Objectives) of the Project

This project has been designed under the Salem District Record of Decision and Resource Management Plan, May 1995 (ROD/RMP) and related documents which direct and provide the legal framework for management of BLM lands within the Salem District (see *EA section 1.3*).

The Turner Creek project area is within the Adaptive Management Area (AMA) and Riparian Reserve land use allocations (ROD/RMP p. 5; NWFP pp. A-4, A-5; EA section 1.3). The following ROD/RMP and NWFP objectives would be applied to achieve the purpose of this project.

Within the AMA land use allocation:

1. The objectives in the Northern Coast Range AMA are to restore and maintain late-seral forest habitat outside of reserves, consistent with marbled murrelet guidelines, as well as provide a stable supply of timber. In addition, there is an objective to develop and evaluate new management approaches to integrate and attain ecological and economic health, and other social values. There is also a guiding principle of permitting freedom in

forest management approaches (USDA Forest Service and USDI Bureau of Land Management 1994). Specific management goals in the ROD/RMP include:

- Manage developing stands on available lands to promote tree survival and growth and to achieve a balance between wood volume production, quality of wood, and timber value at harvest. (ROD/RMP p. 46).
- Provide a sustainable supply of timber and other forest products (ROD/RMP p. 46);
- Manage timber stands to reduce the risk of loss from fires, animals, insects and diseases (ROD/RMP p. 46);

2. LSRA landscape cell and zone: The Late-Successional Reserve Assessment for Oregon's Northern Coast Range Adaptive Management Area (LSRA) (USDA Forest Service and USDI Bureau of Land Management, 1998) identified the Turner Creek Project area as part of the Buffer/Early Seral landscape cell and zone. Lands within the Buffer landscape zone do not link directly to areas outside of the assessment area, and are not expected to develop large contiguous blocks of late-seral habitat. The Buffer landscape zone is intended to provide refugia for late-seral species in parts of the assessment area that will probably continue to be dominated by early and mid-seral stands. The goals of the Buffer landscape zone are to (1) maintain and increase late-seral habitat connectivity and dispersal habitat and (2) develop and maintain refugia for species that depend on late-seral habitat (LSRA p. 46). In addition, specific management goals for early-seral landscape cells located in the Buffer landscape zone are as follows (LSRA pp. 48-50):

   - Maintain diversity by managing special habitats for non-late-successional species.
   - Maintain natural processes.
   - Emphasize maintaining late-seral refugia and the habitat they provide, while recognizing the limitations of small parcels of federally managed land in a mid to early-seral-stage landscape.

Within the Riparian Reserve land use allocation:

3. Maintain water quality standards (ROD/RMP p.2) and improve stream conditions by:

- Maintaining effective shade for streams pursuant to BLM's TMDL agreement with the State of Oregon.

- Removing or replacing stream crossing culverts that restrict stream flows and fish passage, or pose a threat of future failure.

- Providing habitat for special status, SEIS special attention and other terrestrial species (ROD/RMP p. 9).

- Meeting all Aquatic Conservation Strategy (ACS) Objectives (ROD/RMP pp. 5-6).

4. Develop large conifers and future large coarse woody debris, large snag habitat and in-stream large wood. Develop long-term structural and spatial diversity, and other elements of late-successional forest habitat, to control stocking (stand density), to acquire desired vegetation characteristics and improve diversity of species composition within the RR LUA. These objectives would be accomplished by applying commercial thinning treatments within the RR LUA concurrent with treatments in the adjacent AMA LUA, removing merchantable material only when it is consistent with the purposes for which the RR were established (ROD/RMP pp. 9-15, D-6, NWFP p. B-31).

Within all land use allocations:

5. Protect, manage, and conserve federal listed and proposed species and their habitats to achieve their recovery in compliance with the Endangered Species Act, approved recovery plans, and Bureau special status species policies (ROD/RMP p. 28).

6. Maintain and develop a safe, efficient and environmentally sound road system (ROD/RMP p. 62) and reduce environmental effects associated with identified existing roads within the project area (ROD/RMP p. 11) by:

    - Providing appropriate access for timber harvest, silvicultural practices, and fire protection vehicles needed to meet the objectives above;
    - Perform road maintenance to prevent road deterioration or failure and to prevent road generated sedimentation that exceeds ODEQ standards.

1.2.3 Decision Factors

In choosing the alternative that best meets the purpose and need, the Tillamook Resource Area Field Manager will consider the extent to which each alternative would:

1. Provide timber resources and revenue to the government from the sale of those resources (objectives 1, 2 and 3);

2. Reduce the costs both short-term and long-term of managing the lands in the project area (objectives 1 and 2);
3. Provide safe, cost-effective access for logging operations, fuels management and fire suppression (objectives 2 and 7);
4. Reduce competition-related mortality and increase tree vigor and growth (objective 1);
5. Provide for the establishment and growth of conifer species while retaining structural and habitat components, such as large trees, snags, and coarse woody debris (objectives 5 and 6);
6. Promote the development of healthy late-successional characteristics in the Riparian Reserve land use allocation (objective 5);
7. Reduce erosion and subsequent sedimentation from roads (objectives 4 and 7).

1.3 Conformance with Land Use Plan, Statutes, Regulations, and other Plans

The following documents direct and provide the legal framework for management of BLM lands within the Salem District and for this project:

1. *Salem District Record of Decision and Resource Management Plan***,** May 1995 (ROD/RMP): The ROD/RMP has been reviewed and it has been determined that the proposed thinning activities conform to the land use plan terms and conditions (e.g. complies with management goals, objectives, direction, standards and guidelines) as required by 43 CFR 1610.5 (BLM Handbook H1790-1). Implementing the ROD/RMP is the reason for doing these activities (ROD/RMP p.1-3);
2. *Record of Decision for Amendments to Forest Service and Bureau of Land Management Planning Documents within the Range of the Northern Spotted Owl and Standards and Guidelines for Management of Habitat for Late-Successional and Old-Growth Forest Related Species within the Range of the Northern Spotted Owl*, April 1994 (the Northwest Forest Plan, or NWFP);

Land Use Allocations: The area proposed for treatment falls within the following Land Use Allocations (LUA) as defined in the previously described Salem District ROD/RMP and Northwest Forest Plan:

Adaptive Management Area (AMA LUA). The management objectives for this land use allocation include: restoration and maintenance of late-successional forest habitat outside reserves, consistent with marbled murrelet guidelines; restoration and protection of riparian zones; and provision of a stable timber supply (ROD/RMP p. 19).

Riparian Reserves (RR LUA). The primary management focus for the RR LUA is to meet the Aquatic Conservation Strategy Objectives described in the ROD/RMP (pp. 5-6) "to restore and maintain the ecological health of watersheds and aquatic ecosystems contained within them on public lands." This includes terrestrial habitat, water quality

and quantity, and aquatic habitat. See EA section 1.2.2 for management objectives associated with this land use allocation. For the Turner Creek Project, the RR LUA includes the stream and the area extending from the edges of the stream channel (each side) to a distance equal to:

- For fish-bearing streams and all lakes and natural ponds – a slope distance equal to the height of two site potential trees. For this project this is 440 feet each side of the stream channel.
- For non-fish-bearing streams and all constructed ponds, and wetlands larger than one acre - a slope distance equal to the height of one site potential tree. For this project this is 220 feet each side of the stream channel.

In addition, the NWFP (p.B-31) also states that "Active silvicultural programs will be necessary to restore large conifers in Riparian Reserves ". The NWFP (p.C-32) and the ROD/RMP (p. 11) direct the BLM to apply silvicultural practices for RR to control stocking, reestablish and manage stands, and acquire desired vegetation characteristics needed to attain Aquatic Conservation Strategy objectives. The ROD/RMP (p. D-6) states that merchantable logs may be removed "where such action would not be detrimental to the purposes for which the RR were established". EA section 3.13 describes the project's compliance with the Aquatic Conservation Strategy, including the nine ACS objectives.

3. *Record of Decision and Standards and Guidelines for Amendments to the Survey and Manage, Protection Buffer, and other Mitigation Measures Standards and Guidelines*, January 2001.

The analysis in the Turner Creek Project EA is site-specific, and supplements and tiers to analyses found in the *Salem District Proposed Resource Management Plan/Final Environmental Impact Statement*, September 1994 (RMP/FEIS). The RMP/FEIS includes the analysis from the *Final Supplemental Environmental Impact Statement on Management of Habitat for Late-Successional and Old-Growth Forest Related Species within the Range of the Northern Spotted Owl*, February 1994 (NWFP/FSEIS). The RMP/FEIS is amended by the *Final Supplemental Environmental Impact Statement for Amendments to the Survey and Manage, Protection Buffer, and other Mitigation Measures Standards and Guidelines*, November 2000.

Information from the *North Yamhill Watershed Analysis*, January 1997, has been incorporated into the development of the proposed thinning activities and into the description of the Turner Creek Project EA's affected environment and environmental effects (*EA section 3.0*) and is incorporated by reference.

The above documents are available for review in the Tillamook Resource Area Office.

1.3.1 Survey and Manage Species Review

The Turner Creek Project is consistent with court orders relating to the Survey and Manage mitigation measure of the Northwest Forest Plan, as incorporated into the Salem District Resource Management Plan.

On December 17, 2009, the U.S. District Court for the Western District of Washington issued an order in *Conservation Northwest, et al. v. Rey, et al.*, No. 08-1067 (W.D. Wash.) (Coughenour, J.), granting Plaintiffs' motion for partial summary judgment and finding a variety of NEPA violations in the BLM and USFS 2007 Record of Decision eliminating the Survey and Manage mitigation measure. Previously, in 2006, the District Court (Judge Pechman) had invalidated the agencies' 2004 RODs eliminating Survey and Manage due to NEPA violations. Following the District Court's 2006 ruling, parties to the litigation had entered into a stipulation exempting certain categories of activities from the Survey and Manage standard (hereinafter "Pechman exemptions").

Judge Pechman's Order from October 11, 2006 directs: "Defendants shall not authorize, allow, or permit to continue any logging or other ground-disturbing activities on projects 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 large wood, channel and floodplain reconstruction, or removal of channel diversions; and
D. The portions of project 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 of stands younger than 80 years old under subparagraph a. of this paragraph."

Following the Court's December 17, 2009 ruling, the Pechman exemptions are still in place. Judge Coughenour deferred issuing a remedy in his December 17, 2009 order until further proceedings, and did not enjoin the BLM from proceeding with projects. Nevertheless, the Turner Creek Project has been reviewed in consideration of both the December 17, 2009 and October 11, 2006 order. Because the Turner Creek Project entails no regeneration harvest and entails thinning only in stands less than 80 years old as well as replacing culverts on system roads that are in use and removing culverts on roads that are to be decommissioned, we have made the determination that this project meets Exemptions A and B of the Pechman Exemptions (October 11, 2006 Order), and therefore may still proceed to be implemented

even if the District Court sets aside or otherwise enjoins use of the 2007 Survey and Manage Record of Decision since the Pechman exemptions would remain valid in such case. Because the Turner Creek Project is exempt from Survey and Manage requirements, there will be no further discussion of the Survey and Manage mitigation measure in this EA.

1.3.2 Relevant Statutes/Authorities

This section is a summary of the relevant statutes/authorities that apply to this project.

- Oregon and California Act (O&C) 1937 – Requires the BLM to manage O&C lands for permanent forest production, in accord with sustained-yield principles. Management of O&C lands must also protect watersheds, regulate streamflow, provide for recreational facilities, and contribute to the economic stability of local communities and industries.

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

- National Environmental Policy Act (NEPA) 1969 – Requires the preparation of EAs or EISs on federal actions. These documents describe the environmental effects of these actions and determine whether the actions have a significant effect on the human environment.

- Endangered Species Act (ESA) 1973 – Directs Federal agencies to ensure their actions do not jeopardize threatened and endangered species.

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

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

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

- Magnuson-Stevens Fishery Conservation and Management Act of 1996, (P.L. 94-265) as amended and reauthorized by (P.L. 109-479), (2007)

- The Migratory Bird Treaty Act (MBTA), Executive Order 13186, and Migratory Bird Treaty Reform Act of 2004.

Additional authorities and management direction are described in Table 22.

1.4 Scoping

External scoping (seeking input from people outside of the BLM) was conducted by means of a scoping letter for the Turner Creek Project sent out to nine municipal government agencies, nearby landowners, and interested parties on the Tillamook Resource Area mailing list on October 13, 2010. In addition, a description of the proposal was included in the Salem Bureau of Land Management Project Update for September 2010, which was mailed to more than 1000 individuals and organizations.

A total of three comment letters were received as a result of this scoping. A summary of the comments and BLM responses are in *Section 1.4.1*. The scoping comment letters are available for review at the Tillamook Resource Area Office, 4610 Third Street, Tillamook, Oregon. Internal scoping was conducted by the Interdisciplinary Team (IDT) through record searches, field reviews and the project planning process.

1.4.1 Scoping Comments and BLM Responses

Project Record Document 5
Brian Tenbusch
American Forest Resource Council

BLM Summary of Comments:

AFRC supports using temporary roads for access to harvest units and does not support decommissioning of any permanent roads. They support mechanical harvesting on ground-based treatment areas, and are concerned about the effects of seasonal restrictions on the economic viability of BLM timber sales. AFRC is concerned about thinning treatments that produce low volumes per acre, they support thinning in Riparian Reserves and would like to see flexibility in fuels treatment prescriptions.

BLM Response:

In general, the Proposed Action is consistent with AFRCs recommendations, with the exception of decommissioning of permanent roads, and fuels treatment prescriptions. While not explicitly stated, the Proposed Action does allow for mechanical harvesting in ground-based yarding areas. A detailed description of the proposed project can be found in *sections 2.4.1* and *2.4.2*.

Project Record Document 4
Richard A. Howard Sr.
Public Works Superintendent
City of Yamhill

BLM Summary of Comments:

Mr. Howard expressed concerns regarding sediment in Turner Creek, which is the water supply for the City of Yamhill. The concerns include both logging generated sediment and dust produced by truck traffic on Turner Creek road near the City's water treatment plant. Mr. Howard also asks for clarification on ownership and control of roads on City of Yamhill land in section 9.

BLM Response:

BLM is aware of the City's water intake on Turner Creek within the project area and concerns regarding sediment affecting the treatment plant. A detailed description of the proposed project can be found in *section 2.4*, and the anticipated impacts of the project on water quality are in *section 3.2*. We are investigating the subject of legal access on roads in section 9 and expect to contact Mr. Howard directly to discuss this matter.

Project Record Document 6
Bill Richardson
Rocky Mountain Elk Foundation

BLM Summary of Comments:

RMEF supports thinning projects because of the opportunity to create early seral vegetation for foraging habitat for wildlife. They offer several suggestions for improving wildlife habitat, including reducing crown closures to 40% and creating larger openings to allow for early seral species establishment, and re-vegetating disturbed areas and decommissioned roads with native forage species for deer and elk.

BLM Response:

As described in *section 3.1.2*, the variable density thinning prescribed for the proposed treatment areas would result in a relatively variable crown cover over the project area, including areas with sufficient light for establishment and growth of early seral species already present in those areas. Decommissioned roads and other areas of disturbed soils would be planted with native plants, which may include grasses, forbs and trees. A more detailed description of the proposed project can be found in *sections 2.4.1* and *2.4.2*.

1.5 Decisions to be Made

The following decisions will be made through this analysis:

- To determine if a Supplemental Environmental Impact Statement (SEIS) should be prepared based on whether the proposed action would result in significant impacts to the human environment not already analyzed in the EIS prepared for the Salem District RMP and its amendments.

- If there are any such additional impacts that are significant, we will determine whether the project proposals could be modified to mitigate the impacts so an SEIS would not be necessary. If we determine there is no need to prepare an SEIS, we will document this determination in a Finding of No Significant Impacts (FONSI).

- To determine at what level, where, and how to harvest trees on BLM-administered lands allocated to the programmed timber harvest base within the project area.

2. ALTERNATIVES

2.1 Alternative Development

Pursuant to Section 102 (2) (E) of the National Environmental Policy Act (NEPA) of 1969, as amended, Federal agencies shall "…study, develop, and describe appropriate alternatives to recommended courses of action in any proposal which involves unresolved conflicts concerning alternative uses of available resources." There were no unresolved conflicts concerning alternative uses of available resources, therefore, this EA will analyze the effects of the current "Proposed Action" and "No Action" alternatives.

2.2 Planning and Implementation Process

The BLM would require the timber sale operators to accomplish the following actions as required in the timber sale contracts written by the BLM. The BLM would develop the timber sale contracts to implement the actions described below and the project design features (PDF) that follow (*EA section 2.4.2*). These actions and the PDF, taken together, form the best management practices (BMPs) that the IDT developed based on the principles of the BMPs described in Appendix G of the RMP/FEIS and Appendix C of the RMP which the IDT adapted to the site specific conditions of the proposed Turner Creek Project.

2.3 Alternative 1: No Action

The No Action alternative describes the baseline against which the effects of the proposed action can be compared, i.e. the existing conditions in the project area and the continuing trends in those conditions if the BLM does not implement the proposed project. Consideration of this alternative also answers the question: "What would it mean for the objectives to not be achieved?" The No Action alternative means that no timber management actions or connected actions would occur at this time. If this alternative were to be selected, the following items would not be done in the project area at this time: silviculture treatments; timber harvest; road

construction, renovation, maintenance or decommissioning; and stream crossing projects such as culvert upgrades or removal.

Only normal administrative activities and other uses (e.g. road use, programmed road maintenance, harvest of special forest products on public land) would continue on BLM lands within the project area.

On private lands adjacent to the project area, forest management and related activities would continue to occur. Selection of the No Action alternative would not constitute a decision to change the land use allocations of these lands. Selection of the No Action alternative would not set a precedent for consideration of future action proposals.

2.4 Alternative 2: The Proposed Action

2.4.1 Proposed Treatments

The proposed action is the application of a variable-density thinning prescription to approximately 940 acres of 35- to 71-year-old, relatively dense, single-storied, even-aged, Douglas-fir-dominated stands (Table 2). Treatments include thinning the Douglas-fir stand component, generally retaining hardwoods and conifers other than Douglas-fir. Treatments would be designed to retain legacy trees, trees with structural deformities, existing down wood and snags, and a component of trees in the suppressed and intermediate crown classes.

Specifically, the proposed action includes thinning the units to various densities and varying the density within units by various ways including areas of heavy thinning, leaving areas untreated, and by varying the stocking of trees to be left. Various-sized, naturally occurring open areas, the result of infection with *Phellinus weirii* root rot, would be managed by a combination of relatively wide spacing of highly susceptible species (Douglas-fir and grand fir), retention of existing hardwoods and less-susceptible conifers, and underplanting with disease-resistant western redcedar and hardwoods (red alder, bigleaf maple and Pacific madrone). In selected units, scattered, one-acre areas of heavy thinning would be created. The purpose of this treatment is to maximize individual tree development, encourage some understory vegetation development, and encourage the initiation of structural diversity by planting shade tolerant conifers. Relatively open areas around landings would be planted with shade-tolerant conifers. Spacing would be allowed to vary by as much as 25% in order to promote variable density and to maintain the variability already present in the stand. In some units, more than one stocking level would be prescribed with the variation occurring down to the scale of approximately one-half acre. Existing down wood and snags would be retained for coarse wood. Approximately 44% (740 acres) of the area originally planned for thinning would be left unthinned. These unthinned areas consist of portions dropped from harvest consideration for a variety of reasons and areas that are within the 100 foot-wide streamside buffers. In addition, selected units would include scattered 1 acre to 5 acre unthinned clumps.

In general, the proposed treatments would be similar in both the Riparian Reserve and in the upland AMA areas; exceptions to this are noted in the design features.

Table 2: Land Use Allocations and Logging Systems for Proposed Harvest Units.

Unit Number	*AMA Treatment (acres)*	*Riparian Reserve Treatment Acres*	*TOTAL UNIT ACRES*	*Logging Systems (acres)*	
				Ground-based	*Skyline*
3-3	69	13	82	82	0
5-1	19	12	31	15	16
5-5	13	3	16	16	0
5-17	3	9	12	12	0
7-2	155	42	197	107	90
9-17	141	48	189	90	99
17-4	30	20	50	14	36
17-9	6	7	13	13	0
17-10	21	10	31	31	0
17-44	43	23	66	51	15
21-41	130	34	164	164	0
21-42	39	21	60	60	0
29-49	19	10	29	17	12
Total	**688**	**252**	**940**	**672**	**268**

Connected Actions

Road Work

A summary of the anticipated road work is in Tables 3, 4 and 5. Overall, there would be a net reduction in road mileage in the project area of approximately 3.9 miles as a result of implementing the proposed action.

In order to give potential timber sale purchasers more flexibility in the work windows available for logging and hauling of timber from this project, all the skyline yarding treatment areas that

would haul out Belt Road (sections 9, 17, 21, 29 and portions of section 7) would be available for year-around skyline yarding and log haul. To accommodate that, any new road construction that accesses skyline yarding units in this area are being analyzed as though they would be rock-surfaced and decommissioned afterwards. BLM would require the timber sale purchasers to rock any new roads at their own expense, so it is possible that all of these roads would be natural-surface, however the analysis of effects for the proposed action treats them as though they would be rocked.

Table 3: Summary of Road Work for the Proposed Action

Type of Road Work	***Approximate Length (miles)***	***Net Change in Road Length (miles)***
New Natural-surface Road Construction and Decommission	0.7	0
New Rock-surface Road Construction and Decommission	1.6	0
Renovation and Decommission of Existing Natural-surface Road	2.9	-2.9
Renovation and Decommission of Existing Rock-surface Road	6.7	0
Renovation of Existing Rock-surface Road	0	0
Improvement of Existing Rock-surface Road	0.7	0
Decommission of Existing Road	1.0	-1.0
Total	**13.6 miles**	**-3.9 miles**

Road Construction: Approximately 2.3 miles of new road construction would occur. Of this, approximately 1.6 miles would be rock-surface and 0.7 miles would be natural-surface (no rock would be added). New natural-surface roads and landings would be decommissioned (remove culverts, decompact surface, waterbar and seed surface) and blocked following timber harvest and site preparation activities. New rock-surface roads would be decommissioned by pulling

culverts, waterbarring and blocking the roads to motorized vehicles. Amount of treatment area accessed by new road construction is shown in Table 4.

Table 4: New Road Construction: Proposed Treatment Acres Accessed by Each Newly Constructed Road Segment.

Road Number	*Surface Type*	*Approximate Length (feet)**	*Approximate Area Accessed (acres)**
P2	Natural	663	20
P4	Rock	1,683	33
P5	Rock	681	12
P6	Natural	1,213	31
P7	Rock	277	18
P8	Rock	573	169
P9	Rock	1,093	28
P10	Rock	2,199	77
P11	Rock	1,277	55
P13	Natural	879	29
P14	Rock	856	13
P15	Natural	869	30
P17	Natural	185	22
Total		**12,448 feet**	**537 acres**

* Lengths and areas are derived from GIS data and are approximate.

Road Renovation: Approximately 9.6 miles of existing roads would be renovated as necessary. This would include brushing, blading, drainage structure improvement or replacement, and rocking where needed. Of the roads to be renovated, 2.9 miles are natural-surface and they would remain natural-surface following renovation. The remaining 6.7 miles of road to be renovated are rocked and would remain rocked following renovation. All natural-surface renovated roads would be decommissioned (remove culverts, decompact surface, waterbar and seed surface) and blocked following timber harvest and site preparation activities.

Road Maintenance and Improvement: Approximately 3.7 miles of BLM-controlled roads would have maintenance (3.0 mi.) or improvement (0.7 mi.) performed prior to log hauling. All the roads to be maintained are gravel-surfaced. Maintenance and improvement would consist of cutting vegetation from the roadbed and ditches; blading and shaping the roadbed and ditches; repairing small slides and slumps; cutting brush adjacent to the road; maintaining, repairing,

adding cross drainage and stream-crossing culverts; replacing cross drains and undersized stream crossing culverts; and adding rock to replace depleted rock surfaces.

Table 5: Culvert Work for the Proposed Action

Section	*Road Number*	*Culvert Number*	*Proposed Activity*
5	2-5-5.1	C1	Replace Two Existing Culverts with Large Open-Bottom Culvert
5	2-5-5.1	C2	Replace Existing Culvert
7	2-5-6.1	C3	Remove Existing Culvert
7	2-5-6.1	C4	Remove Existing Culvert
7	2-5-6.1	C5	Remove Existing Culvert
7	P4	C6	Install New Temporary Culvert
9	P8	C7	Replace Existing Culvert
9	P8	C8	Replace Existing Culvert
17	P6	C9	Install New Temporary Culvert
17	2-5-19	C10	Replace Existing Culvert
17	2-5-19	C11	Replace Existing Culvert
17	2-5-19	C12	Replace Existing Culvert
17	2-5-17	C13	Replace Existing Culvert
17	2-5-17	C14	Replace Existing Culvert
9	2-5-10.2	C15	Replace Existing Culvert
9	2-5-10.2	C16	Replace Existing Culvert
22	2-5-22	C17	Replace Existing Culvert

Road Decommissioning: In addition to the natural-surface new road construction, approximately 2.9 miles of renovated roads and another 1.0 miles of existing road would be decommissioned for a total of 3.9 miles. Decommissioning would consist of removing stream-crossing culverts, decompacting, water barring, seeding or planting with native species, and restricting OHV use. Restricting OHV use may include the strategic placement of boulders, logs, root wads, or other types of earthen barriers.

Fuels Treatments

Fuel treatment strategies would be implemented on portions of the project areas to reduce both the intensity and severity of potential wildfires in the long term (after fuels reduction has occurred) and for site preparation in *Phellinus weirii* pockets or gaps. Post-harvest fuels hazard

surveys would be conducted and site-specific treatments would be recommended. A variety of fuels prescriptions may be implemented including slashing brush and lopping slash and brush, lopping and scattering of slash, pullback of slash from property lines and roadsides, broadcast burning, hand or machine piling and burning, swamper burning, landing piling and burning, selling the material as firewood, or allowing the material to be utilized for energy production from biomass. These treatments may occur along roads or property lines, on landings, within *Phellinus weirii* pockets, or other areas within the harvest units such as heavily thinned "gap" areas or variable density thinning areas where the fuel load is determined to be hazardous, or where underplanting of trees is recommended. Table 6 shows the approximate number of acres, or the approximate number of piles that would be treated.

Table 6: Fuel Loading and Treatments

Treatment Unit	Unit Acres	Site Preparation Slashing / Lopping Acres	Broadcast Burning Acres	Hand Pile Total Acres	Machine Pile Total Acres	Landing Pile Total	Slash Pullback Acres
3-3	82	18	0	18	3.0	7.0	1.2
5-1	31	4	0	4	2.3	4.0	1.3
5-5	16	4	0	4	0.5	3.0	0.0
5-17	12	0	0	0	2.0	3.0	1.3
7-2	197	31	0	31	5.2	14.0	2.3
9-17	189	0	0	0	10.0	9.0	1.0
17-4	50	3	0	3	5.2	7.0	1.0
17-9	13	2	0	2	0.0	2.0	0.5
17-10	31	4	0	4	2.3	4.0	0.0
17-44	66	10	0	10	5.0	9.0	2.2
21-41	164	8	0	8	2.0	9.0	0.5
21-42	60	6	0	6	11.5	9.0	3.2
29-49	29	0	0	0	1.0	2.0	2.0
Totals	**940**	**90**	**0**	**90**	**45**	**82**	**17**

2.4.2 Project Design Features

The following is a summary of the project design features (PDF) that reduce the risk of effects to the affected elements of the environment. The proposed action would be implemented consistent with the Best Management Practices (BMPs) contained in Appendix C of the ROD/RMP.

The design features are organized below by benefiting resource.

<u>Desirable Stand Features, Diversity, and Protection</u>

- Generally thinning would be from below, favoring the largest, healthiest trees to leave.

- Leave trees would include damaged trees and suppressed and intermediate crown class trees. The suppressed/intermediate trees would be left close to a dominant or codominant tree. The prescription would specify leaving a damaged, suppressed or intermediate crown class tree every 7th to 10th tree marked, approximately 10% - 14% of the leave trees per acre.
- Only Douglas-fir and grand fir would be cut, all other species would be reserved to preserve species diversity, unless in road rights-of-way, landings or yarding corridors. Grand fir would only be cut in *Phellinus* pockets and in portions of stands where it is the dominate species. Grand fir would be favored to leave over Douglas-fir.
- All legacy Douglas-fir (old-growth) would be retained, none would be cut for corridors or landings. Legacy trees would be protected from damage during harvest by leaving a ring of the closest trees or more if necessary, to ensure trees that pose a risk of damaging the legacy tree's canopy are left uncut.
- Spacing would be allowed to vary by as much as 25% in order to promote variable density.
- Generally, trees larger than diameter limits recommended in the LSRA (pp. 100-101) would be retained unless they are hazard trees or occur in heavily thinned areas including designated *Phellinus weirii* root disease gaps, yarding corridors, landings or road rights-of-way.
- Approximately 81 acres of heavy thinning treatment would be implemented through a combination of designated *Phellinus weirii* disease treatment areas and the one acre heavily thinned "gaps".
- Treatment of the designated *Phellinus weirii* treatment areas would be as follows:
  - An average of 20 trees per acre would be retained in the designated *Phellinus weirii* disease treatment areas. All Douglas-fir and grand fir less than 30 inches dbh, inside the designated area and within 30 feet of the flagged boundary would be harvested to reduce the potential for disease to spread through root contact. These designated *Phellinus weirii* root disease treatment areas would not be placed within 220 feet of streams or MAMU potential habitat.
  - The treatment areas would be planted with disease-resistant tree species, primarily western redcedar or hardwoods including red alder, bigleaf maple and Pacific madrone.

- Up to 10 percent of the acreage in selected units would be occupied by scattered one acre heavily thinned gaps. Treatment of the heavily thinned gaps would be as follows:
  - The one acre heavily thinned gaps would contain 12 leave trees, at least 30 feet from the edge of the gap. The trees left would be the largest, healthiest trees. These areas would be placed outside of one site potential tree height (220 ft.) from stream edges and MAMU potential habitat.
  - Following harvest these areas would be underplanted with shade-tolerant conifer species including western hemlock, grand fir and western redcedar.
- Site preparation for underplanting the heavily thinned areas would include brush cutting and treatment of logging slash to the extent needed to plant the areas. Piling and burning piles may be necessary where slash loads limit planting spots. Slash would be piled away from leave trees.
- Survival and growth of planted seedlings would be promoted by protecting them, as appropriate, with tubes and manual (usually chainsaw) brush release.
- Following harvest, the units would be examined to determine if there are other planting opportunities in brushy areas with relatively few trees in the overstory, generally over 2 acres in size, where site preparation for planting could be accomplished without cutting any

additional trees. Site preparation and subsequent planting and maintenance would be the same as described for the heavily thinned areas.

- Log lengths would be limited to 40 feet plus trim.
- Within selected units, leave scattered 1 to 5 acre unthinned clumps. Target high quality snags and legacy trees where possible. At least 10 percent of each stand (Forest Operations Inventory (FOI) unit) would be left unharvested.
- Stand densities of harvest areas within one site-potential tree height (220 ft.) of streams would be maintained at a Curtis Relative Density (RD) of 30 or higher
- In commercial thinning treatment units, felling and yarding operations would be restricted during the peak bark-slip period (generally April 1 to June 30).

Coarse Woody Debris (Snags and Down Wood)

- Retain green trees with defects that are desirable to wildlife such as cavities or dead, forked or broken tops, etc.
- During harvest, all coarse woody debris would be retained and protected to the extent practicable. Where necessary for safety or operational reasons, snags may be felled, but must be left on site. Snags that are greater than 18" dbh and 20' in height, or snags being actively used by wildlife would be surrounded with two or more leave trees to protect them from logging damage.
- In units where the pre-harvest quadratic mean diameter (QMD) is $\geq$ 18", leave 4 trees $\geq$ 22" dbh beyond the prescribed post harvest target to be converted to two snags and two down trees after harvest. To provide for snag recruitment in the next two to three decades leave another eight trees >22" with at least three $\geq$25" to accommodate the pileated woodpecker. Up to two of these trees/acre can be big leaf maple or Pacific madrone if they are available and of sufficient size.
- In units with QMD $\geq$15" and $\leq$ 18" dbh (Excluding Unit 9-17), leave four trees $\geq$ 20" dbh beyond the prescribed post harvest target. Convert two of these trees into down logs and two into snags after harvest.

Water, Fisheries and Soil Resources

- To protect water quality, trees would be felled away from all no-harvest buffers within the harvest area. If a cut tree falls into a no-harvest buffer, the portion of the tree within the buffer would remain in place.

Seasonal Restrictions (See Table 7 for a summary of seasonal restrictions)

- All ground-based yarding and the skyline yarding areas in sections 3, 5 and the majority of section 7 (the skyline yarding areas that would be hauled down Turner Creek road) would be restricted to periods of low soil moisture, generally June 1 through October 15. Log haul from these areas would also be restricted to the June 1 through October 15 time period. This could be adjusted if unseasonable conditions occur (e.g., an extended dry or wet season) (BMPs R 9, R72 and R73).
- The skyline yarding areas in sections 9, 17, 21, 29 and a small area in section 7 (the skyline yarding areas that would be hauled down Belt road) would be available for year-around yarding. The BLM would maintain authority to suspend yarding activities that would affect

resources such as water quality or ESA-listed fish or their habitat. Roads accessing these areas would be rocked, and log haul would be permitted year-around, with the restrictions identified elsewhere in this section (BMPs 72 and R73).

- Hauling on natural surface roads would be prohibited during the wet season, generally October 16 through May 31 (BMPs R16 and R73).
- Hauling and maintenance activities would be suspended when conditions exist that could generate excessive turbidity or fine sediment inputs to streams, such as times of intense or prolonged rainfall where water in ditches is flowing, or streamflow, as measured above and below the effects of the road, becomes discolored. In addition, suspension would occur if a road surface is showing signs of serious deterioration such as excessive rutting or pumping of fines from the sub-grade (BMP R73, R87 and R88).
- The BLM would maintain authority to suspend hauling or maintenance activities that may affect water quality, ESA- listed fish or designated critical habitat (BMPs 72 and R73).
- All road decommissioning, construction, maintenance and renovation would occur during the dry season (generally June 1 through October 15). All work required in live streams (culvert replacement or removal) in the Yamhill Watershed would be limited to the ODFW in-stream work window (July 15 to September 30) (BMPs R9, R16, R44, R47, R57, R61, R66, R77, R83, R87 and R97).
- All hauling and road maintenance work done during the "wet season" (generally outside of the period between June 1 and October 15) would be subject to the following stipulations to reduce the potential delivery of fine sediment to streams that may adversely affect downstream water quality or aquatic habitat:
  - Prior to the wet season, all roads designated for winter use hauling would be surfaced with an approved lift of durable rock (BMPs R15, R71, and R87).
  - Sediment control measures such as straw bales, silt fences and bark bags or additional road surface rock would be installed at designated stream crossings and ditch lines. The filter devices would allow for the free passage of water without detention or plugging. They would receive frequent maintenance and be removed when needed and at the completion of haul and disposed in areas in which the sediment would not be delivered to stream channels (BMPs R14, R17, R21, R51, R80 and R87).

