Revised Bottleneck Late-Successional Reserve Enhancement Environmental Assessment and Finding of No Additional Significant Impact

Environmental Assessment Number OR-080-07-16

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United States Department of the Interior
Bureau of Land Management
Oregon State Office
Salem District
Marys Peak Resource Area

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BLM
Salem District

Abstract: This environmental assessment (EA) discloses the predicted effects of two projects located on federal lands in Township 7 South, Range 9 West Sections 8 and 9, Willamette Meridian located in the Salmon River 5th-field Watershed.

- Project 1 (Mid-Seral Habitat Enhancement) proposes to thin approximately 161 acres of dense, mid-seral (68 years old) conifer forest, release existing wolf trees (large trees with full live crowns), and create snags and coarse woody debris (CWD). This project is designed to improve wildlife habitat for species which depend upon late-seral/old-growth forest conditions by accelerating the development of these conditions.
- Project 2 (Late-Seral Habitat and Deciduous Swamp Enhancements) proposes to enhance a 24 acre late-seral (103 years old) stand, and a 4 acre deciduous swamp, both occurring adjacent to the mid-seral forest of Project 1. Habitat within the late-seral stand would be enhanced by increasing structural complexity (live, dead, horizontal, and vertical) through selective cutting and girdling around existing wolf trees which exhibit complex crown structure. The objective for the swamp site is to maintain the water level and improve the dead wood habitat by cutting and girdling encroaching conifers and hardwoods.

These projects would occur in Late-Successional Reserve (LSR) and Riparian Reserve (RR) Land Use Allocations (LUA) within the North Coast Range Adaptive Management Area.

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.

FINDING OF NO SIGNIFICANT IMPACT

Introduction

The Bureau of Land Management (BLM) published the Bottleneck Late Successional Reserve Enhancement Environmental Assessment *(*EA) (EA# OR080-07-16) in March of 2007. Comments received on the EA were reviewed and as a result, the BLM revised the ***Bottleneck Late Successional Reserve Enhancement EA***. The Revised Bottleneck Late Successional Reserve Enhancement EA is attached to and incorporated by reference in this Finding of No Additional Significant Impact determination (FONASI). The analysis in this revised 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 density management activities have been designed to conform to the *Salem District Record of Decision and Resource Management Plan*, May 1995 (RMP) and related documents which direct and provide the legal framework for management of BLM lands within the Salem District (*EA Section 1.3*). Consultation with the U.S. Fish and Wildlife Service and National Marine Fisheries Service is described in Section 7.1 of the revised EA.

The projects are on BLM-managed land in Township 7 South, Range 9 West, Sections 8 and 9 Willamette Meridian.

The proposed action is to conduct density management through thinning, and wolf tree release through selective cutting and girdling, on approximately 161 acres of 68 year old stands and enhance a 24 acre late-seral (103 years old) stand, and a 4 acre deciduous swamp, both located adjacent to the 68 year old stands of Project 1. Approximately 171 of these acres are in the LSR (Late Successional Reserve) and 18 acres are in the RR (Riparian Reserve) LUAs (land use allocations).

The revised EA and FONASI will be made available for public review from June 30, 2010 to July 14, 2010. The notice for public comment will be published in a legal notice in the *News-Guard* and *News-Times* newspapers. Written comments should be addressed to Trish Wilson, Field Manager, Marys Peak Resource Area, 1717 Fabry Road S., Salem, Oregon 97306. Emailed comments may be sent to OR_Salem_Mail@blm.gov. Attention: Patricia Wilson.

Finding of No Significant Impact

Based upon review of the Revised Bottleneck Late Successional Reserve Enhancement EA and supporting documents, I have determined that the proposed actions are not major federal actions and would not significantly affect the quality of the human environment, individually or cumulatively with other actions in the general area. No site-specific environmental effects meet the definition of significance in context or intensity as defined in 40 CFR 1508.27. Therefore, supplemental or additional information to the analysis done in the RMP/FEIS through a new environmental impact statement is not needed. This finding is based on the following information:

Context: Potential effects resulting from the implementation of the proposed actions have been analyzed within the context of the Salmon River 5th-field Watershed and the project area boundaries. The proposed action would occur on approximately 172 acres of LSR and 17 acres of RR LUA land, encompassing less than one percent of the forest cover within the Salmon River 5th-field Watershed [40 CFR 1508.27(a)].

Intensity:

1. The resources potentially affected by the proposed thinning activities are: air quality, fire hazard/risk, fish species/habitat, invasive, non-native plant species, migratory birds, other special status species / habitat – wildlife, recreation, soils, threatened or endangered species – northern spotted owl, visual

resources, water quality, and wildlife habitat components. The effects of density management through thinning, and wolf tree release through selective cutting and girdling on approximately 161 acres of 68 year old stands and enhance a 24 acre late-seral (103 years old) stand, and a 4 acre deciduous swamp, are unlikely to have significant adverse impacts on these resources [40 CFR 1508.27(b) (1)] for the following reasons:

- *Project design features* described in *(EA section 2.2.2)* would reduce the risk of effects to affected resources to be within RMP standards and guidelines within the effects described in the RMP/EIS.

Vegetation and Forest Stand Characteristics (EA section 3.2.1): No special status (SS) vascular plant, lichens, bryophytes or fungi species would be affected.

Noxious Weeds - While the number of plants may increase in the short term, any increase that does occur should be short lived because all large areas with ground disturbing activities would be grass seeded with Oregon Certified (blue tagged) red fescue (*Festuca rubra*) as a rate equal to 40 pounds per acre or sown/planted with other native species as approved by the resource area botanist. Sowing disturbed soil areas allows the sown seed to become established and dominant in areas that may otherwise be suitable for noxious weeds to become established thus reducing the physical space of the potential habitat for noxious weeds to become established.

Implementation of the Marys Peak integrated non-native plant management plan (EA # OR080-06-09) allows for early detection of non-native plant species which allows for rapid control and generally these species often persist for several years after timber harvest but soon decline as native vegetation increases within the project areas. In addition, all road construction and road maintenance areas would be monitored for Scot's broom infestations and eradicated under this proposal and as part of MP's non-native plant management plan. Other species would be eradicated as funding allows. No significant increase in populations of the noxious weed (invasive/non-native) species identified during the field surveys is expected to occur because this project would disrupt very few acres of exposed mineral soil which could provide habitat for noxious weed species. All of the proposed timber removal activities are planned and layed out to remain below the cumulative level of 10 percent aerial extent of soil disturbance from the RMP (Timber harvest BMP's, Appendix C-2).

Following completion of this proposed action, the majority of the understory vegetation and root systems would remain, along with surface soil litter and slash from the harvested trees. This amount is considered as not significant when compared to other annual disturbances throughout western Oregon which also provide habitat for noxious weed species. These disturbances include but are not limited to: any forest management activities, road construction (city, highway and logging roads), road maintenance (pulling ditches, mowing), vegetation management, residential and commercial building construction, gardening and any activity which would expose mineral soil.

- *Carbon Sequestration (Storage) and Climate Change- **(EA section 3.2.8)***

The U.S. Geological Survey, in a May 14, 2008 memorandum to the U.S. Fish and Wildlife Service, summarized the latest science on greenhouse gases and 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. Based on the BLM's review of statutes, regulations, policy, plans and literature, the BLM accepts the conclusions above as appropriate context for a reasoned choice among alternatives.

Carbon Storage

The following show quantities of carbon in forest ecosystem vegetation[1] in the Coast Range, and in the Bottleneck 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, Bottleneck Projects 1 and 2 stands = 36,000 tonnes or 0.000036 Gt. This represents .001% 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, p. 4-537).

Carbon Emissions and Storage, Comparison of Action and No Action Alternatives

Source	Proposed Action (Tonnes)	No Action Alternative (Tonnes)	Notes
Emissions, 2010-2060	1,700	0	Logging, fuel treatments (burning), and emissions from harvested wood.
Live tree storage, 2059	28,900	42,400	50 years of stand growth
Live tree storage, 2009 (current condtions)	29,400	29,400	68 year old stand, 2009
Net change, live trees	-550	+ 13,000	Live tree carbon from growth 2009 - 2059
Harvested wood storage, 2059	3,565	0	69% of harvested wood carbon, 50 years
Total storage increase	**3,015**	**13,000**	Storage: live trees and harvested wood
Net Carbon Storage, Proposed Action	**1,300**	**13,000**	**Storage minus emissions, 2009-2059**

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.

- *Hydrology; Beneficial Uses, Fisheries and Aquatic Habitat; and Soils (EA sections 3.2.2 to 3.2.4)*: It is unlikely that the proposed projects would lead to measurable increases in sediment delivery to streams, stream turbidity, the alteration of stream substrate composition, or sediment transport regime. Stream protection zones would eliminate disturbance of streamside vegetation; no trees would be cut from the stream bank or where roots are stabilizing the stream bank. Tree girdling and piling of slash would have minimal to no ground disturbance and no activities would take place directly in or adjacent to stream channels.

  Measurable effects to hydrologic processes, channel conditions, and water quality due to the proposed action are unlikely. Alterations in the capture, infiltration and routing (both surface and subsurface) of precipitation may occur as a consequence of the mechanical removal of trees and reductions in stand density. This effect from the proposed action would be difficult to measure and unlikely to substantially alter stream flow or water quality.

  Increases in stream temperature as a result of this action are unlikely. All tributary reaches in the project area would have a 55-foot primary shade zone distance based on the hill slope of the area. Trees located within this primary shade zone would not be harvested thus helping to maintain the existing thermal regime of the tributary by maintaining greater than 80 percent effective stream shade. At stream heads, where groundwater and surface water interfaces, stream temperatures are relatively insensitive to change and are likely consistently below ODEQ temperature standards.

[1] 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.

Based on the riparian stand analysis, the proposed action would retain trees which would reach larger diameters earlier compared to the no treatment option, creating natural opportunities for higher quality LWD recruitment in the long-term (Snook 2008). In the short-term, the smaller woody debris would continue to fall from within the untreated SPZs. Wood recruitment studies conducted in the Pacific Northwest have shown the majority of woody debris recruitment occurs within 59 to 65 feet of the stream edge (McDade et al 1990, Van Sickle and Gregory 1990, Meleason et al 2002). The proposed SPZ width, which accounts for 85 percent of this woody debris recruitment zone, is anticipated to maintain wood recruitment rates. Therefore, the proposed actions are not expected to cause any short-term effects to aquatic habitat at the site or downstream.

- *Special Status Species: (EA section 3.2.1).*These projects would not directly affect any Bureau SS (special status) vascular plant, lichen, bryophyte or fungi species since there are no known sites within the project area or adjacent to the project. Although the implementation of these projects would be detrimental to any bureau SS mycorrhizal fungal species occurring in the project area, the likelihood of any occurring in the stand is low because the majority of these species have no known sites within the Marys Peak Resource Area or the Northern Oregon Coast Range Mountains.

- *Wildlife* (*EA section 3.2.5*): No SS (special status) wildlife species are known to occur within the planned harvest areas.

  The proposed wildlife enhancement treatments (189 acres) represent less than one percent of the lands in the watershed. The short-term impacts from this action would be so small at this scale that no measurable change in wildlife habitat conditions is expected. Long-term impacts on public lands (31 percent, BLM and USFS), under current management plans would trend towards LSOG habitat conditions.

  The most substantial impacts, (lasting about ten years) would be a simplification of the stand's live structure, due to the removal of green trees, followed by an increase in structural complexity and species diversity in the understory, due to an increase in light penetration and available water in the soil. The treated mid-seral habitat would continue to function as such. These actions would have long-term positive impacts for species dependent on LSOG forest habitat in the Slick Rock Creek watershed by accelerating the development of large tree structure by creating snags and CWD, and by protecting the full live crowns of wolf trees.

- *Air Quality and Fire Hazard/Risk (EA section 3.2.6):*
  Fuel loading, risk of a fire start and the resistance to control a fire, would all increase at the sites as a result of the proposed action. Slash created from timber harvest would add an estimated 7 to 15 tons per acre of dead fuel to the thinned areas. The fuel arrangement would be discontinuous.

  Risk of a fire start in the untreated slash would be greatest during the first season following cutting. Fire risk would diminish as the area "greens up" with under story vegetation, and as the fine twigs and branches in the slash begin to break off and collect on the soil surface. Past experience, in the geographic area of this proposed action, has shown that, in approximately 15 years, untreated slash would generally decompose to the point where it no longer contributes significantly to increased fire risk. Depending on the amount of large, down wood left on site from logging, the resistance to control would also decrease over time but more slowly. The resulting total residual dead fuel loading would vary throughout the thinned areas ranging from 5 to 30 tons per acre. It is expected that about half of the dead fuel tonnage to be left on site following treatment would be in the form of down logs and pieces in the 10 inch and larger size class.

The total amount of slash debris expected to be piled for burning is estimated to be approximately 365 tons from the thinned areas. Burning approximately 365 tons of dry, cured, piled fuels under favorable atmospheric conditions in the Oregon Coast Range is not expected to result in any long-term negative effects to air quality in the air shed. Locally within ¼ to ½ mile of the piles there may be some very short-term smoke impacts after piles are ignited resulting from drift smoke. Depending on size, arrangement, type and moisture content of the fuel, the smoke would diminish over several hours or days as the piles cool and burn out (sooner if rain develops). Generally this smoke only affects the immediate area (¼- ½ mile or less) around the pile. Due to the location of this project (over 2000 feet elevation), it is unlikely that inversions would present a problem impacting the local air quality. Burning of slash would always be coordinated with the Oregon Department of Forestry (ODF) and conducted in accordance with the Oregon State Smoke Management Plan. This serves to coordinate all forest burning activities on a regional scale to prevent negative impacts to local and regional air sheds.

- *Public health or safety* [40 CFR 1508.27(b)(2)]: The project's effects to public health and safety would not be significant because: the project occurs in a forested setting, removed from urban/residential areas, where the primary activities are forest management and timber harvest.

  Public safety along haul routes would be minimally affected because log truck traffic from forest management activities on both private and public land is common and the majority of the public using these haul routes are aware of the hazards involved in driving on these forest roads. In addition project design features such as speed limits and warning signs near logging activities would provide for public safety.

2. *Projects 1 and 2* would not affect:

   - ü Unique characteristics of the geographic area [40 CFR 1508.27(b)(3)] because there are no historic or cultural resources, parklands, prime farmlands, wild and scenic rivers, wilderness, or ecologically critical areas located within the project area (EA Section 3.0);
   - ü Districts, sites, highways, structures, or other objects listed in or eligible for listing in the National Register of Historic Places, nor would the proposed actions cause loss or destruction of significant scientific, cultural, or historical resources [40 CFR 1508.27(b)(8)] (EA Section 3.0).

3. *Projects 1 and 2* are not unique or unusual. The BLM has experience implementing similar actions in similar areas without highly controversial [40 CFR 1508.27(b) (4)], highly uncertain, or unique or unknown risks [40 CFR 1508.27(b) (5)].

4. *Projects 1 and 2* do not set a precedent for future actions that may have significant effects, nor do they represent a decision in principle about a future consideration [40 CFR 1508.27(b) (6)]. The BLM has experience implementing similar actions in similar areas without setting a precedent for future actions.

5. The interdisciplinary team evaluated *Projects 1 and 2* in context of past, present and reasonably foreseeable actions [40 CFR 1508.27(b)(7)]. Potential cumulative effects are described in the attached EA. These effects are not likely to be significant because of the projects' scope (effects are likely to be too small to be detectable), scale (project areas of 161, 24, and 4 acres, encompassing less than one percent of the forest cover within the Salmon River Watershed, and short duration (direct effects would occur over a maximum period of 10 years) (EA Section 3.2).

6. *Projects 1 and 2* are not expected to adversely affect threatened or endangered species, or their habitat, under the Endangered Species Act (ESA) of 1973 [40 CFR 1508.27(b)(9)].

U. S. Fish and Wildlife Service (USFWS)

To address concerns for potential effects to listed wildlife species and potential modification of critical habitats, the proposed action was consulted upon with the USFWS, as required under Section 7 of the Endangered Species Act. Consultation for this proposed action was facilitated by its inclusion within a programmatic Biological Assessment (BA) that analyzed all projects that may modify the habitat of listed wildlife species on federal lands within the Northern Oregon Coast Range during fiscal years 2009 and 2010. The proposed action has been designed to incorporate all appropriate design standards set forth in the BA. This action would be considered a "may affect, not likely to adversely affect" northern spotted owl dispersal habitat and northern spotted owl and marbled murrelet critical habitats. In the resulting Letter of Concurrence (FWS Reference Number 13420-2008-I-0125), after reviewing the effects of the proposed action on the spotted owl and its critical habitat, and the marbled murrelet and its critical habitat, the USFWS concurred with BLM that the activities, as proposed, are not likely to adversely affect spotted owls or marbled murrelets and are not likely to adversely affect critical habitat for either species.

National Marine Fisheries Service

Consultation with NMFS is required for all actions which 'may affect' ESA listed fish species and critical habitat. Oregon Coast (OC) Coho Salmon are listed as threatened under the ESA, as amended, and are known to occur in the area where the proposed actions are located (Salmon River and Siletz River).

The proposed thinning actions associated with the Bottleneck LSR Thinning Project are within 0.5 miles to the listed fish or listed critical habitat in the Slick Rock Creek Sub-Watershed. Proposed hauling associated with the project occurs adjacent to listed fish . A determination has been made that this proposed project would be a 'May Affect' on OC coho salmon. The 'May Affect' determination is based on the proximity of the density management treatments to the Trout Creek and Slick Rock Creek in the Slick Rock Creek Sub-Watershed where listed fish reside. Due to the "May Affect" determination this project would need to have consultation completed with the NMFS prior to implementation.

Project 1 – Concurrence from NMFS on consistency of this project with guidance described in *Endangered Species Act Section 7 Informal Consultation for the 2008-2009 North Coast Province Thinning Timber Sales Programmatic on Portions of the Siuslaw National Forest and Eugene and Salem Districts of the Bureau of Land Management, Seven Watersheds within the Oregon Coast Recovery Domain* (NMFS 2008) would provide consultation coverage for the May Affect actions of the Bottleneck LSR Thinning project. Concurrence from NMFS was received on March 24, 2010 concluding informal consultation for this project. Actions which do not comply with design criteria of the Thinning Timber sale Programmatic or *Aquatic Restoration Biological Opinion (ESA Section 7 Formal Programmatic Consultation and Magnuson-Stevens Fishery Conservation and Management Act-Essential Fish Habitat Consultation for Fish Habitat Restoration Activities in Oregon and Washington, CY2007-2012)* would require additional ESA consultation coverage.

Project 2 activities have no connections to listed fish habitat; therefore no effects to listed fish or listed fish habitat would occur.

Protection of Essential Fish Habitat (EFH) as described by the Magnuson/Stevens Fisheries Conservation and Management Act and consultation with NMFS is required for all projects which may adversely affect EFH of Chinook and coho salmon. The proposed Bottleneck LSR Enhancement Projects 1 and 2 are not expected to adversely affect EFH due to distance of all activities associated with the projects from ESA listed fish or critical habitat. Consultation with NMFS on EFH is not required for these projects.

7. *Projects 1 and 2* do not violate any known federal, state, or local law or requirement imposed for the protection of the environment [40 CFR 1508.27(b)(10)].

Approved by: _____ _____

Patricia Wilson, Field Manager Date
Marys Peak Resource Area

Glossary: Abbreviations, Acronyms, and Terms

ACS	Aquatic Conservation Strategy
Alternative	Proposed project (plan, option, choice)
Anadromous Fish	Species that migrate to oceans and return to freshwater to reproduce.
BLM	Bureau of Land Management
BMP	Best Management Practice(s) design features to minimize adverse environmental effects.
CEQ	Council of Environmental Quality, established by the National Environmental Policy Act of 1969
CEQ Regulations	Regulations that tell how to implement NEPA
Crown	That portion of a tree with live limbs.
Cumulative Effects	Past, present, and reasonably foreseeable effects added together (regardless of who or what has caused, is causing, and might cause those effects)
CWD	Coarse Woody Debris refers to a tree (or portion of a tree) that has fallen or been cut and left in the woods. Usually refers to pieces at least 20 inches in diameter as described in Northwest Forest Plan and FEMAT.
Deciduous Swamp	Shallow-water and/or waterlogged land dominated by deciduous trees.
Density Management	To change the structure, and possibly the composition and function, of a stand of trees by either increasing the number of trees per acre through planting, or by decreasing the existing tree density through cutting. Usually reserved for land-use allocations other than timber production.
DBHOB	Diameter Breast Height Outside Bark
EA	Environmental Assessment. NEPA document that describes a federal action(s) and analyzes the effects to the public and other agencies and tribes.
ESA	Endangered Species Act. Federal legislation that ensures federal actions would not jeopardize or elevate the status of living plants and animals.
FEIS	Final Environmental Impact Statement
FLPMA	Federal Land Policy Management Act
FONSI	Finding of No Significant Impact. NEPA document that describes why the proposed action within an EA would not significantly affect the quality of the human environment, individually or cumulatively.
Fuels	Any natural combustible material left on site that is available for burning
Ground-Base Yarding	Moving trees or logs by equipment operating on the surface of the ground to a landing where they can be processed or loaded
Harvester/Forwarder Equipment (cut to length system)	A logging system which uses "harvesters" to fell and delimb a tree and then cut it into logs, paired with a tracked "forwarder" that has a long reach, gathers up the logs and transfers them to a log truck. Many of these systems are known for their low PSI (pounds per square inch) impact to the ground.
Invasive Plant	Any plant species that is aggressive and difficult to manage.
Landing	Any designated place where logs are laid after being yarded and are awaiting subsequent handling, loading and timber hauling
LSOG	Late seral/old growth
LSR	Late-Successional Reserve (a NWFP land use allocation) Lands that are to be protected or enhanced for the purpose of providing habitat for older forest related species.
LSRA	Late-Successional Reserve Assessment for Oregon's Northern Coast Range Adaptive Management Area. Interagency document which facilitates appropriate management activities to meet LSR objectives in the project area.
LUA	Land Use Allocation. Lands designated using objectives as described in the NWFP.
LWD	Large Woody Debris; material found within the bankfull width of the stream

	channel and is specifically of a size 23.6 inches diameter by 33 feet length (per ODFW - Key Pieces)
MBTA	Migratory Bird Treaty Act of 1918, as amended
Native Plant:	Species that historically occurred or currently occur in a particular ecosystem and were not introduced
NEPA	National Environmental Policy Act (1969)
NMFS	National Marine Fisheries Service
Non-Native Plant	Any species that historically does not occur in a particular ecosystem or were introduced
Non-Point	No specific site
Noxious Weed	A plant species designated by federal or state law as generally possessing one or more of the following characteristics: aggressive and difficult to manage; parasitic; a carrier or host of serious insects or diseases; or non-native, new, or not common to the United States.
NWFP	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).
ODEQ	Oregon Department of Environmental Quality
ODFW	Oregon Department of Fish and Wildlife
Oregon Smoke Management Plan	The State of Oregon's plan for implementing the National Clean Air Act in regards to burning of forest fuels
RMP	Salem District Record of Decision and Resource Management Plan (1995).
RMP/FEIS	Salem District Proposed Resource Management Plan / Final Environmental Impact Statement (1994).
Road Decommissioning	Road is closed to vehicular traffic. Road is waterbarred. May include removal of culverts, ripping and seeding of roadbed. Road prism remains intact for future use.
Road Improvement	Work done to an existing road which improves it over its original design standard. May include widening of subgrade, upgrading existing culverts, and applying rock surfacing that exceeds original design standards.
Road Renovation	Work done to an existing road which restores it to its original design standard. May include blading and shaping of a roadway, clearing brush from cut and fill slopes, cleaning or replacing culverts, and applying rock surfacing material to depleted surfaces. Generally these roads are driveable prior to work commencing.
ROD	Record of Decision
RR	Riparian Reserves (NWFP land use allocation) Lands on either side of streams or other water feature designated to maintain or restore aquatic habitat.
Rural Interface	BLM-managed lands within ½ mile of private lands zoned for 1 to 20 acre lots. Areas zoned for 40 acres and larger with homes adjacent to or near BLM-managed lands.
Skid Trails	Path through a stand of trees on which ground-based equipment operates.
Skyline Yarding	Moving trees or logs using a cable system to a landing where they can be processed or loaded. During the moving process, a minimum of one end of trees and logs are lifted clear of the ground
Snag	A standing dead tree
Special Status Species	Collectively, any plant or animal species which is federally listed or proposed for listing under the ESA, and BLM Sensitive species (BLM manual 6840 – Special Status Species Management).
SPZ	Stream Protection Zone is a buffer along streams where no material would

	be removed and heavy machinery would not be allowed. The minimum distance is 50 feet.
Succession	A predictable process of changes in structure and composition of plant and animal communities over time. Conditions of the prior plant communities that are favorable for eh establishment of the next stage. The different stages in succession are often referred to as seral stages.
TPA	Trees per acre
Turbidity	Multiple environmental sources which causes water to change conditions.
USDI	United States Department of the Interior
USEPA	United States Environmental Protection Agency
VRM	Visual Resource Management. Lands are classified from 1 to 4 based on visual quality ratings.
Wolf Tree	A tree within a forest stand that is significantly larger and more complex in structure than the average tree in the stand; usually because it was open-grown and therefore was not limited by competition for essential resources.
Yarding Corridors	Corridors cut through a stand of trees. Cables are strung in these corridors to transport logs from the forest to the landing.

BOTTLENECK LATE SUCCESSIONAL RESERVE ENHANCEMENT ENVIRONMENTAL ASSESSMENT

Table of Contents

1.0 INTRODUCTION

This Environmental Assessment (EA) is a revision of the Bottleneck Late Successional Reserve Enhancement EA (original EA) that was published and made available for public review from March 17, 2008 to April 15, 2008. The original Bottleneck Late Successional Reserve Enhancement EA is incorporated by reference.

The purpose of the revised EA, hereafter referred to as this EA, is to incorporate changes to the proposed action, and update the description of the affected environment, and environmental effects as a result of response to the comments received on the original EA.

This EA will analyze the impacts of proposed re-thinning and CWD (coarse woody debris) creation operations and connected actions on the human environment in the Salmon River fifth field watershed. The EA will provide the decision-maker, the Marys Peak 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 and whether a supplement to that Environmental Impact Statement is needed or if a Finding of No Additional Significant Impact is appropriate.

Section 1 of this EA for the proposed Bottleneck Late Successional Reserve Enhancement projects provide a context for what will be analyzed in the EA, describes the kinds of action we will be considering, defines the project area, describes what the proposed actions need 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.

This June 2010 revision of the EA addresses Carbon Sequestration (Storage) and Climate Change.

1.1 Projects Analyzed

- Project 1, Mid-Seral Habitat Enhancement, is a proposal to cut and remove a portion of the trees, through a timber sale, on approximately 161 acres of 68 year old stands in Late Successional Reserve (LSR) and Riparian Reserve (RR) Land Use Allocations (LUAs) within the North Coast Range Adaptive Management Area.
- Project 2, Late-Seral Habitat and Deciduous Swamp Enhancement, is a proposal to create, within a 24 acre 103 year old stand, large, hard snags and CWD structure and to release the largest live trees with the greatest crowns (wolf trees) from adjacent tree competition; and to maintain and enhance a 4 acre deciduous swamp by cutting and girdling encroaching conifers and hardwoods.

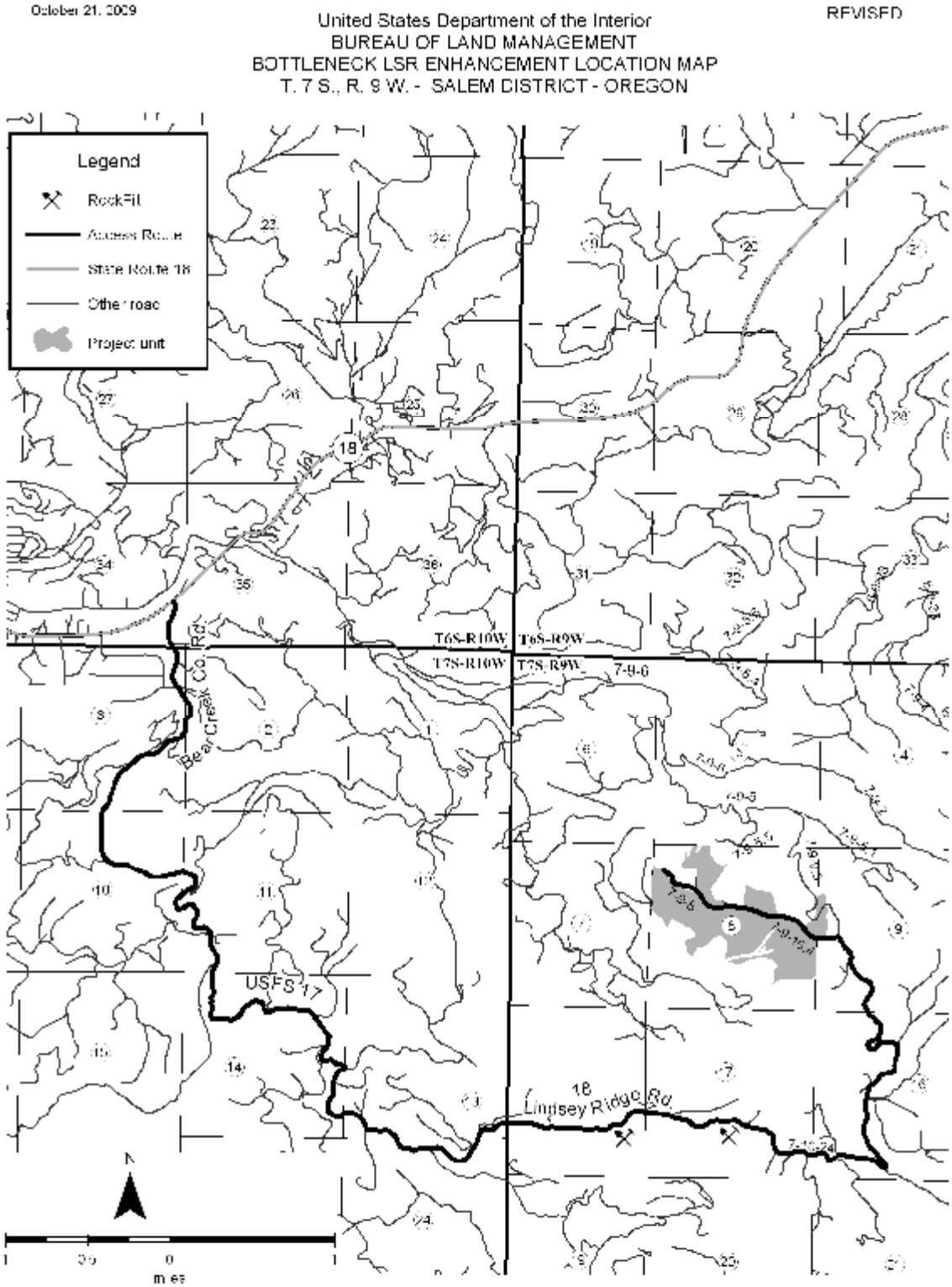
1.1.1 Relationship between Projects

Projects 1 and 2 are within the same section and are in the Salmon River Watershed.

1.2 Project area Location

The projects are located approximately 10 miles east of Lincoln City, Oregon, in Lincoln County on forested land managed by the Marys Peak Resource Area (MPRA), Salem District of the Bureau of Land Management (BLM). They are within Township 7 South, Range 9 West, Sections 8 and 9, Willamette Meridian (see Map 1).