Yarding

- Ground-based yarding would generally be limited to slopes less than 35%. Ground-based equipment would be restricted to tracked equipment only (BMP TH14).
- Designated skid trails would be used to limit the extent of skid trails and landings to less than 10% of each harvest unit. Skid trail and landing cutting limits would be kept to the narrowest width and size necessary to reasonably harvest the unit (for analysis purposes, assume 12-foot-wide skid trails spaced on average 150 feet apart and a 50-foot diameter impact area for landings). Existing skid trails and landings would be used to the extent possible (BMP TH16).
- Yarding logs or construction of skid trails through depressions with very moist, poorly drained soils would be avoided where practical. These areas may or may not be identified on the ground prior to logging operations (BMPs TH7, TH12 and TH16).
- The purchaser may elect to use mechanized, cut-to-length systems provided that the

following measures are met:

- Harvesters, feller-bunchers, and or log processors would be boom-mounted with a minimum operating radius of 20 feet. The equipment would have a ground pressure rating of 8 psi (pounds per square inch) or less. Log harvesting equipment trails would be spaced 40 to 50 feet apart and be no more than 15 feet in width. No more than two passes over the same ground would be permitted.
- Forwarding or skidding equipment would be restricted to designated trails approved by BLM prior to felling and yarding operations.
- Harvesters would be required to place slash in front of the machine tracks in order to reduce compaction. Forwarders or skidders would operate on a nearly continuous layer of slash that is at least 6 inches thick.

- Where skyline yarding corridors are needed across stream channels, full log suspension would be required within the no-harvest buffers. At least one-end suspension of logs would be required in all other skyline and ground-based logging areas (BMPs TH2 and TH14).
- Skyline corridors would generally not exceed 12 feet in width and would be located at least 150 feet apart at one end.
- Riparian no-harvest buffers may have yarding corridors cut through them if necessary, however any trees cut within the no-harvest buffers would be left on site to minimize ground disturbance (BMPs TH2 and TH7).
- In the ground-based yarding areas within Riparian Reserves, equipment would be restricted to existing skid trails or roads, unless a mechanized cut-to-length system with the restrictions described above is used (BMPs TH6, TH7, TH12, TH16, TH18).
- Skyline yarding would be restricted in Riparian Reserves to corridors that are as perpendicular to streams as possible (BMPs TH2 and TH4).

Road, Skid Trail and Landing Construction, Reconstruction and Decommissioning

- New roads and skid trails would generally be located outside of Riparian Reserves (BMPs R2 and R5).
- All new road construction would avoid wetlands and where practical avoid depressions with very moist, poorly drained soils (BMP R4)
- All new road construction and renovation would avoid large remnant trees.
- Natural-surface roads would be winterized at the end of each operating season by water barring and blocking the roads to vehicle traffic (BMPs R87, R90 and R91).
- The number of landings and their size would be kept to the minimum required to reasonably harvest the units. Landings would be located by the purchaser and approved by the BLM.
- In general, landings would not be located within 220 feet of streams (BMP R1 and R5).
- All of the natural surface roads and landings used during the harvesting activities would be decommissioned. Decommissioning would consist of removing culverts, de-compacting, water barring, seeding or planting with native species, and restricting OHV use. Restricting OHV use may include the strategic placement of boulders, logs, root wads, or other types of earthen barriers (BMPs R87, R89, R90, R91, R93, R97, R98, R99 and R100).
- Large stumps created by road building or yarding activities would be retained and stockpiled to be used later to block skid trails and roads in areas that could easily be accessed by OHVs.

Special Status Species

- No potentially suitable murrelet or northern spotted owl nest trees would be felled for any purpose and no openings greater than ¼ acre would be created within one site-potential tree height surrounding a potential murrelet nest tree.
- Any newly discovered marbled murrelet sites (as per the Pacific Seabird Group Marbled Murrelet Technical Committee protocol) would be protected by a 0.5-mile radius buffer on all contiguous existing and recruitment federal habitat.

Invasive / Non-Native Plants

- Prior to entering the sale area each work season, or before returning to the watershed after leaving it, any heavy machinery (with the exception of log trucks and pickup trucks used for daily personnel travel) would have all dirt and adhering vegetation removed by power-washing.
- Post-treatment ground disturbance (i.e. yarding corridors', decommissioned roads, landing margins, etc), will be evaluated to determine the need to seed or plant native vegetation to mitigate invasive/non-native plant introduction.

Cultural Resources

- Survey techniques for cultural resources are based on those described in the *Protocol for Managing Cultural Resources of Lands Administered by the Bureau of Land Management in Oregon* (BLM, 1998). A post-project survey would be conducted according to standards based on slope defined in the Protocol appendix. If cultural material is discovered during project implementation, work would be suspended until an archaeologist can assess the significance of the discovery.

Recreation and Access

- Existing OHV trails within sections 3, 5, 9 and the northeast portion of section 7 would be blocked where practicable to discourage OHV use.

Air Quality, Fire Risk, and Fuels Management

- Burning would be conducted in accordance with the *Oregon State Implementation Plan* and *Oregon Smoke Management Plan* and would comply with the provisions of the Clean Air Act. It would be conducted under good atmospheric mixing conditions to lessen the impact on air quality in Smoke Sensitive Receptor Areas.
- Swamper burning, or hand, machine, and landing pile construction and burning may be used individually or in combination in areas where fuel loading is heavy or the fire risk is determined to be high.
- Large woody debris would not be piled.
- Hand piles and machine piles would be located at least 10 feet from green trees to minimize damage, or on top of Bigleaf maple stumps to help prevent re-sprouting.
- Landing piles would be located as far as possible from reserved trees to minimize damage.
- Hand, machine, and landing piles would be covered to facilitate the consumption of fuels during the high moisture fall/winter burning periods.
- Lopping and scattering of fuels would be incorporated in areas where fuel loading is

relatively heavy but not heavy enough to warrant burning.

- Pullback of fuels would be incorporated in areas where fuel loading is relatively light (especially along roads and property lines) and not heavy enough to warrant burning.
- Utilization of small diameter slash for firewood or energy production from biomass would be incorporated where appropriate.
- The Density Management project areas will be posted as "Closed" to OHV use during harvest and log hauling activities.

Design Features Specific to RR Land Use Allocation

Water, Fisheries and Soil Resources

- Maintain a minimum 100 foot no-harvest buffer on either side of fish-bearing streams and perennial non-fish bearing streams.
- Maintain a minimum 100 foot no-harvest buffer on the outer edge of ponds, and wetlands larger than one acre.
- Maintain a minimum one tree wide no-harvest buffer on the outer edge of unmapped wetlands less than one acre. This requirement may be achieved by leaving reserve trees along the edge of the wetlands; excluding these areas from the treatment units would not be required.
- Maintain a minimum 60 foot no-harvest buffer on either side of intermittent non-fish bearing streams.

Table 7: Seasonal Restrictions Incorporated into the Turner Creek Project

***Restricted Times are Shaded**

	JAN		FEB		MAR		APR		MAY		JUN		JUL		AUG		SEP		OCT		NOV		DEC	
Activity	**1**	**15**	**1**	**15**	**1**	**15**	**1**	**15**	**1**	**15**	**1**	**15**	**1**	**15**	**1**	**15**	**1**	**15**	**1**	**15**	**1**	**15**	**1**	**15**
Felling and Bucking**							■	■	■	■	■	■												
Ground-Based Yarding	■	■	■	■	■	■	■	■	■	■										■	■	■	■	■
Skyline Yarding – sec. 3, 5 and most of 7	■	■	■	■	■	■	■	■	■	■										■	■	■	■	■
Skyline Yarding – sec. 9, 17, 21, 29 and a portion of 7																								
Road construction, renovation and decommissioning	■	■	■	■	■	■	■	■	■	■										■	■	■	■	■
Log Haul – rock-surface roads sec.9, 17, 21, 29 and a portion of 7																								
Log Haul – all natural-surface roads and rock-surface roads sec. 3, 5 and most of 7	■	■	■	■	■	■	■	■	■	■										■	■	■	■	■

* All dates are dependent on actual weather conditions ** Bark slip restrictions may be conditionally waived

2.5 Alternatives Considered But Not Analyzed In Detail

None

3. AFFECTED ENVIRONMENT AND ENVIRONMENTAL EFFECTS

This section of the EA describes the current condition and trend of the affected resources and the environmental effects of the alternatives on those resources. The interdisciplinary team of resource specialists (IDT) reviewed the elements of the human environment, required by law, regulation, Executive Order and policy, to determine if they would be affected by the proposed action (BLM Handbook H-1790-1: p. 137), [40 CFR 1508.27(b)(3)], [40 CFR 1508.27(b)(8)] (EA section 3.13), as well as the issues raised in scoping (EA *section 1.4.1*).

The resources potentially affected by the proposed thinning activities are described in the following sections: Vegetation and Forest Stand Characteristics; Hydrology; Threatened or Endangered Fish Species or Habitat, Magnuson Stevens Act-Essential Fish Habitat, and Species with Bureau Status; Fish Species with Bureau Status, Essential Fish Habitat and Other Fish; Soils; Threatened or Endangered Wildlife Species, Habitat and/or Critical Habitat; Special Status (BLM 6840 Policy), SEIS Special Attention (Salem RMP), and Migratory Bird Treaty Act Wildlife Species and Habitat; Recreation; Invasive, Nonnative Species (Executive Order 13112); Special Status and SEIS Special Attention Plant Species and Habitat; Air Quality, Fire Risk and Fuels Management; and Carbon Storage, Carbon Emissions and Climate Change.

3.1 Vegetation and Forest Stand Characteristics

3.1.1 Affected Environment

The stands proposed for treatment to a large extent reflect the bulk of the stands within the Turner Creek watershed. Units planned for thinning range in age from about 35 to 71 years; the weighted average age is 60 years (Table 8). These ages do not reflect the lightly scattered (less than one tree per acre) legacy old-growth trees, primarily Douglas-fir, that occur in several of the stands. The legacy component of the stands would not be affected by the proposed treatment. The stands are essentially single-storied stands; Douglas-fir-dominated ($\geq$50% by basal area). For the most part, the portions of stands proposed for thinning are currently overstocked as indicated by Curtis Relative Densities (RD[2]) above 55, the approximate density level where competition-related mortality in Douglas-fir stands begins.

[2] Relative density (RD) is a measure of crowding in a stand of trees, expressed as a percentage of density (based on number and size of trees) relative to a theoretical maximum density. Curtis Relative Density (RD) is calculated by dividing the basal area per acre by the square root of the quadratic mean diameter. Although not expressed as a percentage, Curtis Relative Density can be interpreted approximately as the percentage of the maximum possible

Table 8: Current Stand Parameters from Stand Exam Data

Unit	Year of origin	Site Index[1]	Trees/Ac. ≥7 in. Diameter at Breast Height (4.5 ft.) (dbh)	Basal Area (ft.[2])	Quadratic Mean Diameter[3] (QMD) (in.)	Curtis RD	Ave. Ht (ft)	Crown Cover %	Species composition by Basal Area[2]
3-3	1951	138	153	255	17.5	61	128	81	DF 67%, GF 19%, BLM 12%, WRC 1%
5-1	1955	132	102	226	20.2	50	121	75	DF 100%
5-5	1970	151	232	253	14.2	67	107	86	DF 97%, BLM 2%, RA 1%
5-17	1947	133	113	264	20.7	58	135	78	DF 97%, WH 3%
7-2	1954	131	166	211	15.3	54	116	79	DF 95%, WH 2%, BLM 1%, GF , RA, WRC trace amts.
9-17	1944	133	154	246	17.2	60	132	80	DF 87%, WRC 7%, BLM 5%, GF, PY trace amts.
17-4	1968	136	212	178	12.4	50	91	83	DF 100%
17-9	1968	149	256	235	13	65	105	87	DF 100%
17-10	1975	141	225	181	12.1	52	93	83	DF 92%, RA 6%, BLM 5%
17-44	1943	122	132	265	19.2	60	116	81	DF 94%, WRC 5%, GF 1%
21-41	1939	123	162	305	18.6	71	117	83	DF 95%, GF 3%, BLM 1% , PM trace
21-42	1944	124	133	251	18.5	58	114	80	DF 88%, BLM 12%
29-49	1939	119	165	235	16.2	59	113	80	DF 100%

[1]DF King (1966), unless noted
[2]DF= Douglas-fir, WH = western hemlock, RA=red alder, BLM= bigleaf maple, WRC=western redcedar, GF= grand fir, PY=pacific yew, PM=pacific madrone
[3]Diameter of the tree with average basal area at breast height

Phellinus weirii root disease is widespread throughout the project area. *Phellinus weirii* is a native root pathogen that is a natural part of many forest ecosystems (Thies and Sturrock 1995). Disease centers occur throughout the units in well-defined discrete pockets as well as in a diffuse pattern where groups of one to several trees are affected throughout the infested area. Douglas-fir and grand fir are highly susceptible to *Phellinus weirii*, (they are readily infected and killed by it); western hemlock is intermediately susceptible; western redcedar is tolerant or resistant; and all hardwoods are immune (Hadfield et al. 1986). Because the disease decays their root systems, it kills trees directly by depriving them of water and

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Curtis Relative Density (RD 100). Other common ways of communicating density in a forest stand include trees/acre, basal area/acre, average spacing and crown or canopy closure.

nutrients, or makes them prone to windthrow by undermining their structural integrity (Thies 1984). The disease spreads through root contacts with infected trees or stumps. Disease centers are believed to expand radially at the rate of about one foot per year (Nelson and Hartman 1975), and the number of trees impacted by the disease can generally be expected to double about every 15 years (Hadfield 1985; Nelson et al. 1981). *Phellinus weirii* attacks susceptible hosts regardless of tree size, age, or vigor.

The most abundant understory species are sword fern, dwarf Oregon grape, salal and vine maple. Understory density varies inversely with the amount of overstory canopy closure. The understory is often well developed where openings occur. Openings related to *Phellinus weirii* are typically dominated by vine maple. Where the dense overstory canopy consists of relatively young, short trees, such as in Unit 17-4, the understory is rather sparse. The southern-most units can be characterized as hot and dry sites with stands containing a poison oak component in the understory and a Pacific madrone component in the overstory. From about the middle of Section 17 northwards, poison oak and madrone drop out of the units and the sites can be characterized as warm and dry sites. Grand fir occurs to some degree in most of the units and is the second most common conifer next to Douglas-fir. Bigleaf maple is the most common hardwood species in these stands.
There is considerable variation in the amount of down wood, snags, and total coarse wood volume among the units. The weighted (by acres) average total coarse wood volume (includes down wood and snags) among the proposed treatment units is 632 cubic feet per acre. This amount is near the low end of the minimum range (525 to 1,100 cubic feet per acre) for Oregon Coast Range stands 25 to 49 years old and for stands 50 to 79 years old), as shown in Table 24 of the LSRA. The down wood data was collected for pieces that meet the minimum dimensions of 20 inches diameter on the large end diameter and 20 ft. long. Because of these measurement standards, the amount of coarse wood on the ground is probably a low estimate. The snag data includes only snags $\geq$10 in. dbh and $\geq$10 feet in height. Approximately 60% of the total coarse wood volume is from down wood, and 40% is from snags. About 41% of the down wood volume is in decay classes 1, 2, and 3, and about 59% is in decay classes 4 and 5. The source of the more recent decay class down wood seems to be smaller trees that have died as a result of suppression or have been windthrown as a result of *Phellinus weirii* root rot infection. The weighted average down wood volume is 376 cubic feet per acre. There is a weighted average of 5 conifer snags per acre that average approximately 18 inches dbh and approximately 68 feet in height. Approximately 91% of the snags are in decay classes 1, 2, and 3 and about 9% of the snag volume is in decay classes 4 and 5. The weighted average snag volume is 256 cubic feet per acre.

The affected environment for forest vegetation is described in further detail in the silvicultural prescription for the Turner Creek project area.

3.1.2 Environmental Effects Alternative 1: No Action

Under this alternative, no density management or CWD creation would take place at this time. In the absence of thinning or some other form of canopy disturbance, projections are for the density levels of the stands to generally increase to fairly high levels over the next 25 years (Table 9). Stands are expected to become increasingly dense and uniform. As the level

of competition among the trees remains high, crown development (live crown ratio, crown expansion, and branch growth) will decrease, diameter growth rate can be expected to decline, and competition-related mortality will increase, resulting in coarse wood additions mainly from the smaller-diameter trees that slowly die from suppression. The difference in trees per acre currently (Table 8) and in 25 years (Table 9) reflects competition mortality as predicted by ORGANON (Hann et al. 2006). The increase in density is reflected in the Curtis RD numbers in Table 9. Competition mortality in Douglas-fir stands generally occurs at RD's between 50 and 60. Competitive mortality occurs at a relatively even spatial distribution, maintaining stands uniformity. See Table 11 for a summary of parameters describing the predicted tree mortality. Understory development will also be limited because of stand densities as well as a general lack of shade tolerant species in the overstory. Any conifers which may exist in the understory (i.e. saplings and seedlings) of some stands can be expected to decline in vigor and exhibit a very slow growth rate, with some possibly falling out of the stands because they are no longer able to survive under the increasingly dense overstory shade. Due to the preponderance of Douglas-fir in the overstory of these stands, very little development of a second canopy layer, composed of shade-tolerant conifers, would be expected even if disturbances create openings. A declining trend in the hardwood component can be expected in the future as they are out-competed (overtopped) by the conifers. In addition, the trees are expected to become less stable, as expressed by the height/diameter ratio, and therefore, more likely to experience windthrow or break off in severe winter storms.

In centers of *Phellinus weirii* root disease infection where tree species that are less-susceptible to this disease (species other than Douglas-fir and grand fir) are not filling in as trees are killed by the disease, centers are expected to expand resulting in further decreases in conifer stocking and enlargement of the shrub-dominated openings. The developmental trajectory for the majority of these root disease infection centers appears to be vine maple or bigleaf maple dominated openings containing short-term snags (because they blow over) and down logs. The shrub density in many of these disease centers precludes establishment and growth of understory trees. Therefore, these root disease centers, while contributing to the overall diversity of the stands, do not appear to be developing older-forest characteristics and have a greatly diminishing timber production capability as well.

There would not be any cumulative effects to forest vegetation associated with selecting the "No Action" alternative.

Table 9: Estimated stand conditions 25 years after implementing Alternative 1 as projected by ORGANON

Unit	Trees/Ac.	BA (sq. ft.)	QMD (in.)	Curtis RD
3-3	122	308	21.5	67
5-1	87	288	24.7	58
5-5	142	295	19.5	67
5-17	95	315	24.7	63
7-2	125	274	20.1	61
9-17	111	295	22.0	63
17-4	165	274	17.4	65
17-9	153	305	19.1	69
17-10	173	257	16.5	63
17-44	119	327	22.4	70
21-41	125	324	21.8	69
21-42	113	332	23.2	69
29-49	131	291	20.2	65

3.1.3 Environmental Effects Alternative 2: The Proposed Action

Table 10 displays the predicted harvest unit conditions immediately after harvest. The various unit parameters presented in the table represent the prescriptions for thinning outside of the heavily thinned patches and designated *Phellinus weirii* patches. The stands are recommended to be thinned from below (retention of the larger-sized trees) modified to favor conifer species other than Douglas-fir and to retain trees with significant damage. Emphasis on retaining species other than Douglas-fir will increase the relative diversity of species, maintain a seed source for understory trees and improve the general resiliency of the stands to insects, disease and other disturbances. Because of the large numbers of Douglas-fir in the stands now, it is expected that it would remain the major species. Leaving trees with significant damage such as cavities, broken tops, etc. will conserve trees useful to wildlife. Implementing guidelines for treating *Phellinus weirii* root rot pockets, including the planting of large openings with seedlings immune or resistant to the disease, will result in a reduced spread of the disease and further contribute to species diversity. Underplanting the one acre heavily thinned gaps will introduce shade-tolerant conifer species into the stands to help develop understory diversity both in the gaps and as a seed source for shade tolerant species such as western hemlock to gradually expand throughout the stand.

Table 10: Estimated conditions outside of heavily thinned gaps and designated *Phellinus* patches, immediately following harvest and CWD creation as projected by ORGANON

Unit	Trees/Ac.	BA (sq. ft.)	QMD (in.)	Curtis RD	Est. Canopy Cover
3-3	84	169	19.2	38	64
5-1	50	158	24.0	32	58
5-5	84	149	18.0	35	62
5-17	50	174	25.2	35	60
7-2	65	129	19.1	30	63
9-17	59	150	21.6	33	63
17-4	83	103	15.1	26	66
17-9	83	118	16.1	29	66
17-10	81	90	14.3	24	62
17-44	50	154	23.7	31	57
21-41	65	177	22.4	38	60
21-42	50	153	23.6	31	58
29-49	61	156	21.6	34	61

Thinning "captures" much of the snag recruitment that results from inter-tree competition and very little density mortality (3 trees per acre) is expected to occur for 25 years after treatment. See comparison of the alternatives in Table 11. Approximately 10% to 14% of the leave trees will be in the suppressed and intermediate tree classes, somewhat ameliorating the loss of trees likely to die from competition, although thinning will tend to keep these trees alive for a longer period of time. Approximately 52% of the Forest Operations Inventory (FOI) units acreage considered for harvest would be left untreated during this entry because of logging difficulties, poor stocking, slope stability, stream buffers, and thinning within the last 15 years (271 acres). Subtracting out previously thinned units, 44% of the stand acreage proposed for thinning would remain in an unthinned condition. Leaving variable-sized areas unthinned will provide places where mortality will continue at current rates. Table 11 for estimated mortality including both thinned and unthinned portions of the stands proposed for harvest. Within the harvest units, coarse wood would be expected to increase due to windthrow, damage and breakage during felling, and the design feature requiring the creation of CWD. CWD treatments would result in inputs from trees of at least 20 to 22 inches dbh over approximately 625 acres. The combination of 2 snags and 2 downed trees per acre would result in an addition of approximately 405 ft^3 of decay class 1 material per acre. Inputs resulting from harvest consist of limbs and tops, breakage and cull and incidentally felled or topped trees that would be left on site. The harvest input would likely result in a gain of 200 cubic feet per acre of coarse woody debris in skyline yarding areas and about 100 cubic feet per acre in ground-based yarding areas. The numbers in Table 11 do not reflect CWD treatments or other expected CWD inputs such as logging slash. The proposed action is not designed to treat all of the *Phellinus* weirii pockets within the harvest units, *Phellinus weirii*-related mortality is expected to continue across all tree sizes within the units.

Table 11: Comparison of Wt. Ave. Estimated Tree Mortality and Parameters after 25 years

	Alternative 1: No Action				Alternative 2: Proposed Action			
	TPA	BA	QMD	Volume Cu. Ft.	TPA	BA	QMD	Volume Cu. Ft.
All Harvest Units	36	36 ft^2	13.5 in.	1,495	3	6 ft^2	19.2 in.	279
Units with QMD currently <15 in. dbh	64	52 ft^2	12.2 in.	2,132	6	9 ft^2	16.6 in.	384
Units with QMD currently ≥15 in. dbh	33	33 ft^2	13.5 in.	1,411	3	6 ft^2	19.2 in.	265
Stand Total including Harvested and Unharvested Portions	36	36 ft^2	13.5 in.	1,495	17	19 ft^2	14.3 in.	802

See Table 12 for predicted unit parameters 25 years after implementing Alternative 2.

Table 12: Estimated unit conditions outside of heavily thinned gaps and designated *Phellinus* patches, 25 years after implementing Alternative 2 as projected by ORGANON

Unit	Trees/Ac.	BA (sq. ft.)	QMD (in.)	Curtis RD
3-3	76	245	24.4	50
5-1	48	225	29.3	42
5-5	76	220	23.0	46
5-17	49	238	30.0	42
7-2	62	201	24.5	40
9-17	63	223	25.5	45
17-4	78	202	21.8	43
17-9	76	227	23.4	47
17-10	77	170	20.2	38
17-44	49	216	28.4	41
21-41	61	227	26.1	44
21-42	49	213	28.2	40
29-49	59	221	26.1	43

The expected short-term effects (0-25 years) of the proposed thinning include:

- Redirecting the current stand developmental trajectory away from increased uniformity and towards a more complex structure characteristic of older forests while minimizing short-term effects on habitat quality.
- Increased diameter growth rates to lessen the time it takes to develop the large trees, snags and logs characteristic of late-successional forests.
- Increased crown ratios, crown widths, and limb development (branch size) of the residual trees.
- Increased windfirmness and stability of the residual trees.
- Decreased mortality of the smaller-sized trees over the next 25 years following treatment compared to the untreated stands.
- By retaining tree species other than Douglas-fir and grand fir and by planting disease-resistant conifers and hardwoods in areas infested with *Phellinus weirii* root rot, the current and future impacts from this disease should be reduced, and the species diversity and structural complexity should be increased.
- Thinning primarily from the Douglas-fir component to increase the relative proportion of the other species should also increase the general species diversity of the units.
- As a result of implementing this prescription, the density within and among units would vary. On 415 acres the prescription would require marking units to two different densities, alternating between these densities at the scale of one-half acre. Therefore, some trees would be given more room to grow and others would be given less. This should increase overstory canopy heterogeneity and result in a more uneven pattern of understory development as well.
- The contrast between the harvest areas and untreated portions of stands would create diversity as would the creation of heavily thinned areas and reserve clumps within harvest units.
- On average, the recommended thinning treatments are expected to remove 59% of the trees per acre and 39% of the basal area. The resultant weighted average Curtis RD is estimated to be 32.
- The initiation of an understory canopy layer through planting the heavily thinned areas as well as any additional planting of existing openings following harvest. Species planted would include shade-tolerant conifers which would become a seed source, over time, for increasing diversity throughout the stands.
- In the units with component of shade-tolerant tree species in the overstory, thinning would stimulate natural regeneration of trees in the understory.
- Growth of understory shrubs and herbs should increase

Project implementation is expected to set the stage for future treatments that could continue the progress of the stands towards developing more complex structures.

The environment effects for the Proposed Action on forest vegetation are described in further detail in the silvicultural prescription for the Turner Creek project area (Project Record Document no. 7).

3.2 Hydrology

The Area soil scientist completed field reviews in summer and fall 2010, confirming soil types and fragile sites, identifying disturbance conditions, and determining appropriate best management practices and project design features. Data sources in this analysis include BLM GIS data, aerial photos (1993 to 2009), and the 1997 North Yamhill Watershed Analysis and 2003 Trask River Watershed Analysis.

The focus of this analysis is two primary water resources concerns:
1. How would the proposed action through timber harvest and road work affect stream flows and channel morphology?
2. How would the proposed action through timber yarding, road work, and timber hauling affect water temperature, sedimentation, and turbidity (cloudiness).

On-site soil effects of slope stability are discussed in the Soil Resources section (*2.3.4*).

The action area is the area directly affected by the proposed action (e.g. harvest units, haul roads). The analysis area is the area that maybe affected directly or indirectly by the proposed action and not merely the immediate area involved in the action. The analysis area varies with the affected parameter but generally includes the action area and all 6th field subwatersheds in which the proposed timber harvest, fuels reduction, and road activities would occur.

3.2.1 Affected Environment

Setting

The bulk of the proposed forest management activities would occur within the Turner Creek (HUC 17090008060603) and Upper North Yamhill River (HUC 170900080601) 6th-field subwatersheds, which drain into the Willamette River Basin. Approximately 28 acres of the proposed thinning is located within the Middle Fork of North Fork of Trask River (HUC 17100203401) subwatershed, which drains into the Trask River.

The most sensitive beneficial uses for surface water draining the action area are municipal drinking water, cold-water fisheries (including salmonid habitat), and other cold aquatic life. The action area is not within a Key Watershed as defined in the Northwest Forest Plan.

There are three municipal surface water withdrawals downstream of the proposed harvest units. The Cities of Hillsboro, Beaverton, and Forest Grove have water rights on Barney Reservoir. Barney Reservoir is located on the Middle Fork of the North Fork Trask. The nearest proposed harvest area, unit 7-2, is located approximately 2.0 miles upstream of the reservoir, upstream of several large ponds. The City of Yamhill has water rights on upper Turner Creek and a small reservoir above it. The City of Yamhill operates a water treatment plant (river mile 3.8) with a water intake structure located 100 to 200 yards upstream. The nearest proposed harvest area, unit 7-2, is located approximately 1,500 feet upstream of the water intake structure and one the proposed haul routes (Turner Creek Road) passes near the treatment plant. According to a draft Environmental Assessment, the City of Yamhill is hoping to decommission an old water intake

structure and replace it with a new one adjacent to the water treatment facility (City of Yamhill, 2010). The existing intake is requiring additional maintenance because it is located in an active landslide area. If the water intake work was done, the project could cause moderate, but temporary, adverse effects to water quality, during construction. Most increases in turbidity would within 700 feet below the work site.

The bedrock geology consists of a mixture of basalt (Siletz River Volcanics), sandstone (Yamhill Formation), and ancient landslide and debris-flow deposits from mixed volcanic and sedimentary rocks (Walker, and MacLeod, 1991). The dominant erosion processes within the project area are shallow, rapid-moving landslides and soil creep. The soils are fine textured and relatively deep (>6 ft). Surface soils have high silt contents (50 to 90%) and little rock.

The mild, maritime climate is characterized by cool, wet winters and warm, dry summers. Rain is the primary hydrologic flow generating process within the affected subwatersheds. Snow accumulation is rare. Precipitation averages about 60 to 85 inches annually, falling mainly as rain between November and April. Fog drip is minimal. Approximately 50 acres of the 672 acres proposed for timber harvest are within the transient snow zone (TSZ), which is assumed to range between 2,000 to 3,000 feet in elevation. This area is subject to rain-on-snow (ROS) events that have the potential to increase during winter or spring storms. The mean 2-year precipitation event of the analysis area is moderate for the coast, at approximately 3.0 to 4.5 inches in a 24-hour period (estimated at: http://www.nws.noaa.gov/ohd/hdsc/noaaatlas2.htm).

Nearly all of the Middle Fork of North Fork of Trask River and Upper North Yamhill River subwatersheds are forestland. In contrast, about a quarter of the Turner Creek subwatershed is agriculture land; the remainder is forested.

Industrial and private forestry is the predominant land use. These forestlands are generally managed on 30- to 50-year rotations that culminate in clearcut harvest. Lands managed by BLM comprise approximately 21% of the area, distributed in a checkerboard-like pattern. No other timber harvest projects are planned on BLM lands within the analysis area over the next five years. Reasonably foreseeable actions within the analysis area would include continued timber harvest and road building by private industry.

Past logging has created a dense network of roads. The road density is currently approximately 4.8 mi/sq mi in the affected subwatersheds. The majority of the roads were built prior to 1970, when construction standards were much less stringent than today. Some were built on steep, unstable slopes. Landslides and washouts are probably the dominant source of road-related sediment. Principal mechanisms for fine sediment delivery to streams from roads in the analysis area are surface erosion of the road surfaces and runoff resulting from inadequate road drainage.

Most roads in the project vicinity and those to be use in the proposed action area are in good condition. Most road surfaces are rocked and smooth, they have good surface drainage and well-vegetated cut and fill slopes. Existing culverts do not appear to be contributing abnormal levels of fine sediment, however many are undersized or aging and need replacing. Two culverts on BLM land (C15 and C16, Figure 6), located about 0.6 mile upstream of the City of Yamhill

water diversion are not planned to be used in the timber sales, are in poor condition. The C15 crossing has a failing log fill. It is on a small intermittent headwater stream and some of the water is being diverted onto the road. The C16 crossing has a greatly undersized culvert. It is on a larger down-cut, 2nd or 3rd order stream on earthflow terrain with very erosive soils that are prone to slumping. It has a high potential for a washout, which could result in several hundred yards of sediment being delivered downstream.

Stream Channel

Little in-channel, quantitative data is available. Available data includes a 1993 Oregon Department of Fish and Wildlife (ODFW) aquatic habitat survey conducted on the North Yamhill River (RM 20-30) and Cedar Creek (RM 0-1.5), downstream of the proposed activity area. Data indicates that these larger streams are highly disturbed, are constrained and downcut, and have low levels of large woody debris (LWD). This lack of LWD has resulted in reduced channel stability and has reduced the percent of the channel in pools and pool frequency. Many of the channel banks along lower Cedar Creek showed active erosion and channel substrates had high percentage of fines (50%) in riffles.

This data is not sufficient to characterize channel conditions or draw conclusions regarding trends or background levels in the area around the proposed activity area where the timber sale is planned. Most riparian areas on BLM lands are nearly fully stocked with mid-seral staged dominated conifers. Young conifers and hardwoods dominate most riparian areas on private lands. Based upon a limited number of field observations and knowledge of the area, most streams on BLM lands appear to be in *functional condition*. They generally have adequate riparian-wetland vegetative cover, stable stream banks, and mostly intact floodplains, but lack desired numbers and volumes of large wood and probably have higher percentage of fines in substrates and fewer numbers of quality pools than in reference conditions.

There a numerous places in the area of proposed action where roads cross streams. Road stream crossings alter stream hydraulics and channel morphologies both downstream and upstream. Some of the drainage structures are undersized and are restricting passage of high flows, wood, and sediment. Some drainage structures are prone to failure.

There are approximately 12 miles of stream channels near (<200 feet) or within the proposed timber units. Of that total, approximately 11 miles (~91%) are small (mostly < 5-feet bankfull width), zero to and second order, non-fish bearing headwater streams. (Zero-order streams refers to stream channels with a defined beds and banks that were not delineated on 1:24,000 scale USGS topographic maps. They generally are small, first-order channels determined by field delineation.) Roughly, two-thirds of these small channels are located on benches and rolling hills and have gradients of 10% or less. Approximately one third have steep (>10%) gradients and are confined by steep hillslopes. The streams are Rosgen type A channels with low width/depth ratio, and low sinuosity (Rosgen, 1994). Most (about 75%) are perennial but do not have enough fluvial power to cut scour pools and move large wood. Flows commonly go subsurface if very large wood or large amounts of sediment are placed across them. Channel substrates where gradients are 10% or less are dominated by fine gravel, sand, and silt. Channel substrates on steeper gradients are primarily gravels and cobbles.

Largest order streams include approximately 1,600 feet of 4th order reach of Turner Creek near unit 5-17, approximately 1,600 feet of 4th order Cedar Creek near unit 29-49, and approximately 3,100 feet of 3rd order Cedar Creek near units 17-4, 17-9, and 17-44. They are all fish bearing and are primarily Rosgen type B channels confined by moderate to very steep hillslopes with mostly steep gradients and small width-to-depth ratios. These larger streams have sufficient fluvial power to form step pool channels and are able to transport larger material (gravel, cobbles, boulders and large woody debris) downstream.

One wetland is present. It located in unit 5-1 and consists of a pond and cattail marsh totaling about 1.1 acres. The proposed harvesting around this wetland would be completed with ground-base harvest with a 60 feet no-harvest buffer. Additional wetlands were observed near stream headwaters but all are outside the proposed treatment areas.