Map 1: Location Map



1.3 **Conformance with Land Use Plans, Policies, and Programs**

The Bottleneck Late-Successional Reserve Enhancement projects have been designed to conform to the following documents, which direct and provide the legal framework for management of BLM-managed lands within the Salem District:

- *Salem District Record of Decision and Resource Management Plan* (RMP), May 1995: The RMP has been reviewed and it has been determined that the Bottleneck LSR Enhancement projects conform to the land use plan terms and conditions (i.e., complies with management goals, objectives, direction, standards and guidelines) as required by 43 CFR 1610.5 (BLM Handbook H1790-1).
- *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* (the Northwest Forest Plan, or NWFP), April 1994.
- *Record of Decision and Standards and Guidelines for Amendment to the Survey & Manage, Protection Buffer, and other Mitigation Measures Standards and Guidelines* (S&M ROD, January 2001)

The analysis in the Revised Bottleneck Late Successional Reserve Enhancement EA is site-specific and supplements analyses found in the *Salem District Proposed Resource Management Plan/Final Environmental Impact Statement* (RMP/FEIS), September 1994. 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* (NWFP/FSEIS), February 1994. In addition, the EA is tiered to the *Final Supplemental Environmental Impact Statement For Amendment to the Survey & Manage, Protection Buffer, and other Mitigation Measures Standards and Guidelines* (S&M FSEIS, November 2000).

The proposed actions are located within the coastal zone as defined by the Oregon Coastal Management Program. This proposal is consistent with the objectives of the program, and the State planning goals which form the foundation for compliance with the requirements of the Coastal Zone Act. Management actions/directions found in the RMP were determined to be consistent with the Oregon Coastal Management Program.

The following documents provided additional direction in the development of the Bottleneck LSR Enhancement EA:

- *Late-Successional Reserve Assessment for Oregon's Northern Coast Range Adaptive Management Area* (LSRA, see USDA-FS and USDI-BLM 1998);
- *Salmon-Neskowin Watershed Analysis* (SNWA, see USDA-FS and USDI-BLM, 1999).

These documents are available for review in the Salem District Office. Additional information about the proposed actions is available in the Bottleneck LSR Enhancement Project EA Analysis File (NEPA file), also available at the Salem District Office.

1.3.1 Survey and Manage Review

The Bottleneck LSR Enhancement projects are 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 of 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 (including timber sales). Nevertheless, I have reviewed the Bottleneck LSR Enhancement Project 1 in consideration of both the December 17, 2009 and October 11, 2006 order. Because the Bottleneck Project 1 entails no regeneration harvest and entails thinning only in stands less than 80 years old, I have made the determination that this project meets Exemption A of the Pechman Exemptions (October 11, 2006 Order), and therefore may still proceed to be offered for sale 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. The first notice for sale will appear in the newspaper on July 24, 2010.

There are no known sites of any Survey and Manage species within the Bottleneck Project 2 areas. On-site plant and animal habitat evaluations (including some Survey and Manage botany protocol surveys) would occur prior to project implementation to ensure that any Survey and Manage species sites are buffered or excluded from treatment units.

1.3.2 Northern Spotted Owl (NSO) Status Review

"The following information was considered in the analysis of the Bottleneck LSR Enhancement proposed activities: a/ *Scientific Evaluation of the Status of the Northern Spotted Owl* (Sustainable Ecosystems Institute, Courtney et al. 2004); b/*Status and Trends in Demography of Northern Spotted Owls,* 1985-2003 (Anthony et al. 2004); c/ *Northern Spotted Owl Five Year Review: Summary and Evaluation* (USFWS, November 2004); and *Northwest Forest Plan – The First Ten Years* (1994-2003): d/ *Status and trend of northern spotted owl populations and habitat, PNW Station Edit Draft* (Lint, Technical Coordinator, 2005).

The Salem District analyzed reports regarding the status of the northern spotted owl and although the agencies anticipated a decline of NSO populations under land and resource management plans during the past decade, the reports identified greater than expected NSO population declines in Washington and northern portions of Oregon, and more stationary populations in southern Oregon and northern California."

The reports did not find a direct correlation between habitat conditions and changes in NSO populations, and they were inconclusive as to the cause of the declines. Lag effects from prior harvest of suitable habitat, competition with barred owls, and habitat loss due to wildfire were identified as current threats. West Nile Virus and Sudden Oak Death were identified as potential new threats. Complex interactions are likely among the various factors. This information has not been found to be in conflict with the NWFP or the RMP (*Evaluation of the Salem District Resource Management Plan Relative to Four Northern Spotted Owl Reports, September 6, 2005).*

1.3.3 Compliance with the Aquatic Conservation Strategy

On March 30, 2007, the District Court, Western District of Washington, ruled adverse to the US Fish and Wildlife Service (USFWS), National Oceanic and Atmospheric Administration (NOAA-Fisheries) and USFS and BLM (Agencies) in *Pacific Coast Fed. of Fishermen's Assn. et al v. Natl. Marine Fisheries Service, et al and American Forest Resource Council,* Civ. No. 04-1299RSM (W.D. Wash)((PCFFA IV). Based on violations of the Endangered Species Act (ESA) and the National Environmental Policy Act (NEPA), the Court set aside:

- the USFWS Biological Opinion (March 18, 2004),
- the NOAA-Fisheries Biological Opinion for the ACS Amendment (March 19, 2004),
- the ACS Amendment Final Supplemental Environmental Impact Statement (FSEIS) (October 2003), and the
- ACS Amendment adopted by the Record of Decision dated March 22, 2004.

Previously, in *Pacific Coast Fed. Of Fishermen's Assn. v. Natl. Marine Fisheries Service,* 265 F.3d 1028 (9th Cir. 2001)*(PCFFA II)*, the United States Court of Appeals for the Ninth Circuit ruled that because the evaluation of a project's consistency with the long-term, watershed level ACS objectives could overlook short-term, site-scale effects that could have serious consequences to a listed species, these short-term, site-scale effects must be considered.

EA section 4.0 shows how the Revised Bottleneck LSR Enhancement projects meet the Aquatic Conservation Strategy in the context of the PCFFA cases. In addition, project design features (p. 10) would provide protection measures to meet ACS objectives.

1.4 Decision Criteria/Project Objectives for Each Project

The MPRA Field Manager will use the following criteria/objectives in selecting the alternative to be implemented. The field manager would select the alternative that would best meet these criteria. The selected action would:

- Meet the purpose and need of the projects (EA sections 1.6)
- Comply with the *Salem District Record of Decision and Resource Management Plan*, May 1995 (RMP) and related documents which direct and provide the legal framework for management of BLM-managed lands within the Salem District (EA section 1.3)
- Would not have significant impact on the affected elements of the environment beyond those already anticipated and addressed in the RMP EIS.

1.5 **Results of Scoping**

A scoping letter, dated October 11, 2007, was sent to 16 potentially affected or interested individuals, groups, and agencies. Two responses were received during the scoping period.

A description of the project was included in the March, June, September and December 2008, February and November 2009 and March 2010 project updates to solicit comments on the proposed project.

In addition, the original EA and FONSI document was made available for public review between March 4, 2009 and April 2, 2009. Three (3) comment letters/emails were received during the original EA comment period. The scoping and EA comment letters/emails are available for review at the Salem District BLM Office, 1717 Fabry Rd SE, Salem, Oregon. This Revised Bottleneck Late Successional Reserve Enhancement EA includes additional information which addresses EA comments.

1.6 **Purpose of and Need for Action**

The purpose for Projects 1 and 2 is to accelerate the development of late-seral/old-growth forest conditions in order to enhance terrestrial wildlife and aquatic habitats. The proposed action area was chosen for density management of forest stands to meet the future needs of marbled murrelet, northern spotted owl, and other species dependent upon late-seral/old-growth forest habitats; and for improvement to the watershed and road system.

The proposed projects are intended to implement a subset of specific management opportunities that were identified within the *Salmon-Neskowin Watershed Analysis* (USDA FS and USDI BLM, June 1999) and the *Late-Successional Reserve Assessment for Oregon's Northern Coast Range Adaptive Management Area* (USDA FS and USDI BLM, January 1998) in a manner consistent with standards and guidelines described below.

Late Successional Reserve LUA (RMP pp. 15-19): To manage developing forest stands and wildlife habitat in the LSR LUA so that:

- Late-successional forest conditions, which serve as habitat for late-successional forest species, can be developed, accelerated, and enhanced, (LSRA, p. 2).
- Plan and implement silvicultural treatments inside Late-Successional Reserves that are beneficial to the creation of late-successional habitat (RMP p. 16). This implementation would be accomplished through a timber sale that can be successfully offered to the market place.
- To enhance and maintain biological diversity and ecosystem health in order to contribute to healthy wildlife populations (RMP p. 24).

To manage early to mid-seral stands in Riparian Reserve LUAs (RMP pp.9-15) so that:

- Growth of trees can be accelerated to restore large conifers to Riparian Reserves (RMP p.7);
- Habitat (e.g. CWD, snag habitat, in-stream large wood) for populations of native riparian-dependent plants, invertebrates, and vertebrate species can be enhanced or restored (RMP p.7);
- Structural and spatial stand diversity can be improved on a site-specific and landscape level in the long-term (RMP p.11, 26, D-6).

To maintain and develop a safe, efficient and environmentally sound road system (RMP p.62) that:

- Provides appropriate access for timber harvest and silvicultural practices used to meet the objectives above;
- Reduces potential human sources of wildfire ignition and provides for fire vehicle and other management access;
- Reduces environmental effects associated with identified existing roads within the project area.

2.0 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." No unresolved conflicts were identified. Therefore, this EA will analyze the effects of Alternative 1 (No Action) and Alternative 2 (Proposed Action).

2.1 Alternative 1 (No Action)

This alternative serves to set the environmental baseline for comparing effects to the proposed action. 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. 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, or decommissioning
- Fuel reduction projects

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 managed 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.

2.2 Alternative 2 (Proposed Action)

Project 1 (Mid-Seral Habitat Enhancement) Description

This project consists of density management treatments on approximately 161 acres of 68 year old stands within LSR and RR LUAs and would occur through a timber sale (Bottleneck Timber Sale). The stands would be thinned to a variable density basal area ranging from 110 to 160 square feet/acre. Trees would be skyline yarded on approximately 90 acres and ground-based yarded on approximately 71 acres.

Habitat within these mid-seral stands would be further enhanced by releasing approximately one wolf tree (larger green trees that have a complex live-crown structure) per acre from adjacent tree competition. A small gap or patch (up to 0.25 acre) would be created around each wolf tree and two of the adjacent Douglas-fir trees would be left on site within each gap; one of the trees would be girdled

for snag habitat and the other tree felled and left for CWD. This treatment will further increase structural complexity (live, dead, horizontal, and vertical) within the thinned stands.

Project 1 (Mid-Seral Habitat Enhancement) Only Connected Actions

- **Road Construction:** Approximately 5,370 feet of new road would be constructed with road locations being primarily ridge top. All new roads would be surfaced with rock. All of the new construction would be decommissioned (waterbars installed, grass seed applied to exposed soil on cut/fill slopes and entrances blocked).

- **Road Renovation:** Roads utilized for log timber haul would be renovated as necessary. Road renovation could include surface rock application, road blading, roadside brushing and culvert cleaning and/or improvement.

- **Rock Quarry**: To supply rock for Project 1, an existing rock source (Lindsey Ridge Quarry) located in Township 7 South, Range 9 West, Section 17 would be utilized.

Table 1. Summary of Project 1 Activities

Activity	Project 1 Alternative 2 (Proposed Action)
Ground-based yarding (acres)	90
Skyline yarding (acres)	71
Road construction (feet)	5,370
Road renovation (miles)	8
Mid-seral habitat enhancement (acres)	161
Later-seral habitat enhancement (acres)	24
Deciduous Swamp enhancement (acres)	4

Project 2 (Late-Seral Habitat and Deciduous Swamp Enhancements) Description

This project proposes to enhance a 24 acre late-seral (103 years old) stand, and a 4 acre deciduous swamp, both adjacent to the mid-seral forest of Project 1. Habitat within the late-seral stand would be enhanced by increasing structural complexity through selective cutting and girdling around existing large green trees which exhibit complex crown structure (wolf trees). Approximately 25 trees would be selected for release and all cut trees would remain on site. The objective for the deciduous swamp is to maintain and improve the habitat by cutting or girdling an undetermined number of encroaching conifers and hardwoods. All cut trees would remain on site.

2.2.1 Proposed Action Design Features (Project 1 Only)

The following design features are those specific means, measures, or practices that make up the proposed action, and those that are incorporated into the proposed action to reduce or eliminate risk to the affected elements of the environment described in EA Section 3.1.

Table 2. Season-of-Operation or Operating Conditions

Season-of-Operation or Operating Conditions	Applies to Operation	Objective
During periods of low tree sap flow, generally July 15-April 15	Yarding outside of road right-of-ways in density management areas (cable)	Protecting the bark and cambium of residual trees
During periods of low precipitation, generally May 1-October 31	Road construction/renovation/decommissioning	Minimize soil erosion
During periods of low soil moisture, generally July 15-October 15	Ground-based yarding (Tractor)	Minimize soil erosion/compaction
During periods of low soil moisture, generally June 15-October 31	Ground-based yarding (Harvester/Forwarder; Hydraulic Loader) and machine chipping and/or piling	Minimize soil erosion/compaction
July 1 – September 15	In-stream work period (culvert cleaning/ improvement)	Minimize soil erosion/stream sedimentation

Project Design Features by RMP Objectives

To minimize soil erosion as a source of sedimentation to streams and to minimize soil productivity loss from soil compaction, loss of slope stability or loss of soil duff layer:

- All logging activities would utilize the Best Management Practices (BMPs) required by the Federal Clean Water Act (as amended by the Water Quality Act of 1987) (2008, FEIS, Appendix I) . The BMP's listed below would be applied to this project.
- Implement erosion control measures such as waterbars, slash placement and seeding in cable yarding corridors and skid trails where the potential for erosion and delivery to waterbodies, floodplains and wetlands exists. Construct waterbars on skid trails using guidelines in Table I-21, page 289, Appendix I.
- Scatter treatment debris on disturbed soils and water bar any yarding trails that could erode and deposit sediment in water bodies, floodplains, and wetlands.
- Plan use on existing and new skid trails to be less than 12 percent of the harvest area.
- Limit width of skid trails to what is operationally necessary for the equipment.
- Ensure one-end suspension of logs during ground based skidding.
- Limit conventional ground based equipment to slopes less than 35 percent.
- Skid and harvest roads would be blocked where they access main vehicular roads following completion of ground-based yarding.
- Other ground based yarding equipment could be utilized as long as it meets best management practices and results in equivalent or less than the level of impacts analyzed for the project.
- Fell harvested trees away from stream channels when possible
- In the skyline yarding area, one end suspension of logs would be required over as much of the area as possible to minimize soil compaction, damage to reserve trees, and disturbance. Lateral yarding using an energized locking carriage would be required.
- Where workable, require full suspension over flowing streams, non-flowing streams with erodible bed and bank.
- During periods of rainfall when water is flowing off road surfaces, the contract administrator

may restrict log hauling to minimize water quality impacts, and/or require the purchaser to install silt fences, bark bags, or apply additional road surface rock.

- Repair damaged culvert inlets and downspouts to maintain drainage design capacity. All locations where mineral soil is exposed (roads to be constructed/renovated, skid trails and landings, culvert replacements/installations) would be sown with Oregon Certified (blue tagged) red fescue (*Festuca rubra*), and/or sown with a wildlife vegetation mix and applied at a rate equal to 40 pounds per acre or sown/planted with other native species as approved by the resource area botanist.
- Landings should be kept to the minimum size needed to accomplish the job and use existing road surfaces as much as possible.
- To minimize water quality impacts, the purchaser would also be required to install silt fences, barkbags, or additional road surface rock at the direction of the contract administrator. During periods of heavy rainfall, the contract administrator would restrict log timber hauling where the road surface is rutted or covered by a layer of mud and where runoff from that road segment is causing a visible increase in turbidity to adjacent streams.
- Existing landings less than 200 feet from streams channels would be disconnected to stream channels or mitigations would be implemented to avoid connecting existing landings to streams.
- Rock quarry operations would avoid sediment and contaminant delivery to any stream channels.
- Off highway vehicle use would be monitored and areas would be closed (access blocked) if resource damage occurs.

To contain and/or reduce noxious weed infestations on BLM administered lands using an integrated pest management approach:

- All soil disrupting equipment moved into the project area would be required to be clean and free of dirt and vegetation as directed by the contract administrator.