Peak Flow

The primary factors by which forest activities can affect peak flows are by reducing forest cover through timber harvest and altering the routing of water by compacting soil surfaces and increasing road-stream interaction through constructing roads and skid trails. To assess the current risk for peak flows, a preliminary analysis for the risk of increases in peak flows was conducted using two methods as described in the Oregon Watershed Assessment Manual (OWEB, 1999), one for roads and another for forest openings.

For roads, the OWEB method uses a "threshold of concern" based upon percent of roaded area within a watershed. There are three threshold levels: low risk is less than 4%, moderate risk is 4-8%, and high risk is greater than 8%. Using the threshold levels and GIS data for the analysis area (shown below in Table 13), the current risk of peak flow enhancement from roads is low, with a average roaded area of 2.2 percent.

Table 13: Current Risk of Hydrologic Impacts due to Roads

Drainage	Drainage Area (mi^2)	*Road Length (mi)	*Roaded Area (mi^2)	Percent Roaded Area	Risk Level
MF of NF Trask	43.1	179.2	0.84	1.9	Low
N Upper Yamhill	30.1	158.1	0.74	2.5	Low
Turner Creek	15.4	93.0	0.44	2.8	Low
	89.6 Total	430.3 Total	2.0 Total	2.2 Ave.	Low

*Approximate values based on GIS data and an average road width of 25 feet.

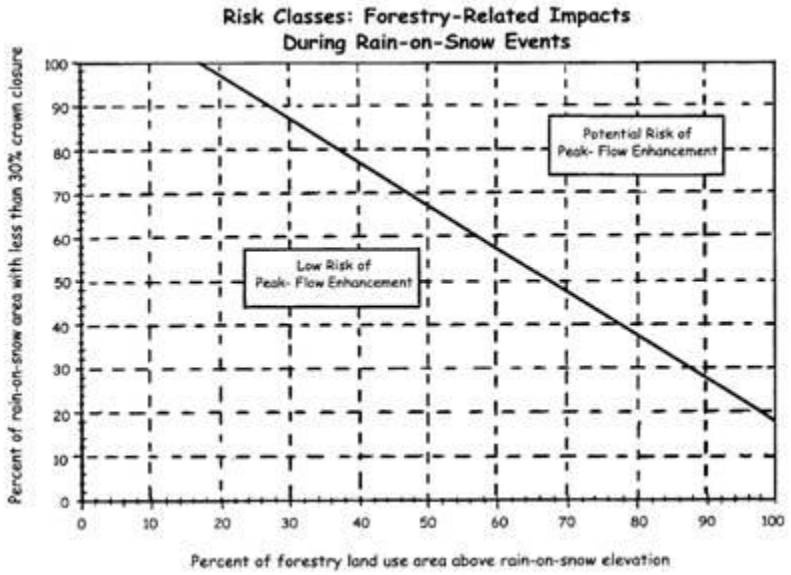
For analyzing forest openings impacts, the OWEB method uses a weighting system. The weighting system is the percent of forestry land in the ROS area and the percent of the ROS area with crown closure of less than 30%. As of 2009, the percent of ROS area with less than 35% crown closure is estimated to range from 0.5% to 2.0% (Table 14). This estimate is based upon a

review of 1993 and 2009 aerial photos. Using these crown closure estimates and the OWEB's analysis weighting system (Figure 10), there is currently a low risk for peak-flow enhancement due to forest openings.

Table 14: Risk of Peak Flow Enhancement by Subwatershed

Subwatershed Name and Acres	Crown Closure in ROS Areas	Watershed in ROS Areas	ROS area with <35% Current Crown Closure	Peak-Flow Enhancement Risk
M F of NF Trask 27,607 ac	50-70%	52.4%	2.0%	Low
N Upper Yamhill 19,294 ac	50-70%	20.6%	0.8%	Low
Turner Creek 9,856 ac	50-70%	1.5%	0.5%	Low

Figure 10: OWEB's Risk of Peak Flow Enhancement from Forestry Openings



Water Quality

The Oregon Department of Environmental Quality (ODEQ) establishes state water quality standards. These standards are designed to protect the most sensitive beneficial uses, namely municipal drinking water, cold-water fisheries and other cold aquatic life. Water quality parameters most likely to be affected by forest management activities within the analysis area are sedimentation, turbidity, and stream temperature. The ODEQ plans to submit to EPA for approval additional Total Maximum Daily Load (TMDL) for the Yamhill Basin, which would include most of the project area, by December 31, 2010.

Currently Turner Creek (RM 0 to 2.5) is on the Section 303(d) list for elevated water temperatures (ODEQ, 1998). This listing was based upon data collected by BLM on RM 1 and RM 4 in 1994 and 1995. Recent data collected in 2009 at RM 4 by BLM indicates that warm summer temperatures are still present. The source of elevated temperatures is unknown. Based on field observations and reviews of recent aerial photos, most streams on BLM lands appear to be near well shaded, near to full potential. Possible heating sources include the shallow municipal reservoir in section 5 and recent clearcutting on private lands.

In addition, Turner Creek (RM 4.0 to 7.3) is on the Draft 2010 Section 303(d) listing for turbidity. The listing is based on high turbidity data for years 1996 to 2009 reported by the City of Yamhill's water treatment facility (ODEQ, 2010). The data show shows an upward linear trend in turbidity with large spikes increasing from1997 to 2009.

The source for the increased turbidity has not been identified other than a landslide that occurred immediately above the water intake on private lands. It appears to come from a variety of natural and management-related sources, including erodible soils, earthflow terrain, and relatively high rainfall. There are approximately 85 acres on very steep (≥70%) mountain slopes (none of which are proposed for treatment) with mixed geologies above the water diversion. Several slumps have been observed on mature tree-covered hillslopes adjacent to Turner Creek, 1.75 to 2.25 miles upstream of the intake.

Roads are perceived to be a major source of fine sediment input especially where they cross streams or when they are used for winter timber haul. Private timber companies use many of the roads extensively throughout the year including during wet weather when water is flowing on roads and into ditches.

Active OHV use is occurring in some parts of the project area. Few OHV trails cross streams and they currently do not appear to be having a measureable, detrimental impact on water quality. To reduce the potential of sediment inputs to streams, decommissioned roads and existing OHV trails within sections 3, 5, 9 and the northeast portion of section 7 would be blocked where practicable to discourage OHV use.

3.2.2 Environmental Effects Alternative 1: No Action

Under this alternative, the current overall hydrologic and water quality conditions and processes described above in the affected environment section would likely continue at near current levels. Sediment would continue to be released from the two failing culverts, C15 and C16. The culverts would not be repaired, steadily increasing the risk of a catastrophic washout. If a catastrophic washout were to occur, several hundred yards of sediment would likely be sent downstream , resulting invery adverse effects to water quality and associated beneficial uses including public drinking water and fish.

Natural events and activities on private lands would continue to have effects on stream flow, stream temperatures, sediment loading, turbidity, and wood contribution to stream channels.

Stream Flow
The timing and magnitude of streamflow would be unchanged from the current condition. The existing forest canopy closure and road levels on BLM managed lands in the analysis area would be maintained. There would be no change in interception of precipitation, reduction in evaporation, or change in surface and subsurface water from soil compaction or extension of the stream network.

Channel Morphology
The channel condition trend on BLM land is expected to be maintained in the short-term and to gradually improve in the long-term. In the short-term, riparian stands would become denser. Slowly, at first and then increasing in about 40 years or so, larger trees would fall and be recruited into streams and capture sediment, organic matter, and bedload, and dissipate energy, increasing channel and habitat complexity.

The channel condition trend on private land is expected to be maintained in the short-term and long-term. Riparian stands along streams on private lands would continued to be dominated by small, young trees producing few large trees. Channels would continue to contain low levels of large wood and remain simplified.

Maintenance and repair of undersized and failing stream crossing culvers proposed under the proposed action would likely not occur. Undersized culverts would continue to alter channel morphologies, restrict passage of high flows, wood, and bedload and be at higher risk of failure.

Water Quality
Current overall hydrologic and water quality conditions and trends described in the affected environment above would continue. The riparian vegetation would continue to grow, slightly increasing streamside shade. However, the overall stream temperature would not change because the effective shade on streams on BLM land is near or at site capacity. Roads would continue to deliver fine sediment to stream channels, the magnitude depending on road conditions and the amount and season of traffic. The current low level of road maintenance by BLM would likely continue. The risk of culvert failures, including the C16 crossing upstream of water treatment facility, would increase in time.

3.2.3 Environmental Effects Alternative 2: The Proposed Action

Streamflow
For the following reasons, the proposed action is unlikely to result in a detectable effect on peak flows in any subwatershed in the analysis area, nor would it increase the annual water yield or base flow to such a degree that it would measurably affect channel morphologies or beneficial uses.

The proposed timber harvest would reduce forest cover, which could result in slight increases in annual water yields and base flows. The amount of increase, however, would likely be very small because the thinning would retain canopy closures of greater than 50% over the treatment

area. Trees would grow and quickly increase transpiration and soil-moisture intake rates. Slight increases in water yields and base flows are unlikely to have noticeable effects on channel morphologies or beneficial uses.

Currently there is a low risk from roads and forest openings. Most roads that would be utilized under this alternative already exist. There would be a temporary increase of 2.3 miles of roads from new construction. This would include 1.6 miles of rocked and 0.7 miles of natural surfaced roads. With one exception, all of the new and temporary roads would be built on ridgetops or gentle topography without direct stream drainage network connections. One new, probably 24" diameter, temporary culvert will be installed at a small 1st order headwater stream crossing. Several new cross-drains would be installed in the road surfaces thereby reducing the roads influence on hillslope hydrology. Upon project completion after road decommissioning, there would be an overall reduction 2.3 miles of road.

The proposed timber harvest would maintain an overall canopy closure of at least 50% in the treatment areas. Nearly all of the harvest units are located in a rain-dominated area that is less prone to peak flow increases. There is little evidence that partial harvest, where 50% of the basal area is retained, contributes to peak flow effects in rain-dominated watersheds (Ziemer, 1981a). Only about 50 acres of the proposed harvest area are within the TSZ. The affected subwatershed is well below the threshold for peak-flow enhancement (see peak flows in the affected environment above). Harvesting these acres would not substantially increase the forest openings in the affected subwatersheds. After thinning, the remaining vegetation would quickly use any newly available soil moisture (Troendle et al, 2006).

Channel Morphology

This proposed timber harvest is unlikely to affect stream channel stability and function. The proposed timber harvest units do not contain active mass wasting or potentially unstable soils. All streams in or within harvest units would be protected with at least a 60-foot no harvest buffer. In the cable yarding areas, full log suspension would be required across no-harvest buffers and stream channels. Only one cable corridor across a stream is anticipated.

Proposed road work in or adjacent to stream crossings, primarily culvert removals and installations, would result in minor channel alteration for one to several years. The proposed work at the crossings would cause little or no disturbance to channel morphology upstream or downstream from the crossings. Disturbance would be largely within the existing road prism. With one exception (culvert C16), stream channels at the crossings are stable. To prevent future problems, the fill on the downslope of the C16 crossing would be armored with riprap.

In the long-term, upgrading the undersized or poor condition culverts would improve the passage for high flows, wood, and bedload and reduce the potential for future culvert and road fill failures.

Water Quality

Stream Temperature

The stream temperature would not be affected because the proposed treatments would be a thinning and all streams within and adjacent to harvest units would have no-cut buffers on them. Treatments would retain at least 50% canopy closure within Riparian Reserves. Perennial and/or fish-bearing streams would have no-cut buffers of at least 100 feet. Riparian buffers of 100 feet or more have been reported to provide as much shade as undisturbed late successional/old-growth forests (Beschta et al., 1987). In a recent study in Maine, researchers found that streams in clearcut units with 75 foot (23 meters) partial-harvest treatment (60% canopy closure on each side of stream) riparian buffers showed no detectable changes in stream temperatures following harvest (Willerson et al, 2006).

Sediment and Turbidity

The primary means by which the proposed action could contribute to increase sediment loads and turbidity in local streams are timber yarding, road work, timber hauling, and mass wasting. Project design features, as described previously in Section 2.4.2, would be implemented to eliminate or minimize sediment production and delivery to stream channels from the proposed project activities.

Timber Yarding: The proposed timber yarding is not expected to measurably increase sedimentation. Hillslopes in harvest units are dominated by gentle to moderate slopes. All areas with potential for slope instability and mass wasting were identified during field work and were removed from the project. All yarding (ground-based and cable) would occur during the dry season. Cable yarding would require full log suspension across no-harvest buffers and stream channels, and only one stream crossing corridor is anticipated. Most sediment produced from logging would travel a short distance before being trapped by duff, woody materials or other obstructions. A recent Washington State study (Rashin et al, 2006) evaluating timber harvest best management practices found that a 10-meter (~33 feet) wide, no ground disturbance buffer along streams prevented 95% of harvest related sediment from being delivered to streams. The proposed action would use no-harvest buffers nearly double to triple that width.

Road Work and Hauling:

All roadwork would utilize applicable PDFs/BMPs as required by the Clean Water Act to minimize the risk of sediment delivery to streams. For example, all new construction, renovation, and improvement activities would occur during the dry season when surface runoff is not likely and there is very little water flowing in channels. All work in live streams (e.g., culvert replacement) would be done during the ODFW in-stream work window, July 15 to September 30. (See *section 2.2* for Planning and Implementation Process. For additional PDFs see *section 2.4.2* associated with road work and hauling under Water, Fisheries and Soil Resources, Road, Skid Trail and Landing Construction, Reconstruction and Decommissioning, and seasonal restrictions in Table 7.) Prior to hauling, portions of the proposed roads will be repaired and upgraded, including drainage structures and running surfaces.

New Road Construction
It is anticipated that approximately 0.7 miles of new natural-surface and 1.6 mile new rocked surface road would be constructed. Roads would be built on stable ridgetops and gentle benches generally far away (more than 200 feet) from streams. One gentle gradient road would cross over a small, non-fish bearing headwater stream to access part of treatment unit 17-10.

This action would have a negligible effect on sediment delivery to streams. There would be a flush of sediment from newly constructed spur roads during the first wet-season following construction. The amount of sediment generated would be small and difficult to measure because roads would be located on gentle and moderate slopes and erosion control measures would be applied. Concentrated drainage would be directed away from potentially unstable, downhill slopes. Sediment produced by these activities would be filtered out by the forest floor and collected in roadside ditches. With one exception, all of the proposed roads are located away from streams. Therefore, there would be no opportunity for these roads to deliver sediment to streams.
Installing and removing a culvert in treatment unit 17-10 would result in some sediment delivery. Moreover, there may be some short-term (less than a few hours) increase in turbidity visible up to a few hundred feet downstream for up to a couple of hours. The amount of sediment would be small (< 0.25 cubic yard) because the installation and removal would be shallow and be done in the summer when there would be very little or no flowing water. Most downstream sediment movement would occur during subsequent winter freshets and probably travel a short distance (less than 150 feet) due to the small stream's gentle gradient and low flow.

Road Renovation, Improvement, Maintenance, and Decommissioning
It is anticipated that approximately 9.6 miles of existing roads would be renovated, approximately 0.7 miles of existing roads would be improved, and approximately 3.7 miles would be maintained. Approximately 0.7 miles of new natural surfaced roads, approximately 2.9 miles of renovated roads, and approximately 1.0 miles existing roads would be decommissioned. Also included would be replacing approximately 16 live stream culverts and installing several new cross drains.

Roadwork in or near streams would disturb soil and stream channels and cause short-term increases in sediment delivery to local streams. Stream crossing work would occur during minimal flow conditions. Most of the increases in sediment inputs would occur during culvert removal and/or replacement activities. It is estimated that the sediment inputs would range from less than 0.25 yd^3 up to 2.0 yd^3 for each installation or removal. Approximately 90 percent of the sediment load would be carried a short distance and be redistributed downstream (less than 300 hundred feet). Sediment loads would unlikely be measureable below mile downstream This added sediment would remain stored in the local channels until the next major debris flow event or move progressively downstream during periodic higher storm flows. Sediment delivery from culvert removal and/or replacement would be small compared to that from culverts plugging and failing.

Roadwork in or near streams would disturb soils and stream channels and cause short-term increases in sediment delivery and turbidity to local streams. Implementation of PDFs and

BMPs would minimize soil erosion and subsequent stream sedimentation. Most of the increases in sediment inputs would occur during culvert removal and/or replacement activities and during the first winter storms after the stream crossing work ceased. It is estimated that the sediment inputs would be less than 1 yd^3 for most of the crossings and up to 2.0 yd^3 for a few larger order and deeper fill crossings. Approximately 90 percent of the sediment load would be carried a short distance and be redistributed downstream (less than 300 hundred feet). Sediment loads would unlikely be measureable below 1/8 mile downstream. This added sediment would remain stored in the local channels until the next major debris flow event or move progressively downstream during periodic higher storm flows. Sediment delivery from culvert removal and/or replacement would be small compared to that from culverts plugging and failing.

During stream crossing work, increased turbidity would likely be visible or measureable at the site or a short distance (less than 300 hundred feet) downstream for a short time period (few hours). Turbidity would return to near pre-culvert removal/replacement levels within about 24 hours after culvert stream crossing work ceased.

Within one or two years after project activities are completed, sediment loading from the road surface would return to pre-project levels. Any sediment delivery increases would be difficult to measure and would be unlikely to contribute more than a small fraction to the supply or transport of fine sediment in the affected subwatersheds. In the long-term, drainage improvements would likely improve water quality over existing conditions.

Timber Hauling

The main haul routes would be on rocked forest roads to paved county roads (Figure 9). Two haul routes are planned for the project, one to be used during the dry season (generally June 1 through October 15) and the other for year around use.

There are approximately 7.7 miles of gravel surface or natural surface road that would be used for dry season hauling. Prior to hauling the road surfaces and road drainages would be further improved. An additional lift of rock would likely be placed on the lower Turner Creek Road where the road closely parallels Turner Creek (approximately 1 mile in length). Most are rocked roads on the haul route but there some natural-surfaced spurs. The route crosses approximately 22 streams and passes near the City of Yamhill water treatment facility. All of the streams crossings, with one exception, are small, non-fish bearing, mostly intermittent, headwater streams. The largest crossing is on a 3rd order fish-bearing reach of Turner Creek that is planned for replacement because it is undersized and a fish barrier (C1, Figure 4). Dry season hauling would have a negligible potential to create or deliver road-derived sediment to live stream channels because there would be no flowing water on road surfaces and ditchlines to transport sediment to streams. Most fine sediment that washes off roads would be trapped and stored in the ditches or on the forest floor below the roads. Increases in turbidity to local streams are unlikely. Hauling during very dry conditions in late summer/early fall will likely result in airborne dust. Some of the dust from hauling may be deposited into sediment basins at the City of Yamhill water treatment facility (roughly 50 to 100 away from the road), potentially resulting in small, short-term increases in turbidity. With the large amount of private haul presently on

this road, additional increases would likely be difficult to distinguish from present levels that occur during such dry haul conditions.

The year around timber haul route would consist of approximately 11.3 miles of rocked roads crossing approximately 16 streams. Again, with two exceptions, all of the streams crossings are small, non-fish bearing, mostly intermittent, headwater streams. The exceptions include a crossing on a 3rd order, fish bearing reach of Cedar Creek (C11, Figure 7) with the Cedar Creek road (2-5-19) and a crossing on a large 2nd order fish bearing reach of Wildwood Creek with the Wildwood road (2-5-21.4).

Wet season hauling will likely add some additional sediment into ditches and, in some instances, into streams, but the effects would be difficult to distinguish from existing background conditions and should not affect beneficial uses. Any changes in turbidity or sedimentation would quickly return to near background levels after hauling operations are completed.

With the implementation of PDFs, most of the timber hauling generated sediment would be trapped and deposited in hillslopes below the roads and roadside ditches and would not reach streams. Any increases in turbidity are unlikely to exceed the State of Oregon Water turbidity standards (> 10 percent increase relative to background levels). Nearly all of the very fine sediment reaching streams would be in small, non-fish bearing headwater streams. No sediment would be expected to be delivered to the larger, fish-bearing streams at the two crossings due to the gentle road gradients, topography and configuration of the crossings.

Mass Wasting
The proposed activity areas do not contain active mass wasting or potentially unstable soils. The proposed forest management activities may slightly increase the short-term (≤10 years) risk of landsliding, primarily from logging on 11 acres of steep slopes (See Slope Stability analysis in Section 3.5.) The proposed action is not expected to change the current rate, size, or number of mass wasting events within the project area. In the unlikely event that a landslide would occur, it would likely be small (< 0.1 acre), travel a short distance and not reach any streams.

Cumulative Effects
The proposed project is unlikely to have any measurable direct or indirect effect on peak flows, channel morphology, and stream temperatures. Current conditions and trends for these attributes would likely be maintained under the proposed action. Therefore, the Proposed Action for these projects have little potential for contributing to any cumulative effects to these hydrology and water quality attributes in the analysis area.

Sediment and Turbidity
The proposed action, primarily road work at stream crossings and timber hauling during wet weather conditions, would likely result in some short-term (during action and up to 2 years following), increases in sediment loads and turbidity. The action would contribute cumulatively to the sediment coming from natural sources (e.g., landslides) and managed activities (e.g., logging and road activities on private lands). However, the amount would be relatively very

small, short in duration, and would likely not be detectable relative to the overall sediment supply in the affected watersheds or be a risk to beneficial uses of the water.

Over the long-term, the proposed action would have a beneficial cumulative effect of improving road surfaces and road drainages thereby reducing future sediment inputs.

3.3 Threatened or Endangered Fish Species or Habitat, Magnuson Stevens Act – Essential Fish Habitat and Species with Bureau Status.

3.3.1 Affected Environment

The fisheries analysis area for the Turner Creek project consists of the Upper North Yamhill River and Turner Creek subwatersheds and a small portion in the headwaters of the Trask Watershed from the dam that creates Barney Reservoir upstream. Within this analysis area, the BLM manages 2980 acres, 940 acres of which are proposed for treatment under this density management project. See *section 3.2.1* for additional description of the affected environment.

Fish Species Distribution and Status
Figure 9 shows the distribution of Endangered Species Act (ESA) listed fish in the proximity of planned actions. There are three species of anadromous fish in the Yamhill River that have status; Upper Willamette steelhead trout (*Oncorhynchus mykiss*), Upper Willamette chinook salmon (*O. tshawytscha),* and coho salmon (*O. kisutch*). Of these species, Upper Willamette steelhead are currently listed under the ESA as threatened, and its distribution is adjacent to several of the planned projects. Also ESA listed, Upper Willamette chinook salmon are known to be present in the Yamhill River approximately 13 miles downstream from the project area. Coho salmon listed under the Magnuson Stevens Act have a smaller distribution than Upper Willamette Steelhead. Coho are not known to be present in either Cedar Creek or Fairchild Creek, and as such, are not adjacent to any of the planned thinning actions. There is no ESA critical habitat for Upper Willamette steelhead or chinook in the North Yamhill River (Streamnet Critical Habitat Map 2003).

In the Trask Watershed there are two species with status, Oregon Coast coho salmon (*O. kisutch*), ESA Threatened, and Oregon Coast steelhead trout (*Oncorhynchus mykiss*), a Bureau Sensitive species located at the outer edge of the analysis area. The definitive end of anadromous fish distribution in the Trask Watershed is at Barney Reservoir; critical habitat also ends at this point for Oregon Coast coho. All planned activities are above the dam that has created Barney Reservoir, which does not provide fish passage. The distance from the project areas to anadromous fish in the Trask Watershed is approximately 3.8 miles. From the reservoir upstream there are an extensive series of wetlands and beaver ponds. Actions in the Trask Watershed are limited to dry season thinning harvest of 28 acres and dry season haul.

Upper Willamette steelhead are known to migrate and spawn in the North Yamhill River and Fairchild Creek and use or are suspected to use tributaries to the North Yamhill such as Turner

and Cedar Creek (Weavers- ODFW 1992). There is limited historical data available on fish habitat and distribution in the Yamhill watershed.

The distance from each individual treatment unit to Upper Willamette steelhead is summarized in Table 15.

Table 15: Distance from Treatment Areas to listed fish/habitat (at closest point)

Unit	Stream	Distance to Listed Fish/Habitat (miles) Upper Willamette Steelhead or *OC coho
3-3	Turner Creek	0.83
5-1	Turner Creek	2.13
5-5	Turner Creek	2.39
5-17	Turner Creek	2.43
7-2	Upper Trask	3.8*
7-2	Cedar Creek	3.15
7-2	Fairchild Creek	1.35
7-2	Turner Creek	3.0
9-17	Turner Creek	0.47
17-44	Turner Creek	2.35
17-44	Cedar Creek	1.31
17-10	Turner Creek	2.54
17-4	Cedar Creek	2.0
17-9	Cedar Creek	1.63
21-41	Cedar Creek	0.13
21-42	Cedar Creek	0.30
21-42	Turner Creek	1.68
29-1	Cedar Creek	0.02

When the Magnuson-Stevens Act (MSA) of 1976 was re-authorized in 1996, it directed Regional Fishery Management Councils to identify Essential Fish Habitat (EFH) for commercial fish species of concern. Effects analyses contained here address potential effects to EFH (i.e., effects to coho salmon habitat). Essential Fish Habitat is defined as 'those waters and substrates necessary to fish for spawning, breeding, feeding, or growth to maturity (16 U.S.C. 1802(10))'.

Existing Habitat Conditions

It can be assumed that prior to extensive timber harvest, log drives, road construction, and settlement, fish habitat was in better condition than it is today. Better habitat was most likely associated with large woody material entering the stream channels creating complex habitat and

pools desirable for fish production and survival. Fish passage was not affected by dams, culverts or water diversions and water quality was generally better except following major forest stand replacement events such as fire.

Steelhead, coho salmon, and cutthroat trout vary in their seasonal habitat utilization but all require structurally diverse channels for the maintenance of healthy populations. In general, coho salmon occupy middle stream reaches while cutthroat and steelhead trout occupy upper reaches. During high flow periods associated with winter and spring, juvenile coho salmon, steelhead and cutthroat trout depend on the low velocity habitats provided by pools, backwaters, and off-channel alcoves. Adult salmon and trout also use pools and wood structure for shelter from predators and for resting. During low flow periods, zero to one year old steelhead and cutthroat trout inhabit higher velocity areas associated with riffles, while coho salmon continue to use pools. Two year and older steelhead and cutthroat trout generally prefer the deepest pool habitat. In Coast Range streams, large wood pieces and accumulations play a vital role in maintaining channel complexity and fish populations. Large woody debris creates scour, recruits and maintains spawning gravel, creates rearing pools, and increases channel complexity.

Data for the North Yamhill River and its tributaries is derived from the January 1997 North Yamhill Watershed Analysis and aquatic habitat inventories completed by ODFW in 1993 and 2000.

Data for the North Yamhill River comes from surveys conducted by the ODFW Aquatic Habitat Inventory project (ODFW 1993). The habitat survey for the North Yamhill began at the confluence with the North Yamhill and Turner Creek and continued upstream 20,318 meters ending at the headwaters. Three reaches were designated based on channel morphology, change in valley width index, and tributary junctions. Land use varies from agricultural to timber with a mixture of young and mature trees, timber harvest and second growth timber. The data indicate that reach channels are terrace-constrained and within a broad valley floor. Silt and organic fines are in low proportion to the other substrates such as gravel, cobble, and boulders. Rapids, riffles, scour pools, and glides are the dominant habitat types. Large wood volume is low in the lower reaches and moderate in the upper reaches. Remnants of a splash dam were noted in the survey. For a more detailed description of the individual reaches, see '1993 AQI habitat' (Project Record Document # 9).

The data for Fairchild Creek (ODFW 2000) is more indicative of streams near BLM managed lands; the land use is almost exclusively forest and forest management. Desirable features noted in the survey of this stream used for spawning and rearing by Upper Willamette steelhead include high values for shade and wood volume, and a low incidence of bank erosion in the lower reaches. The main undesirable feature in this stream is the percentage of fines in riffles. All seven reaches inventoried show abundant fines generally increasing going upstream. The source of these fines may well be from a debris torrent that is thought to have occurred in 1996. For a more detailed description of the individual reaches, see '2000 AQI habitat' (Project Record Document # 8).

Turner Creek has not been surveyed using the ODFW methodology, however field visits by the BLM hydrologist and fisheries biologist have observed a high proportion of fine sediments and evidence of slumps and slides in portions of Turner Creek on BLM managed land. During a recent visit with moderate rainfall, high turbidity was noted in Turner Creek and several of its tributary streams in areas without recent management actions on BLM managed lands. There appears to be quite a bit of "natural" source areas for sediments in this watershed, in addition to sources from management activities.

Additional discussion of these stream channels, potential sources of fine sediments, peak flow analysis and water quality is provided in the hydrology portion of this EA in *section 3.2.1*.

3.3.2 Environmental Effects Alternative 1: No Action

None of the forest management activities described in the proposed action would occur at this time and the identified effects of the proposed action alternative would not occur. The stands proposed for treatment would continue on a slow trajectory toward late-seral habitat. Inputs of LWD to stream channels would continue at the current rate influenced by natural disturbances such as landslides, debris flows and natural tree mortality and competition. By comparing Table 8 to Table 9 there are only two units that will achieve a QMD >24 inches over the next 25 years. Inputs of small woody debris would continue along the current trend, see Table 11 that provides estimated tree mortality and QMD for the next 25 years. There would be no new roads or landings built or additional ground disturbance from forest management activities at this time. Water quality, sediment input, stream channel integrity/geometry would all continue to be influenced by the existing conditions in the watershed and future natural disturbances such as floods. Most of the source of fine sediment in the Turner Creek project area will continue to come from deep-seated, slow moving mass movement (soil creep and rotational slumping) and ongoing timber haul from private lands in the wettest portions of the year. An additional source of sediment in the Turner Creek watershed is culverts C15 and C16 (Figure 6). These culverts have a high potential of failure and the potential to release hundreds of yards of sediment. If these culverts fail, adverse impacts to Upper Willamette steelhead or their habitat is anticipated.

<u>Cumulative Effects</u>
The no action alternative is likely to result in sediment and turbidity conditions that would affect the same reach of Turner Creek near the water intake for the city of Yamhill. If the either one of these culverts fail within a year or two of the proposed dam removal and change in water intake the effects would be cumulative. . This may result in localized adverse effects to individual Upper Willamette Steelhead and their habitat if the current road/stream crossings (C15 and C16) are left in their current condition.

The city of Yamhill is planning to move its water supply intake on Turner Creek downstream from its current location in section 9. This project is anticipated to have short term impacts to listed fish and their habitat. Removal of the current dam and accumulated stream gravels, with their placement downstream will have short term impacts to listed fish and their habitat (Project Record Document #10).

3.3.3 Environmental Effects Alternative 2: The Proposed Action

The discussion below is intended to disclose any environmental impacts, both positive and negative, to Upper Willamette steelhead and their habitat directly, indirectly or cumulatively, resulting from the Turner Creek Projects.

The most likely sources of negative impacts to Upper Willamette steelhead come from road construction and culvert work required to access the proposed treatment units, timber harvest and hauling, and road decommissioning after the proposed treatments are finished. Effects are addressed by proposed project actions below.

In the Trask Watershed there are no anticipated impacts to Oregon Coast coho, Oregon Coast steelhead or their habitat. All design features and BMPs would apply to the small amount of area treated (28 acres of thinning of which only 4.4 acres are in Riparian Reserve adjacent to an intermittent stream). There are no culvert replacements. The 3.8 miles of reservoir and low gradient habitat with beaver ponds between this treatment and these fish would also preclude any effects.

Timber Yarding
The majority of harvest planned in this project will occur in the dry season (typically June 1 – October 15). All harvest in ground based units and cable units accessed by the Turner Creek haul route are dry season.

As discussed in the hydrology analysis (*section 3.2.3*), timber yarding is unlikely to increase sediment delivery to streams. There is one unit (29-49) located adjacent to (within 100 feet) of waters occupied by Upper Willamette steelhead. This thinning unit would be cable yarded but there are no anticipated yarding corridors over this stream.

Any sediment that enters streams from yarding as a result of timber harvest is expected to have an un-measurable and insignificant effect to beneficial uses including listed fish for the following reasons; 1) Hillslopes in harvest units are stable with little potential for mass wasting (see soils *section 3.5.1*); 2) Skid trails and ground-based yarding equipment would be allowed within the Riparian Reserves outside of no harvest buffers only on authorized skid trails or existing roads; 3) No-harvest buffers (min. 60 feet for non-fish bearing intermittent streams and min. 100 feet for perennial and fish bearing streams) would be placed along both sides of streams; 4) Yarding is not expected to cross any streams, with the possible exception of a portion of one unit located in section 17; 5) Most sediment produced from logging would travel a short distance before being trapped by duff, woody materials or other obstructions.

Areas within the harvest units having slopes greater than 70% are generally 1 acre or less in size and are widely scattered. Most of these areas are located inside the unit boundaries with gentler slopes surrounding them which would trap any minor sediment disturbed when the log is initially lifted into the air. There are a couple of slopes greater than 70% located along unit boundaries. In unit 17 there is approximately 1 acre of steep slopes proposed for harvest along the unit

boundary; full suspension would be required in this area. With the implementation of the project design features (*section 2.4.2*), distance from harvest units to Upper Willamette steelhead (including steep slopes), generally small stream sizes near units, and topographic features preventing sediment routing directly to stream channels, there are no likely impacts to UW steelhead as a result of implementing timber yarding.

Road Construction, Renovation, and Decommissioning

As discussed in the Hydrology analysis (*section 3.2.1*), road construction, renovation and decommissioning activities may contribute small amounts of sediments (0.25 to 2 cu yard each) most likely following culvert replacements or removals. The road construction and renovation may contribute sediment to local streams but BMPs implemented during construction and project design features (*section 2.4.2*) would keep the volume of sediment entering local waterways at levels that would have an immeasurable effect on ESA listed fish for the reasons described below.

There are a total of 17 culverts associated with this project with the closest culvert being approximately 0.5 miles to Upper Willamette steelhead. There would be no measurable impacts to Upper Willamette steelhead or habitat from these culvert replacements due to distance from listed species, small stream size for most of the culverts, and small amounts of anticipated sediment released as a result of this action. Most of the sediment generated would move through the stream system during periods of high flows when normal sediment background levels are high. As discussed in the environmental effects for hydrology (*section 3.2.3*) of the EA, turbidity generated during culvert replacements is anticipated to move no more than one- eighth mile at the time of replacement. The following winter when those sediments start moving, visible turbidity should be visible for no more than 50 feet.

Of the new roads to be constructed, there are two new culverts that will be installed and removed after use, a crossing over a small seep (road P-4 culvert C6) and a crossing over a small tributary (road P-6 culvert C9). These streams are small intermittent 1st order channels and would be dry or nearly dry when the roads are constructed. There are two culvert/stream crossings (road P-8 culverts C7 and C8) that would be placed and then removed after harvest and haul. There are two culverts that are currently considered impassable for fish within the project area (C1 and C11). Cutthroat trout are the fish species at these culverts with Upper Willamette steelhead located downstream approximately 2 miles from both culverts. These culverts would be replaced as funding allows, providing fish passage, and would likely occur later in time than the other culvert actions.