To meet the objectives of the Aquatic Conservation Strategy (ACS) Component #1 (Riparian Reserves):

- Stream protection zones (SPZs), where no cutting is permitted, would be established along all streams and identified wet areas within the harvest area. These zones would be a minimum of 55 feet from the high water mark. Stream protection zone width would be established through shade sufficiency analysis (Silviculture Prescription Appendix 4).
- To protect water quality, all trees within one tree height of SPZs would be felled away from streams. Where a cut tree does fall within a SPZ, the portion of the tree within the SPZ would remain in place.
- No yarding would be permitted in or through any SPZs within the harvest area.
- From the SPZ to the upper edge of the RR LUA, stand density would be reduced using the same prescription used on the upland forest, though additional trees would be left as necessary to maintain 50 percent canopy cover in the secondary shade zone (one site potential tree height).
- No refueling would be allowed within 200 feet of any standing or running water (RMP, BMP C-8, C-6)
- Woody material removed from stream crossing for culvert maintenance would be retained in the stream network.
- Stream crossing replacement on perennial streams would be avoided within 1 mile of listed fish habitat (LFH) and on intermittent streams within ½ mile of LFH.

To protect and enhance stand-structure diversity:

- To create variable density, the treatment area would be divided into 6 units of about 16 to 30 acres, and each would have a prescribed average residual basal area target. Residual tree densities would range from 110 to 160 square feet basal area and approximately 44 to 66 trees per acre (TPA). Within each unit, residual basal area would be varied above or below the set

average, to give fine-scale variability. Furthermore, existing variability would be maintained by removing a proportion of the basal area.

- Except in yarding corridors/skid trails and gaps, minor species abundance would be increased by reserving all trees (merchantable and non merchantable) other than Douglas-fir.
- Clumps would be retained through variable density thinning, and would not exceed 0.1 acre in size. However, several areas would remain untreated due to logging infeasibility and SPZs.
- Seven "plus" trees (trees selected for genetic traits) and their reference trees, and bearing trees would be reserved.
- Existing hardwood species stand diversity would be maintained.

To protect and enhance wildlife habitat components:

- Any tree found to have a stick or ball nest, regardless of size (tree or nest), would be reserved.
- Any tree found to have unusual structural attributes (when compared to the average tree in the stand), such as larger trees with open-grown full crowns or natural platforms, would be reserved.
- Any tree found to have deformities, such as broken tops, multiple tops, or cavities, would be reserved.
- Existing snags and CWD would be reserved, except where they pose a safety risk or affect access and operability. Any snags or logs felled or moved for these purposes would remain on site within the project area.
- Additional trees would be reserved around large (greater than 24 inches DBHOB and 50 feet in height) snags to protect them from logging operations and reduce the likelihood of their removal for worker safety reasons.
- At least 2 green trees/acre intended to be part of the residual stand would be felled/girdled/topped to function as snags and CWD within five years post-harvest. Trees to be utilized for snag and CWD creation would be stand average diameter breast height outside bark (DBHOB) or larger. Incidentally felled or topped trees (ie. tail-trees, intermediate supports, guyline anchors, hang-ups, etc.) that may be left by harvest operations would be counted toward this target. The high likelihood of post-harvest windthrow in this project area is anticipated to provide most of the CWD to meet this target.
- Further monitoring and potential enhancement of snags and CWD would occur within the proposed project approximately five years after treatments are completed.

To reduce fire hazard risk and protect air quality:

- If waste recycling is chosen in lieu of burning slash, only logging slash and debris readily available from existing roads and landings would be recycled. Additional yarding separate from the commercial timber harvesting would not be allowed for the sole purpose of obtaining additional material to recycle. Existing roads and landings would not be enlarged to accommodate chipping on site.
- Fuel reduction would be accomplished by burning of slash piles, by machine processing of slash on-site, or by a combination of these techniques.
- Whenever possible, alternative waste recycling of slash material would be encouraged. This may be accomplished by: providing firewood to the public, chipping for co-gen power production, chipping for soil amendments and soil protection, etc.
- Debris accumulations would be machine and/or hand piled and/or chipped. For all areas to be piled or chipped, at least 75 percent of the slash in the ¼ inch to 6 inch diameter range would be piled for burning or chipped with the chips being spread out on the site or removed from the site.
- Light accumulations of debris cleared during road construction and along roads that would remain in drivable condition following the completion of the project would be scattered along the length of rights-of-way.
- Large accumulations of debris on landings and along existing roads that remain in drivable condition would be machine and/or hand piled. Within 30 feet of the edge of each landing and

road, all logs, tops, and debris would be decked or windrowed as directed by the contract administrator (except for logs sold and removed from the project area).
- All piles would be located at least ten feet away from reserve trees and snags. Larger piles would be preferable over small piles. Wind rows would be avoided unless approved by the contract administrator.
- During the late summer and before the onset of fall rains, all machine and hand piles to be burned would be covered at least 80 percent with 4 mil black polyethylene plastic.
- All burning would occur under favorable smoke dispersal conditions in the fall, in compliance with the Oregon State Smoke Management Plan.
- Fuels treatment of any kind would be prohibited within SPZs.
- Hand piling of fuels intended for burning would be prohibited within 100 feet of any stream channel.
- Mechanical fuels treatment would be prohibited closer than 200 feet from any stream channel.

To Protect Special Status (SS) Species:
- The resource area biologist or botanist would be notified if any animal or plant SS species are found occupying stands proposed for treatment during project activities. If the species is a federal listed ESA species then all of the known sites would be withdrawn from any timber harvesting activity. If the species is other than a federal listed ESA species, then appropriate mitigation action would be taken.
- For botanical bureau SS species (includes state and federal threatened and endangered) whose characteristics make locating them with field surveys practical, clearances would generally be done by field surveys using intuitive controlled methods, field clearances, field reconnaissance, inventories, and/or habitat examinations. Clearances for fungi are considered "not practical" and surveys are not required.
- Site management of any Bureau special status (SS) botanical and fungal and animal species found as a result of additional inventories would be accomplished in accordance with BLM Manual 6840- *Special Status Species Management* and the *Record of Decision To Remove the Survey and Manage Mitigation Measure Standards and Guidelines from Bureau of Land Management Resource Management Plans Within the Range of the Northern Spotted Owl (*July, 2007*).*

To Protect Cultural Resources:
The project area occurs in the Oregon Coast Range. Survey techniques are based on those described in Appendix D of the *Protocol for Managing Cultural Resource on Lands Administered by the Bureau of Land Management in Oregon.* Post-project survey would be conducted according to standards based on slope defined in the Protocol appendix. Ground disturbing work would be suspended if cultural material is discovered during project work until an archaeologist can assess the significance of the discovery.

Proposed Action Design Features (Project 2 Only)
- In order to minimize the disturbance to nesting birds all treatment activities would be conducted after August 31 and before February 1.
- Red tree vole surveys would be conducted around each wolf tree before adjacent trees are cut or girdled. Surveys would be conducted prior to treatment and if any active tree vole nests are found in Project 2 then a 300 feet no treatment buffer would protect the nest site .
- Once wolf trees are selected for the release treatment, site management of any botanical and fungal SS species found as a result of inventories would be accomplished in accordance with, BLM Manual 6840- *Special Status Species Management* and the *Record of Decision, To Remove the Survey and Manage Mitigation Measure Standards and Guidelines from Forest Service and Resource Management Plans Within the Range of the Northern Spotted Owl* (July 2007).

- The resource area biologist or botanist would be notified if any animal or plant SS species are found occupying stands proposed for treatment during project activities. If the species is a federal listed ESA species then all of the known sites would be withdrawn from any timber harvesting activity. If the species is other than a federal listed ESA species, then appropriate mitigation action would be taken.

2.3 COMPARISON OF ALTERNATIVES WITH REGARD TO PURPOSE AND NEED

Table 3. Comparison of Alternatives by Purpose and Need

Purpose and Need (EA Section 1.6)	No Action (Alternative 1)	Proposed Action (Alternative 2)
Accelerate the development of late-seral/old-growth forest characteristics in mid and late-successional forest habitat for the future needs of northern spotted owls, marbled murrelets and other species which depend upon late-seral/old-growth habitat. (RMP pp. 15-19)	Maintains the slow level of growth in overstocked mid-seral habitat for the next decade or two; existing wolf trees lose structure to competition; no immediate addition of snags and CWD. In the late-seral stand existing wolf trees lose structure to competition; no immediate addition of snags and CWD.	Creates a more open and faster growing mid-seral forest with variable tree densities; protects and enhances structure of wolf trees; creates hard snags and CWD.
Offer a marketable timber sale. (RMP pp. 15-19)	Would not offer timber for sale.	Offers approximately 161 acres of timber for sale.
Increase structural diversity in the Riparian Reserve LUA from relatively uniform conifer stands. (RMP pp. 9-15)	Maintains a highly dense, uniform stand of trees with receding crown ratios, loss of limbs and loss of growth.	Reduces tree densities within stands to increase diameter growth and restore large conifers to Riparian Reserves. Increases species diversity of native riparian-dependent plants and animals.
Provides appropriate access for timber harvest and silvicultural practices used to meet the objectives above, while minimizing increases in road densities. (RMP p. 62)	Maintain existing road densities.	Constructs approximately 5,370 feet of new roads and renovates approximately eight miles. Following harvest, the new construction would be decommissioned.
	Delay maintenance on feeder roads, main routes would be maintained.	Would implement maintenance on feeder roads, allowing for continued access.
Reduces environmental effects associated with existing roads within the project area (RMP p. 62)	Maintain existing drainage and road surface conditions.	Renovates existing roads (includes drainage structure renovation or replacement). These renovations would improve drainage and road surface conditions, resulting in less road surface erosion into the streams.
Maintain and enhance biological diversity and ecosystem health in order to contribute to healthy wildlife populations (RMP p.24)	Deciduous swamp continues to see conifer encroachment from surrounding forest with potential to decrease in size	Encroachment of conifer trees into deciduous swamp site from surrounding forest is suppressed through the cutting and girdling

Purpose and Need (EA Section 1.6)	No Action (Alternative 1)	Proposed Action (Alternative 2)
	over time; no input of new hard snags and CWD.	of invading trees; new input of hard snags and CWD.

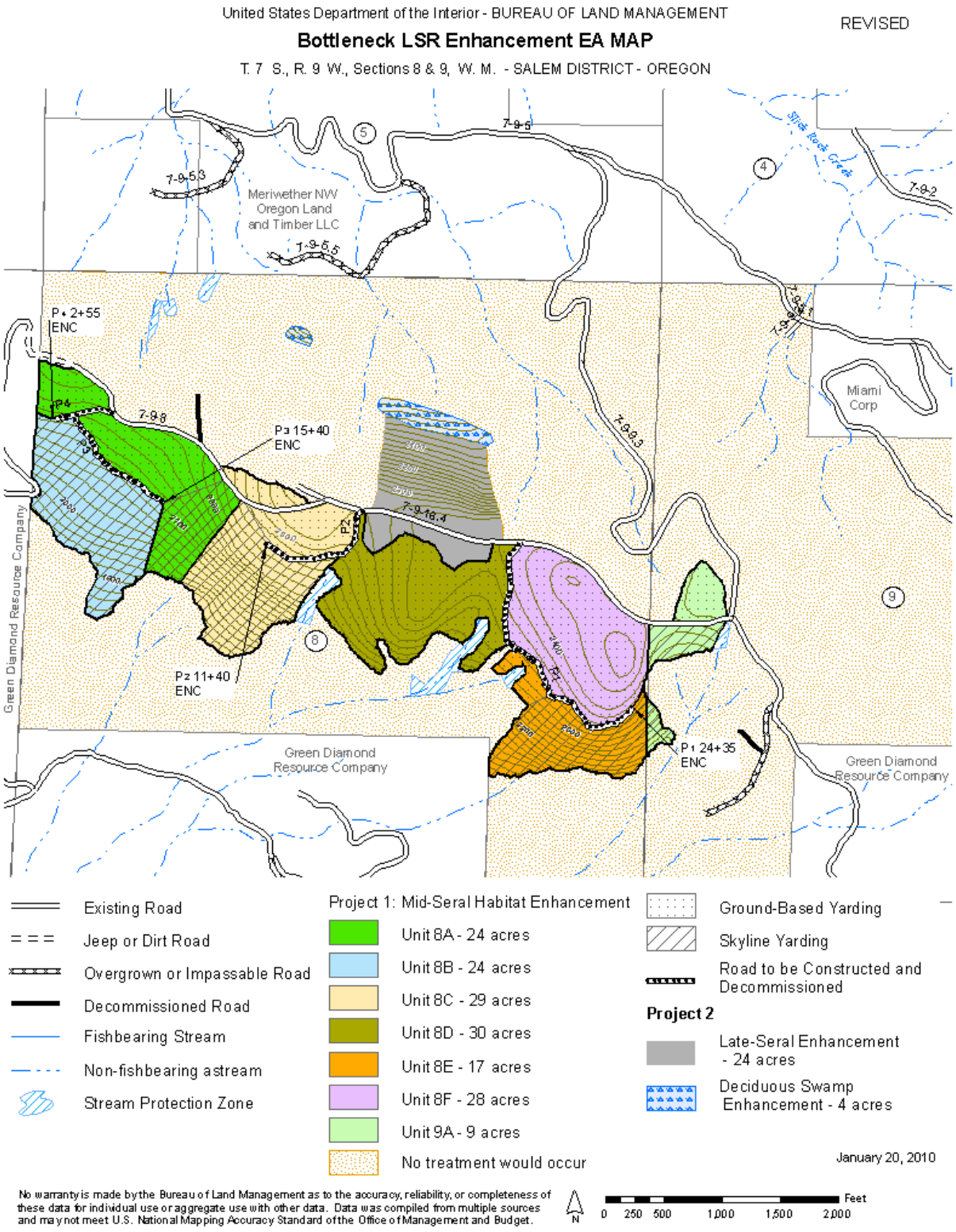
2.4 **Alternatives Considered but not Analyzed in Detail**

Helicopter logging:
An alternative to harvest some of the treatment area in Project 1 with a helicopter was considered and analyzed. It was determined that the sale should be conventionally harvested due to the high cost of helicopter use in conjunction with current value of Douglas-fir and western hemlock. All new construction would occur within ridge top road locations in areas of non-sensitive soils. In addition, helicopter yarding is typically utilized in areas where timber harvest operations are inaccessible due to a lack of roads, in areas of sensitive soils or where adverse impacts to fisheries would occur. None of these conditions exist within the Bottleneck LSR Enhancement Project areas.

Inclusion of additional density management area:
One alternative included a 16 acre unit for skyline yarding in Section 9. A considerable amount of new road construction would be necessary to conventionally harvest the unit so it was dropped from this action and will be considered as a future action which includes helicopter logging of similar stands in the area.

Alternate Haul Route:
An alternate timber haul route (Roads 7-9-6, 7-9-5 and 7-9-9.3) was considered and analyzed. The current poor condition of these roads would have required extensive road renovation work prior to timber hauling. Due to the large amount of road renovation and considerable expense that would have been required, this haul route was not selected.

Map 2 Proposed Action Alternative



3.0 AFFECTED ENVIRONMENT AND ENVIRONMENTAL EFFECTS– COMMON TO BOTH PROJECT AREAS

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

Table 4: 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 RMP. These projects 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 section 5.0 shows how the Bottleneck LSR Enhancement projects meet the Aquatic Conservation Strategy in the context of the PCFFA cases.
Air Quality (Clean Air Act as amended (42 USC 7401 et seq.)	These projects are in compliance with this direction because air quality impacts would be of short duration (one burn period during implementation of pile burning). Addressed in Text (EA Section 3.1.6).
Cultural Resources (National Historic Preservation Act, as amended (16 USC 470) [40 CFR 1508.27(b)(3)], [40 CFR 1508.27(b)(8)]	These projects are in compliance with this direction and the project would have no effect on this element because Cultural resource sites in the Oregon Coast Range, both historic and prehistoric, occur rarely. The probability of site occurrence is low because the majority of BLM managed Oregon Coast Range land is located on steep upland mountainous terrain that lack concentrated resources humans would use. Post-disturbance inventory would be conducted according to Appendix D of the *Protocol for Managing Cultural Resources on Lands Administered by the Bureau of Land Management in Oregon.* Inventoried areas would be based on percent slope and topographic features
Ecologically critical areas [40 CFR 1508.27(b)(3)]	These projects would have no effect on this element because there are no ecologically critical areas present within the project area.
Energy Policy (Executive Order 13212)	These projects are in compliance with this direction because these projects would not interfere with the Energy Policy (Executive Order 13212).
Environmental Justice (E.O. 12898, "Environmental Justice" February 11, 1994)	These projects are in compliance with this direction because projects 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)	Protection of Essential Fish Habitat (EFH) as described by the Magnuson/Stevens Fisheries Conservation and Management Act and consultation with NMFS is required for all projects which may adversely affect EFH of Chinook and coho salmon. The proposed Bottleneck LSR Enhancement Projects 1 and 2 are not expected to adversely affect EFH due to distance of all activities associated with the projects from ESA listed fish or critical habitat. Consultation with NMFS on EFH is not required for these projects
Farm Lands, Prime [40 CFR 1508.27(b)(3)]	The projects would have no effect on this element because no prime farm lands are present on BLM land within the Marys Peak RA.
Floodplains (E.O. 11988, as amended, Floodplain Management, 5/24/77)	These projects are in compliance with this direction because the proposed treatments would not change or affect floodplain functions.