Due to the distance of culvert removals associated with road decommissioning to listed Upper Willamette steelhead, the small magnitude of the sediment releases, the generally small stream size associated with culvert removals, and the spatial and temporal distribution of the culvert removals throughout the project area, there are no anticipated measurable impacts to Upper Willamette steelhead. Indirect long term benefits of the road decommissioning to listed fish would be a more stable road system that would no longer contribute sediment to streams. The Turner Creek project is expected to decrease road density in the watershed by 3.9 miles.

Timber Hauling
As discussed in the Hydrology analysis (section 3.2.3), hauling timber is unlikely to contribute any measurable, quantifiable sediments to streams due to haul being restricted to dry season only in the Turner Creek haul area. The haul route off the Belt Road system accessing the cable harvest units in sections 7, 9 and 17 will be available for year-around haul. Analysis of this route determined that the use of BMPs included in design features (*section 2.4.2*), good road conditions will reduce sediment inputs to immeasurable quantities. The distance to listed fish downstream further reduces the chance of impacts to these fish. Spot rocking and required road rocking to support winter haul would reduce the potential of sediment generation.

Stream Temperature
As discussed in the hydrology analysis (*section 3.2.3*), actions associated with the proposed action would maintain the current stream canopy closures and would not have any effect on stream temperatures and as such, there is no causal mechanism to affect fish or their habitat.

Physical Integrity
With the exception of some small areas in road drainage crossings in the project area, the proposed action would not directly alter any stream channels. All ground equipment, with the exception of some road drainage crossings, would be kept away from stream channels and wetlands. There is currently only one potential location with cable corridors over streams, however if corridors are needed, full log suspension within the no harvest buffer is required (60 to 100 feet) (Refer to *Section 2.4.2 Project Design Features*).

Culvert work at stream crossings would disturb stream channel beds and stream banks which would result in minor, short-term (1 to 2 years) channel adjustments. Nearly all affected streams are small (mostly < 5-feet bank full width) and most are intermittent or nearly intermittent headwaters. As discussed in the hydrology analysis (*section 3.2.3*) and in the project design features (*section 2.4.2*), the magnitude of anticipated sediment generated from culvert removal/replacement would be immeasurable and insignificant where Upper Willamette steelhead are located. In the long-term (greater than 3 years), this action would have a beneficial effect by reducing the risk of future road failure and improve stream channel form and function by resizing replaced culverts to accommodate 100-year flood events .

Large Woody Debris
Approximately 27% of the proposed density management area (approximately 252 acres) would occur within Riparian Reserves. These Riparian Reserve treatments would occur outside "no-harvest" buffers that would be placed along streams. Harvesting trees within the Riparian Reserve and outside the no harvest buffers would directly remove a potential source of small wood to stream channels. The use of 60 or 100-foot no harvest buffers precludes most of the potential loss of this wood however, as seen in table 11 the QMD of the trees destined to die from suppression over the next 25 years average 13.5 inches. These trees are almost certainly shorter than the average height in the stands. . This small wood is recognized to be an important element in both sediment routing and nutrient cycling processes for the aquatic system. By comparing tables 8, and 12 there are 9 of the 13 units that will have QMD > 24 inches after 25

years. In the event of natural disturbances the proposed action is more likely to deliver LWD than the no action alterative.

The Curtis RD following treatment in the riparian reserve first site potential tree height (220') would be maintained at 30 or higher. A Curtis RD of greater than or equal to 30 following timber harvest has been accepted by NMFS as having no measurable effect to large woody debris recruitment when used in combination with no harvest buffers. Although the thinning of riparian reserves removes some potential small diameter wood available for future stream recruitment, small diameter wood does not last as long and is more readily moved out of the system than large diameter wood. Thinning is expected to accelerate the growth rate of the trees that remain in the Riparian Reserves and increase the quality and volume of large woody debris naturally recruited to the stream channel, improving beneficial uses in the future. Beneficial uses include fish habitat and this project would improve on the current condition of LWD inputs where ESA listed species are found. The benefit of this growth will be very minor however as approximately 90% of the streams in the project area are small (<5 feet bank full width), two thirds have low gradient (~10%) and 75% of the perennial streams lack the power to move wood (see hydrology *section 3.2.1*).

Road Density
As described in the proposed action (connected actions *section 2.4.1*) there would be a net decrease in road mileage of 3.9 miles as a result of this project. Decreases in road density are considered beneficial to watershed function, however this benefit is difficult to quantify as it relates to habitats or fish that are not in close proximity. Any effect would be immeasurable with no anticipated or measurable changes, either beneficial or adverse where any of the fish with status are reached.

Streamflow
As discussed in the hydrology section of this analysis (*section 3.2.3*), the proposed action is unlikely to measurably change stream flows at the project area or affected sub-watershed scale and as such there is no causal mechanism to affect fish.

Additional analysis for fish passage and forage species, located below is to support the Magnuson Stevens Act- Essential Fish Habitat affect calls.

Fish Passage
The Turner Creek Project would have no effect on fish passage for MSA species. This project neither creates nor improves fish passage culverts for MSA species and as such has no effect on EFH or MSA species. The two culverts that are currently fish barriers and proposed for replacement in this proposed action would benefit a non-status species (cutthroat trout).

Forage Species
Juvenile coho forage primarily on insects that fall into streams from adjacent riparian vegetation and drifting aquatic insects in the water column. Most of the riparian areas within the project area have mixed stands of hardwoods and conifers with a dense shrub understory. A recently completed study on the impacts of streamside shrubs and trees found that forage species were

greater in areas with abundant streamside shrubs and trees (Romero, Gresswell, and Li 2005). Substrate in stream channels is a mix of gravels, cobbles and boulders that provide good quality habitat for macro-invertebrates. Limited sediment inputs associated with culvert removal and design features such as 60 to 100-foot no harvest buffers would avoid adverse affects on existing in-stream woody material levels or recruitment rates to area streams. Treatment of riparian stands where EFH is reached would have no effect on forage species in EFH areas where MSA species are found.

Conclusions for MSA-EFH and Bureau Status Species

The environmental effects resulting from implementing the proposed action alternative are highly unlikely to have any effect on EFH or species with Bureau Status. Potential long term beneficial effects could include larger sized LWD entering the stream network sooner as a result of increased growth rates of trees in the treated units. Based on the incorporated design features, proximity of project actions to MSA fish species and their habitat, and seasonal restrictions, it is unlikely that the proposed action would have any measurable negative effect on EFH. Effects to EFH resulting from implementing the project as proposed are expected to be discountable and not measureable. Therefore, the effect call is *May Affect, Not Likely to Adversely Affect.* The standard for Bureau Sensitive species is whether the action would contribute to the need to list the fish species under the Endangered Species Act. This action will not contribute to the need to list Oregon Coast steelhead, currently a Bureau Sensitive species.

Cumulative Effects

The proposed action is expected to result in small but immeasurable changes to water quality at a site scale with no measurable impacts to T & E species or habitat due to the distance downstream. The proposed action when combined with other actions (cumulative effect) occurring on private forest lands in the watershed would be unlikely to have any detectable negative impacts on any designated beneficial uses, including fish in the short term (1-3 years). Any effects to these attributes as a result of the Proposed Action would be within the range of effects disclosed in the RMP/FEIS (pp. 4-14 to 4-19). Most of the sediment generated as a result of the proposed action will be stored in small non-fish bearing stream channels during the dry season. The long term (3+ years) cumulative impacts associated with the removal of 3.9 miles of roads, improved road/stream crossings, road maintenance activities, and increased growth and vigor of trees in the riparian zone (future LWD areas) associated with the proposed project would result in minor improvement of the indicators listed above for ESA , MSA (EFH) or Bureau Sensitive species.

3.4 Soils

The Area soil scientist field reviewed the project area in summer and fall 2010. Data sources in this analysis include BLM GIS, aerial photos (1962 to 2009), and the Yamhill County Soil Survey (USDA, NCSS 1974) and Washington and County Soil Survey (USDA, NCSS 1982).

There two primary soil resource concerns:

1) How would the proposed project through soil disturbance affect soil productivity?

2) How would the proposed project through vegetative removal and ground disturbance affect slope stability?

The analysis area for soil productivity encompasses all of the proposed activity area (i.e., timber harvest units, new roadwork, and fuel treatment areas. This scale is selected because all potential changes to soil productivity would be local to the site would not have measurable off-site impacts. The analysis area for slope stability is the proposed activity area. Potential effects on areas beyond the proposed activities are analyzed in the in Section 2.2.3.

3.4.1 Affected Environment

Soil Types

The dominant soils within the proposed activity area are the Olyic, Jory, Laurelwood, and Melby series. They are derived mainly from material weathered from basalt and sandstone rocks. In the proposed unit 3-3 and the eastern portion of unit 9-17 the soil (Laurelwood) is derived from silty, loess-like material. Soils are generally 40 inches thick or greater, are moderate to moderately slowly permeable with high organic matter contents and moderately low bulk density. The surface is primarily silt loam. Clay contents usually increase with depth, with silty clay loam and silty clay textures predominating. Rock fragment contents in the surface and upper soil horizons average less than 20% by volume. Also present are some small areas of somewhat poorly drained soils in depressions and along streams and very gravelly and very cobbly soils less than 40 inches deep on dissected steeper slopes and narrow ridgetops.

Project soils are prone to compaction, rutting and churning from equipment traffic particularly when moist or saturated. Once deeply compacted or rutted, they require a long time to recover. The hazard of erosion on these fine textured soils is severe where vegetation cover has been removed and soil infiltration rates have been reduced by compaction.

Existing Conditions

Roads are necessary to support logging operations in a managed forest but they strongly alter soil physical properties and remove land that was formerly productive. Roads on managed forest are estimated to range from 1 to 30 percent of the landscape. In the West, it is estimated that skid roads and landings occupy on average about 10% of the area in ground-based harvest systems and 2% of the skyline operations (Gucinski et al, 2001, Megahan, 1988a, and Megahan, 1988b).

Currently roads occupy about 1.9 to 2.8 percent of the three affected subwatersheds (Table 13). Based upon soil scientist field observations and a review of aerial photos, about 3% to 7% of the soils within the proposed ground-based units and up to 2% of the proposed skyline harvest units have heavy compaction, rutting and topsoil displacement. Most these disturbances are in primary skid trails, access roads and landings.

Active OHV use is occurring in several parts of the project area. There are roughly 4 miles of known OHV trails, mostly older roads and primary skid trails, on BLM lands within or adjacent to proposed harvest units. Their use does not appear to be having measureable effect on soil

productivity. The project would block existing OHV trails within sections 3, 5, 9 and the northeast portion of section 7.

Soil Productivity

Project soils have high to moderately high potential for growing timber. The most productive soils are Olyic, Laurelwood, and Melby with a site index ranging from 157 to 161 on Douglas fir, 50-year basis. The average number of cubic feet the forest can produce is about 144 per acre per year. Jory soil has a site index of 155.

Soil moisture availability can affect forest soil productivity. Most project soils have an udic moisture regime, which means they usually have sufficient stored moisture plus rain in distributed in the summer so that the amount of stored moisture plus rainfall to equal to or exceed the amount of evapotranspiration. The Jory soil occurs on lower elevations on warmer and drier sites. It has a xeric moisture regime. At times, conifer trees growing on these soils may not have sufficient moisture during the summer months for optimal growth.

Existing Soil Conditions

Currently, on average about 3% to 7% of the soils within the proposed ground-based and approximately up to 2% of the skyline proposed harvest units show heavy compaction, rutting and topsoil displacement. This is based upon soil scientist field observations and review of aerial photos. Most these disturbances are confined to primary skid trails, access roads and landings.

Slope Stability and TPCC

All high risk unstable slopes were removed from the proposed harvest units and new road locations.

Approximately 80% of the proposed timber units are located on gentle to moderately sloping (<60% slope) hummocky irregular and benchy terrain. Small parts within this area are seasonably wet. There is some minor soil creep and slumping associated with windthrow. The terrain was shaped by large, ancient slumps and deep-seated landsliding including earthflows probably induced by large magnitude earthquakes. The primary way forest management practices could reactivate this surface is by increasing the weight on its top slope, removing support on its bottom slope, or altering its natural drainage. Logging is not likely to trigger a landslide because the sliding surface on these slopes is below the maximum rooting depth of trees. The current risk of landslides on this surface is very low.

The remaining 20% of proposed harvest ground is on steep (60 to 75%) mountain and hill slopes. The dominant mass movement process on these surfaces is rapid moving, shallow translational landslides (e.g., debris slides and debris torrents). All areas showing recent movement or showing potential instability were removed from the proposed timber. The current risk of landslides on this surface is mainly low but includes about 11 acres of low to moderate risk located in harvest units 29-49 and 17-44 (See FGR1 below in Table 16).

BLM uses a land classification system, called the Timber Production Capability Classification (TPCC), to identify the land base suitable or unsuitable for harvest. During project planning, the Area's soil scientist verified and remapped TPCC units in the planning area.

There are no "fragile-nonsuitable" sites within proposed harvest units or new road locations. Fragile-nonsuitable are areas where future forest products would likely be reduced even if special harvest and/or restrictive measures were applied. During project planning, approximately 88 acres of fragile-nonsuitable sites were identified within the initial project area. Most of these sites are located in the southwest portion of section 5.

The project area contains approximately 86 acres of "fragile-suitable" sites. A fragile-suitable site is one where forest productivity could be reduced using standard timber practices due to site conditions unless practices to mitigate potential adverse impacts are applied. Examples of special harvest and/or restrictive measures are avoiding the use of ground-based equipment or restricting logging operations to the dry season. Site conditions contributing to fragile conditions within the proposed harvest area include steep slopes, deep-seated/ earthflow terrain, or a combination. See Table 16 below.

Table 16: Fragile TPCC Areas within Proposed Treatment Areas

TPCC Fragile Suitable Codes	Acres	Contributing Factors and Concerns*	Recommended Practices*
FGR1- Slope Gradient	11	Steep slopes (65-80%); Erosion, landsliding	Full suspension yarding especially during wet conditions
FPR1- Mass Movement Potential	19	Deep-seated, earthflow terrain; Deep-seated landsliding	Avoid unloading slope bottoms or loading tops of slumps
FPWR1- Mass Movement Potential & Groundwater	38	Deep-seated, earthflow terrain with wet areas; Deep-seated landsliding, water regime, and loss of forest productivity	Avoid ground-based yarding in depressions & wet areas; Avoid unloading slope bottoms or loading tops of slumps
FWR1- Groundwater	18	Very moist and poorly drained sites; Alter water regime and loss of forest productivity	Avoid ground-based yarding in depressions & wet areas

*Some abbreviated management practices are described in the ROD/RMP. A soil scientist will like provide additional site-specific guidance prior to and during logging operations.

3.4.2 Environmental Effects Alternative 1: No Action

There would be no new ground disturbance from project activities, nor would there be a net reduction of roads. The effects of the no action alternative would be a continuation of current soil processes and conditions as described in the Affected Environment section. Soil creep and small slumps would continue to occur infrequently, mostly consisting of small (<1/4 acre) slumps. The soil building and recovery processes (slow accumulation of organic matter and improvement in soil structure) will continue to improve soil productivity to near pre-harvest conditions until there is disturbance such as timber harvest or wildfire. Erosion and the transport of fine sediment would continue on existing eroded trails and roads within the project area.

3.4.3 Environmental Effects Alternative 2: The Proposed Action

Direct Disturbance

Under the proposed action, ground-based systems would yard approximately 672 acres, or about 71% of the total harvest units and skyline yarding systems would yard about 268 acres, or about 29% of the total harvest units. Most of the ground-based yarding would occur on slopes less than 35% and most of the skyline yarding would occur on slopes greater than 45%. (For list of PDFs that would be used in this project to protect soils and other resources see section *2.4.2*.)

Most of the severe ground disturbance created by ground-based yarding would be in the form of compaction and be concentrated in primary skid trails and landings where most of the equipment traffic would occur. Limiting the area of harvest disturbance and restricting operating periods for ground-based operations would reduce compaction and potential for soil productivity losses. Skid trails and landings from ground-based yarding would cover less than 10% of all harvest units.

If a tractor/skidder were used, most disturbance would be concentrated in skid trails and landings. Severe compaction (soils with platy, dense, or massive appearance) would be expected to range from approximately 6 to 8% or about 40 to 54 acres. If mechanized harvest or cut-to-length systems were used, the more likely method, lighter equipment and placing slash and large wood in front of machine tracks would reduce compaction resulting in less severe compaction.

Skyline yarding would result in some discontinuous strips of compaction and displacement in skyline corridors. About half of the landings would be located in roadbeds. Total severe disturbance, mostly coming from building landings, would be about 2% or about 5 acres.

Under the proposed action, approximately 1.6 miles of new permanent rocked and 0.7 miles of new temporary, native surface roads would be constructed. In addition, approximately 9.6 miles of existing roads (including 2.9 miles that are natural surfaced) would be renovated. Upon completion of the logging, approximately 0.7 miles of newly created, native surface road, 2.9 miles of renovated roads, and 1.0 miles of existing would be decommissioned.

Road construction and renovation on these roads would remove and displace topsoil, greatly alter soil properties, and potentially increase soil erosion on approximately 23 acres. Decommissioning would improve soil drainage and the soil condition and facilitate revegetation of formerly non-forested ground.

Under the project action, fuel treatment strategies including a variety of methods such as slashing, lopping, machine piling, and burning would be used on portions of the project area. To minimize soil damage, burning would be restricted to wet soil conditions when soil resources are less vulnerable to impacts. All heavy equipment would be restricted to existing roads. Much of the burning would be done on roads and landings.

Burning hand or machine piles would cause localized, widely spread areas of severe soil disturbance (usually less 25-feet diameter), potentially altering the soils nutrient availability, reducing soil infiltration, and changing the soil structure.

Disturbance Effects

Long-Term Site Productivity
Soil disturbance effects from forest management activities can affect tree growth negatively, neutral, or even positively. The direct link between disturbance and loss in forest productivity is often difficult to predict. A number of factors such as the magnitude and duration of the disturbance, sensitivity of the soil to the disturbance, and the climate can affect forest productivity and effects are site specific and highly variable. Based upon a number of recent, short-term (less than 10 years) studies, sites with favorable soil and climate conditions in the Pacific Northwest show no or very little effect on short-term tree when logged by current standard timber harvest practices (Miller, 1996; Heninger, 2002; Scott et al, 2004, Ares, et al, 2005).

In summary, under the Propose Action, the overall soil productivity would be maintained. Project design features would be implemented to minimize soil disturbance. Soils within the proposed activity area have a moderate to moderately high resiliency. This appraisal is based upon a review of soil properties, present conditions, and literature. All "fragile non-suitable" were removed from proposed harvest units. The 75 acres of fragile ground with areas of poor drainage and/or subject to slow mass movement (FWR1, FPWR1, and FPR1) and the Jory soil would be ground-based yarding when soil moisture conditions are present or skyline yarded. Some severe soil disturbance and loss in soil productivity would occur after building and renovating roads (approximately 23 acres). After the project completion, the amount of roaded area would be reduced by approximately 2.3 miles or approximately 5.75 acres.

Slope Stability
The proposed action is not expected to change the current rate, size, or number of mass wasting in the project area. New road construction and road renovation would occur on stable surfaces. All areas showing signs of active movement or slope instability were removed from the proposed harvest units and new road locations.

The proposed action would slightly increase the short-term (ten years or less) risk of harvest-related landslides on approximately 11 acres of fragile sites (FGR1) that would be thinned. The increase in risk would be difficult to quantify but it would likely remain in low to moderate range for the following reasons:

1) Most past harvest-related landslides in the watersheds have occurred during very large events (e.g., 1964 and 1996 winter storms) on very steep slopes (>80%) at headwalls and inner gorges near streams following clearcut harvesting.
2) Most of the vegetation, root systems and litter would remain in place thereby retaining most of the soil moisture and root strength.
3) Many field and experimental studies have confirmed the importance of trees and root mass on shallow forest soils for slope stability (Roering, 2001, Schmidt, 2000, Krogstad, 1995; Sidle, 1992, Ziemer, R.R., 1981, Burroughs, 1977.)
4) Landsliding is less likely to occur in terrain covered by intermediate age stands. An ODF study (also confirmed by Miller et al, 2007) found that fewest landslides and smallest erosion volumes occur in forest slopes covered by intermediate age stands.
5) The mitigation for FGR sites would include minimizing site disturbance during harvest through thinning and the use of full log suspension when feasible.

The effect of landslides on soil productivity would likely be small since the landslides that might occur would likely be widely scattered and small in size (less than 0.1 acre).

Cumulative Effects

The proposed action would increase soil compaction and topsoil displacement at specific sites within the project area. Some of the soil recovering from past disturbances would be re-disturbed, increasing the recovery period. However, the overall timber growth and soil productivity would not be affected. The occurrence of any landslide under the proposed action would be expected to be small and within the range of natural variation for unthinned mid-seral stands.

3.5 Threatened or Endangered Wildlife Species, Habitat and/or Critical Habitat

The analysis below includes the direct, indirect and, in separate sections, cumulative effects of the alternatives. The area of analysis is approximately 18,540 acres and was determined by combining the areas of 1.5 mile circles (the home range of spotted owls in the northern Coast Range province) centered on the individual proposed action harvest areas excluding overlaps. Within the analysis area there are 5,500 acres of BLM, 122 acres of city of Yamhill land and the remaining 12,918 acres being private land; primarily industrial forest land of which about 8000 acres is owned by Weyerhaeuser Company. The area is on the eastern slope of the Coast Range and trends from a Douglas-fir dominated upland in the northern and western portions of the analysis area to oak woodland and rolling farmland to the south and east of the proposed action area. See the Environmental Effects section of the Vegetation and Forest Stand Characteristics analysis for a detailed description of the expected impacts to the forest vegetation component of wildlife habitat. Table 17 show the species listed under the Endangered Species Act whose

range includes the Tillamook Resource Area. Only those species for which the Proposed Action could result in an effect whether negative, positive or both will be discussed.

Table 17: ESA Listed Species that could occur within the Tillamook Resource Area

Common Name	Status	Impact Synopsis
Mammals:		
Columbia White-tailed Deer (*Columbia River DPS*)	ESA-Endangered.	Not affected – Not in range
Birds:		
Marbled Murrelet	ESA-Threatened.	**Affected** – Suitable habitat within ¼ mile of treatment.
Northern Spotted Owl	ESA-Threatened.	**Affected** – Impact to suitable and dispersal habitat

3.5.1 Affected Environment

Northern Spotted Owl

The proposed action area is approximately 940 acres within the Adaptive Management Area and Riparian Reserve land use allocations and is not within Designated Critical Habitat for the spotted owl. An evaluation of the spotted owl habitat quality and quantity was done using BLM GIS data, 2009 aerial photography, recent notifications of pending timber harvest activity by adjacent landowners, and many on-the-ground visits. Table 18 below shows the relative abundance of habitat types by owner class.

Table 18: Habitat Types by Land Owner

		Ownership		
		BLM	Non-BLM	Total
Spotted Owl Habitat Type	Suitable	320	60	380
	Dispersal	4,320	3,600	7,920
	Non-habitat	860	9,380	10,240
	Total	5,500	13,040	18,540

The analysis finds that there are only about 380 acres of suitable owl habitat with 320 of it on BLM land and the remaining 60 acres belonging to the City of Yamhill (immediately above their water treatment plant). The City of Yamhill's land is by far the best habitat in the analysis area being a small contiguous block of old-growth forest. Due to the limitations of mostly using aerial photos to evaluate habitat conditions on private lands, particularly those furthest from the proposed action area, it is possible that a small portion of the dispersal habitat found on private lands may actually meet the requirements for low quality suitable habitat but it clearly is not enough to influence the accuracy of the analysis.

Of the BLM lands proposed for harvest activity, unit 21-41 is approximately 71 years old and about 70 acres of the unit includes habitat elements, including a few old remnant Douglas-firs, larger diameter grand fir and large hardwoods that together provide functioning low quality suitable spotted owl nesting, roosting, and foraging habitat. There are about 810 acres of spotted owl dispersal habitat in the proposed treatment units that are currently about 40 -71 years old and about 65 acres of stands that are less than 40 years old that do not currently function as spotted owl habitat of any kind. Some stands classified as dispersal habitat currently have QMD's over 18 inches dbh but they lack the structural diversity that would support owl foraging or nesting and therefore are not categorized as suitable habitat.

The nearest known spotted owl site is in Maroney Creek about 3.5 miles southwest of the project area (known as the Kutch Creek site). The last spotted owl detection at the site was in 2004 with many barred owl detections since. However, in 2010 Weyerhaeuser Co. detected a spotted owl in T.2S, R.6W, section 27 about 1.5 miles west of the Kutch Creek site or about five miles west of the proposed action area. No owls were detected on follow-up.

The spotted owl would be affected by this project through the modification of suitable and dispersal habitat. Due to the minor impact to a component of spotted owl habitat, informal consultation with the U.S. Fish and Wildlife Service is warranted and would be completed programmatically within the appropriate years (year of sale if the proposed action is selected) Biological Assessment in the "Light to Moderate Thinning" category.

Marbled Murrelet

Marbled murrelets are seabirds that only come on-shore to nest in large trees with adequate platform structures. The Turner Creek project area is approximately 30-34 miles from the ocean which places it at the far eastern edge of the Northwest Forest Plans marbled murrelet zone 1. Within the analysis area there are 90 acres of marbled murrelet Designated Critical Habitat in seven parcels with the largest being 28 acres and the smallest being three acres. These Critical Habitat parcels are based on BLM FOI data that are not very accurate. Most of the parcels do not contain enough murrelet suitable habitat trees (six per five acres) to meet the definition of suitable habitat for stands beyond 20 miles from the coast as defined in the *Policy for the Management of Potential Marbled Murrelet Nesting Structure within Younger Stands* issued by the Level 2 Team for the North Coast Planning Province, Oregon on March 26, 2004. Scattered suitable trees are considered to be murrelet *potential* habitat of which there are a number found throughout several proposed harvest units at a rate of about 1 per 5 acres. On-the-ground inspection of murrelet suitable habitat stands finds about 94 acres of suitable habitat in the analysis area with one parcel of about 60 acres owned by the City of Yamhill being the best habitat. Less than 20 acres of the suitable habitat actually coincides with the Designated Critical Habitat stands. No marbled murrelet suitable or Designated Critical Habitat is within any proposed harvest unit. Unit 9-17 of the Proposed Action is adjacent to two suitable habitat parcels where non-protocol surveys were conducted in 2002 and 2003 which yielded no detections. No harvest activities would occur within 300 feet of any marbled murrelet suitable habitat and all *potential* habitat trees where they occur within harvest units would be managed

consistent with the guidance provided in the aforementioned level 2 policy by protecting the trees from damage by reserving trees adjacent to them from harvest and not creating any openings in the canopy within 220 feet. Because the proposed project would occur within ¼ mile of suitable marbled murrelet habitat informal consultation with the USFWS is necessary and would be conducted programmatically within the appropriate years (year of sale if the proposed action is selected) Biological Assessment in the "Light to Moderate Thinning" category.

3.5.2 Environmental Effects Alternative 1: No Action

Northern Spotted Owl and Marbled Murrelet

If the proposed action is not selected the stands considered for treatment would continue to age naturally. The stands with higher densities of trees would enter the stem exclusion stage in the near future and begin to produce snags from the currently suppressed trees. These snags would tend to be small but would provide good foraging habitat for a variety of woodpeckers and also habitat for secondary cavity users such as chickadees, nuthatches and small owls. There would be some medium to larger size snags that could provide habitat for northern flying squirrels and thus benefit the spotted owl, but generally most of the snags would not be large enough to accommodate pileated woodpeckers or other species that require larger snags. Those stands that are less well stocked will take longer to reach the stem exclusion stage and thus the snags produced would be larger and last longer. Overall the No Action alternative would result in much more coarse wood in the next several decades as compared to the Proposed Action which would provide better overall habitat for small mammals which in turn may benefit the spotted owl. By not thinning the overstory now during this window of opportunity the trees would be less able to respond in the future and the development of a second canopy layer would be delayed by a few decades thus taking longer to reach the vertical diversity characteristic of late-successional stands. Trees with platforms suitable for murrelet nesting would take longer to develop, especially in the more dense stands where mechanical damage resulting from impacts from adjacent trees would limit the development of large limbs. Most likely only trees that are fortunate enough to grow next to an opening resulting from mortality are likely to become murrelet habitat.

Cumulative Effects

Cumulative effects, if any, would be negligible since regardless of the alternative selected the greatest effect to spotted owls or marbled murrelets is currently being determined by the activities on the private lands in the analysis area.

3.5.3 Environmental Effects Alternative 2: The Proposed Action

Northern Spotted Owl

The proposed action would open the stand canopy and provide more growing room for trees on about 940 acres of Douglas-fir dominated forest. After thinning the canopy closure would, on average, remain about 60% for most units with a few being slightly less than 60% but only within dispersal habitat. By definition these stands would still be classified as they are prior to thinning (60% canopy closure for suitable habitat and 40% canopy closure for dispersal habitat). The understory brush layer would respond to additional sunlight as would shade tolerant understory trees such as western redcedar and western hemlock. In the short term, perhaps the next 10 to 15 years, the overstory canopy closure would be more open than desirable for spotted owls but would close again after 20-30 years. The most deleterious effect of the thinning would be the halting of the natural snag production process by removing those trees that might otherwise die from the effects of tree-to-tree competition and reducing the overstory tree density to as low as 50 trees per acre in some units which will limit future opportunity for coarse wood recruitment. Eventually as the expected understory develops, the additional structural diversity would benefit owls by providing a second canopy layer from which owls can hunt more effectively while possibly improving habitat for the prey base. The thinning would also provide a small burst of down CWD at the time of harvest which would be beneficial to small mammals. Snags are important habitat elements for spotted owls in that they are the primary nesting and cover habitat for the northern flying squirrel (Carey 1991), which is the principal prey species for spotted owls in the northern Coast Range (Forsman et al., 1991). The loss of natural snag production for several to many decades on the thinned acres will reduce the potential for owl use due to the lack of suitable prey habitat. The creation of a couple snags and some down wood in the near term will provide a modicum of coarse wood habitat that will benefit species that require such habitat but will not provide a bridge to the future when the stands begin to naturally recruit coarse wood which may take more than five decades.

Since spotted owls are not known to use oak woodlands or the Willamette foothills to the east of the project area and considering the rapidly declining amount of dispersal habitat on private lands adjacent to the project area along with the already very little amount of suitable habitat, it is highly unlikely that there are any owls currently inhabiting the analysis area or would be expected to in the foreseeable future. Consequently, while there will be detrimental impacts to spotted owl habitat resulting from the proposed action, actual impact to the spotted owl will be miniscule.

Cumulative Effects

In addition to the impacts of the proposed action on spotted owls, there are also past activities, other current activities occurring nearby on other lands, and future actions that are reasonably certain to occur that may also affect owls. Such actions include the BLM's *Roaring Creek Projects* which include density management thinning, snag and down wood creation and a fish enhancement project in the next watershed to the north of the Turner Creek project. Also occurring is commercial timber harvest on private lands in the analysis area. There is very little timber anywhere nearby that is over 80 years and stands as young as 40 are being clearcut harvested. Aerial photo estimates show that about 28% of the private land within the analysis area is currently spotted owl dispersal habitat and about 1 % of it is suitable habitat. What can also be seen on the photos is the new road networks built into much of the remaining dispersal

habitat stands, presumably with the intention of harvesting those stands in the near future. With the exception of the two trees per acre average that the Forest Practices Act requires (which are almost always left in a discrete clump to be harvested in the future) there are virtually no snags or large down logs left on private land. With the exception of the City of Yamhill's 60 acres of suitable habitat, it is likely that within 20 years private land will provide no habitat of any type for the spotted owl. Compared with the ongoing effects of habitat loss on private land, the proposed action is of little consequence. It is not likely that spotted owls could breed anywhere near the analysis area due to the overall habitat conditions, but if an owl were dispersing through the area survivability would probably be similar regardless of whether the proposed action occurred or not.

Marbled Murrelet

The proposed action would not result in any adverse effect to the marbled murrelet or to Designated Critical habitat. It is very unlikely that any murrelets occupy any stands within the analysis area due to the relatively poor habitat conditions and the great distance from the ocean. Those suitable stands that are closest to any proposed harvest activity did have some surveys in the past that yielded negative results and although the surveys are no longer valid they still provide some indication as to the improbability of murrelet use in the area. Additionally, if any harvest activity occurs it will be at least 300 feet away from suitable habitat (the disruption distance for murrelets) and the resulting stands would still provide adequate protection to the suitable habitat after harvest. The proposed action could eventually result in better murrelet habitat by growing larger trees at a reduced density but claiming any potential beneficial effect would be so far removed from the project implementation as to be speculative in nature. Since there would not be any noticeable direct or indirect effects to the murrelet by definition there would not be any cumulative affects either.

Harvest activity would occur within ¼ mile of suitable murrelet habitat (the USFWS disturbance distance) therefore the threshold where Section 7 ESA consultation is required is reached. Consultation with the USFWS would be done programmatically in the appropriate year based on the proposed timber sale date.

3.6 Special Status (BLM 6840 Policy), SEIS Special Attention (Salem RMP), and Migratory Bird Treaty Act Wildlife Species and Habitat

The analysis below includes species that could occur within the Tillamook Resource Area; have the potential to be impacted by the Turner Creek Project; and are on either the BLM State Director's Special Status Species List from February 2008, the USFWS's 2008 "Birds of Conservation Concern" list for the U.S. portions of the Northern Pacific Forest Bird Conservation Region, or are included in the Salem District's 1995 RMP. All of these lists are the most recent available. Table 19 below the complete list and a brief impact synopsis which shows which species may be impacted and are thus carried forward to the analysis below.

Table 19: Special Status (BLM 6840 Policy), SEIS Special Attention (Salem RMP), and Migratory Bird Treaty Act wildlife species that could occur within the Tillamook Resource Area.

Project Name: Turner Creek		
Common Name	**Status***	**Impact Synopsis**
Mammals:		
Fringed Myotis	BLM-Sen., Salem RMP	Not affected – negligible impact to low quality habitat
Long-eared Myotis	Salem RMP	Not affected – negligible impact to low quality habitat
Long-legged Myotis	Salem RMP	Not affected – negligible impact to low quality habitat
Silver-haired Bat	Salem RMP	Not affected – negligible impact to low quality habitat
Townsend's Big-eared Bat	BLM-Sen., Salem RMP	Not affected – No roosting habitat in area
Red Tree Vole	BLM-Sen.	**Affected** – Remote possibility of disturbance based on presence of old-growth trees.
Birds:		
Bald Eagle	BLM-Sen.	Not affected – No suitable habitat within project area
Black Swift	MBTA	Not affected – No habitat within project area
Harlequin Duck	BLM-Sen.	Not affected – Project not within suitable habitat
Horned Lark (*strigata* ssp.)	MBTA	Not affected – Project not within suitable habitat
Lewis' Woodpecker	BLM-Sen.	Not affected – Project not in suitable habitat
Olive-sided Flycatcher	MBTA	**Affected** – Possible improvement of habitat
Oregon Vesper Sparrow (*affinis* ssp.)	MBTA, BLM Sen.	Not affected – Project not in suitable habitat
Peregrine Falcon	MBTA, BLM Sen.	Not affected – No habitat affected
Purple Finch	MBTA	**Affected** – Possible improvement of habitat
Purple Martin	BLM-Sen.	Not affected – No habitat affected
Rufous Hummingbird	MBTA	**Affected** – Possible improvement of habitat
Willow Flycatcher	MBTA	Not affected – Fairly common species in early seral habitat
Reptiles and Amphibians:		
Cope's Giant Salamander	BLM-Sen.	Not affected – No impact to stream habitat
Northwestern Pond Turtle	BLM-Sen.	Not affected – No habitat within project area
Painted Turtle	BLM-Sen.	Not affected – No habitat within project area
Invertebrates (Mollusks):		
Crowned tightcoil (snail)	BLM-Sen.	**Affected** – possible impact to potential habitat
Evening Field slug	BLM-Sen.	Not affected – Preferred habitat excluded from project

Project Name: Turner Creek		
Common Name	**Status***	**Impact Synopsis**
Pacific Walker (snail)	BLM-Sen.	Not affected – Not in range
Puget Oregonian (snail)	BLM-Sen.	**Affected** – possible impact to potential habitat
Salamander slug	BLM-Sen.	**Affected** – possible impact to potential habitat
Spotted taildropper (slug)	BLM-Sen.	**Affected** – possible impact to potential habitat
Tillamook Westernslug	BLM-Sen.	**Affected** – possible impact to potential habitat
Warty jumping slug	BLM-Sen.	**Affected** – possible impact to potential habitat
Invertebrates (Arthropods):		
Johnson's Hairstreak (butterfly)	BLM-Sen.	Not affected – No habitat within project area

* BLM-Sen. = Species listed as Sensitive under the BLM's 6840 Special Status Species Policy
Salem RMP = Species included in the Salem District RMP for special consideration
MBTA = Species covered by the Migratory Bird Treaty Act of 1918

3.6.1 Affected Environment

Terrestrial Mollusks Bureau Sensitive

The Turner Creek project area is within the range and contains habitat for six BLM Sensitive terrestrial mollusk species (see Table 19). These species are generally associated with the organic duff layer and moss on the floor of cool forested areas containing coarse woody debris, sword ferns, hardwood brush species and for some species, hardwood trees, especially big-leafed maple.

Warty jumping slugs are a very common slug on the west side of the Coast Range in northern Oregon with over 1,400 known sites entered in the regional special status species database. On the east side of the Coast Range the warty jumping slug is much less common but has been regularly encountered during surveys. The Tillamook westernslug occurs in the same general habitat and area as the warty jumping slug and is also very common on the west side of the northern Coast Range, but has only been encountered once during a survey in the fall of 2010 in the Turner Creek area.

The other four species either have never been found in the Tillamook RA after approximately 10,000 acres of survey or have only been encountered a very few times. There are three known sites of the Puget Oregonian in the Tillamook RA (approximately nine air miles south of the project area) which represents a range extension of what was thought to be a Washington Cascades and Columbia gorge species and these sites are the only records in the Coast Range. According to the BLM's regional database the only site of the crowned tightcoil in all of Oregon and Washington is in the Nestucca drainage about 12 miles southwest of the project area. Little is known about the spotted taildropper; and there appears to be some disagreement about which specimens actually represent the spotted taildropper. The Tillamook RA has one record of finding a specimen that according to Nancy Duncan (BLM mollusk expert, retired) represents the species and there are only three other records in the Northwest Forest Plan area. A slug found during fall surveys in section 9 outside of but near one of the proposed harvest areas resembles

the spotted taildropper but has been tentatively identified by a taxon expert as an unusual variety of the reticulate taildropper. Definitive identification would require dissection and possible DNA analysis which has not occurred to date. The salamander slug has not been encountered in the Tillamook RA.

The first round of the two visit mollusk protocol surveys have been completed on approximately 500 acres in and around selected Turner Creek proposed harvest units. The final round will be completed in spring of 2011. To date the only BLM Sensitive Species located has been one specimen of the Tillamook westernslug which due to its abundance on the west side of the Coast Range would not be protected. If any sites of crowned tightcoil, Puget Oregonian, salamander slug or spotted taildropper are located during spring surveys they would be protected with an appropriate buffer to control impacts to the site.

Red Tree Vole Bureau Sensitive

The red tree vole is an arboreal rodent that is thought to be strongly associated with mature and late-successional Douglas-fir forests. Some recent study and the results of many surveys over the last ten years have shown that red tree voles are also sometimes found in younger forests. At this time it is uncertain what role younger forests play in the general health of the red tree vole populations, especially in the northern mesic zone where the Turner Creek Project area is located. According to Eric Forsman, a noted spotted owl and red tree vole researcher, tree voles are quite uncommon in the northern coast range; and genetic work by Miller et al. (2005) suggest that in the historical past the northern populations of red tree voles had become fragmented and discontinuous with the southern populations by climate change associated with glaciation. The red tree vole rarely comes to the ground and may live its entire life in a few acres. In the infrequent cases where red tree voles do come to the ground to disperse, they tend to remain hidden under heavy vegetation and/or down wood. Due to the red tree voles' propensity for staying near its natal territory and its low fecundity, the expansion of red tree vole populations into uninhabited areas is a slow process.

There are relatively few records of the red tree vole in the northern coast range of Oregon where it remains listed as a Bureau Sensitive species. In the last ten years of surveys covering about 5000 acres the Tillamook RA has located approximately 100 red tree vole nests of which about 40 were active. All of the located nests are on the west side of the Coast Range in the Nestucca drainage. The site nearest the proposed project area is about 9 miles west southwest.

The proposed treatment areas are located just inside of the red tree vole habitat zone adjacent to oak woodland habitat associated with the Willamette Valley. The stands are generally comprised of young second growth Douglas-fir, some with a grand fir mix, that resulted from clearcut logging in the 1940's, 50's, and 60's and are not currently considered to be able to support viable tree vole populations. There are a couple of units in sections 3, 9 and 21 that contain some widely scattered old-growth trees that, if not for their history of being isolated in young forests, might be valuable red tree vole habitat trees. These trees occur at a rate of about 1 per 5 acres. No surveys have been done in the Turner Creek area, nor are they required based on stand conditions. For analysis purposes results from surveys done in two nearby eastern Coast Range

watersheds, one to the north and one to the south of the project area were reviewed and neither survey located any tree vole sites. Also, a 2006 purposive survey was conducted by climbing selected mature and old-growth trees north of the Turner Creek area with the specific intent of trying to find tree voles in the best habitat available on the east side of the northern Coast Range, again with negative results. Due to the forest history of the east side of the northern Coast Range and, in this case, the proximity to the Willamette Valley, it is unlikely, although not impossible, that red tree voles still currently exist in or near the proposed project area.

Migratory Bird Treaty Act

Executive Order (EO) 13186, issued Jan. 17, 2001 directs federal agencies to enter into a Memorandum of Understanding (MOU) with the U.S. Fish and Wildlife Service to further the goals of the Migratory Bird Treaty Act of 1918 (MBTA). The pertinent goals of the EO are to "support the conservation intent of the migratory bird conventions by integrating bird conservation principles, measures and practices into agency activities and by avoiding or minimizing to the extent practicable adverse impacts on migratory bird resources when conducting agency actions"; and to "ensure that environmental analyses for Federal actions required by the NEPA or other established environmental review processes evaluate the effects of actions and agency plans on migratory birds, with emphasis on species of concern". On April 12, 2010 the Director of the BLM signed a Memorandum of Understanding with the USFWS which outlines a collaborative approach to promote the conservation of migratory bird populations. The portion of the MOU that is most applicable to the Turner Creek Project follows…. *At the project level, evaluate the effects of the BLM's actions on migratory birds during the NEPA process, if any, and identify where take reasonably attributable to agency actions may have a measurable negative effect on migratory bird populations, focusing first on species of concern, priority habitats, and key risk factors. In such situations, BLM will implement approaches lessening such take…..*

The Turner Creek project would cut and remove trees, and construct, renovate and decommission roads which could result in the unintentional take of adult or nestling birds that are covered by the MBTA, or result in failed nesting attempts. In general, thinning of young conifer forests results in greater abundance of birds and, depending on the presence of other habitat features such as snags, hardwoods, etc., can also increase bird species richness. Of the bird species that are included in the USFWS's 2008 "Birds of Conservation Concern" list for the U.S. portions of the Northern Pacific Forest Bird Conservation Region only the **olive-sided flycatcher, purple finch** and the **rufous hummingbird** occur within the analysis area and have the potential, either negatively, positively or both, to be impacted by the Turner Creek Project.

Olive-sided Flycatcher

In the Coast Range, the olive-sided flycatcher builds nests in mature conifer stands, preferring western hemlock and Douglas-fir, with openings nearby such as early seral forest stands, marshes, ponds, etc., over which they forage. This bird arrives on the breeding grounds in early- to mid-May with nest building most evident in early to mid-June and fledging in mid-July.

Olive-sided flycatchers are conspicuous when singing and fly catching from high perches on snags or tall trees adjacent to openings.

The Turner Creek project area contains some marginal olive-sided flycatcher habitat in the mid-seral habitat with larger trees, particularly along forest edges, in *Phellinus weirii* pockets, and along the riparian and marshy areas in the vicinity of the proposed project, although the oldest stands in the area are still a little younger than that preferred by olive-sided flycatchers.

Purple Finch

Purple finches are breeding residents of low to mid elevation, open to semi-open conifer forests in western Oregon and parts of the Blue Mountains of eastern Oregon. Winter residency in Oregon is erratic, varying from year to year with most individuals migrating south for the winter. While purple finches are still somewhat common, their numbers have been declining in recent years. The reasons for the perceived decline are unclear but loss of habitat from conversion of forestland to urban or agricultural uses and competition from the house finch are thought to be contributors (M. Patterson; *in* Birds of Oregon: A General Reference, 2003).

Purple finches undoubtedly breed in the vicinity of the Turner Creek Project along riparian corridors, at the edges of *Phellinus weirii* pockets, along edges of old clearcuts and in other areas of reduced canopy cover. With the exception of the outer edges, the proposed thinning units are probably not preferred purple finch habitat in that the canopy is rather closed and the shrub layer is rather simple.

Rufous Hummingbird

Rufous hummingbirds can be found in a variety of habitats as long as a well developed flowering shrub layer is present. Foraging consists of feeding on nectar from flowering shrubs such as red-flowering current and red elderberry, as well as on tiny insects, spiders and mites that are gleaned from plants. Nests are generally found between ground level and about 16 feet (D. Vroman; *in* Birds of Oregon: A General Reference, 2003). This hummingbird is the most common hummingbird in Oregon and is the only breeding hummingbird in the Turner Creek area. While the private lands near the project contain a lot of early seral habitat, management strategies there keeps competing vegetation suppressed which includes flowering shrubs. Thus, while there is a large quantity of early seral habitat, much of it may not be suitable for rufous hummingbirds. The proposed units themselves do not include good hummingbird habitat in that there is little foraging opportunity.

3.6.2 Environmental Effects Alternative 1: No Action

<u>Special Status Species (BLM 6840 Policy)</u>

Under the "No Action" alternative the current habitat condition for Special Status species would be unaffected now and in the near future. There would not be any potential for additional drying of the terrestrial environment that may otherwise result from a thinned canopy that would affect

terrestrial mollusk, nor would there be any damage or destruction of existing coarse woody debris. Habitat for red tree voles would remain poor as it is today and would probably improve at a slow rate. The young stands would continue to grow at a declining rate and become less stable over time. Eventually disturbances such as windthrow, root disease, insect attack, or possibly fire will influence the character of the stands and introduce more structural diversity into the ecosystem thus affecting the suite of animals that would use these stands. The attainment of a more structurally complex stand may take longer under the No Action alternative and would eventually result in an old forest system with more, smaller trees but with a high amount of coarse wood (although of smaller piece size). It is not clear in the long term whether the overall animal species composition and abundance resulting from the No Action alternative would be appreciably different than from what it is today.

Cumulative Effects

Generally speaking the Special Status Species analyzed here would not experience any cumulative effects in the next several decades. Beyond the next two to three decades, a very small cumulative effect could occur for species that may prefer older forest structure such as the red tree vole. None of the affects, if realized, would change the level of population viability for any of the Special Status Species.

Migratory Bird Treaty Act

Under the "No Action" alternative none of the activities described for the Proposed Action alternative would occur. The current habitat condition for the MBTA listed Species of Concern would be unaffected now and in the near future. Neither the negative nor the beneficial effects to habitat for migratory birds would be realized. The stands would continue to grow at a declining rate and become less stable over time. Eventually disturbances such as windthrow, root disease, insect attack, or possibly fire will influence the character of the stands and introduce more structural diversity into the ecosystem thus affecting the suite of animals that would use these stands. Not thinning the proposed action stands would maintain less desirable habitat conditions for the rufous hummingbird and the purple finch in the near term (next few decades) and possibly into the long term since both of these species favor more open forested conditions. The olive-sided flycatcher may also find the unthinned stands less favorable than thinned stands but that assessment is less clear in that stands that are too open are not favored for nest site selection. However thinned stands that maintain high growth rates and then recover canopy closure with larger, denser crowns that mimic late-seral conditions may be more beneficial to olive-sided flycatchers within a few decades as long as open foraging areas still occur nearby. Due to the limited scale of the project area and the small potential for impacts, neither the proposed action nor the "No Action "alternative would affect the population viability or trends for the purple finch, rufous hummingbird or the olive-sided flycatcher.

Cumulative Effects

While the actions on some of private lands in the analysis area may benefit the rufous hummingbird, they are most likely detrimental to the purple finch and olive-sided flycatcher and

not implementing the Turner Creek Project would have little impact on any of these species. Considering the scope of activity on private land compared to the potential for impacts, or lack thereof, from the "No Action" alternative, no cumulative impacts are expected from a decision to select the "No Action" alternative.

3.6.3 Environmental Effects Alternative 2: The Proposed Action

Terrestrial Mollusks

In general, light to moderate thinning of mid-seral forest stands cause minor changes in the microclimate at the ground level post harvest whereas heavy thinning and small gap creation would have greater impacts. Results from studies of microclimate changes between various thinning densities compared to unthinned stands seem to indicate that, although thinned stands are warmer and dryer than unthinned stands, there is considerable overlap in conditions between them suggesting that these stands provide a wide range of microclimates (Chan et. al. July 2004). The Turner Creek Project proposes to thin the stands from below and would result in canopy closure after harvest of approximately 60%. Considering that even in unthinned stands there are long periods in a given year when the climate is unsuitable for terrestrial mollusk activity, it stands to reason that there may only be a slight change in the average time when conditions in the thinned stands are unsuitable for mollusk activity compared with the unthinned stand condition, presumably on the cusps of the dry weather in the early summer and later fall, and if there is a change, it may be within the range of natural variability. Also, the additional cover at the ground level provided by the increase of the shrub layer due to the thinning would moderate some of the effects of additional solar radiation and air movement through the stand. Treatment on approximately 9% of the acres would include removing trees susceptible to *Phellinus weirii* and the cutting of heavily thinned gaps (up to 1 acre in size) where post-harvest tree densities would be approximately 20 trees per acre. The slash resulting from these treatments may be treated by pile burning or some mechanical method. Overall the treated stands would still average about 60% after harvest. In these "gap" or heavy thinning areas, ground conditions could be changed to a point where they are unfavorable to terrestrial mollusks for a longer portion of a year, perhaps by as much as 6-8 weeks. Additionally, harvest activities, especially ground-based harvesting, can have direct impact on mollusks by crushing individuals or breaking apart later decay stage coarse wood.

The principles of conservation biology hold that species with patchy distribution and that have genetically isolated populations are at greater risk of extinction. With so little available information and few records of the crowned tightcoil, salamander slug, spotted taildropper and Puget Oregonian (in Oregon) it is impossible to accurately assess the impacts of a project like the Turner Creek project on these species. The true rarity of these species cannot be determined by the available data since only the Puget Oregonian and warty jumping slug were included in the Survey and Manage program and thus the other species were not specifically searched for during surveys (although all good surveyors learned to identify all species encountered, the non-S&M species were not always recorded). That said, we expect the level of direct and indirect impacts to Sensitive mollusk populations to be minor based on the design features.

Cumulative Effects

The Sensitive species addressed by this analysis generally require attributes found in forests that are in the mature to late-seral stage. The project area is on the young side of qualifying as suitable habitat for these species. There is very little private land in the analysis area that has trees that are 70 years old or older. Generally forest management on private land is aimed at maximizing the production of Douglas-fir and there is no requirement to reserve any down woody debris. Bare ground and young plantations of Douglas-fir are not favorable habitat for Sensitive terrestrial mollusks. While the thinning of about 940 acres of conifer forest on BLM land may temporarily reduce the habitat quality on those acres, its cumulative impact compared to the intensity of impacts on private lands would be imperceptible and would not result in any additional population viability loss.

Red Tree Vole

While it is very unlikely due to stand condition and history that red tree voles are present in any of the proposed action stands, it is not possible to positively rule it out. Swingle and Forsman (2005) suggest that thinning of young conifer forest could have detrimental effects on red tree vole habitat speculating that decreased connectivity between individual tree crowns may be the reason. It is unlikely but possible that there may be some direct negative impact to some individual tree voles in the vicinity of the remnant old growth trees in sections 3, 9 and 21 however, the design features to protect marbled murrelet potential habitat (maintain adjacent trees and not allow any gaps within 220 feet) would also reduce those potential negative effects. Those younger stands where the tree density would be taken down to 50-60 trees per acre, do not contain remnant trees and thus are even less likely to have tree voles in them. While this level of thinning would still be considered a moderate thinning, it would nonetheless result in a variably spaced canopy where in some portions of the stands there would be several decades before crowns are again interconnected enough to allow tree voles to travel from tree to tree. Taken in context the overall potential for impact to the red tree vole is exceptionally small. Given that the project area is on the fringe of the tree vole range, and that over 40% of the area analyzed for thinning would remain untreated (see the Vegetation and Forest Stand Characteristics section) and that that there is only a very small possibility that there would be direct impact to voles, the proposed action would have a small potential for negative impacts to the red tree vole population.

Cumulative Effects

Considering the lack of good red tree vole habitat in the analysis area and the rapid conversion of mid seral stands to plantations on private lands in the area, the proposed action would not have any perceptible cumulative effects.

Migratory Bird Treaty Act

Olive-sided Flycatcher

There is a small possibility that the proposed thinning could affect individual flycatcher nests that could be present in the stand, and thus result in "Take" under the MBTA. The proposed project would generally benefit flycatcher habitat by providing more early seral openings (root rot pockets and one acre gaps) in the vicinity of the mid-seral stands that are being thinned, thus providing additional foraging opportunities.

Purple Finch

The proposed action would generally benefit the purple finch by increasing or improving breeding habitat through the opening of the canopy and treatment of *Phellinus weirii* pockets by removing the majority of trees in infected patches thus creating small early seral gaps/edges. It is possible that through the harvesting process one or more nests could be destroyed if individual purple finches chose to nest within the proposed units, therefore "Take" under the MBTA is possible, although somewhat remote.

Rufous Hummingbird

The proposed action most likely would not directly impact any hummingbirds except for the very slight possibility that there may be a few nesting in a proposed harvest unit near an opening with suitable forage. "Take" under the MBTA is possible but remote. On the other hand, the expected development of the understory brush layer from the thinning of the overstory, especially in the "gap" areas or areas of heavier thinning, would improve hummingbird habitat for the next ten to twenty years.

Cumulative Effects

Considering the low level of potential impacts associated with the proposed action there are not expected to be any cumulative impacts caused by the proposed action relative to the impacts occurring on the private lands in the analysis area. From a population viability perspective, the low level of impact and the relatively small scale of the project compared to the range of the three species analyzed here would not result in any additional cumulative effects.

3.7 Recreation

3.7.1 Affected Environment

Recreational opportunities within the project areas consist primarily of hunting, recreational Off-Highway Vehicle (OHV) riding and limited dispersed camping. Access into the area is primarily gated with the exception of section 9 which can also be accessed through a private driveway. With limitations on access, the majority of the use is currently publics entering these areas by foot. An exception to access may be during big game hunting seasons when landowners may open gates to grant hunting access.

Sections 17, 21, and 29 are designated under the ROD/RMP as "open" for OHV use. Open OHV use is classified as an area where all types of vehicle use are permitted at all times, anywhere in the area subject to the operating regulations and vehicle standards set forth in 43 CFR 8341and 43CFR 8342. Sections 3, 5, 9 and the northeast corner of section 7 are classified as "limited to designated roads and trails". Limited is described as an area restricted at certain times, in certain areas, and/or to certain vehicular use. These restrictions may be of any type of categories: Numbers of vehicles; types of vehicles; time or season of vehicle use; permitted or licensed use only; use on existing roads and trails; use on designated roads and trails; and other restrictions. There are no designated roads or trails within these areas, so in effect they are closed to OHV use. Regardless of the OHV designation, signs of OHV use can be seen throughout the project area.

To protect water quality, OHV "limited" designations were incorporated within Sections 3, 5, 9 and the northeast corner of section 7. This designation was determined, in agreement with the City of Yamhill, to aid in limiting sediment delivery to streams above the municipal water intake.

Recreational OHV use has risen progressively over the last few years primarily due to closure of private lands to motorized use and limitations placed on public lands. The project area is within reasonable travel distance from major metropolitan areas and within close proximity to urban communities which enables OHV users to schedule day trips to the area as opposed to multi-day trips required for many public land locations that allow for OHV use.

The majority of the lands within the project area fall under Visual Resource Management (VRM) IV classification. VRM class IV allows for major modifications of existing character of landscapes. Section 9 is VRM class III objectives which are to partially retain the existing character of landscapes.

3.7.2 Environmental Effects Alternative 1: No Action

Under the no action alternative, recreational activity within the project area would remain at current opportunity levels with the exception of OHV use within sections 3, 5, and portions of 7 and 9. In meeting the current OHV trail designations within these sections, and to maintain the agreement between the BLM and the City of Yamhill, existing and future trails may be signed or blocked to discourage OHV use.

3.7.3 Environmental Effects Alternative 2: The Proposed Action

The nature of the proposed action alternative will have no effect on hunting and camping opportunities within the project area. . There are no designated OHV trails within sections 3, 5, 7, and 9; to obtain desired conditions and discourage use of unauthorized trails, trails located within these sections would not be cleared of logging slash after timber harvest and where practicable they will be blocked or otherwise closed. Effects to OHV use within sections 17, 21,

and 29 would be minimal and would occur primarily be during project activities; no additional measures will be taken for trails within these sections.

The proposed action will meet the objectives of VRM classifications within the entire project area.

3.8 Invasive, Non-native Species (Executive Order 13112)

3.8.1 Affected Environment

The Turner Creek Project area is approximately 15 miles southwest of the town of Forest Grove, Oregon, in the Upper North Yamhill River and Turner Creek subwatersheds of the Yamhill River watershed and the Middle Fork of North Fork Trask River subwatershed of the Trask River watershed. Examples of forest management activities within the affected area that will create soil disturbance and influence the spread of invasive/non-native invasive plant species are: commercial and pre-commercial density management thinning, young stand maintenance, new road construction, road decommissioning, road maintenance, culvert replacements, and off highway vehicle (OHV) trails. Activities that do not necessarily create disturbance but influence the spread of weed seeds are recreational hiking, biking, horseback riding, fishing, and hunting. Other sources of seed dispersal are from wildlife that are either passing through or frequent the area, water movement, and wind. Many past and present management activities tend to open dense forest setting and disturb soils therefore providing opportunities for widespread weed infestations to occur. Many, if not all of the weed species designated as category B (established infestations) on the Oregon Department of Agriculture's (ODA) noxious weed list are present throughout the area. Because they are present in and adjacent to the project area, newly formed seed is readily available and/or an established seed bank is present. Most non-native weed species are not shade tolerant and will not persist in a forest setting as they compete for light when tree canopies close and light to the understory is reduced. So, based on what we know about invasive plants distribution, dispersal mechanisms and their ability to establish in newly disturbed sites we can expect new and old populations to fluctuate over time within the analysis area based on these factors as described.

Existing vegetation within the Turner Creek project area consists of 35-71 year-old conifer overstory, scattered pockets of hardwoods, an under-story of common shrubs and scattered populations of grasses and forbs. A comprehensive plant species list is located at the Tillamook Resource Area field office. Varieties of habitats are represented throughout the project area (substrates, rock, features, elevations, slopes, aspects, water, and topography). Any ground-disturbing activity that occurs within these habitats offers opportunity for the introduction of noxious weeds and/or invasive non-native plant species based on the existence of a seed source. Botanical surveys for invasive, non-native plant species within the Turner Creek project area began in June 2010 and concluded by August 2010. Completed surveys indicate that where mature native plant communities were established, non-native species were not dominant or were non-existent. Species that were identified within the proposed project areas consisted of False

brome (*Brachypodium sylvaticum*), Bull thistle (*Cirsium vulgare*), Canada thistle (*Cirsium arvense*), Scotch broom (*Cytisus scoparius*), Tansy ragwort (*Senecio jacobaea*), Armenian blackberry (*Rubus armeniacus*), Himalayan blackberry (*Rubus discolor)* and St. Johns-wort (*Hypericum perforatum*), Oxeye daisy (*Leucanthemum vulgare*), Shining geranium (*Geranium lucidum*), and Herb Robert Geranium (*Geranium robertianum*). These species were located along road edges and exposed areas that tended to have soil disturbance (i.e. open meadows, past commercial thinning, riparian areas and OHV trails). These species are designated as category B (established infestations) on the ODA noxious weed list. These aggressive weed species are prevalent throughout Western Oregon and proliferate easily through vectors such as human traffic, animal movement, wind, and water. Some degree of noxious/exotic weed introduction or spread is probable as management activities occur in the project area.

3.8.2 Environmental Effects Alternative 1: No Action

Surveys completed show that most invasive/non-native species found were located along existing roadways. For all invasive weed species identified, with the exception of False Brome and Shining Geranium, no appreciable increase in populations can be expected to occur if the No Action alternative is chosen. Plant communities within the project area would continue to be dependent on ecological processes currently in place. Based on the lack of shade tolerance no appreciable increase in the non-native or invasive plant species populations identified during the field surveys is expected to occur within the interior of existing stands. However, as regeneration harvest occurs on lands adjacent to public lands, an increase of non-native invasive plant species would invade the areas that are exposed to higher intensities of light.

False Brome and Shining Geranium on the other hand are both shade tolerant and can become aggressive in existing understory herbaceous plant communities. In the no action alternative both these species would continue to expand in population and become dominant understory components. A Environmental Assessment has been completed for the Northern Coast Range that allows for treatment of invasive/non-native plant species on BLM managed lands therefore treatments will be applied to these populations even if the no action alternative is chosen thus control or elimination of these sites is eminent.

3.8.3 Environmental Effects Alternative 2: The Proposed Action

Category B designated noxious weed species found were located along existing roadways. Initial increase in population size and new establishment due to density management thinning activities should be confined to disturbance areas as described above in "affected environment" and would be expected to decrease over time as native species re-vegetate and the recovery of canopy closure occurs. All Invasive/Non-native plant species identified, with the exception of False Brome and Shining Geranium, do not tolerate overtopping and can be negatively affected by competition for light. Design features that are incorporated into this project such as introducing native plant species on disturbed sites and washing equipment prior to entering the project area, would mitigate increases in weed populations.

Cumulative Effects

No cumulative effects are expected with regard to invasive/non-native plants because the project would not contribute to the spread of invasive species populations or to the introduction of new species with the implementation of project design features and because little or no difference in the composition or numbers of invasive/non-native species populations have been observed in similar projects on BLM lands in the vicinity.

3.9 Special Status and SEIS Special Attention Plant Species and Habitat

As discussed, It is the policy of the BLM to conserve Threatened and Endangered species and the ecosystems they depend upon primarily by prescribing management for conservation of lands these species inhabit (BLM Manual Chapter 6840). The primary goals of the Threatened and Endangered Species Program are inventory, monitoring, plan preparation, and plan implementation to ensure the maintenance and recovery of these species.

Similarly, it is BLM policy to manage Candidate species and their habitats to ensure that BLM actions do not contribute to the need to list any Candidate species as Threatened or Endangered. The Oregon BLM Director has the authority to designate Sensitive (or Special Status) Species, which are to be managed under the same policy as Candidate species. It is also BLM policy to carry out management for the conservation of state-listed plants. Surveys being conducted for the Turner Creek Project area are compliant with these management policies. Based on the "Pechman Exemptions" this project is exempt from Survey and Manage Standard and Guide requirements (refer to section 1.3.1, page 6 of this EA document).

3.9.1 Affected Environment

The Turner Creek Project area is approximately 15 miles southwest of the town of Forest Grove, Oregon, in the Upper North Yamhill River and Turner Creek subwatersheds of the Yamhill River watershed and the Middle Fork of North Fork Trask River subwatershed of the Trask River watershed. Much of the lands within the scope of this project are located behind locked gates and access is difficult. BLM managed lands are in a checkerboard pattern throughout this part of the coast range. Much of the adjacent ownership is in private holdings and has been observed at an accelerated harvest rate and only requires compliance with the Oregon State forest practices act concerning habitat alteration. Because the forest practices act does not require the private land owners to conduct pre-disturbance surveys and identify sensitive plant sites, a considerable amount of habitat adjacent to the project area is continuously being reduced, therefore increasing the importance of known site protection of sensitive plant species on public lands. Design features such as establishing no-cut stream buffers, harvest by commercial thinning vs. regeneration harvest, and increasing the amount of down woody debris, all contribute to the essential habitat requirements for sensitive plant species throughout the project

area. Sensitive plant species located within or adjacent to the analysis area only have the ability to colonize or populate where required habitat is available.

3.9.2 Environmental Effects Alternative 1: No Action

There would be no effects to Special Status and Special Attention plant species and habitats under the No Action alternative.

3.9.3 Environmental Effects Alternative 2: The Proposed Action

The proposed action is the application of a variable-density thinning prescription to approximately 940 acres of relatively dense, single-storied, even-aged, Douglas-fir-dominated stands. Treatments include thinning the Douglas-fir stand component, generally retaining hardwoods and conifers other than Douglas-fir. Treatments would be designed to retain legacy trees, trees with structural deformities, existing down wood and snags, and a component of trees in the suppressed and intermediate crown classes.

Existing vegetation consists of a 35-71 year-old conifer over-story, an occasional remnant old growth, scattered pockets of hardwoods, an under-story of common shrubs and scattered populations of grasses and forbs. A variety of habitats are represented throughout the project area (substrates, rock, features, elevations, slopes, aspects, water, and topography). Surveys for BLM Special Status Species and all lichens, bryophytes, and vascular plants identified on the Oregon Natural Heritage Information Center Rare, Threatened and Endangered species of Oregon website (http://oregonstate.edu/ornhic/publications.html) were conducted. Plant surveys began in Spring of 2010. A complete record of the field surveys including a comprehensive plant list is available for review at the Tillamook Resource Area field office. No Threatened or Endangered species were encountered. Several Special Status Species were located and have been identified to date. Any listed species found as a result of conducting surveys will be subject to protection using management recommendations for that species. If these types of recommendations are not available then an assessment will be conducted to consider protection based on specific habitat requirements.

Cimicifuga elata is a BLM Special Status Species. All populations of this species were located within the no cut riparian reserves where no actual ground disturbance will occur. Current research has indicated that this species responds positively to partial disturbance and an increase in reproduction can be expected with increased amounts of light. Density management thinning will open the canopy allowing more light to access this population.

Euonymus occidentalis is a BLM Special Status Species. Several populations were located within the no cut riparian reserves and will not be affected by the thinning project therefore no protection recommendations will be required.

No other known sites of BLM Special Status Species have been verified at this time.

Cumulative Effects

There would be no indirect or direct effects under the proposed action alternative; therefore there would be no cumulative effects.

3.10 Air Quality, Fire Risk and Fuels Management

3.10.1 Affected Environment

Air Quality

The major source of air pollutants within the Turner Creek project area would come from potential wildfire starts, and from associated resource management activities including prescribed burning (swamper burning, hand, machine, and landing piles), and dust from the use of natural-surfaced roads in association with road construction, road maintenance, log hauling.

Smoke and dust contain pollutants consisting of small particles called particulate matter (PM). Particulate matter can cause health problems, especially in individuals with respiratory illness. Smoke in the air also affects visibility. Air quality standards are set by the Environmental Protection Agency and provide health and visibility protection as directed by the Clean Air Act of 1970, with amendments. The state of Oregon also sets standards to help protect air quality. The project areas are located 6 - 10 miles northwest of the city of Yamhill, Oregon, and closer to numerous unincorporated, rural areas. Yamhill is classified as a Smoke Sensitive Receptor Area under the Oregon State Implementation Plan and Oregon Smoke Management Plan. The anticipated haul routes will include BLM, private and county maintained asphalt, gravel, and dirt surfaced roads.

Fire Risk

The climate in Northwest Oregon is generally mild and wet in the winter. Occasionally, snowfall will remain at higher elevations for an extended period of time. Summers are warm with periods of dry weather usually during the months of July, August, and September. Summer temperatures during this period average approximately 60° F with high temperatures reaching the mid to upper 90's, and occasionally topping 100° F for short periods of time. During average weather years the conditions under the forest canopy remain relatively moist. The two main causes of wildfire starts across the state are lightning and people. Dry lightning (lightning that that has no accompanying moisture) that occurs during the summer months is rare in Northwest Oregon. Within the Oregon Department of Forestry's Astoria, Forest Grove & Tillamook Districts approximately 4% of fire starts in the analysis area are attributed to lightning (http://oregon.gov/ODF/FIRE/HLCause.pdf) . The highest risk ignition source within the

analysis area is people. Section(s) 3, 5, and 7 are located behind locked gates on Turner Creek Road. Section(s) 9, 17, 21, and 29 are located behind a locked gate on Belt Road. These areas may be accessible to the public via rocked roads during harvest operations on private land or during hunting season. OHV use on drivable and unimproved roads and trails is prevalent even when gates are locked. OHV use is one of the major human activities in the analysis area. The Oregon Department of Forestry regulates the use of forested lands during fire season. OHV riding in non-designated areas falls under the Oregon Department of Forestry Regulated Use Fire Season Closure.

Fire Regime and Condition Class (FRCC)

The modeling predictions from the LANDFIRE Rapid Assessment Vegetation Models (http://www.fs.fed.us/database/feis/fire_regime_table/fire_regime_table.html) within the Turner Creek analysis area are listed in Table 20.

Table 20: Modeling Predictions of Fire Regimes for the Turner Creek Project Area

Vegetation Community (Potential Natural Vegetation Group)	Fire Regime	Condition Class	Fire Severity	Fire Regime Characteristics			
				Percent of fires	Mean interval (years)	Minimum Interval (years)	Maximum interval (years)
Douglas-fir/western hemlock (dry mesic)	III	1	Replacement	25%	300	250	500
			Mixed	75%	100	50	150
Douglas-fir/western hemlock (wet mesic)	V	1	Replacement	71%	400	N/A	N/A
			Mixed	29%	>1000	N/A	N/A

The fire regime classifies the role fire would play across the landscape in the absence of modern human intervention. The analysis area falls within two different Fire Regimes. Fire Regime III is characterized by a moderate to low fire return interval with a mixed severity and is associated with south and west facing slopes. Fire Regime V is characterized by a low fire return interval with a high severity and is associated with north facing slopes. The Condition Class classifies the amount of departure from the natural fire regime. The timber stands in the analysis area generally fall within Condition Class 1 with species composition and structure functioning within their natural (historical) range. Some stands are moving into Condition Class 2 with moderate increases in tree density, recent fire exclusion, and replacement of shrubs with woody fuels and litter.