Element of the Environment /Authority	Remarks/Effects
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)	These projects 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 these projects.
Healthy Forests Restoration Act (Healthy Forests Restoration Act of 2003 (P.L. 108-148)	These projects are in compliance with this direction because treatments would decrease the risk of fire and help restore forests to healthy functioning condition (EA Section 3.1.6).
Migratory Birds (Migratory Bird Act of 1918, as amended (16 USC 703 et seq)	These projects are in compliance with this direction because treatments would restore natural resources that could degrade habitat for migratory birds. Addressed in text (EA Section 3.1.2).
Native American Religious Concerns (American Indian Religious Freedom Act of 1978 (42 USC 1996)	These projects are in compliance with this direction because no Native American religious concerns were identified during the scoping period.
Noxious weed or non-Invasive, Species (Federal Noxious Weed Control Act and Executive Order 13112)	These projects are 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 3.1.1).
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 the public would be restricted from 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)	These projects are in compliance with this direction because there would be no adverse effects on Threatened or Endangered Species (EA Section 3.1.2 and 3.1.4).
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.)	These projects are 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 Section 3.1.3)
Wetlands (E.O. 11990 Protection of Wetlands 5/24/77) [40 CFR 1508.27(b)(3)]	These projects are in compliance with this direction because wetlands within the project area would be protected by buffers. (EA Section 3.1.3)
Wild and Scenic Rivers (Wild and Scenic Rivers Act, as amended (16 USC 1271) [40 CFR 1508.27(b)(3)]	These projects are in compliance with this direction because there are no Wild and Scenic Rivers within or adjacent to the project areas.
Wilderness (Federal Land Policy and Management Act of 1976 (43 USC 1701 et seq.); Wilderness Act of 1964 (16 USC 1131 et seq.)	These projects are 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 areas.

3.1 Affected Environment and Environmental Effects

Those elements of the human environment that were determined to be affected are *vegetation, wildlife, soils, water, fisheries/aquatic habitat, fuels/air quality and recreation/visual resources.* This section describes the current condition of those affected elements, and the environmental effects of the alternatives on those elements.

3.1.1 Vegetation

Affected Environment

Mid-Seral Habitat Enhancement (Project 1) and Late-Seral Habitat and Deciduous Swamp Enhancements (Project 2)

Present Stand Condition and History

The Mid-Seral Habitat Enhancement project occurs within a 68 year old coniferous forest that is comprised mainly of Douglas-fir (93 percent), western hemlock (6 percent), fewer Sitka spruce and sparse noble fir. It appears that a scattering of the Douglas-fir, Sitka spruce and western hemlock trees originated before the majority, as they are relatively large full-crowned and open-grown (wolf trees). There are almost 12 TPA greater than 24 inches diameter breast height outside bark (DBHOB).

The understory is mainly open with few concentrations of vine maple and red huckleberry on sloped areas. Western hemlock seedlings are also common and often concentrated in small stands. The upper gentle slopes, mid-slope benches and ridges are mostly dominated by forbs, graminoids and widely spaced sword-fern. Steeper upper, mid and lower slopes are dominated by sword-fern and Oregon grape. In general, this project area is fairly uniform with little vegetative diversity when compared to multi-layered coniferous forested stands with less dense canopy cover. There are some areas with concentrations of bryophyte covered boulders. These areas would not be considered "unique" within the project area as these habitats are a common occurrence on the upper slopes and ridges throughout adjacent lands.

The Late-Seral Habitat Enhancement portion of Project 2 has stand conditions essentially the same as Project 1 with the exception that this stand is about 36 years older. It also has scattered older, bigger (height and diameter) conifers associated with the stand. These older trees are considered to be the first trees to become established on the site following a historical natural stand replacing fire event which took place over 100 years ago. The older trees tend to have complex crowns and large branches that extend from the canopy to near the ground. This stand is located on the upper gentle slopes and is surrounded on three sides by Project 1.

Table 5. Current stand attributes for Projects 1 and 2 (Stand exam data-2004).

Stand Exam Unit		STAND DATA					
Project 1							
Species	***Acres***	***Total age[1]***	***Trees/ac***	***Basal area/ac[2]***	***DBHOB (in.)[3]***	***RDI[4]***	***Crown closure[5]***
Douglas-fir			226	331	16.4		
Western hemlock			15	18	15.0		
Sitka spruce			1	3	24.6		
Totals	**161**	**68**	**242**	**353**	**16.4**	**1.02**	**79%**
Project 2							
Douglas-fir			**41**	**141**	**25.1**		
Western hemlock			**77**	**175**	**20.4**		
Sitka spruce			**0.9**	**6**	**36.0**		
Western red cedar			**0.3**	**2**	**37.0**		
Totals	**24**	**104**	**119**	**324**	**22.3**	**.69**	**75%**

Values are for trees greater than 7 inches diameter in each stand.

[1] Stand age in 2009. Data collected in 2004. Unit M413 data grown forward to 2009 using Organon model.

[2] Basal area in square feet: cross-sectional area occupied by tree boles on each acre, a measure of density.

[3] Average diameter at breast height (4.5 feet).

[4] Relative Density Index, the density of TPA relative to the maximum density possible (Reineke, 1933).

[5] Average crown closure, average of estimate on each plot by stand exam contractor.

The Deciduous Swamp Enhancement portion of Project 2 occurs on a mid-slope bench where there is shallow water for much of the year and forms the 'headwaters' of a first order stream which drains to the north. The water source of this area in the summer appears from several locations in the form of springs at the lower extent of the upslope conifer dominated slopes. The outer edge of the aquatic system is surrounded by western red cedar, Douglas-fir and red alders. Several red alder snags are present around the perimeter and within the aquatic system and are presumed to have died from past high water events. The aquatic system has an open canopy and has a heavy salmonberry component. There are several decay class 3 logs within the aquatic area, but many are red alders. Other species associated with this aquatic area are: skunk cabbage, gold thread, gold carpet, bishops-cap and pig-a-back plant.

Snag and CWD Conditions

Table 6 displays the volume of downed wood and snags per acre, and the count of snags and broken topped TPA in Project 1 area. Of the total, about 50 percent of the volume is in the 'hard' decay classes (class 1 and 2; see Figure 1 below), resulting from recent tree mortality and windthrow or *Phellinus weirii* root rot infection. Most of the snags that have died are a result of suppression from overtopping trees. Snags greater than 24 inches DBHOB have value for the greatest amount of wildlife species; there is an average of only 1.3 of these larger snags per acre, and they are all in decay class 5 (most decayed). About half of them are 50 feet or less in height.

Table 6. Current snag and CWD amounts[1] in Projects 1 and 2.

Project	Total age (yrs)	Down wood volume (cu ft/ac)	Down wood volume (%)	Snag Volume (greater than5 inches DBHOB) (cu ft/ac)	Snag volume (%)	Total volume (cu ft/ac)	Snags per acre	Snag QMD	Broken Topped Live TPA
1	68	119	17%	589	83%	708	55	8.5	0
2	104			1443			46	13.0	

[1]Conifer only; CWD over 8 feet long and 5 inches DBHOB; snags over 10 feet long and 5 inches DBHOB.

Figure 1. Snag and CWD Decay Class Condition Codes

Decay Class	1	2	3	4	5
Bark	Intact	Intact	Trace	Absent	Absent
Twigs	Present	Absent	Absent	Absent	Absent
Texture	Intact	Intact to soft	Hard, large pieces	Soft, blocky pieces	Soft, powdery
Shape	Round	Round	Round	Round to oval	Oval
Color of wood	Original	Original	Original to faded	Light brown to faded brown	Faded to light yellow or gray
Bole portion on ground	None, elevated on supports	Parts touch, still elevated	Bole on ground	Partially below ground	Mostly below ground

Using guidelines from the Late Successional Reserve Assessment for Oregon's Northern Coast Range Adaptive Management Area, (p. 96), for Project 1 moderate levels of CWD (greater than 1100-1980 cubic feet per acre) are recommended for early or mid-seral stands.

Forest Health

There are no known current threats to forest health beyond the following endemic processes in the proposed project areas; laminated root rot, caused by the fungus *Phellinus weirii*, and Douglas-fir bark beetles. The risk of windthrow from severe winter storms always exists, and the upper lee slopes of major southeast to northwest-running ridges generally experience the highest degree of windthrow in the Oregon Coast Range.

Special Status Botanical and Fungal Species

Inventory of the Project 1 and 2 areas for vascular plant, lichen, bryophyte and fungal SS Species were accomplished through review of; 1) existing survey records and spatial data, 2) habitat evaluation and evaluation of species-habitat associations and presence of suitable or potential habitat, and 3) field clearances, field reconnaissance and inventories utilizing intuitive controlled surveys, in accordance with survey protocols for the specific groups of species. There are no "known sites" of any vascular plant, lichen, bryophyte or fungi SS Species within the project areas nor were any found during subsequent surveys.

Invasive (Noxious Weeds, Invasive Non-native Species)
The following noxious weeds are known from within or adjacent to the project area (mid and late-seral enhancements only; there are no noxious weeds that occur in the immediate area of the deciduous swamp site), Tansy ragwort, bull and Canadian thistles, St. John's wort, Himalayan blackberry, and Scot's broom.

Environmental Effects

3.1.1.1 Alternative 1 (No Action Alternative)

Mid-Seral Habitat Enhancement (Project 1)
Without treatment, natural disturbance agents such as disease, insects, and wind would create stand structural diversity and contribute to late-successional structural development. The timing and intensity of these conditions are unknown, but it is expected that diversity would take considerably longer to develop than if the proposed action was implemented.

Stand structural conditions would remain on the current trajectory of increasing density and decreasing individual tree growth rates. Stand growth projections for the next 30 years (using ORGANON version 7.0, a growth and yield computer simulation model; Hann, 2003) indicate that relative density would continue to maintain the current average in 30 years without treatment. The stand is currently at such high density, that continued mortality would occur, offsetting tree growth. Understory development would be very limited: few new understory trees would establish, and existing understory trees would die or slow in growth due to increasing competition.

Stand structure would remain relatively uniform, except for gaps created by disturbance. The main input of CWD would come from density mortality, disturbance events and endemic levels of insects and disease and would result in more numerous snags or downed logs than would occur with treatment. In general, the quantity of trees dying is expected to be much greater than if the stands were thinned, but dead trees would be smaller in size. On average, density mortality in trees of all sizes (including understory) is predicted (ORGANON) to average 70 TPA of about 11 inches DBHOB in the next 30 years, and only 0.10 TPA of 12 inches DBHOB with density management in that same time period.

One 22 year study of stands aged 14 to 38 years, showed total annual stem mortality of 1 to 5 percent. Since the stands in the project area are older than the researched stands and have fewer TPA, annual mortality would likely be somewhat less. In the study, wind damage accounted for 18 percent of the stem mortality, but represented 50 percent of the bole biomass lost because mortality resulting from wind is relatively larger than density mortality (Lutz and Halpern, 2006).

As the canopy closes and lower limbs are lost to shading, crown ratios would decrease from the current average of 40 percent to less than 30 percent in 30 years. Relatively large, open-grown "wolf" trees would continue to lose lower crown due to competition from surrounding trees that established subsequent to them. Wind firmness and individual tree stability would also decrease.

There would be no short-term elevated risk of bark beetle infestation resulting from harvest, but risk of significant windthrow that could trigger bark beetle infestation would remain.

This alternative does not meet the objectives for speeding the development of late-successional forest structural characteristics in younger stands. Characteristics for the Project 1 stand and treatment units for the next 30 years with and without treatment as projected by ORGANON are compared in Table 8.

Table 7 Average pre-treatment and post-treatment stand characteristics immediately after thinning stands in Bottleneck Project 1 (trees greater than 7" DBHOB only).

Unit / Treatment	Age[1] (yrs)	Pre-treatment					Immediately After Treatment				
		TPA[2]	% DF	BA[3] (sq ft)	QMD (in)[4]	RDI[5]	TPA[2]	% DF	BA[3] (sq ft)	QMD (in)[4]	RDI[5]
Total Unit 140 BA **avg.**	68	242	93%	352	16.3	1.02	56	71%	139.0	21.4	0.36
Units 8B, 8E and 9A 160 BA	68	242	93%	352	16.3	1.02	66	76%	162.0	21.2	0.42
Units 8A and 8D 140 BA	68	242	93%	352	16.3	1.02	57	72%	142.0	21.4	0.37
Units 8C and 8F 110 BA	68	242	93%	352	16.3	1.02	44	64%	112.0	21.6	0.29
Avg	**68**	**242**	**93%**	**352**	**16.3**	**1.02**	**56**	**72%**	**139**	**21.4**	**0.36**

[1]Total stand age in 2009 - 2004 data grown forward to 2009.
[2]Number of trees per acre. [3]Basal area per acre.
[4] Diameter at breast height (4.5 feet) of tree of average basal area.
[5]Proportion of maximum Stand Density Index (Reineke 1933), as a ratio of trees in a given stand compared with the biological maximum number of trees a site can support.

Table 8 Project 1 Stand Characteristics with Treatment vs. No Treatment 30 years in the future (year 2039)[1]

Stand or Unit	Treatment Residual BA	Age[1] (yrs)	TPA[2]	Percent D-Fir (TPA)	BA[3] (Sq.Ft.)	QMD (in.)[4]	RD[5]	Density Mortality		
								TPA	BA	QMD
Stand	No Tmt.	98	172	92%	385	20.3	1.03	70.00	50.00	11.4
Stand (Avg.)	140 BA	98	56	71%	217	26.9	0.52	0.10	0.08	12.5
Units 8B, 8E and 9A	160 BA	98	66	76%	244	26.0	0.59	0.10	0.11	12.4
Units 8A and 8D	140 BA	98	57	72%	222	26.8	0.53	0.10	0.08	12.7
Units 8C and 8F	110 BA	98	44	64%	186	27.9	0.44	0.10	0.05	12.3

[1]Modeled from stand ages 2009 to 2039.
[2]Trees per acre greater than7 inches DBHOB.
[3]Basal area in square feet: cross-sectional area occupied by tree boles on each acre, a measure of density
[4]QMD=quadratic mean diameter, the DBHOB of tree of mean basal area.
[5]Relative Density (RD) is a ratio of trees in a given stand compared with the number of trees a site can support.

Special Status Botanical and Fungal Species

Not affected, since no known sites exist within the project area.

Invasive (Noxious Weeds, Invasive Non-native Species)
Without any new human caused disturbances in the proposed project area the established noxious weed populations would remain at the current level (low).

Late-Seral Habitat and Deciduous Swamp Enhancements (Project 2)
No tree cutting/girdling would occur around large legacy trees. Tree competition would cause the lower crowns to be lost on the legacy trees, reducing their crown structure and wildlife value. No tree cutting/girdling would occur in the wet area, and successional change from open wetland habitat to forest would continue. Without cutting and girdling, there would not be a new impulse of hard snags and CWD in the stand and deciduous swamp.