Timber Stand and Fire History

The Turner Creek analysis area has experienced numerous management activities over the past 100 years. In the early 1900's the Carlton & Coast Railroad began building tracks into the coast

range from the city of Carlton. In the early 1920's the Flora Logging Co. purchased a controlling interest in the railroad. The company continued to construct spurs farther into the coast range. Prior to the formation of the BLM under the management of the General Land Office from the early 1920's through the mid 1940's numerous individuals and private companies including the Flora Logging Co. purchased timber in the proposed project areas. (See Metskers Atlas of Yamhill County). In 1939 sections 5 and 7 were burned during the Saddle Mtn. Fire. This was the second of four fires that comprised the "Tillamook Burn". During the years following the burn, salvage and re-salvage of trees that were killed during this fire continued. In addition to salvage operations that harvested dead standing trees, many of the BLM contracts of the time included snag falling stipulations to remove smaller diameter trees that were not merchantable. These stipulations were designed to help reduce the potential for wildfire starts and to reduce the intensity and spotting potential if a fire did start. Occasionally, small prescribed (spot) burns were also conducted to further reduce concentrations of slash. Clearcut harvesting continued through the 1970's and 1980's within the analysis area. There are very few documented records that prescribed burning occurred on these clearcut harvest units, although it is likely, as with most timber sales of that era, that some of these areas had some type of prescribed fire activity for either hazard reduction or site preparation. Commercial thinning also occurred into the 1990's with the BLM Neverstill timber sale.

The BLM has two commercial thinning sales that are active in the analysis area (Blind Barney, and Cherry Sunday). Both of these sales have extensive patches of *Phellinus weirii*, and will have site preparation including the lopping and scattering of brush and slash, and handpiling and burning conducted. It has been 70 years since the 1939 Saddle Mtn. fire. Small amounts of the landscape have had broadcast or spot burning. This is well within the range of a normal fire return interval.

Fire Effects

Fire effects on forested areas are influenced by fire frequency, fire duration, and fire intensity (Van Wagner 1965). These factors in turn vary with forest type, depending on fuel type and structure, topography, and weather variables (east winds often have a major influence on wildfire events in the area). Previous wildfires, fuels treatments, and timber harvests, proposed treatments in the analysis area that would occur in the future, as well as the suppression priorities placed on BLM land by the Oregon Department of Forestry (the contracted agency responsible for fire protection on BLM land) would result in a continued low risk of a major stand replacement wildfire.

The National Fire Plan (August, 2000) and the Ten-Year Comprehensive Strategy for Reducing Wildland Fire Risks to Communities and the Environment (May, 2002) places a priority on working collaboratively within communities to reduce their risk from fires. The Healthy Forest Restoration Act of 2003 (HFRA) builds on existing efforts of the Ten-Year Strategic Plan and stresses the need for development of Community Wildfire Protection Plans (CWPP's). The Turner Creek analysis area is located within Yamhill County, OR. Yamhill County completed a CWPP in September, 2009. This plan identifies "Communities at Risk" within the county where natural cover and wildland fires pose a potential threat to people and their homes. The analysis area is not immediately adjacent to any identified "Communities At Risk". Yamhill County

identified two zones within their CWPP. Zone 1 is the forested, mountainous area located approximately in the western one-third of the county, and is generally considered to be commercial forest land. Zone 2 includes all portions of the county east of Zone 1 and is made up of agricultural land, incorporated cities, unincorporated communities and scattered homes and wood lots. The majority of BLM managed land within the analysis area falls within Zone 2. In addition, BLM managed land in Section 21 and 29 falls within managed Rural Interface Areas as identified in the *Salem District Record of Decision and Resource Management Plan (May, 1995).* Collaboration is essential to meet the objectives of the HFRA so fuels treatments that would reduce the likelihood of wildfire starts on federal land spreading to private land and eventually "Communities at Risk" would help the counties to meet the goals of their CWPP's.

Fuels Management

Density management thinning prescriptions will change the structure of the timber stands in the analysis area. Management direction within the AMA (Adaptive Management Area) land use allocation calls for exploring and supporting opportunities to research the role and effects of fire management on ecosystem functions. The AMA Land Use Allocations require site specific prescribed fire (burn) plans to be prepared if burning is to be initiated to reduce fire hazard or for site preparation. The current dead fuel load in the Density Management timber stands identified during stand exams and by using GTR PNW-105 *Photo Series for Quantifying Natural Forest Residues in Common Vegetation Types of the Pacific Northwest* (Maxwell and Ward, 1980) is listed in Table 21.

Table 21: Dead Fuel Loading in Proposed Density Management Units

Unit Number	Curtis Relative Density Pre-Harvest	Curtis Relative Density Post-Harvest	Decay Class 1/2/3 tons/ac.[1]	Decay Class 4/5 tons/ac.[1]	Current CWD tons/ac.[1]	Additional CWD (DC 1 & 2 + tops & limbs) tons/ac.[2]	Future Snag to CWD tons/ac.[3]	Total Future CWD tons/ac.[4]
3-3	61	38	1.9	0.8	2.7	18.7	3.0	21.7
5-1	50	32	0.2	0.2	0.4	14.5	3.0	17.5
5-5	67	35	0.0	0.7	0.7	37.7	1.5	39.2
5-17	58	35	0.0	0.0	0.0	17.2	3.0	20.2
7-2	54	30	0.5	1.8	2.3	18.0	3.0	21.0
9-17	60	33	20.2	3.0	23.2	25.0	3.0	28.0
17-4	50	26	0.0	0.2	0.2	13.9	1.5	15.4
17-9	65	29	0.0	2.9	2.9	43.9	1.5	45.4
17-10	52	24	0.0	0.8	0.8	37.5	3.0	40.5
17-44	60	31	0.1	1.1	1.2	22.0	3.0	25.0
21-41	71	38	0.0	0.3	0.3	25.8	3.0	28.8
21-42	58	31	2.5	0.8	3.3	22.5	3.0	25.5
29-49	59	34	0.9	2.5	3.3	27.5	3.0	30.5

[1]Current CWD identified during stand exams.

[2]Includes 1.5 tons/ac for additional CWD following harvest (2 trees), and 1 ton/ac for every 7 harvested trees (tops, limbs, and bark).
[3]Includes ¾ ton/tree/ac for additional snags left for future CWD.
[4]Total of all current CWD and future CWD from snags left following harvest.

Existing CWD within the analysis area falls within all Decay Classes, however Decay Classes 4 & 5 comprise 71% of this material if you exclude Unit 9-17 which has a much larger amount of Decay Class 1, 2, & 3 CWD than any of the other units. The stands currently fall under NFDRS Fuel Model 10 (Timber - (closed timber litter)). Following commercial thinning, management direction further requires leaving additional logs to meet short term needs (Decay classes 1 & 2). Also, additional trees must be left for future recruitment of snags and CWD.

When harvest has been completed, fuels surveys will be conducted and density management units that are identified as containing hazardous fuels or as areas that need site preparation (*Phellinus weirii* pockets) for reforestation may have hand piles constructed within areas containing dense slash. Machine piles may be constructed along roads, and landing piles may be constructed where logs are hauled to roads. If fuel loads are relatively light along property lines or roads, slash pullback may be incorporated as the desired fuels treatment.

3.10.2 Environmental Effects Alternative 1: No Action

Air Quality

With no density management thinning project there would be no need for road construction or log hauling, and little need for road maintenance. There would be little need for hazard reduction and no need for site preparation prior to reforestation. Consequently, there would be no need for prescribed burning and no localized effects to air quality.

Fire Risk / Fuels Management

With no density management commercial thinning project the no action alternative would allow the analysis area to continue on its current trend. The current risk of a fire start would remain low. There would be a slow increase in the coarse woody fuel load (1000 hour fuels) as well as the fine fuel load (1, 10, and 100 hour fuels) in these timber stands as stress-induced mortality within the stands increases. Areas infected with the root disease *Phellinus weirii* would see somewhat larger increases in fuel loading as Douglas-fir tree roots are weakened and the trees fall in small 1 to 2 acre pockets. Ladder fuel densities would continue to increase as understory trees grow larger and new understory trees begin to grow. The potential for these stands to eventually succumb to a wildfire would continue to increase. There would be little need for hazard reduction anywhere except along roads, and no need for site preparation. As a consequence, there would be no need for broadcast burning, hand or machine piling and burning, or landing burning, and no risk of one of these treatments escaping and starting a wildfire. The same areas currently behind locked gates would remain relatively inaccessible to the public. The

risk of a wildfire would gradually increase as the fuel load accumulates and the stands near the mean interval for a naturally occurring return of fire.

Cumulative Effects

Under the no action alternative there would be no commercial harvest of timber, no log hauling, and no prescribed burning, and therefore no cumulative effect to air quality or fire risk. The stands would continue on their trajectory toward a natural return of fire as the main disturbance mechanism with the fuel load slowly increasing over time and with it the potential for producing large quantities of smoke associated with a wildfire.

3.10.3 Environmental Effects Alternative 2: The Proposed Action

Air Quality

The project areas will have timber harvested and logs will be hauled over short sections of BLM and other roads. Dust created from vehicle traffic on gravel or natural-surface roads, from road construction, road maintenance, logging operations, or log hauling, would contribute short-term effects to air quality. None of these management activities would create dust above threshold levels. These effects would be localized to the immediate vicinity of the operations.

If the increased fuel load resulting from the density management timber harvest project is determined by the BLM to be a fire hazard, or to significantly reduce the ability to reforest then prescribed burning in the form of hand or machine piling and burning, swamper burning, or landing burning would be conducted and smoke will be created. Hand or machine pile burning, swamper burning, and landing pile burning would occur during the fall/ winter time period. All prescribed burning would be coordinated with the local Oregon Department of Forestry office. All burning will be conducted in accordance with the *Oregon State Implementation Plan* and *Oregon Smoke Management Plan*. These plans limit or prohibit burning during periods of stable atmospheric conditions. Burning would be conducted when the prevailing winds are blowing away from SSRA's (Smoke Sensitive Receptor Areas) in order to minimize or eliminate the potential for smoke intrusions. The potential for smoke intrusion would be further reduced by burning under atmospheric conditions that favor good vertical mixing so that smoke and other particulate matter is borne aloft and dispersed by upper elevation winds.

Where hand or machine pile burning, swamper burning, or landing pile burning is the designated hazard reduction or site preparation strategy the short term impacts to air quality within one-quarter to one mile of units would persist for 1-to-3 days. None of the harvest units or other treatment areas are sufficiently close to any major highways that motorist safety would be affected. The overall effects of smoke on air quality is predicted to be local and of short duration. Activities associated with the proposed action would comply with the provisions of the Clean Air Act.

Fire Risk

Fire is the major disturbance process in the analysis area. Initially, the fuel load, risk of a fire start, and the ability to control a fire, would all increase as a result of the proposed action.

Slash created by the harvest of timber, and the addition of coarse woody debris for wildlife habitat within harvest units would add an estimated 15 - 38 tons/acre of dead fuel to the density management harvest units.

Wildfire or prescribed fire has a major influence on vegetation in the analysis area. It specifically affects seedbed preparation, nutrient cycling, successional pathways, fish and wildlife habitat, vegetative species composition, age, and structure, insect and disease susceptibility, and fire hazards.

Fire effects from wildfire may include: total tree mortality, formation of snags, loss of plant, fish and wildlife habitat, loss of resources on adjacent private land, elimination of the duff and litter layers, reduction of the downed woody component (especially logs in later stages of decay), loss of soil productivity, increased soil erosion, increased sediment loading to streams, decreased infiltration rates, and short term, high level inputs of smoke into the air. All density management harvest projects result in short term (1-5 year) increased fire ignition potential because of the increase of fine dead fuels.

The first strategy to reduce the risk of a fire is to reduce fuels in accessible areas. Although the project areas are located behind locked gates, these gates are often open when logging operations are taking place on private industrial forest land. In addition, many of these gates are open during hunting season leaving the project areas

Density management thinning from below will remove ladder fuels (fuels that provide a "ladder" for fire to climb from the surface into the crowns) and decrease tree crown density (or crown bulk density) to levels that would be unlikely to sustain a high intensity crown fire. A relative density of 35-45 has been identified as the point where crown bulk density is unlikely to sustain a high intensity crown fire (Agee, 1996). The silvicultural prescription for all of the units in the analysis area (see Table 10) falls within or below this range.

Surface fuel reduction in strategic locations such as landing areas, along roads, property lines, and in *Phellinus weirii* pockets through hand piling and burning, machine piling/landing piling and burning, swamper burning or slash pullback will further reduce the risk in accessible areas. Increasing the height to the live crown base, opening canopies, and reducing surface fuels should result in lower fire intensity, less probability of torching, and a lower probability of an independent crown fire.

The second strategy to reduce the potential of a large fire is through aggressive initial attack of all fire starts. BLM managed lands in Western Oregon are protected through the Western Oregon Fire Protection Services Contract with the Oregon Department of Forestry. BLM land managed under the AMA land use allocation within the analysis area has been identified in most

cases for aggressive initial attack using minimum impact suppression techniques that are appropriate to the land use allocation.

For the short term, the fire risk associated with the density management thinned timber stands, and the other treatment areas within the analysis area would remain low. Over the long term, the fuel load would steadily increase, primarily as a consequence of increased mortality of diseased (*Phellinus weirii* infected) and other stressed trees in the stands, but also as a result of the wildlife trees left as snags and other trees left for future CWD recruitment.

Fuels Management

The fuel load will increase as a result of the proposed action. Slash created by the harvest of timber, along with the addition of Decay Class 1 and 2 coarse woody debris and snags for future CWD recruitment for wildlife habitat would add an estimated 15 - 38 tons/acre of dead fuel to the density management harvest units.
Treatment of selected, high hazard fuel concentrations is planned for hazard reduction and site preparation. Hand piling and burning, machine/landing piling and burning, swamper burning, slashing, lopping and scattering, and pullback of slash to create fuel free zones will be used individually or in combination in the project area.

Fuels treatments in areas with elevated risk of human-caused ignition would reduce potential fire starts. Fuels treatments adjacent to areas with high value resources such as riparian habitat, and private lands, would reduce potential costs associated with fire suppression. The proposed fuel treatments associated with prescribed burning would result in small (<0.5 acre), scattered, localized areas of severe soil disturbance. This would potentially alter nutrient availability, soil infiltration, and soil structure. To mitigate this damage broadcast burning would be conducted during the spring and other types of burning would be conducted during the fall with wet soil conditions, when soil resources are less vulnerable to impacts. Piles will not be constructed in riparian buffers. See Table 6 for approximate treatment acres and numbers of piles to be constructed in each unit.

Cumulative Effects

Under the proposed action alternative, air quality issues will be local and of short duration during timber harvest, and burning of hand, machine, and landing piles. With the current trend in the public's activities on federal lands the potential for wildfire starts would be expected to remain the same or increase slightly if recreational activities increase. The density management thinning units within the analysis area would likely see a decrease in use as a result of the slash created during harvest. There would be a decrease in the potential for wildfire moving from surface fuels in the harvest units into the crowns with the removal of ladder fuels, however there would be a cumulative short term one to five (1 - 5) year increase in the risk of a fire start due to the residual slash left following harvest. This increase will be somewhat mitigated by the burning of hand, machine, and landing piles. The 1939 Saddle Mtn. Fire that burned several of the sections, and the small amount of prescribed burning treatments that occurred would further mitigate the potential spread of wildfire in the analysis area. Cumulative potential for a wildfire start would

decrease in the longer term over the next few decades as the logging slash decays, and because the potential natural increase in the fuel load as a result of suppression mortality would not be present following harvest.

3.11 Carbon Storage, Carbon Emissions, and Climate Change

This proposed project is tiered to the PRMP FEIS (1994) which concluded that all alternatives analyzed in the FEIS, in their entirety including all timber harvest, would have only slight (context indicates that the effect would be too small to calculate) effect on carbon dioxide levels. Responsive to public comment, the BLM considers it prudent to include project level analysis of carbon storage and emissions.

Resource Specific Methodology

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

Greenhouse Gases, Climate Change and the Spatial Scale for Analysis

Forster et. al. 2007 (pp. 129-234), which is incorporated here by reference, concluded that human-caused increases in greenhouse gases are extremely likely to have exerted a substantial effect on global climate. The U.S. Geological Survey, in a May 14, 2008 memorandum to the U.S. Fish and Wildlife Service, concluded that it is currently beyond the scope of existing science to identify a specific source of greenhouse gas emissions or sequestration and designate it as the cause of specific climate impacts at a specific location. This defines the spatial scale for analysis as global, not local, regional or continental. That memorandum is incorporated here by reference.

Temporal Scale for Analysis

The BLM has selected 30 years as the analysis period of carbon storage for this project, because it encompasses the duration of the direct and indirect effects on carbon storage. In 30 years, stands in the project area will have exceeded current carbon storage levels, and carbon storage will have offset carbon emissions resulting from harvest.

Calculations of Carbon Storage and Carbon in Greenhouse Gas Emissions, Project Area Scale

The purpose of the calculation of carbon storage is to provide a basis for determining significance of carbon storage relative to the temporal and spatial scale. The BLM used site specific data from stand exams as input to the ORGANON stand growth model (v. 8.1, 2006) to

predict stand growth to calculate live tree carbon under of each alternative. Calculations from Smith et al, 2006 were used to calculate carbon in the other than live trees category.

Greenhouse gas emission from harvest operations are based on empirical analysis of fuel use per thousand board feet from past timber sales. The estimates of emissions from prescribed fire (burning of landing piles) are based on quantity of slash accumulations typically produced in similar projects.

The 2008 FEIS analyzed carbon stored in harvested wood in the using a factor from Smith et al. 2006, p. 35 for converting board feet of harvested wood to carbon. Based on information developed after the 2008 FEIS, this factor has been refined to better account for regionally-specific conditions and the proportion of harvested volume that is typically milled into solid wood products and into processed wood products. Harvest volumes were converted to cubic feet, converted to pounds of biomass, and then to carbon content, yielding an overall conversion factor of 1,000 board feet = 1.326 tonnes of carbon (R. Hardt, personal communication, 11/09). Of this total amount of carbon in harvested wood, 63.8% of harvest volume is considered as sawlogs and 36.2% as pulpwood (GTR RM-199, Table B-6), for evaluation using the storage rates over time from Smith et al. 2006, p. 27. The improved conversion factor is used in this analysis to evaluate the amount of carbon stored in harvested wood. The effect of the 2008 FEIS alternatives on carbon storage has been reanalyzed based on this improved conversion factor. This reanalysis revealed a slight increase in the amount of carbon storage over time for all alternatives and less difference among the alternatives than described in the 2008 FEIS, pp. 537-543, but no change in the magnitude or trend of effects on carbon storage from that described in the 2008 FEIS.

3.11.1 Affected Environment

Climate Change

The 2008 FEIS described current information on predicted changes in regional climate (pp. 488-490) , concluding that the regional climate has become warmer and wetter with reduced snowpack, and continued change is likely. However, because of uncertainty about changes in precipitation, it is not possible to predict changes in vegetation types and condition, wildfire frequency and intensity, streamflow, and wildlife habitat.

Under average historic conditions (2008 FEIS, pp. 3-211), BLM-managed lands in western Oregon stored 576 million tonnes of carbon, 35% more than is currently stored in forests and harvested wood today, due to the greater proportion of young stands on those lands today (2008 FEIS, pp. 3-224).

The proposed action is to conduct density management harvest on approximately 940 acres of trees with a weighted average (by acre) age of 61 years.

Carbon Storage

The following show quantities of carbon in forest ecosystem vegetation[3] in the Coast Range, and in the Turner Creek project area.

- Total carbon, forest ecosystem vegetation, Pacific Northwest, Coast Range 1.8-2 Giga-tonnes (Gt) (Hudiburg, et al. 2009).
- Total carbon, forest ecosystem vegetation, Turner Creek Project stands = 178,100 tonnes or 0.0001781 Gt. This represents *.009%* of the Coast Range total.
- The annual carbon accumulation from forest management in the United States is 191 million tonnes. Current management on BLM-managed lands in western Oregon would result in an average annual accumulation of 1.69 million tonnes over the next 100 years, or 0.9% of the current U.S. accumulation. (WOPR, pp. 4-537).

Carbon in forest ecosystem vegetation can be divided into three pools, and form the basis of the analysis for carbon storage and emissions for the Upper Siletz River project:

- Live trees (foliage, branches, stems, bark and live roots of trees),
- Forest carbon other than live trees (dead wood and roots, non-tree vegetation, litter and soil organic matter) and
- Harvested wood products.

Emissions of carbon resulting from timber harvest can be divided into several sources:

- Equipment used to harvest and haul logs,
- Disposal of harvest-generated fuels or slash by burning,
- Harvested wood products that are disposed of as waste, burned without energy capture, or discarded over time and allowed to decay.

3.11.2 Environmental Effects Alternative 1: No Action

Under the no action alternative, no greenhouse gases would be emitted from harvest operations or fuels treatments. Carbon stored in live trees would not be converted to the harvested wood carbon pool. A portion of the carbon currently stored in live trees would be converted over time to the forest "carbon other than live trees" pool through ongoing processes of tree mortality.

After 30 years of growth, live tree carbon would increase to 214,000 tonnes, an increase of 71,800 tonnes from the current level of 142,200 tonnes.

The no action alternative would result in greater net carbon storage over the 30 year analysis period than the proposed action by approximately 53,400 tonnes.

Cumulative Effects

<u>Incremental Effects of Project Related Greenhouse Gases and Carbon Storage</u>*:*

[3] Carbon contained in both above ground and below ground parts of trees and forest vegetation, and downed wood, litter and duff. It does not include mineral carbon in soil, nor fossil fuels.

This increase of 71,800 tonnes of live tree carbon would contribute to an annual average of 2,393 tonnes, or .001% to the U.S. annual accumulation of carbon from forest management of 191 million tonnes. The WOPR EIS (p. 4-538), which is incorporated here by reference, states that by 2056, the No Harvest benchmark analysis (no future harvest of BLM-managed lands in the analysis area, as reanalyzed in November 6, 2009 memo, on file, BLM Salem District Office, Marys Peak Resource Area) would result in a total carbon storage of approximately 603 million tonnes, 5% higher than average historic conditions (576 million tonnes, WOPR, p. 3-224).

3.11.3 Environmental Effects Alternative 2: The Proposed Action

Short-term Impacts (0-10 years after timber harvest):

Harvest Operations
Equipment use necessary to harvest and transport the timber to the nearest mill would consume an estimated 39,856 gallons of fuel. This represents total emissions of 109 tonnes of carbon.

Live Trees
Live trees would be removed, decreasing live tree carbon from 142,200 to 86,300 tonnes, and transferring 55,900 tonnes of live tree carbon storage to other pools.

Forest Carbon Other Than Live Trees
Some carbon would be converted to forest carbon other than live trees - dead material that would store carbon and slowly release it through decay. Decay of dead material would result in slow release of carbon under all alternatives, and this analysis assumes that the rate of release would not differ among alternatives, including the No Action alternative. Emissions from decay of dead material are not quantified in this analysis. Burning of landing piles after harvest would result in 635 tonnes of carbon emitted.

Harvested Wood
Harvested saw log gross volume of 15,040 mbf would contain 19,943 tonnes of carbon. Much of the emissions from harvested wood occur shortly after harvest. In the first 10 years after harvest, approximately 4,545 tonnes would be emitted.

Long-term Impacts (11-30 years after timber harvest):

Live Trees
Following harvest an average of 65 trees per acre would remain on site, and would store carbon as they grow. Additionally, new tree seedlings are likely to establish and grow on 81 acres planned for planting, increasing carbon storage. However, in order to avoid prediction error they are not included in this analysis, providing a conservative estimate of carbon storage. Carbon emissions resulting from the proposed action would be offset by carbon storage in tree growth approximately five years after harvest. Live tree carbon would equal the pre-treatment level after approximately 30 years of growth. After 30 years of growth, carbon stored in live trees would be 152,800 tonnes, 10,600 than the current (pre-harvest) level of 142,200 tonnes.

Harvested Wood
Harvested wood in the Turner project would contain 19,900 tonnes of carbon. From 11 to 30 years after harvest approximately 1,200 tonnes of carbon would be emitted from harvested wood, totaling 6,500 tonnes (33%) emitted without energy capture in the full 30 year analysis period. The balance, approximately 13,400 tonnes (67%) of the carbon would remain stored in products still in use and in landfills, or emitted with energy capture (based on regional averages, Smith et al. 2006, WOPR Appendix C:30).

Summary of Carbon Storage and Greenhouse Gas Emissions
To summarize, total greenhouse gas emissions resulting from harvest, fuel treatment and harvested wood would be 6,450 tonnes, while storage would equal 24,832 tonnes (net storage of 18,382 tonnes) and include the following:

Short-term emissions (0-10 years post-harvest)
- Harvest operations emissions totaling about 109 tonnes
- Fuel treatment (burning) emissions totaling 635 tonnes
- Emissions from harvested wood 0 to 10 years after harvest 4,545 tonnes

Long-term emissions(11-30 years post-harvest)
- Emissions from harvested wood, 11 to 30 years after harvest of 1,161 tonnes.

Long-term Storage (30 year analysis period)
- 14,236 tonnes of storage in harvested wood
- 10,596 tonnes net storage in live trees after 30 years of growth

Greenhouse gas emissions and carbon storage over the 30 year analysis period resulting from the proposed action are displayed in21, below.

Cumulative Effects

Incremental Effects of Project Related Greenhouse Gases and Carbon Storage*:*
Carbon emissions resulting from the proposed action would total 6,450 tonnes. Current global emissions of carbon dioxide total 25 billion tonnes of carbon dioxide (IPCC 2007, p. 513), and current U.S. emissions of carbon dioxide total 6 billion tonnes (EPA 2007, pp. 2-3). Therefore, the emissions from the proposed action would constitute .00003% of current global emissions and 0.0001% of current U.S. emissions.

Tree growth following harvest would offset greenhouse gases and result in net storage of 18,382 tonnes of carbon. The WOPR EIS (p. 4-538), which is incorporated here by reference, states that by 2106, the No Action Alternative (management under the 1995 RMP) would result in a total carbon storage of approximately 628 million tonnes, 9% higher than average historic conditions (576 million tonnes, WOPR, 3-224, as reanalyzed in November 6, 2009 memo, on file, BLM Salem District Office, Marys Peak Resource Area). The incremental effect of the proposed action, over time, would be net storage of carbon.

Comparison of Alternatives
Greenhouse gas emissions and carbon storage over the 30 year analysis period resulting from the Proposed Action and No Action Alternatives are displayed in Table 21.

Table 21: Carbon Emissions and Storage, Comparison of Alternatives

Source	***Proposed Action (Tonnes)***	***No Action Alternative (Tonnes)***	***Notes***
Emissions, 2010-2040	*6,450*	*0*	***Logging, fuel treatments (burning), and emissions from harvested wood.***
Live tree storage, 2040	152,800	214,000	30 years of stand growth
Live tree storage, 2010 (current conditions)	142,200	142,200	60 year old stand, 2010
Net change, live trees	10,600	71,800	Live tree carbon from growth 2010 - 2040
Harvested wood storage, 2040	14,240	0	69% of harvested wood carbon, 30 years
Total storage increase	**24,840**	**71,800**	Storage: live trees and harvested wood
Net Carbon Storage, Proposed Action	**18,390**	**71,800**	**Storage minus emissions, 2010-2040**

Under the No Action alternative, 29% more carbon would remain stored in live trees than under the Proposed Action during the 30 year analysis period. Under the Proposed Action, carbon would be released through logging, fuel treatments and emissions resulting from harvested wood, the majority (82%) within ten years after harvest. Stand growth subsequent to harvest would store carbon equivalent to those emissions within three years. Therefore, the period where emissions are greater than storage is less than four years, a temporary effect.

Under the No Action alternative, no carbon emissions would occur except for processes not considered in this analysis due to their relatively small effect. Emissions under the Proposed Action would total 6,450 tonnes, equivalent to 4% of the current live tree storage in the project area, and approximately .0001% of current U.S. annual emissions. The cumulative effect of management of BLM Western Oregon forest lands is a net increase of carbon storage above average historic conditions.

Emissions resulting from the Proposed Action would be small and temporary, and therefore not significant. Furthermore, it is currently beyond the scope of existing science to identify a specific source of greenhouse gas emissions or sequestration and designate it as the cause of specific climate impacts at a specific location.

3.12 Review of Elements of the Environment Based On Authorities and Management Direction

Table 22: Elements of the Environment Review based on Authorities and Management Direction

Element of the Environment /Authority	Remarks/Effects
Aquatic Conservation Strategy	In compliance with PCFFA IV (Civ. No. 04-1299RSM), this project complies with the Aquatic Conservation Strategy described in the Northwest Forest Plan and ROD/RMP. This project also complies with the PCFFA II (265 F.3d 1028 (9th Cir. 2001)) by analyzing the site-scale effects on the Aquatic Conservation Strategy. EA sections 3.1, 3.2, 3.3, 3.4 and 3.13 show how the Turner Creek Project meets the Aquatic Conservation Strategy in the context of the PCFFA cases.
Air Quality (Clean Air Act as amended (42 USC 7401 et seq.)	This project is in compliance with this direction because air quality impacts would be of short duration. Addressed in Text (EA section 3.10).
Cultural Resources (National Historic Preservation Act, as amended (16 USC 470) [40 CFR 1508.27(b)(3)], [40 CFR 1508.27(b)(8)]	This project is in compliance with this direction and it would have no effect on this element because cultural resource inventories of the affected area would precede management actions that include any ground disturbing activities that could potentially damage cultural resources.
Ecologically critical areas [40 CFR 1508.27(b)(3)]	This project would have no effect on this element because there are no ecologically critical areas present within the project area.
Energy Policy (Executive Order 13212)	This project is in compliance with this direction because it would not interfere with the Energy Policy (Executive Order 13212).
Environmental Justice (E.O. 12898, "Environmental Justice" February 11, 1994)	This project is in compliance with this direction because it would have no effect on low income populations.
Fish Habitat, Essential (Magnuson-Stevens Act Provision: Essential Fish Habitat (EFH): Final Rule (50 CFR Part 600; 67 FR 2376, January 17, 2002)	This project is in compliance with this direction because it would have minimal short-term adverse effects and long-term beneficial effects on MSA species and Essential Habitat. Effects to this element are addressed in text (EA section 3.3).
Farm Lands, Prime [40 CFR 1508.27(b)(3)]	The project would have no effect on this element because no prime farm lands are present in the project area.
Floodplains (E.O. 11988, as amended, Floodplain Management, 5/24/77)	This project is in compliance with this direction because the proposed treatments would not change or affect floodplain functions.
Hazardous or Solid Wastes (Resource Conservation and Recovery Act of 1976 (43 USC 6901 et seq.) Comprehensive Environmental Repose Compensation, and Liability Act of 1980, as amended (43 USC 9615)	This project would have no effect on this element because no Hazardous or Solid Waste would be stored or disposed of on BLM lands as a result of this project.
Healthy Forests Restoration Act (Healthy Forests Restoration Act of 2003 (P.L. 108-148)	This project is in compliance with this direction because treatments would decrease the risk of fire and help restore forests to healthy functioning condition (EA section 3.10)

Element of the Environment /Authority	Remarks/Effects
Migratory Birds (Migratory Bird Act of 1918, as amended (16 USC 703 et seq)	This project is in compliance with this direction because treatments would generally enhance habitat for migratory birds. Addressed in text (EA section 3.6).
Native American Religious Concerns (American Indian Religious Freedom Act of 1978 (42 USC 1996)	This project is in compliance with this direction because no Native American religious concerns were identified during the scoping period (EA section 1.4).
Noxious weed or non-Invasive, Species (Federal Noxious Weed Control Act and Executive Order 13112)	This project is in compliance with this direction because Project Design Features would prevent establishment of new populations of invasive plant species and because vegetation development would result in decline in both number and vigor of invasive plant populations in the project area. Addressed in text (EA section 3.8)
Park lands [40 CFR 1508.27(b)(3)]	The project would have no effect on this element because there are no parks within or adjacent to the project area.
Public Health and Safety [40 CFR 1508.27(b)(2)]	The project would have no effect on this element because public access would be controlled within the project area during operations and the project would not create hazards lasting beyond project operations.
Threatened or Endangered Species (Endangered Species Act of 1983, as amended (16 USC 1531)	This project is in compliance with this direction because there would be no adverse effects on Threatened or Endangered Species (EA sections 3.3 and 3.5).
Water Quality –Drinking, Ground (Safe Drinking Water Act, as amended (43 USC 300f et seq.) Clean Water Act of 1977 (33 USC 1251 et seq.)	This project is in compliance with this direction because Oregon State water quality standards would be adhered to and the area hydrology would not be changed measurably. Addressed in text (EA sections 3.2)
Wetlands (E.O. 11990 Protection of Wetlands 5/24/77) [40 CFR 1508.27(b)(3)]	This project is in compliance with this direction because no wetlands are within the project area and adjacent wetlands would be protected by buffers. (EA section 3.2)
Wild and Scenic Rivers (Wild and Scenic Rivers Act, as amended (16 USC 1271) [40 CFR 1508.27(b)(3)]	This project is in compliance with this direction because there are no Wild and Scenic Rivers within or adjacent to the project area.
Wilderness (Federal Land Policy and Management Act of 1976 (43 USC 1701 et seq.); Wilderness Act of 1964 (16 USC 1131 et seq.)	This project is in compliance with this direction because there are no Wilderness Areas or areas being considered for Wilderness Area status in or adjacent to the project area.

3.13 Compliance with the Aquatic Conservation Strategy

Based on the environmental analysis described in the previous sections of the EA, Tillamook Resource Area staff have determined that the project complies with the ACS on the project (site) scale. The project complies with the four components of the Aquatic Conservation Strategy, as follows:

- ***ACS Component 1 - Riparian Reserves:*** The project would comply with Component 1 by maintaining canopy cover along all streams and wetlands, which protect stream bank stability and water temperature. No-harvest buffers would protect streams from direct disturbance from logging. Road and landing locations have been minimized in Riparian Reserves. Addressed in text (EA sections 3.2 and 3.3)
- ***ACS Component 2 - Key Watershed***: The project would comply with Component 2 by establishing that the Turner Creek Project is not within a Key watershed. (ROD/RMP p. 7).
- ***ACS Component 3 - Watershed Analysis:*** The project would comply with Component 3 by incorporating the following recommendations from the North Yamhill River Watershed Analysis.
  - Density management and thinning in Riparian Reserve to develop and maintain late seral stand characteristics. Thinning in this project is designed to develop the large tree component faster, leading to earlier potential for recruiting CWD, LWD, snag and large tree habitat and to develop understory vegetation. Maintains at least 50% crown closure in Riparian Reserve. Untreated areas provide additional range of species and density mix.
  - Develop standing dead and down LWD by leaving enough trees for future recruitment if needed. Thinning would leave many times the recommended retention to develop large trees for future recruitment. This goal would be achieved over time.
  - Road densities. Roads to be constructed, improved or renovated for use in this project would be located on ridgetops and stable, gentle slopes to avoid sedimentation impacts.. There would be a net decrease of 3.9 miles of road as a result of this project.
  - Noxious weeds. Equipment washing required. Vegetation Management EIS provides further guidance.
  - Riparian Condition and LWD on Federal Lands, accelerate growth for recruitment of LWD for stream structure. Thinning is designed to accelerate growth. Suitable large trees would be available years to decades sooner than without treatment.
  - Stream flows, water quality, ODEQ 303(d), and stream temperatures. The project would not contribute to detectable changes in these elements.
  - Soils, Slope Stability and Mass Wasting: Project design avoids erosion. There are no slides or bare slopes identified in the project area.
- ***ACS Component 4 - Watershed Restoration*** The project would comply with Component 4 by the combination of thinning and unthinned areas in Riparian Reserves, which would further enhance terrestrial habitat complexity in the long- and short-term. Thinning in all LUAs would be expected to result in long-term restoration of large conifers and the potential for material that would contribute to in-stream habitat complexity in the long-term.

Tillamook Resource Area staff have reviewed this project against the ACS objectives at the project or site scale with the following results.

The No Action alternative does not retard or prevent the attainment of any of the nine ACS objectives because this alternative would maintain current conditions. The proposed action

does not retard or prevent the attainment of any of the nine ACS objectives for the following reasons.

1. **ACSO 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.** Addressed in Text (*EA sections 3.1, 3.5, 3.6*). In summary:

   No Action Alternative: The No Action alternative would maintain the development of the existing vegetation and associated stand structure at its present rate. The current distribution, diversity and complexity of watershed and landscape-scale features would be maintained.

   Proposed Action: The proposed treatment would maintain and restore the distribution, diversity, and complexity of watershed and landscape-scale features. Variable density thinning would result in forest stands that exhibit attributes typically associated with stands of a more advanced age and stand structural development (larger trees, a more developed understory, and an increase in the number, size and quality of snags and down logs). This would occur sooner than from the No Action alternative. Thinning treatments in Riparian Reserves would be the same as the adjacent AMA lands. It would increase the growth of residual trees and reduce the time for those trees to become large enough to provide a future source of large woody debris to stream channels.

2. **ACSO 2: Maintain and restore spatial and temporal connectivity within and between watersheds.** Addressed in Text *(EA sections 3.1, 3.3, 3.5, 3.6)* In summary:

   No Action Alternative: The No Action alternative would have little effect on connectivity except in the long term within the affected watersheds.

   Proposed Action: Long term connectivity of terrestrial watershed features would be improved by enhancing conditions for stand structure development. In time, the Riparian Reserve LUA would improve in functioning as refugia for late successional, aquatic and riparian associated and dependent species.

   Both terrestrial and aquatic connectivity would be maintained, and over the long-term, as the Riparian Reserve LUA develops late successional characteristics, lateral, longitudinal and drainage connectivity would be restored.

3. **ACSO 3: Maintain and restore the physical integrity of the aquatic system, including shorelines, banks, and bottom configurations.** Addressed in Text (*EA sections 2.4.2, 3.2, 3.3*). In summary:

   No Action Alternative: It is assumed that the current condition of physical integrity would be maintained.

   Proposed Action: Physical integrity of short channel segments at existing stream crossings would be altered for one to several years following replacement of approximately 15 culverts and removal of two other culverts under the Proposed Action. Alterations

would be localized in channel surfaces, banks and beds at stream crossings. Following stream crossing work, there will likely be some channel adjustments when existing undersized structures, which are increasing sediment deposition upstream and reducing sediment deposition and increasing scour downstream, are replaced with larger culverts or are removed. Because the streams are stable and low gradient at these stream crossings, adjustments would not extend more than 100 feet downstream or upstream. In the long-term, this action would maintain and restore the physical integrity of the aquatic systems at these stream crossings and reduce the potential for future culvert and road fill failures.

4. **ACSO 4: Maintain and restore water quality necessary to support healthy riparian, aquatic, and wetland ecosystems.** Addressed in Text (*EA sections 2.4.2, 3.2, 3.3, 3.4*). In summary:

   No Action Alternative: It is assumed that the current condition of the water quality would continue a gradual downward trend with more sediment delivery and higher turbidity due to a poorly maintained road system.

   Proposed Action: Sediment delivery rates and turbidity levels in the affected subwatershed are likely to increase over the short-term as a direct result of road maintenance, road decommissioning, and hauling. Sediment increases would not be visible beyond a few hundred feet downstream from road/stream intersections and would not be expected to affect recognized beneficial uses. Over the long-term (beyond 3-5 years), current conditions and trends in turbidity and sediment yield would likely be slightly improved under the proposed action. The proposed action would be unlikely to have any measurable effect on other water quality parameters including bacteria, stream temperatures, pH, or dissolved oxygen.

5. **ACSO 5: Maintain and restore the sediment regime under which aquatic ecosystems evolved.** Addressed in Text (*EA sections 2.4.2, 3.2, 3.3*). In summary:

   No Action Alternative: It is assumed that the current levels of sediment delivered to streams would continue to gradually increase primarily due to lack of road maintenance.

   Proposed Action: Short-term localized increases in stream sediment can be expected during temporary roadwork (mainly at stream crossings) and, to much more limited extent, timber hauling. Project planning, PDFs and BMPs would be implemented to minimize sediment delivery to streams. Over the long-term (beyond 3-5 years), the sediment inputs would decrease with road maintenance and road improvements.

6. **ACSO 6: Maintain and restore in-stream flows sufficient to create and sustain riparian, aquatic, and wetland habitats and to retain patterns of sediment, nutrient, and wood routing.** Addressed in Text (*EA sections 2.4.2, 3.2, 3.3*). In summary:

   No Action Alternative: No change in in-streams flows would be anticipated.

Proposed Action: A preliminary analysis for the risk of increases in peak flow as a result of forest harvest was conducted using the Oregon Watershed Assessment Manual watershed analysis methods for forest hydrology (OWEB, 1997).

The proposed project would remove less than half the existing forest canopy and only a small fraction of the forest cover (roads and landings). The total amount of roads and road density would increase slightly but would remain in the "low risk" OWEB threshold level for peak flow enhancement. Therefore, the Proposed Action it is unlikely to produce any measurable effect on stream flows.

7. **ACSO 7: Maintain and restore the timing, variability, and duration of floodplain inundation and water table elevation in meadows and wetlands.** Addressed in Text (*EA sections 2.4.2, 3.2, 3.3*). In summary:

   No Action Alternative: The current condition of flood plains and their ability to sustain inundation and the water table elevations in meadows and wetlands is expected to be maintained.

   Proposed Action: With the exception of approximately 15 culvert replacements and 8 culvert removals at stream crossings, there would be no alteration of any stream channel, wetland or pond morphological feature. All logging equipment would be kept a minimum of 100 feet from all large wetlands (larger than one acre) and perennial stream channels, and 60 feet from all small wetlands (one acre or less) and intermittent stream channels. Thus, the current condition of floodplain inundation and water tables would be maintained

8. **ACSO 8: Maintain and restore the species composition and structural diversity of plant communities in riparian areas and wetlands to provide adequate summer and winter thermal regulation, nutrient filtering, appropriate rates of surface erosion, bank erosion, and channel migration and to supply amounts and distributions of coarse woody debris sufficient to sustain physical complexity and stability.** Addressed in Text (*EA sections 2.4.2, 3.2, 3.3*). In summary:

   No Action Alternative: The current species composition and structural diversity of plant communities would continue along the current trajectory. Diversification would occur over a longer period of time.

   Proposed Action: No-cut buffers (from 60 feet on intermittent streams to 100 feet on perennial streams) would maintain the current species composition and structural diversity of plant communities in riparian areas and wetlands. Riparian areas adjacent to no-cut buffers would retain a canopy closure of 50% or greater.

9. **ACSO 9: Maintain and restore habitat to support well-distributed populations of native plant, invertebrate and vertebrate riparian-dependent species.** Addressed in Text (*EA sections 2.4.2, 3.2, 3.3, 3.5, 3.6*). In summary:

   No Action Alternative: Habitats would be maintained over the short-term and continue to develop over the long-term with no known impacts on species currently present.

Proposed Action: The proposed action would have no adverse effect on riparian dependent species. Although thinning activities may affect some invertebrates within the treatment areas, adjacent non-thinned areas should provide adequate refugia for the species. In the long term, the treatments would restore elements of structural diversity to treatment areas in the Riparian Reserve LUA. These attributes would help to provide resources currently lacking or of low quality, and over the long-term, would benefit both aquatic and terrestrial species.

3.14 Comparison of Alternatives with regard to the Decision Factors

This section compares the alternatives with regard to the decision factors described in *EA section 1.2.3* and the project objectives in *EA section 1.2.2*.

1. *Provide timber resources and revenue to the government from the sale of those resources (objectives 1, 2 and 3);*

2. *Reduce the costs both short-term and long-term of managing the lands in the project area (objectives 1 and 2); and*

3. *Provide safe, cost-effective access for logging operations, fuels management and fire suppression (objectives 2 and 7;*

   Decision Factors 1-3: The No Action alternative would not meet these factors since no timber sales would take place. The proposed action would provide timber resources to the market and would use commonly used silvicultural, transportation and logging practices that BLM experience with past timber sales has shown to be cost-effective, providing revenue with reasonable logging costs.

4. *Reduce competition-related mortality and increase tree vigor and growth (objective 1);*

   Decision Factor 4: The No Action alternative would not meet this factor. The proposed action would meet this factor.

5. *Provide for the establishment and growth of conifer species while retaining structural and habitat components, such as large trees, snags, and coarse woody debris (objectives 5 and 6); and*

6. *Promote the development of healthy late-successional characteristics in the Riparian Reserve land use allocation (objective 5).*

   Decision Factors 5 and 6: The No Action alternative does not meet these factors. Under this alternative, stand health and tree growth rates would decline if stands are not thinned. Competition would result in mortality of smaller trees and some co-dominant trees in the

stands, resulting in numerous snags and CWD that are too small to meet resource objectives (minimum 15 inches diameter for snags, minimum 20 inches diameter for CWD). This alternative retains existing elements, but does not enhance conditions to provide these elements for the future stand. Trees would continue to grow slowly until reaching suitable size for large woody debris, snags and late successional habitat.

The proposed action would meet decision factors 5 and 6. Stand health and tree growth rates would be maintained as trees are released from competition. The alternative retains the elements described under "no action" on untreated areas of the stands in the project area and encourages development of larger diameter trees and more open stand conditions in treated areas. These conditions add an element of diversity to the landscape on BLM lands which is not provided under the No Action alternative.

7. *Reduce erosion and subsequent sedimentation from roads (objectives 4 and 7);*

Decision Factor 7: The proposed action meets this factor because existing roads would be maintained, renovated or decommissioned, reducing the risk of erosion and sedimentation associated with the existing road system, and because new road construction and renovation would not cause sedimentation. The total length of roads in the project area would be reduced by 3.9 miles as a result of the proposed action.

4. LIST OF PREPARERS

Table 23: List of Preparers

Resource	Name
IDT Leader	Bob McDonald
Botany	Kurt Heckeroth
Cultural Resources	Debra Drake
Engineering	Vanessa Stone
Fire/Fuels	Kent Mortensen
Fisheries	Matt Walker
Hydrology/ Water Quality	Dennis Worrel
Logging Systems	Tim Lieske
Recreation	Debra Drake
Silviculture	John Johansen
Soils	Dennis Worrel
Wildlife	Andy Pampush

5. CONTACTS AND CONSULTATION

5.1 Consultation

5.1.1 US Fish and Wildlife Service (USFWS)

The spotted owl would be affected by this project only through the modification of dispersal habitat and approximately 70 acres of low quality suitable habitat. While modification would occur, all acres would continue to function in the same capacity after treatment as before. Due to the minor impact to components of spotted owl habitat, informal consultation with the U.S. Fish and Wildlife Service is warranted and would be completed programmatically within the appropriate years (year of sale if the proposed action is selected) Biological Assessment in the "Light to Moderate Thinning" category.

5.1.2 National Marine Fisheries Service (NMFS)

Consultation with the National Marine Fisheries Service on the potential effects of the proposed action on Oregon Coast coho salmon will be completed with project specific consultation (Section 7 Streamlined Consultation) or one of the programmatic consultation processes available at the time of implementation for actions that require consultation.

Required consultation for Magnuson-Stevens Fisheries Conservation and Management Act Essential Fish Habitat for the proposed action is included in *EA Section 3.4.3*.

Section 7 Endangered Species Act Consultation will be completed prior to the Field Manager authorizing an action.

5.2 Public Scoping and Notification - Tribal Governments, Adjacent Landowners, General Public, and State County and local government offices

For information on project scoping, see *EA section 1.4*.

The EA and FONSI will be made available for public review from ***March 5, 2011 to April 4, 2011*** and posted at the Salem District website at http://www.blm.gov/or/districts/salem/plans/index.php. The notice for public comment will be published in a legal notice in the *McMinnville News-Register* newspaper. Written comments should be addressed to Stephen M. Small, Field Manager, Tillamook Resource Area, 4610 Third Street, Tillamook, Oregon, 97141. Emailed comments may be sent to robert_mcdonald@blm.gov.

6. GLOSSARY AND ACRONYMS

6.1 Glossary

303(d) Water Quality Listing - Impaired waters that do not meet water quality standards, identified by ODEQ, as required by the Clean Water Act.

acre - A measure of surface land area in U.S.customary units that is 43,560 square feet, which is 1/640 of a square mile (or approximately 0.4 hectares).If square, it is nearly 209 feet on each side.

activity fuel - Debris (wood chips, bark, branches, limbs, logs, or stumps) left on the ground after management actions, such as logging, pruning, thinning, or brush cutting, versus debris left after storms or fires.

age class - A management classification using the age of a stand of trees

allowable sale quantity - The timber yield that a forest can produce continuously under the intensity of management outlined in the RMP from those lands allocated for permanent forest production.

alternative - One of several proposed management actions that have been studied and found to meet the goals and objectives of a project's purpose and need and, as a result, is suitable to aid decision-making.

anadromous fish - Fish that are born and reared in freshwater, move to the ocean to grow and mature, and return to freshwater to reproduce. Includes species such as salmon and steelhead. Also see *salmonid.*

analysis - The scientific evaluation of the environmental impacts of proposed planning decisions.

analytical assumption - A judgmental decision that is based on the science and relationships of natural systems assumed to be true and from which conclusions can be drawn to supply the missing values, relationships, or societal preferences needed for proceeding with an analysis of alternatives.

(ACS) Aquatic Conservation Strategy - A Northwest Forest Plan methodology designed to restore and maintain the ecological health of watersheds and aquatic ecosystems, consisting of four components: riparian reserves, key watersheds, watershed analysis, and watershed restoration.

aquatic habitat - Habitat for vertebrate and invertebrate wildlife species and vascular and non-vascular plants occurring in free water (e.g. lakes, ponds, streams, rivers, springs and seeps).

authority - The right and power to make decisions and give orders such as the United States Congress exerts when passing legislation (e.g. the O&C Act and the Endangered Species Act).

basal area - The cross-sectional area of a single stem, of all stems of a species in a stand, or of all plants in a stand (including the bark) that is measured at breast height (about 4.5 feet up from the ground) for larger plants (like trees) or measured at ground level for smaller plants.

baseline - The starting point for the analysis of environmental consequences, often referred to as the Affected Environment. This starting point may be the condition at a point in time (e.g., when inventory data is collected) or the average of a set of data collected over a specified number of years.

beneficial use - In federal and state water use law, uses of water necessary for the survival or well being of man, plants and wildlife. Examples include: instream, out of stream, and ground water uses; domestic, municipal, and industrial water supplies; mining, irrigation, and livestock watering; fish and aquatic life; wildlife watering; fishing and water contact recreation; aesthetics and scenic attraction; hydropower; and commercial navigation.

(BMPs) Best Management Practices - BMPs are defined as methods, measures, or practices selected on the basis of site-specific conditions to ensure that water quality will be maintained at its highest practicable level. BMPs include, but are not limited to, structural and nonstructural controls, operations, and maintenance procedures. BMPs can be applied before, during, and after pollution-producing activities to reduce or eliminate the introduction of pollutants into receiving waters (40 CFR 130.2, EPA Water Quality Standards Regulation).

biological assessment A biological assessment is a document that evaluates potential effects of a proposed action to listed and proposed species and designated and proposed critical habitat and determines whether any such species or habitats are likely to be adversely affected by the action.It is used in determining whether formal consultation or conferencing with the U.S.Fish and Wildlife Service or National Marine Fisheries Service is necessary (50 CFR 402.12[a])

(BO) biological opinion - An opinion by the U.S, Fish and Wildlife Service or the National Marine Fisheries Service as to whether or not a federal action is likely or not to jeopardize the continued existence of listed species, or would result **in** the destruction of or adverse modification of critical habitat. The opinion may contain reasonable and prudent alternatives, a statement of anticipated take of listed animals, and conservation recommendations for listed plants.

Bureau Strategic Species - A special status species category established by the Oregon/Washington BLM that includes animal, plant and fungi species that are of concern in the two states. The special status species policy (BLM **6840**) does not apply to these species, and no analysis of them is required in NEPA documents. Field units are required to collect occurrence field data and maintain records. Also see *Bureau sensitive species*.

Bureau Sensitive Species - A special status species category established by the BLM that includes those plant and animal species eligible for status as federally listed, federal candidate, state listed, or state candidate (plant) species; **on** List 1 of the Oregon Natural Heritage

Database or approved for this category by the BLM state director; or included under agency species conservation policies. Also see *Bureau strategic species*.

canopy - The more or less continuous cover of branches and foliage formed collectively by adjacent trees and other woody species in a forest stand. Where significant height differences occur between trees within a stand, formation of a multiple canopy (multi-layered) condition can result.

canopy closure - The ground area covered by the crowns of trees or woody vegetation as delimited by the vertical projection of crown perimeter and commonly expressed as a percent of total ground area.

checkerboard land ownership pattern - A land ownership pattern in which square-mile sections of federal lands are typically intermixed, on the basis of alternating sections, with adjoining private lands. The O&C lands of western Oregon are an example of checkerboard ownership. This ownership pattern resulted from the revestment back to the federal government of lands granted by the federal government to early railroad companies. The checkerboard ownership pattern of the O&C lands creates additional access, management, and perception issues.

(CWD) coarse woody debris - That portion of trees that has naturally fallen or been cut and left in the forest. Usually refers to pieces at least 20 inches in diameter. There are four classes used to describe coarse woody debris. The classes range from Class I (which has the least decay, intact bark, and a hard log) to Class IV (i.e., the coarse woody debris has decayed to the point of nearly being incorporated into the forest floor).

commercial thinning - Any type of thinning producing merchantable material at least equal to the value of the direct cost of harvesting.See *thinning*.

Consultation - A formal review between the U.S.Fish and Wildlife Service or National Marine Fisheries Service and another federal agency when it is determined that an action by the agency may affect critical habitat or a species that has been listed as threatened or endangered to ensure that the agency's action does not jeopardize a listed species or destroy or adversely modify critical habitat. Critical habitat is an Endangered Species Act term denoting a specified geographic area occupied by a federally listed species, and on which the physical and biological features are found that are essential to the conservation and recovery of that species and that may require special management or protection.
crown - The upper part of a tree that has live branches and foliage.

crown fire - Fire that moves through the crowns of adjacent trees independent of any surface fire. Crown fires can often move faster and ahead of ground fires.

culmination of mean annual increment (CMAI) The age in the growth cycle of a tree or stand at which the *mean annual increment* (MAI) for volume is at its maximum.

cumulative effect - The impact on the environment that results from incremental impacts of an action when added to other past, present, and reasonably foreseeable future actions regardless of which agency or person undertakes such other actions. Cumulative impacts can result from individually minor, but collectively significant, actions taking place over a period of time.

diameter at breast height (DBH) - The diameter of the stem of a tree measured at 4.5 feet above the ground level on the uphill side of the stem.

dispersal habitat (spotted owl) - Forest habitat that allows northern spotted owls to move (disperse) across the landscape; typically characterized by forest stands with average tree diameters of greater than 11 inches, and conifer overstory trees having closed canopies (greater than 40 percent canopy closure) with open space beneath the canopy to allow owls to fly.

dropped (e.g. some of the canopy gaps and the 117 year old stand) – dropped from this proposed action. The actions may be considered in the future and would be documented in an environmental analysis with a new decision. Dropping these areas does not constitute a change in land use allocations.

effective shade - The proportion of direct beam solar radiation reaching a stream surface to total daily solar radiation.

environmental effects - The direct, indirect and cumulative effects of a proposed action or alternative on existing conditions in the environment in which the action(s) would occur.Also see *baseline.*

fine sediment - Fine-grained soil material, less than 2mm in size, normally deposited by water, but in some cases by wind (aeolian) or gravity (dry ravel).

floodplain - Level lowland bordering a stream or river onto which the flow spreads at flood stage.

Forest Operations Inventory (FOI) - An intensive inventory that provides managers with information regarding the age, species, stand location, size, silvicultural needs, and recommended treatment of stands based on individual stand conditions and productivity.

fuel loading - The dry weight of all accumulated live and dead woody and herbaceous material on the forest floor that is available for combustion, and which poses a fire hazard.

green tree - A live tree.

forest habitat - An area containing the forest vegetation with the age class, species composition, structure, sufficient area, and adequate food source to meet some or all of the life needs (such as foraging, roosting, nesting, breeding habitat for northern spotted owls) of specific species.

harvesting -The process of onsite cutting and removing of merchantable trees from a forested area.

key watershed -A Northwest Forest Plan term that denotes a watershed that contains habitat for potentially threatened species, stocks of anadromous salmonids, or other potentially threatened fish, or is an area of high-quality water and fish habitat. Also see *watershed*.

land use allocation - A designation for a use that is allowed, restricted, or prohibited for a particular area of land, such as the matrix, adaptive management, late-successional reserve, or critical habitat land use allocations.

late-successional forest - A forest that is in its mature stage and contains a diversity of structural characteristics, such as live trees, snags, woody debris, and a patchy, multi-layered canopy.

long term - A period of time used as an analytical timeframe; starts more than 10 years after implementation of a project, depending on the resource being analyzed. Also see *short term*.

long-term soil productivity - The capacity of the soil to grow vegetation, specifically commercial trees, over time.

mass wasting - The sudden or slow dislodgement and downslope movement of rock, soil, and organic materials.

mature stage - Generally begins as tree growth rates stop increasing (after culmination of mean annual increment), and as tree mortality shifts from density-dependent mortality to density-independent mortality.

merchantable - Trees or stands having the size, quality and condition suitable for marketing under a given economic condition, even if not immediately accessible for logging

modeling - A scientific method that operates by a structured set of rules and procedures to simulate current conditions and predict future conditions. Also see *analysis*.

multi-layered canopy - Forest stands with two or more distinct tree layers in the *canopy*.

National Marine Fisheries Service - A federal agency under the United States Department of Commerce that is responsible for working with others to conserve, protect, and enhance anadromous fish and their habitats. NMFS is an agency in the National Oceanic Atmospheric Administration (National Marine Fisheries Service [NMFS] is now called NOAA Fisheries)

non-point source pollution - Water or air pollutants where the source of the pollutant is not readily identified and is diffuse, such as the runoff from urban areas, agricultural lands, or forest lands. Also see *point source*.

(NWFP) Northwest Forest Plan - Record of Decision for Amendments to Forest Service and Bureau of Land Management Planning Documents within the Range of the Northern Spotted Owl and Standards and Guidelines for Management of Habitat for Late-Successional and Old-Growth Related Species within the Range of the Northern Spotted Owl (1994) (Northwest Forest Plan). A 1994 common management approach for the 19 national forests and 7 BLM districts located in the Pacific Northwest ecological region and jointly approved by the Secretary of Agriculture and the Secretary of the Interior.

nutrient cycling - Circulation of elements (such as carbon or nitrogen) between vegetation/organic material and soil, water and air.

old-growth forest - A forest stand usually at least 180-220 years old with moderate to high canopy closure; a multilayered, multispecies canopy dominated by large overstory trees; high incidence of large trees, some with broken tops and other indications of old and decaying wood (decadence); numerous large snags; and heavy accumulations of wood, including large logs on the ground.

overstory - That portion of trees forming the uppermost canopy layer in a forest stand and that consists of more than one distinct layer.

plan conformance - The determination that a management action is consistent with the terms, conditions, decisions, and is within the anticipated environmental consequences, of an approved resource management plan.

point source - An origin of water or air pollutants that is readily identified, such as the discharge or runoff from an individual industrial plant or cattle feedlot. Also see *nonpoint source*.

relative density - A means of describing the level of competition among trees or site occupancy in a stand, relative to some theoretical maximum that is based on tree size and species composition. Relative density is determined mathematically by dividing the stand basal area by the square root of the quadratic mean diameter.

(ROD/RMP) Resource Management Plan - Salem District Record of Decision and Resource Management Plan (1995). A BLM planning document, prepared in accordance with Section 202 of the Federal Land Policy and Management Act that presents systematic guidelines for making resource management decisions for a resource area. An RMP is based on an analysis of an area's resources, their existing management, and their capability for alternative uses. RMPs are issue oriented and developed by an interdisciplinary team with public participation.

rotation - The planned number of years between establishment of a forest stand and its regeneration harvest.

salmonid - Fish that are born and reared in freshwater, move to the ocean to grow and mature, and return to freshwater to reproduce. Includes species such as salmon and steelhead. Also see *anadromous fish.*

short term - A period of time used as an analytical timeframe and that is within the first 10 years of the implementation of a resource management plan. Also see *long term*.

silvicultural prescription - A planned series of treatments designed to change current stand structure to one that meets management goals.

site index – A measure of forest productivity expressed as the height of the tallest trees of a particular species (e.g. Douglas-fir) in a stand at an index age (e.g. 50-years).

snag - Any standing (upright) dead tree.

special forest products (SFP) - Those plant and fungi resources that are harvested, gathered, or collected by permit, and have social, economical, or spiritual value. Common examples include mushrooms, firewood, Christmas trees, tree burls, edibles and medicinals, mosses and lichens, floral and greenery, and seeds and cones, but not soil, rocks, fossils, insects, animal parts, or any timber products of commercial value.

special status species - Those species that are listed under the Endangered Species Act as threatened or endangered (including proposed and candidate species); listed by a state as threatened, endangered or candidate species; and listed by the BLM as sensitive species. Under the BLM Special Status Species policy (BLM 6840), the BLM State Director has created an additional category called Bureau Strategic Species (see glossary *Bureau strategic species*).

stand - An aggregation of trees occupying a specific area and sufficiently uniform in composition, age, arrangement, and condition so that it is distinguishable from the forest in adjoining areas.

standards and guidelines - 1995 RMP rules for managing the different land use allocations.

stream, intermittent - Drainage feature with a dry period, normally for three months or more, where the action of flowing water forms a channel with well-defined bed and banks, supporting bed-forms showing annual scour or deposition, within a continuous channel network.

stream, perennial - Permanent channel drainage feature with varying but continuous year-round discharge, where the base level is at or below the water table.

structurally complex stage - Stage at which stands develop characteristics approximating "old-growth" stands.

thinning - A silvicultural treatment made to reduce the density of trees primarily to improve tree/stand growth and vigor, and/or recover potential mortality of trees, generally for commodity use.

timber - Forest crops or stands, or wood that is harvested from forests and is of a character and quality suitable for manufacture into lumber and other wood products rather than for use as fuel.

Timber Production Capability Classification (TPCC) - An analytical tool that inventories and identifies sites as capable of sustaining intensive timber management without it degrading their productive capacity. This tool evaluates a site's soil depth, available moisture, slope, drainage, and stability to determine site capacity for timber management activity. Sites that prove incapable of sustaining intensive timber management are typically not included in the harvest land base.

Total Maximum Daily Load (TMDL) - Is a regulatory term in the U.S. Clean Water Act (CWA), describing the maximum amount of a pollutant that a body of water can receive while still meeting water quality standards. It is for a particular pollutant calculated to protect the beneficial use that is most sensitive to that pollutant.

understory - Portion of trees or other woody vegetation that forms the lower layer in a forest stand, and that consists of more than one distinct layer.

(USFWS) United States Fish and Wildlife Service - A federal agency under the United States Department of the Interior that is responsible for working with others to conserve, protect, and enhance fish, wildlife, plants, and their habitats.

watershed - All of the land and water within the boundaries of a drainage area that are separated by land ridges from other drainage areas. Larger watersheds can contain smaller watersheds that all ultimately flow their surface water to a common point.

wetland - Land with presence and duration of water, sufficient to support wetland vegetation.

wildfire - Any nonstructural fire, other than prescribed burns, that occurs on wildland.

(WUI) wildland/urban interface- The area in which structures and other human development meet or intermingle with undeveloped wildland. The term used primarily for wildfire prevention and suppression. Rural/Urban Interface is used primarily for other recreation and forest management activities.

windthrow - A tree or trees uprooted or felled by the wind.

6.2 Additional Acronyms

BLM – Bureau of Land Management
BS – Bureau Sensitive, a category of species under the Oregon/Washington Special Status Species Policy
DBH – diameter at breast height
EA - Environmental Assessment
EFH – Essential Fish Habitat
ESA – Endangered Species Act
FONSI – Finding of No Significant Impact
GFMA – General Forest Management Area land use allocation (Matrix)
MSA – Magnuson-Stevens Fishery Conservation and Management Act
NEPA – National Environmental Policy Act (1969)
ODEQ – Oregon Department of Environmental Quality
RIA – Rural-Urban Interface (recreation, visual and sociological issues)
RMP/FEIS – Salem District Proposed Resource Management Plan / Final Environmental Impact Statement (1994)
ROW – right-of-way (roads)
RR – Riparian Reserve Land Use Allocation (Riparian Reserves)
SPZ – Stream Protection Zone (no-cut protection zone)
USDI – United States Department of the Interior
USFS – United States Forest Service