3.1.1.2 Alternative 2 (Proposed Action)

Mid-Seral Habitat Enhancement (Project 1)

Stand Development
Stand development for 30 years growth after density management with and without treatment is compared in Table 8. Variable density thinning to the recommended densities is expected to put the stands on a trajectory toward development of stand structure and individual tree characteristics desirable for attainment of composition and structural diversity objectives in the LSRA and the Aquatic Conservation Strategy in the following ways:

Restored structural complexity of the stands
Tappeiner, et al (1997) concluded that thinning 40 to 100 year-old Douglas-fir stands in the Coast and Cascade ranges of western Oregon promotes tree regeneration, shrub growth, and multi-storied stand development, and thinning that incorporates retention of large remnant trees, snags, down wood, and hardwoods accelerate the development of old-growth characteristics. Treatment includes variable density thinning, creation of small gaps around "wolf" trees, and retention of small clumps. This would increase spatial and structural diversity of the stand. Some trees would experience no competition and grow very full crowns. Some trees would remain at close spacing and retain closed canopy conditions.

Thinning around "wolf" or legacy trees in Projects 1 and 2 would increase growth and vigor of the remaining trees and prevent loss of lower crown due to competition.

Accelerated development of desired tree characteristics
Residual trees would increase in diameter and crown depth/width. The long-term results of density management would be larger average diameters and deeper crowns (higher crown ratios) at any given age. The predicted average increase in QMD for overstory trees as a result of density management thinning is 5.5 inches. (With thinning, the QMD would increase from the current of 16.4 inches to 21.4 inches from the removal of smaller trees, raising the mean QMD. With 30 years of growth, QMD would then increase from 21.4 inches to 26.9 inches, an increase of 5.5 inches). Without thinning, the average increase in QMD is predicted to be 4 inches (from 16.4 inches to 20.3 inches QMD). Density management would result in an additional 1.5 inch of diameter growth in 30 years, a 37 percent increase from no treatment.

Species Composition
Species abundance would change, as thinning would target Douglas-fir, increasing the relative proportion of the other tree species. The current weighted average species composition is 93 percent Douglas-fir, 6 percent western hemlock, less than 1 percent Sitka spruce, and a trace of noble fir. After treatment, the composition would be approximately 72 percent Douglas-fir, 26 percent western hemlock, two percent Sitka spruce and a trace of noble fir.

Maintenance of stand health and stability
Trees with less competition maintain deeper live crowns, lowering their center of gravity and decreasing their height/diameter ratios, reducing susceptibility to wind damage. Deep live crowns are also a structural attribute of late seral forest. Some researchers now suggest that wind firmness and individual tree stability may be factors in a tree reaching age 300 and over. With treatment, the current stand average height to diameter ratios of 81 would decline to an average of 59 after 30 years of growth indicating an improvement of tree stability over time.

Crown ratios below 30 percent indicate a stand is no longer suitable for density management, as the trees would likely not respond to more open conditions, and are more subject to wind throw if the stand is opened up. Crown ratios in the treatment stands are predicted to fall to an average of 24 percent within 30 years without treatment, but stay at about 40 percent in treated stands.

Long-term increase in quality CWD recruitment
Thinning short-circuits the snag recruitment that results from inter-tree competition (Carey, 1999), and very little density mortality (0.1 TPA) is expected to occur for 30 years after treatment. Measures to protect existing large snags are likely to be effective, but many of the smaller snags would likely be felled and left for safety reasons. Potential future treatments to create downed logs and snags would increase the number of snags and downed log volumes. Inputs would be of large diameter, created from average size of the residual stand, and of decay class 1 material. 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 CWD in skyline yarding areas (90 acres of the project area), and about 100 cubic feet per acre in ground-based yarding areas. In the long-term, due to increased diameter growth resulting from density management, larger trees would be available for recruitment for CWD.

There would be a short term (one to three years) elevated risk of a bark beetle infestation from the increased fresh down wood, resulting from both the logging operation and (10 years or more later) creation of additional snags and down wood. Tree mortality resulting from bark beetle infestation as a result of logging or CWD creation would be unlikely.

The potential for windthrow from winter storms would be higher for the first decade following density management. The risk is reduced in the design of the variable density thinning; the heavier residual densities are targeted for the areas that would be most vulnerable to prevailing winds. The risk would be further reduced by selecting leave trees with deep healthy crowns. Risk is greater near created openings (clearcuts on adjacent private lands), and where aspect (the lee side of ridges from prevailing winds), topography, and shallow soils increase risk. Windthrow is not expected to reduce tree stocking by more than 20 percent for the first decade after treatment over the treated area (Busby, Adler, Warren and Swanson, 2006). A two-year study of wind damage following variable density thinning (Roberts, et al., 2007), showed loss of 1.3 percent of stems. The study showed overall level of wind damage resulting from variable density thinning is not statistically greater than unthinned stands, nor uniform thinning.

Skyline and ground-based yarding systems would result in bole and crown damage to a small percentage of the residual trees. Damage may result in greater incidence of stem decays in the future, adding to late-successional structure and function. Burning of slash piles along roads and on landings could result in damage to the crowns of a few adjacent residual trees. Restrictions to yarding during the sap-flow period in the spring would reduce damage.

Effects within Riparian Reserves
Approximately 17 acres (or 15 percent) of the treatment area are within RR LUA. However, the habitat conditions within the RR LUA, outside the SPZ are essentially identical to habitat conditions within the uplands (outside of RR LUA). From the SPZ to the upper edge of the RR LUA, stand density would be reduced using the same prescription used on the upland forest. However, gaps would not be located within 100 feet from streams. Habitat for aquatic and riparian dependent species would be maintained or

enhanced in RR LUA in the following ways:

Long-term increase in quality instream large woody debris (LWD) recruitment
In the long-term, trees would reach large diameters earlier compared to the no treatment option, creating natural opportunities for high quality LWD recruitment. As indicated in Table 8, average stand diameter reaches 20 inches years earlier than if the stands were not treated, and in fact would jump to over 20 inches with treatment itself, where it would take almost 30 years to reach that average without treatment. Large amounts of smaller wood would continue to fall from within the untreated SPZs, and larger wood would begin to be recruited from farther up the slopes as the treated stands reach heights of 200 feet. Thus, wood with a larger range of sizes would potentially be recruited into streams over the long-term in treated stands.

Maintenance of stream temperature through shading
Stream shading would not be affected by the proposed treatments. According to the Stream Shading Sufficiency Analysis (USDA Forest Service et al 2004) done for the proposed treatment (Silviculture Prescription Appendix 4), SPZs need to be 55 feet wide to provide critical shade in the primary shade zone, based on topography and average tree height. Additional criteria required for shade sufficient to maintain stream temperatures are that vegetation density is high and would benefit from thinning and that vegetation treatment in the secondary shade zone (from the primary shade zone to approximately one tree height from the stream) would not result in canopy reduction of more than 50 percent. Canopy cover may drop to about 45 percent in Units 8C and 8F (110 residual basal area) outside the secondary shade zone but future tree growth would result in recovery of canopy by 3 percent or more cover annually. Unit 8C has about 300 feet of stream frontage on one bank, and Unit 8F contains no streams. Understory establishment and growth would contribute to canopy cover as well.

Maintain and restore the species composition and structural diversity of plant communities in riparian areas and wetlands
Collection of data in 2002 and 2005 within the Green Peak Timber Sale on overstory trees, understory vegetation, snags, and CWD provides a basis for monitoring changes due to treatment. Early study findings were summarized in Chan et al., 2004.

In summarizing Density Management Studies regarding vegetation, thinning affected vegetation structure by increasing cover of grasses and forbs and increasing species richness, a measure of diversity. Richness increased because forest floor herb species typically found under forest canopies remained and flourished, and were joined by open-site herbs and grasses not typically found under forest canopies. In the six year period following treatment, plant communities transitioned from an increased cover of species associated with open sites and early seral stages, to a greater proportion of shade-tolerant forest floor species. For example, cover of grasses and early seral forbs was greatest one year following treatment, and were decreased six years after treatment. Since thinning occurred in riparian reserves within 20 to 50 feet from streams in the sampled areas, these results are applicable to riparian areas and would support thinning to maintain species composition and structural diversity of plant communities. Because the previous treatment and proposed action are similar, effects to plant communities in riparian areas are expected to be similar.

Maintain and restore habitat to support well-distributed populations of native plant, invertebrate and vertebrate riparian-dependent species.
Research at the DMS sites, including Green Peak Timber Sale, found that the treatments generally maintained habitat for native plant, invertebrate and invertebrate riparian-dependant species. Similar effects are expected in the proposed action as the previous treatment measured in the research. However, no additional patch cuts are included in the proposed action. Specifically, thinning was found to increase species richness of arthropods, and forest riparian buffers thirty meters wide serve as refuge for both forest-upland and forest-riparian arthropod species. Thinning was found to have minimal effects on most species of aquatic vertebrates (salamanders). Native plants were found to persist and increase in coverage after density management. Patch openings and low (retention) thinning drastically reduced the diversity

of epigeous ectomycorrhizal fungal species, but medium and high retention thinning showed little change in fungal diversity. Buffers of widths defined by the transition from riparian to upland vegetation or topographic slope breaks appear sufficient to mitigate the impacts of upslope thinning on the microclimate above headwater streams. Because the microclimate, as well as the structure and composition of the forest stand and understory vegetation are protected within the untreated buffer, habitat elements seem to be protected.

Special Status Botanical and Fungal Species

This project would not directly affect any SS vascular plant, lichen, bryophyte or fungi species since there are no known sites within or adjacent to the project area. However, this action could provide positive effects for these species. Thinning dense conifer stands could provide habitat for SS botanical and fungal species known from forests with larger diameter trees at an earlier age since thinning dense stands can provide an increase in secondary conifer growth and allow for an increase in diversity and density of the existing shrub and forb species.

This project could adversely affect any species that are not practical to survey for and known sites that were not located during subsequent surveys. These species would mainly include SS hypogeous fungi species. However, the majority of these species have no known sites within the MPRA or the Northern Oregon Coast Range Mountains.

Invasive (Noxious Weeds, Invasive Non-native Species)

Exposed mineral soil often creates environments favorable for the establishment of noxious listed plant species. All road construction areas, road maintenance areas, ground based logging areas, cable yarding corridors and fire trails pose the greatest risk of exposing mineral soil with the implementation of this project. Many common and widespread non-native plant species such as foxglove (*Digitalis purpurea*), burn weed (*Erechtites minima*) and noxious listed species such as Canadian and bull thistles are anticipated to become established throughout the project area post treatment. These populations generally persist until the native vegetation out competes them in approximately 5-10 years or until the conifers reach the sapling stage.

All of the known noxious weed species that occur near the project areas are classified by the Oregon Department of Agriculture as “B” designated weeds. “B” designated weeds are weeds of economic importance which are regionally abundant, but which may have limited distribution in some counties. Where implementation of a fully integrated statewide management plan is not feasible, biological control shall be the main control approach.

All of the noxious weeds species that are known to occur near the project areas are more than regionally abundant and are widespread throughout all of western Washington and Oregon and a fully integrated Oregon statewide management plan has not been implemented. The Marys Peak Resource Area has an integrated non-native plant management plan in place for the control of non-native plant species.

Any adverse effects from the establishment of Canadian and bull thistles, St. John's wort, tansy ragwort, Himalayan blackberry, and Scot's broom within or near the project area are not anticipated. The risk rating for the long-term establishment of these species and consequences of adverse effects on this project area is low because:

1) the implementation of the Marys Peak integrated non-native plant management plan allows for early detection of non-native plant species which allows for rapid control,
2) the known noxious weeds species which occur in the project area are regionally abundant throughout the Oregon Coast Range Physiographic Province, and control measures generally consist of biological control,
3) generally these species often persist for several years after timber harvest but soon decline as native vegetation increases within the project areas, and
4) there are no other Oregon listed noxious weed species that are anticipated to become established with the implementation of this project and design features. In addition, all road

construction and road maintenance areas would be monitored for Scot's broom infestations and eradicated. Other species would be eradicated as funding allows. Monitoring newly constructed roads would provide for early detection and allow for a rapid response to remove any non-native species of concern.

Late-Seral Habitat and Deciduous Swamp Enhancements (Project 2)

Within the 32 acre late-seral stand, conifers that occur adjacent to existing wolf trees and extend outward to approximately 40 feet would be felled or girdled to increase CWD and snags to the stand. Approximately 20 wolf trees would be enhanced by reducing competition for light, water and nutrients with adjacent smaller trees.

Within and around the perimeter of the deciduous swamp, conifers would be felled or girdled to increase snags and CWD in the area and to remove trees otherwise considered as encroaching into the swamp. None of the trees cut or girdled would be removed from the project area. All of the material would remain on site to decay.

Trees felled would kill minor amounts of vegetation were the bole of the tree comes to rest on the ground. Other vegetation (including bryophytes) would be killed in locations were the branches and needles accumulate in dense piles and block any available sunlight to the plants. Most all epiphytic lichens and bryophytes that occur on the felled trees would die and be replaced with other lichen and bryophyte species. Minor infestations of the Douglas-fir bark beetle are anticipated. However, if a few additional conifer trees are killed due to higher than anticipated levels of Douglas-fir bark beetle infestations, it would add to the structural diversity of this project.

The project would reduce the canopy in a few small areas which would create an increase in available light to vegetation surrounding the reserved trees. This would allow for an increase in size and diversity of native perennial vegetation.

Project 2 would maintain open wet meadow habitat, a rare component of the landscape that provides a specialized habitat niche for many species, rather than allowing succession to the more common closed forest habitat.

Special Status Botanical and Fungal Species

This project would not directly affect any SS vascular plant, lichen, bryophyte or fungi species since there are no known sites within or adjacent to the project area.

This project could affect any species that are not practical to survey for and any species that were not located during field surveys.

This project could create suitable habitat for several SS lichen or bryophyte species by allowing additional light to the reserved conifers.

Invasive (Noxious Weeds, Invasive Non-native Species)

Little mineral soil is expected to be exposed during the implementation of this project. The felling of trees would only have minor amounts of mineral soil exposed and it is expected that few if any noxious weed would become established through the implementation of this project. Therefore, the risk rating for the establishment of noxious weeds and any adverse affects is considered as low.

3.1.2 Wildlife

Affected Environment

Mid-Seral Habitat Enhancement (Project 1) and Late-Seral Habitat and Deciduous Swamp Enhancements (Project 2)

Stand-Level Habitat Conditions

Slick Rock Creek (9,151 acres)

The conifer forest habitat enhancement projects occur in mid-seral (Project 1=68 years) and late-seral (Project 2=105 years) stands. A moderate density management thinning is proposed for Project 1 stands (139 acres of LSR and 22 acres of RR). See Table 10 for a summary of each unit's current stand conditions.

BLM, U.S Forest Service Managed and Private Lands

Conditions at the stand-level are greatly influenced by management practices on private lands (65 percent ownership). The current arrangement in the Slick Rock Creek watershed is managed early-seral habitat (59 percent). The early-seral arrangement and large mid-seral patches (27 percent) are dominated by Douglas-fir with some other scattered and clumped conifers and various hardwoods. These second and third-growth forests typically have stands characterized by a single-layered, dense, overstory canopy with few large snags and little to no CWD or large wood, live or dead, remaining from the original stands. Approximately 10 percent of the stands in the Slick Rock Creek watershed currently provide late seral/old growth (LSOG) habitat.

BLM and U S Forest Service Managed Lands

Habitat conditions on public lands in the Slick Rock watershed can be defined by an arrangement of early-seral (37 percent) stands with a patch arrangement dominated by managed mid-seral (22 percent) and unmanaged late-seral (23 percent) stands. The remaining patches are a combination of old-growth habitat (6 percent) and hardwood stands/nonforest-openings (2 percent). The corridor arrangement (10 percent), in the form of an SPZ provides connectivity for dispersal throughout the watershed. Table 10 summarizes habitat types at the stand-level by acres and land management/ownership.