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8. ADDITIONAL SUPPORTING DATA AND MAPS OF THE ACTION ALTERNATIVES

8.1 Maps

Figure 1. Project Location

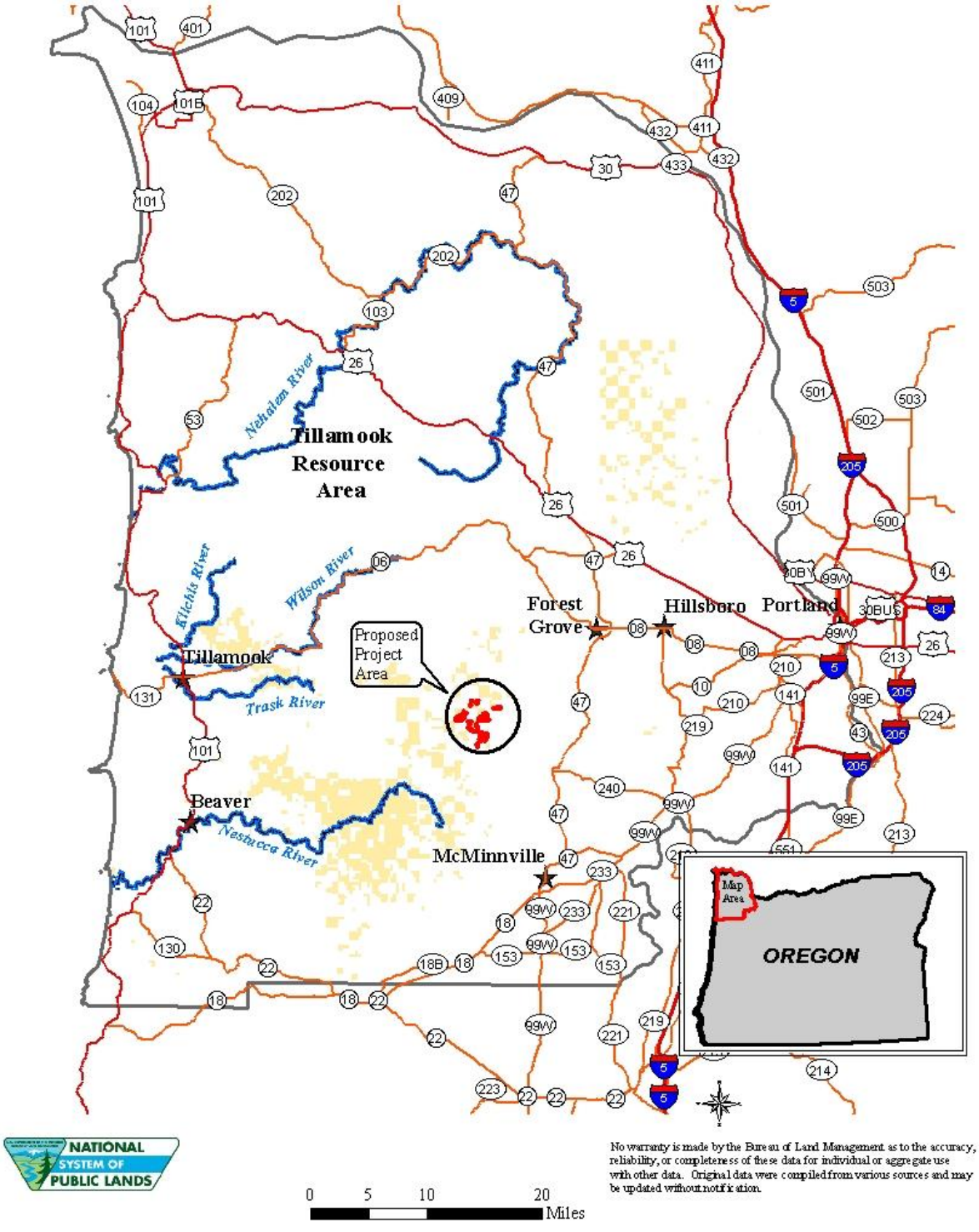


Figure 2. Proposed Density Management Treatments

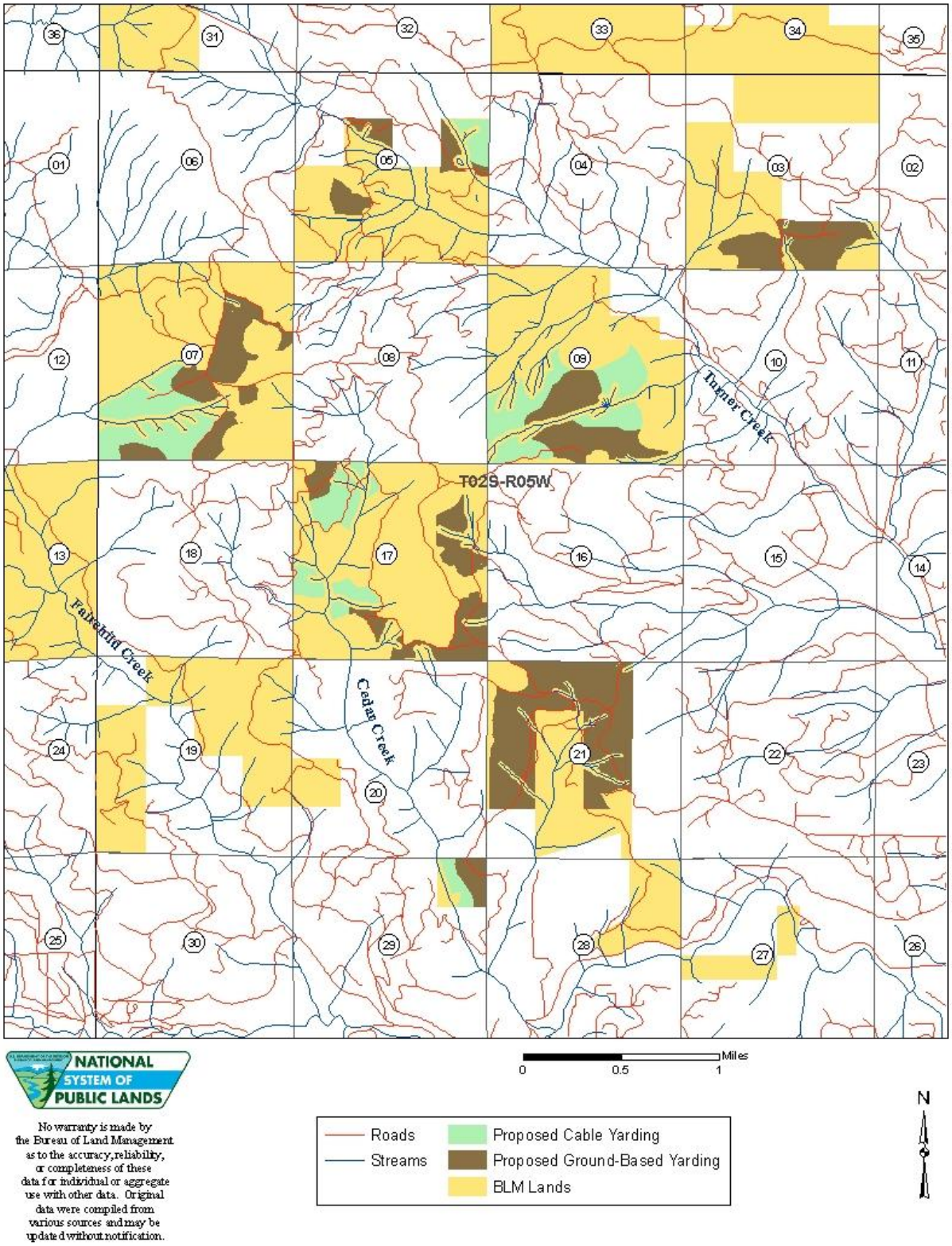


Figure 3. Proposed Action - Section 3

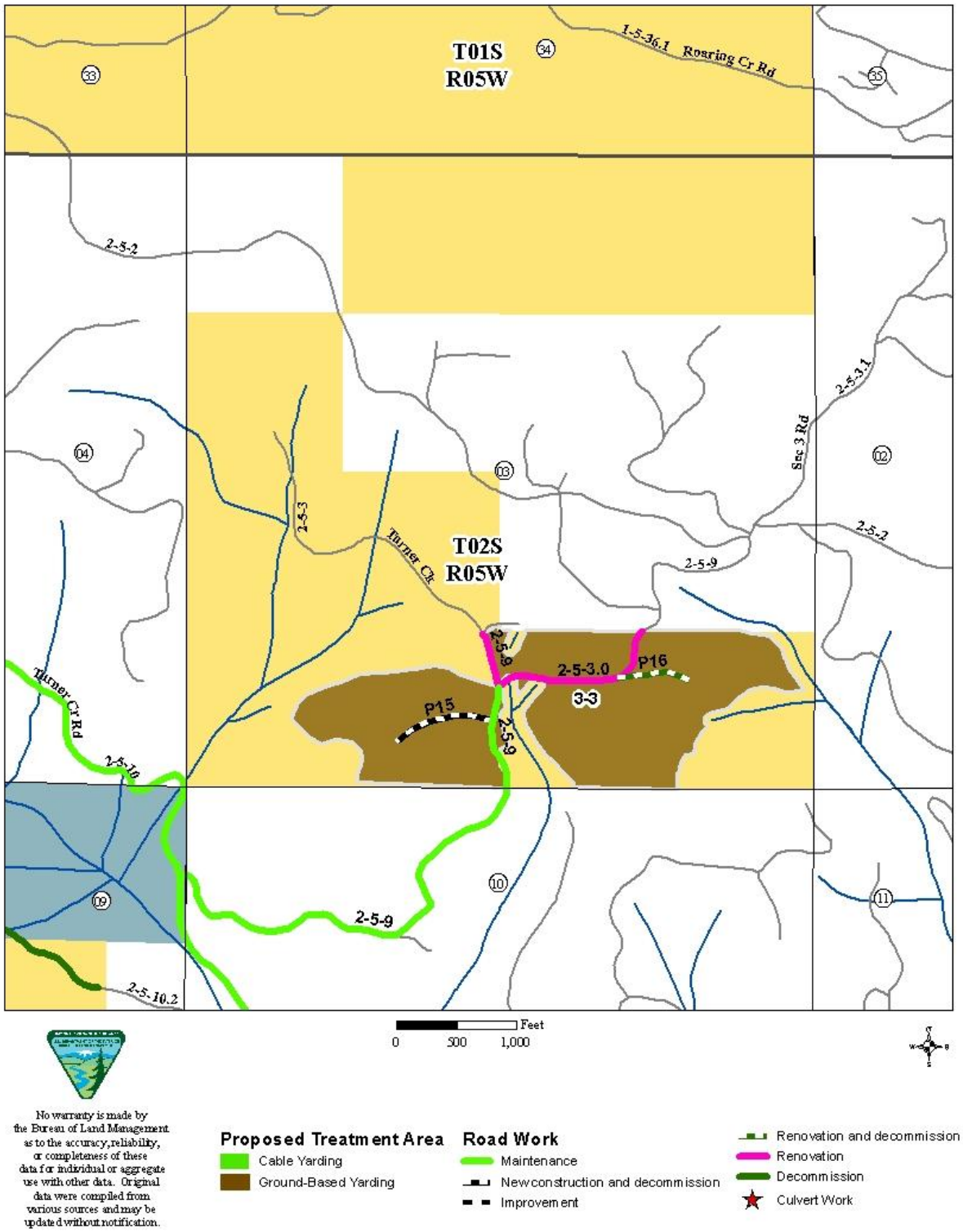


Figure 4. Proposed Action - Section 5

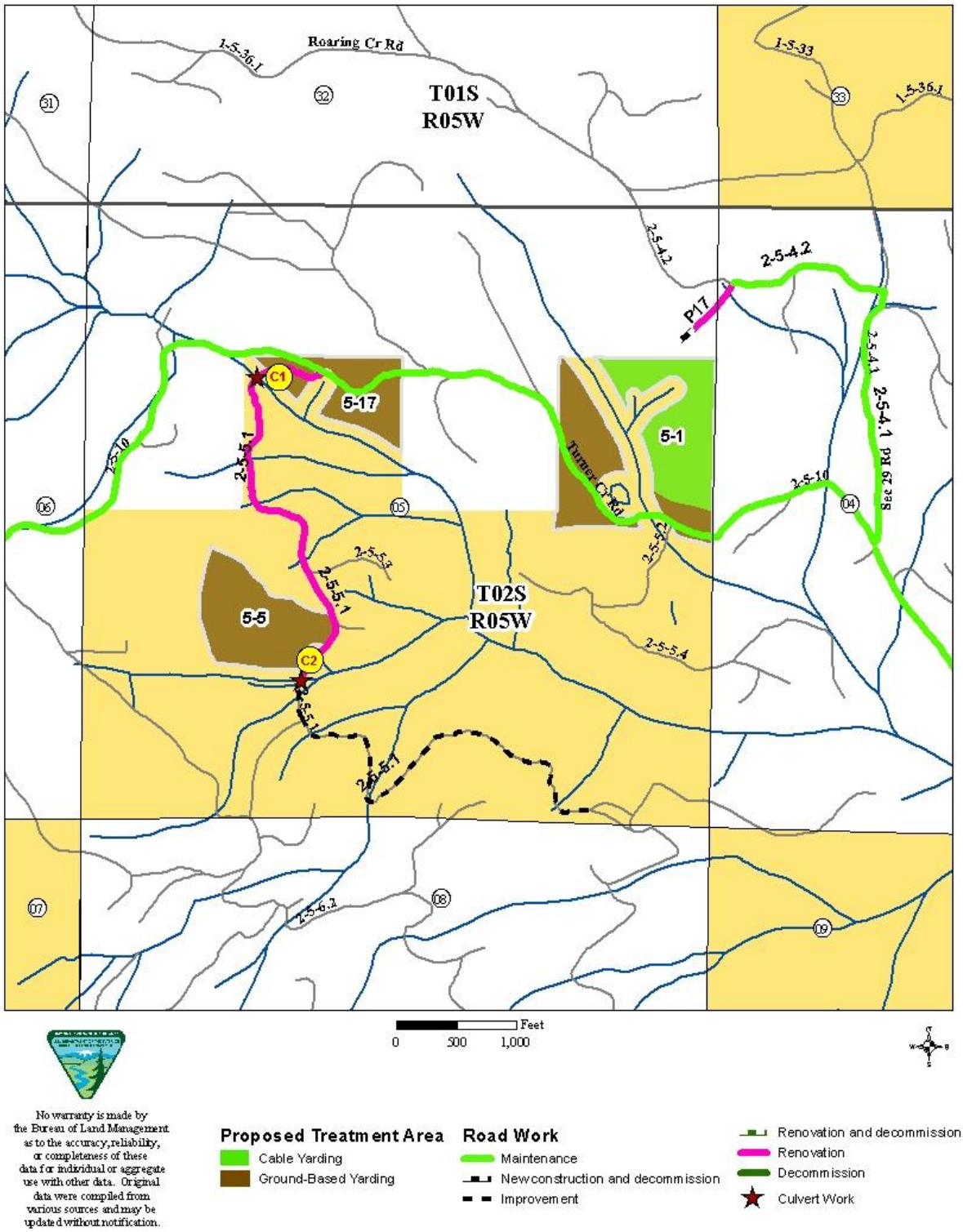


Figure 5. Proposed Action - Section 7

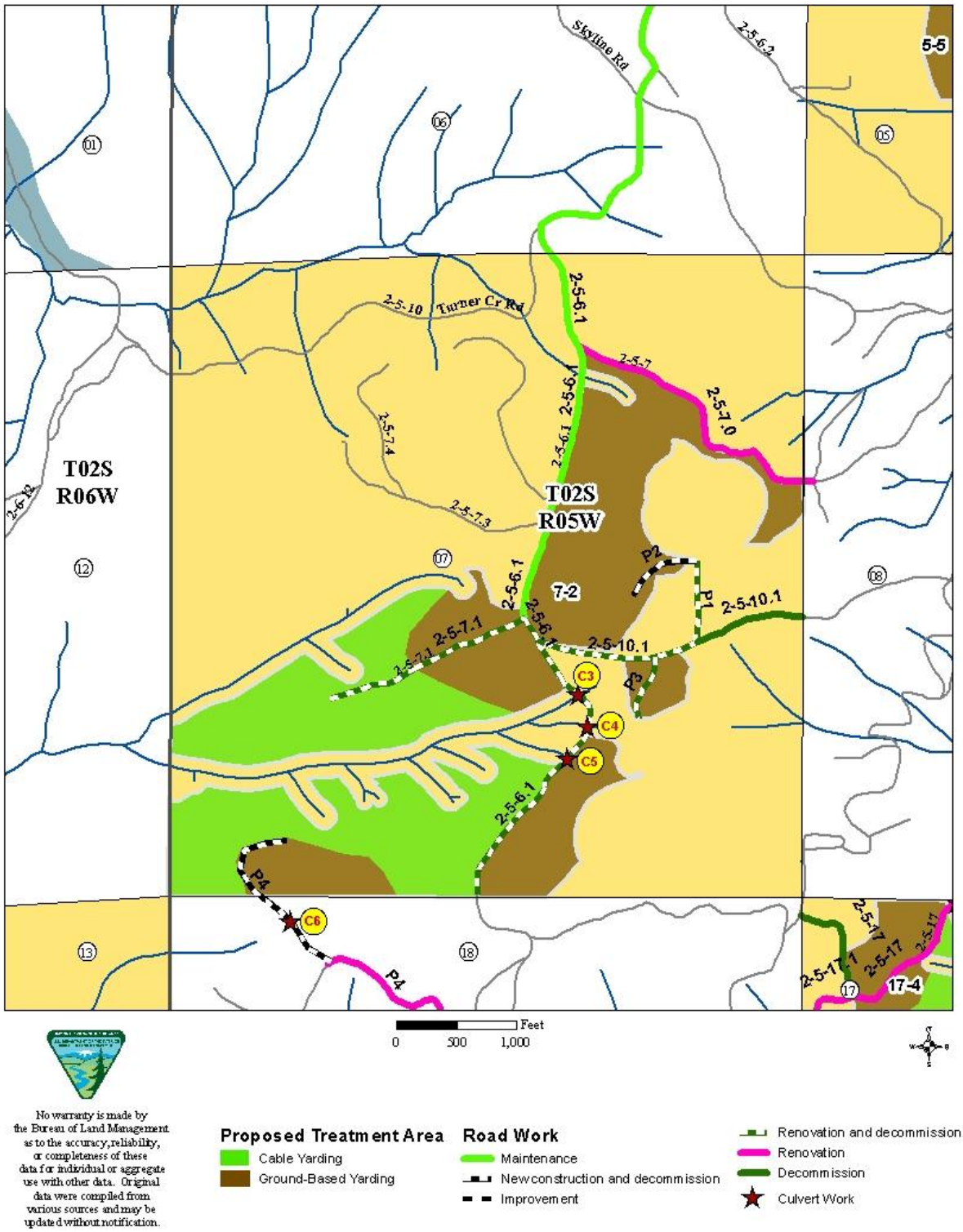


Figure 6. Proposed Action - Section 9

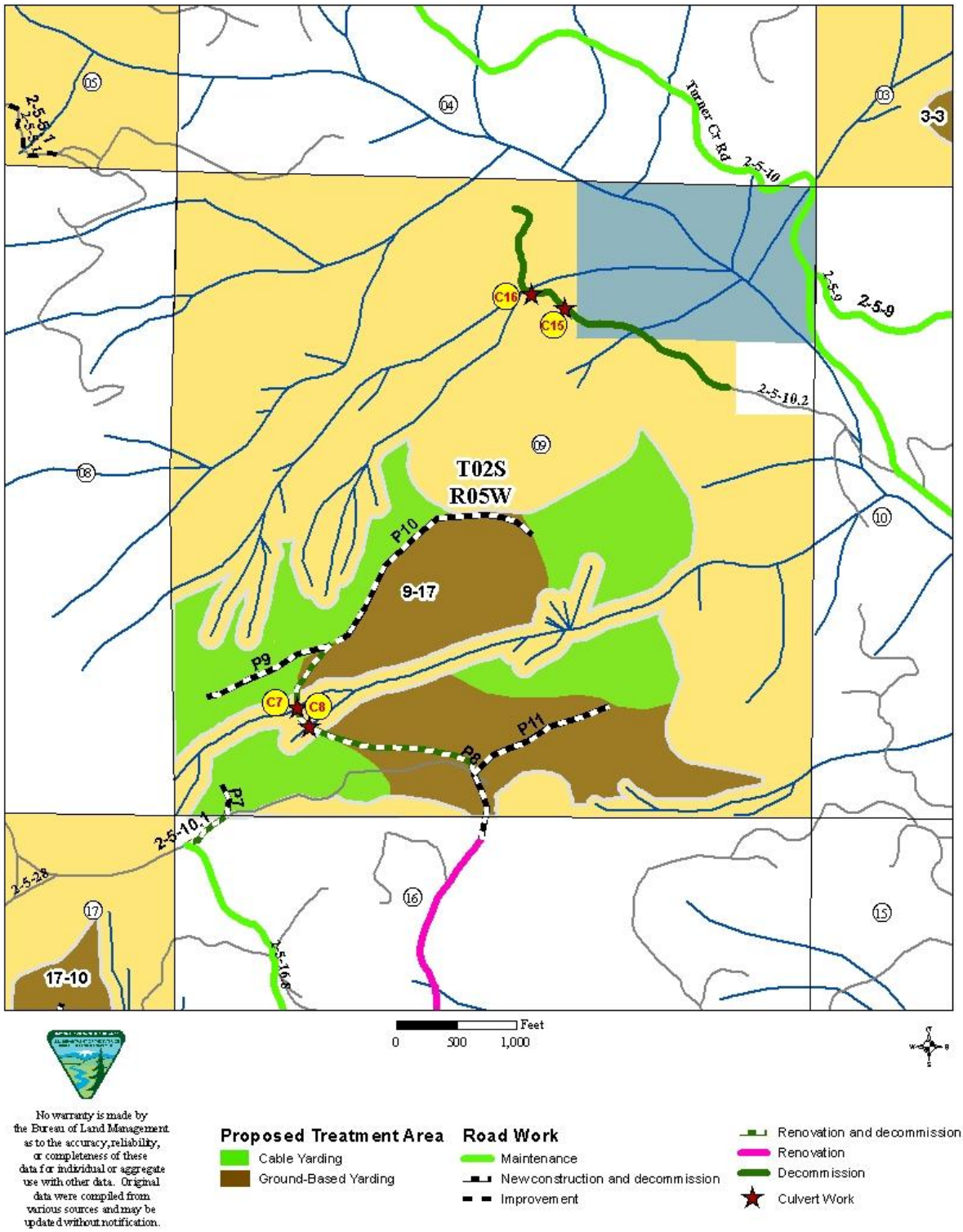


Figure 7. Proposed Action - Section 17

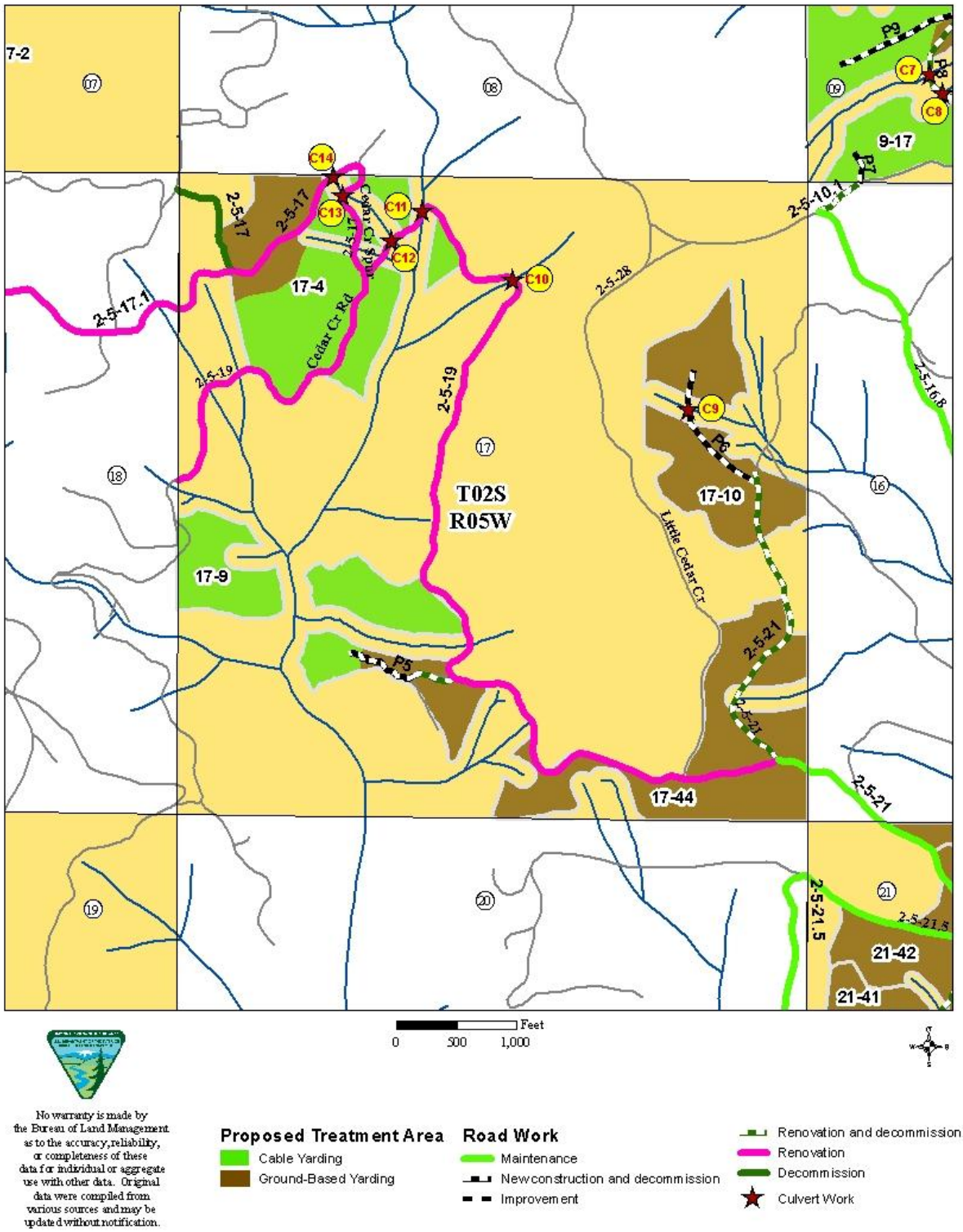


Figure 8. Proposed Action - Sections 21, 28 and 29

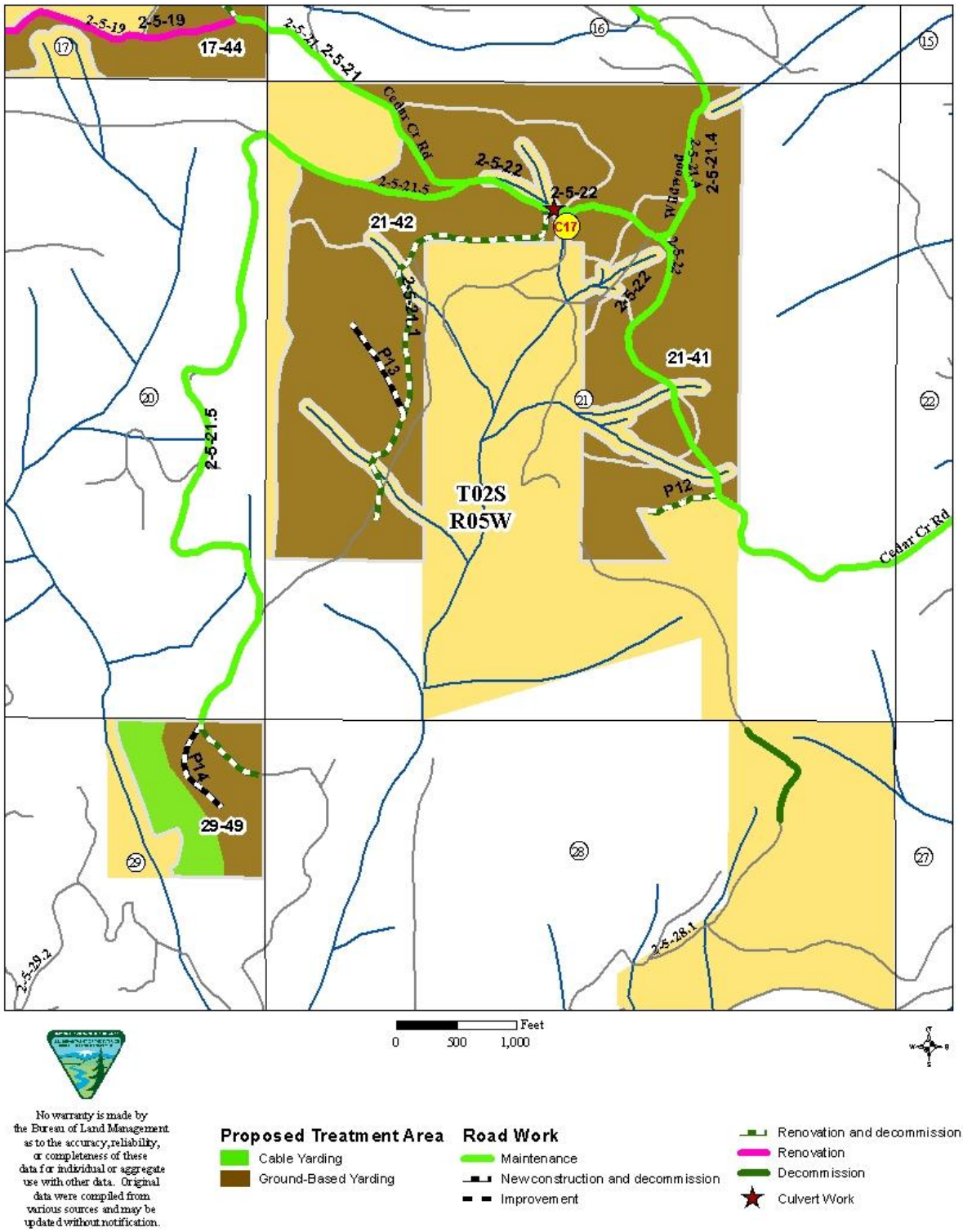
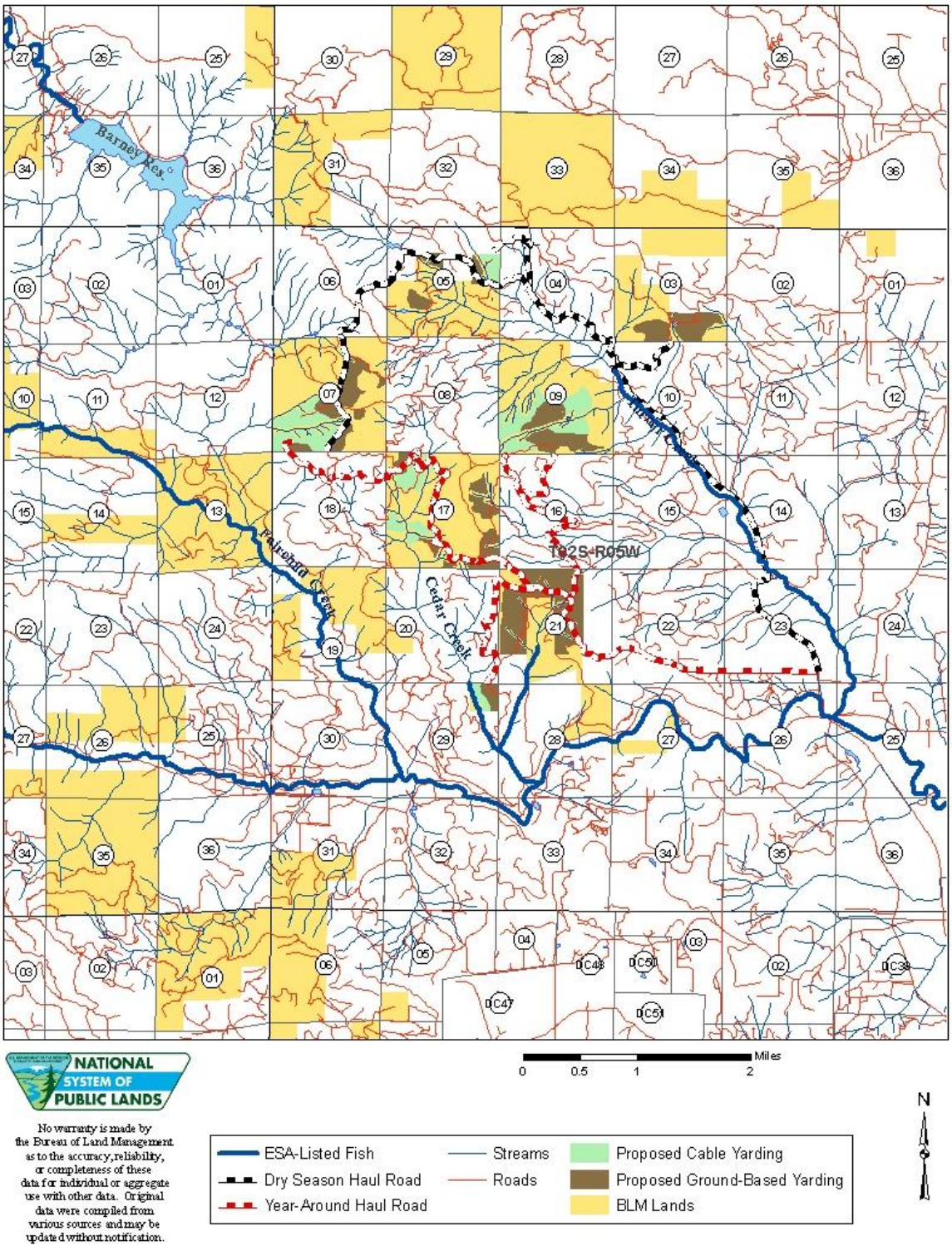


Figure 9. Proposed Haul Routes and ESA-Listed Fish Distribution



8.2 Additional Supporting Data

8.2.1 Water Quality Management Plan

Introduction

Water Quality Management on BLM-administered lands that are covered under the Turner Creek EA is based on the site specific application of Best Management Practices (BMPs) and disclosed as Project Design Features (PDFs).

Best Management Practices

Best Management Practices are required by the federal Clean Water Act as amended to mitigate the potential for non-point source pollution. Non-point source pollution is pollutants detected in concentrated water (e.g. stream or lake) from a wide range of forest management activities on federal lands administered by the Bureau of Land Management (BLM). BMPs are considered the primary methods for achieving Oregon's water quality standards.

The overall goal is not to strictly adhere to the wording of the BMP, but rather to implement the intent of the prescribed BMP. That is to protect, promote and enhance water quality in order to meet federal and state water quality objectives. In that matter, BMPs are site specific and the implementation of the BMP is tailored to the "on the ground" conditions. The following BMPs are site specific applications to forest management activities undertaken by the Turner Creek Environmental Analysis on the Tillamook Resource Area.

Table 24: Best Management Practices

BMP No.	Practice Technique
R1	Locate roads and landings on stable locations that minimize sediment delivery potential to streams (e.g., ridge tops, stable benches or flats, and gentle-to-moderate side-slopes).
R4	Locate roads and landings outside of jurisdictional wetlands.
R5	Avoid expanding existing landings within Riparian Reserves, where sediment delivery to stream channels is likely to occur.
R9	Limit road and landing construction, reconstruction, or renovation activities to the dry season, generally from June 1 to October 15. When conditions permit operations outside of the dry season, keep erosion control measures concurrent with ground disturbance to the extent that the affected area can be rapidly storm proofed if weather conditions deteriorate.
R14	Where deemed necessary, use temporary sediment containment structures to contain runoff from construction areas (e.g. silt fencing).
R15	Surface roads if they would be subject to traffic during prolonged wet weather.

R16	Complete construction activities prior to fall rains. Prevent erosion in areas with direct connectivity to streams by stabilizing exposed soil materials.
R21	Where sediment could be transported to streams, consider windrowing slash at the base of newly constructed fill slopes to catch sediment.
R44	Install all stream crossings during the low flow period, generally from June 15 to September 15.
R47	Construct the stream crossing approach to minimize fill volumes and sediment delivery potential.
R51	Use containment and filtering techniques such as bladder barriers, silt curtains etc., if diversion is not possible. Place sediment controls along and immediately downstream of the in stream work.
R57	Stabilize fill material over stream crossing structures immediately after construction has been completed, normally before October 15.
R61	Limit the use of mechanized equipment to stream bank areas or temporary platforms when installing or removing structures. Avoid driving of mechanized equipment in the stream channel except in the area that is necessary for the installation and removal of in channel structures.
R66	Use structures that would withstand 100-year flow events e.g., concrete, well anchored concrete mats, etc. on permanent crossings.
R72	For winter hauling implement structural treatments such as: adjust frequency of cross-drain spacing, install sediment barriers or catch basins, apply gravel lifts or asphalt road surfacing at stream crossing approaches and clean and armor ditchlines.
R73	Suspend timber hauling during wet weather when road run-off delivers sediment at higher concentrations than existing conditions in the receiving stream.
R77	Avoid routine machine cleaning of ditches during the wet season, generally October 16 to May 31.
R80	End-haul sloughed or excavated materials to a stable site outside of Riparian Reserves with no potential to reach water bodies, wetlands and floodplains.
R83	Avoid blading and shaping of road surfaces during the wet season, generally October 16 to May 31.
R87	Storm proof open or older roads with continued use, but infrequent maintenance. Storm proof new temporary roads, if over-winter.

R90	Close roads not needed, but not recommended to be fully decommissioned. When this measure is used by itself, it applies only to roads that do not significantly reroute hill slope drainage, involve stream channels, or present slope stability hazards.
R91	Place woody material or other appropriate barriers to discourage off-highway vehicle use on decommissioned roads, unless specifically designated for this use
R93	Remove stream crossing culverts and entire in-channel fill material during low flow (generally, June 15 to September 15) prior to fall rains.
R97	Apply erosion control, such as seeding and mulching, to all hydrologically connected road related bare soil surfaces, where erosion could occur, including stream banks and stream-adjacent side slopes following culvert removal. Place sediment trapping materials such as straw bales and jute netting at the toe of stream-adjacent side slopes following culvert removal. Complete seeding and mulching erosion control work by October 15 of each year. When straw mulch or rice straw mulch is used; require certified weed free, if readily available. Mulch shall be applied at no less than 2000 lbs. /acre. Vegetative cuttings, shrubs and trees may be considered as needed for erosion control. Planting of shrubs and trees should occur during the winter dormant season.
R98	Implement measures to reduce the level and depth of soil compaction, including ripping or sub soiling to an effective depth; generally to 16-24 inches. Treat compacted areas including the roadbed, landings, construction areas, and spoils sites.
R99	Pull back unstable road fill and either end-haul or recontour to the natural slopes.
R100	Suspend decommissioning activities if rain saturates soils to the extent that there is potential for movement of sediment from the road to the stream.
TH 2	Design cable yarding corridors so as to limit canopy loss in Riparian Reserves to meet shade targets. Where feasible, require full suspension over flowing perennial and intermittent streams with erodible bed and bank, and

	jurisdictional wetlands.
TH 4	Limit downhill logging into Riparian Reserves where yarding trails can converge, and potentially intersect the stream network.
TH6	Implement erosion control measures such as waterbars, slash placement and seeding in cable yarding corridors where the potential for erosion and delivery to water bodies, floodplains and wetlands exists.
TH7	Exclude equipment from riparian management area retention areas (60 feet from the edge of the active stream channel for fish bearing and perennial streams, lakes and ponds, and 35 feet for intermittent streams), except for road crossings, restoration, wildfire, or similar operational reasons.
TH12	Restrict ground-based harvest and skidding operations to periods of low soil moisture when soils have resistance to compaction and displacement.
TH14	Limit conventional ground-based equipment to slopes less than 35 percent.
TH16	Designate skid trails where water from trail surface would not be channeled into unstable areas adjacent to water bodies, floodplains, and wetlands.
TH18	Apply erosion control practices to skid roads and other disturbed areas with potential for erosion and subsequent sediment delivery to water bodies, floodplains, or wetlands.