Table 10
Current acres of terrestrial wildlife habitat types at the stand-level (Slick Rock Creek watershed)

Management/ Ownership	Early-seral Habitat (0-39 yrs)	Mid-seral Habitat (40-79 yrs)	Late-seral Habitat (80-199 yrs)	Old-growth Habitat (200+ yrs)	Hardwoods & Nonforest Habitats	Stream Protection Zone[1]	Total
BLM (%)	977 (41)	290 (12)	665 (28)	144 (6)	61 (3)	235 (10)	2,372 (26)
USFS (%)	203 (26)	398 (50)	57 (7)	65 (8)	0	71 (9)	794 (9)
Private[2] (%)	4190 (70)	1795 (30)	0	0	0	0	5,985 (65)
Total (%):	5,370 (59)	2,483 (27)	722 (8)	209 (2)	61 (1)	306 (3)	9,151

[1]Represents the acres within a no-entry buffer on both sides of perennial streams; includes all habitat types
[2]Private land early and mid-seral acre estimates are based on current rotation-ages of 40-50 years and review of 2009 aerial photos; private acres in all other habitat types in the table may occur as small, scattered patches across the landscape, but are too difficult to estimate and are not significant to this evaluation

Special Habitats

Special habitats in managed and unmanaged conifer forests of the Oregon Coast Range are usually associated with the following patch and corridor spatial arrangements; long-term and permanent shrub patches, oak woodlands, cliffs, caves, talus, wet/dry meadows, ponds/lakes, and other lentic wetland types. Additional special habitats in managed forests include LSOG patches and corridors. The only known special habitat in the project area is a small (4 acre) deciduous swamp north of Project 1. The swamp area is heavily used by big game (numerous visual sitings, signs and high trail density present) and important to several bird species. It is expected that over time the surrounding forest would continue to invade the swamp and dry it up.

Special Habitat Components

Special habitat components in managed forests of the Oregon Coast Range include the following types of trees: remnant and stand-age snags, remnant and stand-age CWD, remnant live trees, hollow (live and dead), wolf (stand-age trees which were open-grown); older cohorts with full live crowns; trees with deformities like broken/dead tops or witches' brooms, and large diameter deciduous trees like bigleaf maple. All these tree types provide a more complex stand structure, meet more wildlife needs than most trees in the stand, and make for a healthier functioning forest ecosystem.

Rose et al. (2001) identify 93 vertebrate wildlife species in Oregon and Washington that use snags (nesting, foraging, roosting, courtship, drumming, hibernating), and 86 species that use CWD (nesting, foraging, denning/hibernation, hiding cover, thermal cover, travel corridor, lookout). Most of the 93 species associated with snags use trees 15+ inches in diameter, while about one third of these species prefer snags 30+ inches in diameter. Larger diameter hard snags and hard CWD (Decay Class 1 and 2) would, over time, provide for the needs of more wildlife species than smaller and softer snags and CWD.

The production of dead wood mass and structure in the forest is a complex, ongoing, and age-independent natural process involving biotic and abiotic causal agents and forces. In Oregon Coast Range forests biotic mechanisms include density-dependent suppression mortality, disease, insects, and animal damage; abiotic processes include fire, wind, ice glazing, snow loading, flooding, landslides, debris torrents, and crushing (trees falling on trees). Suppression mortality, being density-dependent, is the most common type of mortality in early (0 to 39 years) and mid-seral (40 to 79 years) stands, slowly killing the smallest

and least vigorous hardwoods and conifers. Suppression mortality has a tendency to simplify the stand's structure and composition by killing whole trees, creating more evenly spaced dominant trees, and removing shade-intolerant species.

In a study of early-seral conifer stands (14 to 38 years) in western Oregon, Lutz and Halpern (2006) examined 22 years of tree growth and mortality data and found that suppression mortality in Douglas-fir killed more than 3 times as many trees as abiotic mortality, however, the total mass of dead wood created by abiotic agents was more than 4 times greater than the total mass of dead wood created by density-dependent suppression mortality (regardless of stand age). While suppression mortality tends to create more homogeneity at the stand level, the other biotic and abiotic agents responsible for tree damage and mortality tend to increase levels of heterogeneity. When compared to unmanaged mid-seral stands (Mellen-McLean et al., 2009) the project stands are lacking in desirable amounts of coarse (20+ inches) and large (LSOG) hard snags and woody debris.

Although live and/or dead legacy structure has not been seen in the Project 1 mid-seral stand, there is a significant older cohort present (approximately 12 trees per acre). There is an abundance of smaller snags and CWD as a result of ongoing density-dependent suppression mortality. The late-seral stand of Project 2 has no legacy wood but does have wolf trees.

Special Status Species

Northern Spotted Owl
There are no known owl nests/sites in or adjacent to the project area. The project area is within Oregon Managed Owl Conservation Area-42 (OMOCA-42) which is designated northern spotted owl critical habitat. The mid-seral stands of Project 1 function as owl dispersal habitat and may also function as foraging and roosting habitat.

The late-seral stands in Project 2 are classified as suitable habitat (80+ years) and provide dispersal, roosting, and foraging opportunities but very little, if any, nesting habitat. The complex structure necessary for suitable nesting habitat is still underdeveloped in these relatively young (103 years) stands (which also lack a legacy component). The closest known active owl site is over four miles west of the proposed action on USFS managed lands.

Marbled Murrelet
There are no known murrelet nests/sites in or adjacent to the project areas. The project area is within designated marbled murrelet critical habitat (Late-Successional Reserve RO-269). The mid and late-seral stands in Projects 1 and 2 currently do not provide suitable nesting structure for the murrelet. Although the trees in the late-seral stands of Project 2 could be classified as suitable habitat because of their age (103 years old), they appear structurally younger due to the harsher growing conditions in the project area (shallow, rocky, ridge-top soil conditions and higher elevations). The closest known occupied marbled murrelet site is on USFS managed lands.

Mollusks (Pacific Walker Snail, Salamander Slug, Spotted Tail-dropper Slug)
There are no known SSS mollusk sites in or adjacent to the project area. Spring and fall surveys were completed in 2008 with no detections of these two listed mollusks.

Survey and Manage Species

Mollusks (Oregon Megomphix Snail, Evening Fieldslug)
There are no known S&M (Survey and Manage) mollusk sites in or adjacent to the project area. The evening fieldslug has not been found in the resource area since surveys began in 1997 and the probability of finding it in the project area is very low; the Oregon Megomphix has many known sites in the resource area. Surveys are not required in thinned stands less than 80 years old for S&M species, but SSS mollusk surveys were conducted and completed in spring and fall of 2008 and these two species were not found.

Red Tree Vole

There are no known S&M tree vole nests/sites in or adjacent to the project area. The mid-seral stand in Project 1 is not yet suitable habitat for the red tree vole and surveys are not required in thinned stands less than 80 years old. The largest trees in Project 2 may be suitable red tree vole nest trees. A purposive red tree vole survey was done in late-seral/old-growth stands throughout the resource area in 2007. The best vole habitat on BLM lands in the Slick Rock Creek watershed was surveyed and no active nests were found. Since the proposed activity is determined to not pose a potential significant negative effect, then surveys are not needed within project 2 areas.

Bird Species of Conservation Concern

There are approximately 87 bird species that can occur in the MPRA; 34 have a high likelihood of breeding in the mid-seral stands of Project 1, 14 have a moderate likelihood, 29 have a low likelihood, and 10 are not expected to breed within the project area. Bird Species of Conservation Concern are migratory birds which have been exhibiting downward population trends for several years. There are 34 bird Species of Conservation Concern that can occur in the MPRA; 15 have a high likelihood of breeding in the Project 1 treatment area, 6 have a moderate likelihood, 10 have a low likelihood, and 3 are not expected to breed in the project area.

Environmental Effects

3.1.2.1 Alternative 1 (No Action Alternative)

Mid-Seral Habitat Enhancement (Project 1)

The mid-seral stands of Project 1 would continue to grow and develop into mature structure at a much slower rate than if released through thinning; the wolf trees would lose their full crowns as the largest lower branches die off. There would be no immediate impulse of new, large, hard snags and CWD created in the Project 1 stands. This alternative does not meet the objectives for speeding the development of late-successional forest structural characteristics in younger stands.

Late-Seral Habitat and Deciduous Swamp Enhancements (Project 2)

The large, dominant wolf trees in the late-seral stand of Project 2 would lose their largest lower limbs to competition and no immediate impulse of new, large, hard snags or CWD would be created. Species dependent on larger and more complex structure, both live and dead, would avoid these stands for a longer period of time. The deciduous swamp would grow smaller over time due to the continued invasion of conifer trees from the surrounding stand and no immediate impulse of new, large, hard snags or CWD would be created around its perimeter.

3.1.2.2 Alternative 2 (Proposed Action)

Mid-Seral Habitat Enhancement (Project 1) and Late-Seral Habitat and Deciduous Swamp Enhancement (Project 2)

Stand-Level Habitat (Slick Rock Creek, 9,151 acres)
At this scale, the enhancement treatments represent two percent of the lands in the watershed. Table 11 compares the units' live tree densities before and after treatments. The thinning prescription for Project 1 would remove the suppressed, intermediate, and smaller co-dominant Douglas-fir and leave most dominant Douglas-firs and all the western hemlock, Sitka spruce, noble fir, and all hardwoods. Although the stand's overstory tree diversity would remain the same, its composition would better reflect late-seral conditions, with a decrease of Douglas-fir and increased proportions of hemlock, spruce, and noble fir. Since the largest trees with the best crown ratios would be left, the post-treatment crown canopy is expected to be 40 percent or greater over the project area .

Table 11
Current and post-treatment stand densities by unit and project

Unit No. Project No.	Acres	Age	Habitat Type	Ave. DBH	Pre-Treat Trees/Ac	Post-Treat Trees/Ac
8A, 8D Project 1	**48**	**69**	**Mid-seral**	**16**	**242**	**57**
8B, 8E & 9A Project 1	**56**	**69**	**Mid-seral**	**16**	**242**	**66**
8C, 8F Project 1	**57**	**69**	**Mid-seral**	**16**	**242**	**44**
Late-Seral Habitat Enhancement Project 2	**32**	**105**	**Late-seral**	**25**	**119**	**NA**

The most substantial impacts, (lasting about ten years) would be a simplification of the stand's live structure, due to the removal of green trees, followed by an increase in structural complexity and species diversity in the understory, due to an increase in light penetration and available water in the soil. The treated mid-seral habitat would continue to function as such. These actions would have long-term positive impacts for species dependent on LSOG forest habitat in the Slick Rock Creek watershed by accelerating the development of large tree structure by creating snags and CWD, and by protecting the full live crowns of wolf trees.

The Project 2 late-seral stand would continue to function as late-seral habitat due to the light touch of the proposed treatment. Live and dead structural conditions would be improved by creating snags and CWD, and by protecting the full live crowns of the largest trees. The stand's composition would remain unchanged.

Special Habitat (Deciduous Swamp)
The felling of some encroaching conifers from around the small deciduous swamp would help to maintain its function as a patch of unique lentic habitat in the watershed. In addition, the cut and/or girdled trees

would provide some valuable large dead wood in and adjacent to the swamp. The treatment would provide both short and long-term benefits to a variety of wildlife species.

Special Habitat Components (Snags, CWD, Wolf Trees, Older Cohort)
All existing special habitat components in Projects 1 and 2 would be left undisturbed unless they pose a recognized safety risk, in which case they would remain on site but rendered safe for operational purposes.

The proposed Project 1 treatment of density management, by felling and removing live trees, would bypass the natural biotic and abiotic processes of density-independent tree damage and mortality, resulting in the loss of an unknown quantity of future dead wood (inability to predict the time, location, size, duration and severity of stochastic events). The proposed thinning would also forestall density-dependent suppression mortality (the most common cause of mortality in early and mid-seral stands). The trees to be cut and removed would have provided habitat for some wildlife species associated with small snags. The loss of this potential dead wood is not significant as it would be mitigated by the following conditions and processes:

- The small size of Project 1 (161 acres), which represents only 1.7 percent of the Slick Rock Creek watershed (stand-level)
- Design feature to create snags (2 per acre within 10 years of treatment) and CWD (2 trees per acre post-treatment) in the thinned Project 1 stand and in adjacent Project 2 stands
- Future snags would be larger with treatment; without treatment, and for the next 30 years, snags resulting from density-dependent suppression would average only 11 inches in diameter (still below the desired minimum 15+ inch diameter for cavity nesters), while live trees, with treatment, would be 6 to 7 inches larger in diameter than unthinned trees after 30 years (ORGANON model)
- The existing snags resulting from density-dependent suppression mortality in the early and mid-seral stands at the stand-level (7,700 acres)
- Existing LSOG large dead wood (highest quality due to its 30+ inch diameter size) in the Slick Rock Creek watershed (931 acres)
- Existing dead wood in the SPZs in the Slick Rock Creek watershed (306 acres) and the Salmon River watershed (1,367 acres)
- The total mass of dead wood created by all density-independent processes has been found to be more than 4 times greater than the total mass of dead wood created by density-dependent suppression mortality (Lutz and Halpern 2006); the remaining live trees in the thinned Project 1 stand and all the forested lands in the Salmon River watershed are susceptible to the ongoing abiotic/biotic processes of damage and mortality

The late-seral Project 2 stand is lacking in large, hard, dead wood when compared to unmanaged stands of the same age. The lowest and largest live branches on the well developed wolf trees in the stand are being crowded out by adjacent tree competition. The proposed action would have a positive impact on live and dead structure; first by protect the existing live structure of the wolf trees, and next by creating new snags and CWD in the process of releasing the wolf trees. This action is expected to have no known negative impacts to stand composition or function, while both immediate and long-term positive impacts are anticipated for species which require complex large structure associated with the late-seral forest environment.

Special Status Species

Northern Spotted Owl
The two projects would modify the structure and composition of owl designated critical habitat (OMOCA-42) at the stand level but would maintain the functionality of current primary constituent arrangements, thereby preserving the conservation value of the habitat. Project 1 would modify the structure and composition of owl dispersal habitat at the stand level but would maintain the functionality of the habitat for owl dispersal. Project 2 would modify the structure and composition of owl suitable habitat at the stand level but would maintain the functionality of the habitat for owl foraging, roosting, and dispersal activities. The long-term impact of density management and older cohort/wolf tree release on owls would be positive since the existing habitat would develop into suitable nesting habitat sooner then if left untreated. Project 2 would also have immediate and long-term positive impacts for owls by improving prey habitat by the creation of large dead wood in the stand.

Marbled Murrelet
The two projects would modify the structure and composition of murrelet designated critical habitat at the stand level but would not preclude or delay the attainment of suitable nesting habitat, thereby preserving the conservation value of the habitat. Treatment of the mid-seral habitat in Project 1 would have long-term positive effects by accelerating the time it would take for these stands to develop into suitable nesting habitat. Treatment of the late-seral habitat in Project 2 would have long-term positive effects by preserving the full crowns of the largest wolf trees in the stand.

Red Tree Vole
The two projects would have a positive impact on red tree voles since the vole prefers LSOG habitat and the proposed treatments would accelerate the development of these conditions within the selected stands.

Bird Species of Conservation Concern

In the central Oregon Coast Range the majority of birds complete their breeding cycle within the April 15 to July 15 time period while some birds (eagles; owls; hawks; woodpeckers) begin breeding as early as February or March and others (flycatchers; finches) do not finish breeding until August. Due to the ubiquitous nature of breeding birds, soil disturbance (affecting ground-nesting birds) and vegetation manipulation would have a direct negative impact on bird nesting success if it occurs during the breeding season. There is a high likelihood that some level of disturbance to nesting birds would occur if Project 1 thinning operations are conducted during the February to August breeding season. Project 2 impacts would not disturb nesting birds since the treatment would occur after August and before February.

The Bottleneck Project 1 thinning treatment is not expected to modify bird nesting and foraging habitats to the point that some species are no longer able to occupy the site. Research shows that bird species respond differently to changes in their nesting and/or foraging habitats; some populations seem to be unaffected by thinning (for example, Stellar's Jay, Black-headed Grosbeak), some decrease in numbers (for example, Golden-crowned Kinglet, Hermit Warbler, Pacific-slope Flycatcher, Varied Thrush), and others increase (for example, American Robin, Hairy Woodpecker, Dark-eyed Junco, Western Tanager).

Responses to thinning can occur immediately and then change slowly over time. In some cases short-term (0 to 5 years) decreases can lead to mid-term (6 to 10 years) and/or long-term (10+ years) increases (for example, Hermit Warbler, Varied Thrush); in other cases just the opposite response can occur (for example Olive-sided Flycatcher, Evening Grosbeak, Townsend's Solitaire). In general, species that nest and/or forage in closed canopies would show declines commensurate with the intensity of the thinning, and species that nest and/or forage in open forest canopies usually increase in numbers. Species that nest and forage on the ground and in the understory usually maintain their pretreatment abundance or show an increase in abundance after the thinning.

Projects 1 and 2 include the creation of snags and CWD which would improve habitat conditions in the stands for those species which nest or roost in, and/or forage on, dead wood (for example, Hairy Woodpecker, Northern Flicker, Pileated Woodpecker, Red-breasted Sapsucker, Winter Wren).

3.1.3 Soils

Affected Environment

Mid-Seral Habitat Enhancement (Project 1) and Late-Seral Habitat and Deciduous Swamp Enhancements (Project 2)

The slopes in Sections 8 and 9 vary from 0 to 85 percent. The maximum slope in the harvest areas is approximately 60 percent. There is the potential for moderate to severe landslides on all slopes greater than 60 percent. No landslide scars have previously been identified in the project area. (Boateng, 1999).

Less than one percent of the proposed project area is occupied by distinguishable skid trails. There is some evidence of recent recreational vehicle use in the project area on the upper portion of Unit 8A. There are very thin surface soils in this area and the high percentage of rock near the surface has kept disturbance to the lower soil mantle to a minimum.

The existing road surfaces within the proposed project area have low slopes and are stable. Salmon-Neskowin Watershed Assessment found a low to moderate risk of landslide failure in the project area and proposed timber haul routes.

There are two primary management concerns with the soils found in the project area: 1) the potential for surface soil displacement, surface erosion and dry ravel and 2) the potential for soil compaction. Soil displacement and erosion are of greatest concern in the skyline portion of Unit 8A where the soil layer is shallow, slopes are steep, and there is a high content of coarse fragments in the soil. With increasing slope, the surface soil is subject to dry raveling if the vegetation and litter layer is removed. Under wetting/drying or freezing/thawing conditions, the surface soil particles can detach and will migrate down slope if the vegetation, litter and debris layer is absent. This effect is most prevalent for the steeper sloped areas which occupy approximately 24 acres of Unit 8A.

Environmental Effects

3.1.3.1 *Alternative 1 (No Action)*

Mid-Seral Habitat Enhancement (Project 1) and Late-Seral Habitat and Deciduous Swamp Enhancements (Project 2)

Potential impacts to soils from the proposed actions would not occur. Soils conditions and trends would continue as described under the Affected Environment section above.

3.1.3.2 Alternative 2 (Proposed Action)

Mid-Seral Habitat Enhancement (Project 1)

Compaction and disturbance/displacement of soil

Ground-based yarding:
For those portions of Units 8A and 9A using ground-based yarding systems, impacts would vary depending on whether a harvester/forwarder system or crawler tractors are used, how dry the soils would be when heavy equipment operates on them, and how deeply covered with slash the soils in the skid trails would be. In tractor skid trails, a moderate amount of top soil displacement and moderate to heavy soil compaction could occur depending on the amount of use. In harvester/forwarder skid trails, soil displacement would be minimal and soil compaction would be light to moderate.

For crawler tractor (and shovel) systems, soil impacts would be expected to result in moderate to heavy, fairly continuous compaction within the landing areas and the main skid trails which are approximately 10 feet in width. Impacts would be light to moderate and less continuous on less traveled portions of tractor skid trails and for all shovel system trails. If skidding is done using crawler tractors for all the proposed ground-based units (90 acres), the percentage of total tractor unit area impacted by surface disturbance and soil compaction as a result of skid trails would be approximately two percent or a total of 1.5 acres (as a percentage of the total project area approximately 0.8 percent). Worst case expected reduction in productivity for the skid trails would be a 30 percent reduction in yield on those acres (1.5 ac.).

If harvester/forwarder systems are used, skid trails are expected to result in light to moderate compaction in two discontinuous, narrow strips less than 3 feet in width. If a harvester/forwarder system is used for the entire proposed ground-based area (90 acres), the percentage of total ground-based unit area impacted by surface disturbance and soil compaction as a result of skid trails would be approximately one percent or a total of 0.75 acres (as a percentage of the total project area approximately 0.4 percent). Very little top soil loss or soil displacement should occur. The effect on overall site productivity from light to moderate compaction on less than one percent of the total proposed project area would be expected to be low (no measurable reduction in overall yield for the project area).

Some of the potentially impacted acreage listed above, includes already existing skid trails and where practical, portions of these existing trails would be used for this project. As a result, the amount (acreage) of new or additional harvest impacts would be less than the totals listed above. For the project, the total (new and existing) area of impacted ground is not projected to exceed the 10 percent district guideline for aerial extent of soil impacts listed in the Salem District ROD.

Additional soil compaction can be expected to result in the harvest units associated with this project. A study on the effects of compaction on soil bulk densities by Page-Dumroese (1993) found that intensive timber removal activities using ground based equipment resulted in a 25 percent increase in compaction and was considered “heavy or intense” compaction. Moderate levels of timber removal activities using forwarder-type equipment resulted in an 18 percent increase in bulk density and skyline based timber removal activities resulted in an 11 percent increase in bulk density of the yarding corridors. All of the proposed timber removal activities are planned and laid out to remain below the cumulative level of 10 percent aerial extent of soil disturbance from the RMP (Timber harvest BMP’s , 2008, Appendix I).

Following completion of the proposed action, the majority of the understory vegetation and root systems would remain, along with surface soil litter and slash from the harvested trees. Expected additional amounts of surface soil displacement, surface erosion and dry ravel resulting from harvest operations beyond those discussed below are not expected. Approximately 1 acre in landings and between 1.25 and

2.25 acres in skid trails (depending on the method used) would be utilized. Because the existing skid trails would be reused, this would result in a cumulative detrimental disturbance level of less than 2.5 percent in the sale area units. The aerial extent and degree of disturbance would remain within RMP guidelines of less than10 percent disturbance. (Timber harvest BMP's , Appendix C-2).

For all of the landings, a portion of the existing haul road or the harvest road is used for equipment to operate on. Some additional ground adjacent to the road surface is used to turn equipment around on and to sort and deck logs until transport. Areas where equipment turns or backs around on multiple times would experience heavy compaction and disturbance to the top soil layer. These areas would not readily support new vegetation or tree growth in the first 10 years after the work was completed.

The estimated reduction in growth rate for trees on moderate to heavy impacted areas is 15 to 30 percent during the first 10 to 20 years of growth. As trees age and become established, the negative effect on growth from soil compaction and displacement becomes less pronounced and growth rates may approach that of trees on similar, undisturbed sites. This is especially true where the area of compaction / displacement tends to be in narrow strips (4 to 8 feet wide) as is the case with skyline yarding trails and small landings. If topsoil loss / displacement / compaction are severe or more broadly based in aerial extent, then the negative effects would be more pronounced (greater than 15 to 30 percent growth reduction) and longer lasting (greater than 10 to 20 years in length). The proposed amount of skyline yarding corridors in the sale units is well below the allowable limit in the RMP of 10 percent (Timber harvest BMP's , Appendix C-2), and soil disturbance levels are expected to remain at an insignificant level.

Skyline yarding:

Tree harvest and yarding could increase surface soil displacement, surface erosion and dry ravel and soil compaction. The aerial extent and degree of additional compaction expected to result from this project, would remain within accepted district guidelines (10 percent or less). The steepest areas in the project area, with the most fragile soil types, would be skyline yarded.

Skyline yarding corridors would affect about one percent of the skyline units or a total of 0.75 acres, (as a percentage of the total project area approximately 0.4 percent). Impacts from skyline yarding usually result in light compaction of a narrow strip less than 4 feet in width. Skyline yarding would occur on areas with deeper soils, where there is less risk of soil erosion or dry ravel. The effect on overall site productivity from light compaction on approximately 0.4 percent of the total project area would be expected to be low (no measurable reduction in overall yield for the project area).

Landings:

Potential impacts to soil resources include the additional area used for landings. For all landings on BLM-managed lands, a portion of the existing timber haul road or a proposed skid trail would be used for equipment to operate on. Some additional ground adjacent to the road surface would be used to turn equipment around on and to sort and deck logs until transport. The degree of soil disturbance and compaction in areas where logs are sorted or decked would be expected to be low. Areas where equipment turns or backs around on, multiple times would experience heavy compaction and disturbance to the top soil layer.

Approximately 48 small landings would be needed to harvest the proposed units. Twelve landings would be used for skyline yarding, (18 would be used for both skyline and ground-based yarding). Eighteen landings would be used solely for ground-based yarding. Almost all of the landings would use existing road surfaces or clearings. Landings constructed on roads would use the road surface for approximately half of the landing. The additional area adjacent to the road that would be needed for a landing is estimated to be approximately 600 square feet per landing. For the entire proposed project area this amounts to a total of 0.6 acres for all landings on BLM-managed lands (as a percentage of the total project area, less than 0.4 percent).

Road Work (road construction, renovation, skid trail construction and blocking):
Constructing approximately 5,370 feet of new road (and ditch lines) would result in loss of topsoil and compaction of sub-soil on approximately 1.8 acres. The area is currently forested land that would be converted to non-forested. The roads to be constructed would be on moderate topography (grades of approximately 5 percent to 10 percent), so the total width of the clearing would be expected to be around 20 feet. This narrow clearing would have a minimal effect on overall tree spacing and stocking. All of the new construction would be decommissioned following harvest, so some recovery back to a forested condition would occur in this area over time.

The main haul route would be the Lindsey Ridge Road which is a surfaced road with no perennial stream crossings on BLM lands. The lower portion of the Lindsey Ridge Road is paved except for approximately 1.2 miles in T6S R10W, sections 3 and 10. This portion of the road is graveled but has one area that is within 500 feet of the stream that delivers road runoff and sediment to the hillslopes above Bear Creek. This area has a steep drainage from the road culvert and attached ditch line that shows recent scour and deposition of sediment directly to a terrace 15 feet above the flood plain. There is no direct connection of this runoff to Bear Creek. This section of road is under county maintenance. The design features include upgrading the sediment storage capacity of the road ditch lines during the haul period using bark bags and the maintenance of sediment basins at the outlets of culverts. The major problem road segments on the Slick Rock Creek Road; 7-9-9.3 and the last mile of road 7-9-5 in sections 5 and 8 would not be used for log haul with this proposal and were not studied further.

Based on previous project work, the spot road renovation and improvement of existing roads would not change the existing amount of current non-forest land. Some encroaching vegetation along these older roads would be removed for safety concerns and surface rock would be added where needed. The renovations and improvements would provide better drainage and road surface conditions resulting in less road surface erosion into the surrounding area or streams.

Site Productivity

The estimated reduction in growth rate for trees on moderately impacted areas (skid trails and landing) is approximately 15 percent during the first 10 to 20 years of growth. As trees age and become established, the negative effect on growth from soil compaction and displacement becomes less pronounced and growth rates may approach that of trees on similar, undisturbed sites. This is especially true where the area of compaction/displacement tends to be in narrow strips, as is the case with skid trails and small landings. If top soil loss/displacement/compaction is severe or more broadly based in aerial extent, then the negative effects would be more pronounced and longer lasting.

For the those portions of Units 8A and 9A where ground-base skidding would be used, the effect on project site productivity from the most impacted 1.5 acres (including skid trails and landings) would be a 1.7 percent reduction in overall yield for the ground-based units; this assumes tractor yarding exclusively, as impacts from using a harvester/forwarder or shovel system would be less severe. The effect on project site productivity resulting from skyline yarding landings and corridors, 1.5 acres, would be expected to be a 2 percent reduction in overall yield for the proposed skyline yarding unit areas. The effect on overall project site productivity (from all proposed units) would be a 1.3 percent reduction in overall yield for the entire 153 acre treatment area.

No measurable amounts of surface erosion would be expected from the forested lands treated under this proposed alternative. With timber hauling restricted to periods when no water is flowing on road surfaces, the amount of sediment produced from roads and entering streams would be small.

Hand piling and burning slash and small conifers could produce small patches of soil with altered surface properties that restrict infiltration. However, erodibility rates would be expected to return to original levels a year or two after the burn, as soil and vegetation recover. A slight mineralization of nitrogen under the piles burned could occur, which would enhance plant growth at the spot. However, pile burning is not expected to result in overall long-term losses to soil structure or productivity.

Late-Seral Habitat and Deciduous Swamp Enhancements (Project 2)

Girdling trees for snag creation would not measurably impact soil resources. Felling trees for CWD would cause minor soil displacement and compaction where the tree falls on the ground. Coarse woody debris would be cut and left in place (no further soil displacement) and the impacts would be of no greater extent than a natural tree fall.

3.1.4 Water

Affected Environment

Mid-Seral Habitat Enhancement (Project 1) and Late-Seral Habitat and Deciduous Swamp Enhancements (Project 2)

The project areas contain headwater tributaries of Slick Rock Creek which drains into the Salmon River. The project lies within one six-field watershed: Slick Rock Creek, within the Salmon River Watershed. Salmon River and Slick Rock Creek is neither key watershed nor identified as a municipal watersheds. Trout Creek also drains one portion of the project area but since it is a tributary to Slick Rock Creek it is included by reference to Slick Rock Creek.

The project area receives approximately 120 inches of rain annually and has a mean 2-year precipitation event of approximately 7.5 inches in a 24-hour period (Miller 1973). Most surface runoff is associated with winter storm events that result from low pressure fronts moving inland from the southwest off the Pacific Ocean. Peak stream flow events are concentrated in the months of November through March when Pacific Storm fronts are strongest. As a result of transient snow pack accumulation and infrequent rainfall in the summer, stream flow is typically a fraction of winter levels and many headwater channels retreat to subsurface flow. At a distance of approximately 10 miles from the Pacific Ocean, the Salmon River valley experiences a high to moderate contribution to watershed hydrology from fog and fog drip in the project area (USDA- NRCS).

Terrain in the project area watersheds is generally hilly with elevations ranging from approximately 1,600 to 2,600 feet. While snow pack accumulation in the Oregon Coast Range is unusual, the project area lies within the TSZ (transient snow zone). In most years, at elevations above 2,000 feet, snow can remain for short periods and may be subject to rain on snow events (ROS) (U.S.D.I. 1995).

The TSZ is that area considered to be capable of accumulating snow for periods during the winter but is not cold enough to develop a snow pack that will remain for the entire winter season. Because of this ability to accumulate snow, the area can also release all the water in the snow pack when the area is subsequently hit by a warmer rain event. The resulting stream flows from a rain-on-snow precipitation event can be extreme and very quickly flood the stream channel. Conversely, as a result of little or no snow pack accumulation and infrequent summer rainfall, stream flow in the summer is typically a fraction (less than 20 percent) of winter levels and many headwater channels retreat to subsurface flow.

Overlapping areas between high intensity rainfall and high ROS events are particularly vulnerable to extreme storm events and may lead to flooding (USDI 1996). The proposed project area lies within the TSZ but due to the proposed harvest type (thinning) both Slick Rock Creek and the Salmon River would continue to be at a low risk for peak flow events resulting from rainfall rapidly melting snow pack (see peak flow analysis in project file).

Project area streams

Stream channels in the project areas are primarily small (less than 10 feet wide), intermittent 1st order headwater streams; they are "source" and "transport" reaches, following the classification of Montgomery and Buffington (1993). These streams are generally Rosgen type A reaches: narrow, steep (gradient 8 percent or greater), with low sinuosity and moderate to high entrenchment (Rosgen 1994). During field review of stream channels in the project area, the perennial channels were observed to be mostly stable (not experiencing channel changes outside the expected range of natural variability) and functional (the size of stream substrate and woody debris amounts are similar to reference streams in the Coast Range provence). Sediment supplies are in the range expected for their stream type (Rosgen , 1994). Due to shallow soil conditions, most flow travels as near-surface runoff, which may or may not coalesce into surface flow down slope. Stream flow data is not available for project area streams.

Project area water quality and beneficial uses

Fine sediment and turbidity

During field review of stream channels in the project area, channels were observed to be mostly stable and functional with sediment supplies in the range expected for these stream types. Sedimentation delivery from roads in the project area is limited with few road stream crossings. No quantitative turbidity data was located for this analysis.

Stream Temperature

No stream temperature data exists for project area streams due to their intermittent nature. The channels are generally shaded by alder, conifer, ferns and brush. Stream shading varies between dense canopy (greater than 80 percent angular canopy density) cover by conifers to open canopy (50 to 60 percent angular canopy density) at flatter reaches (Brazier and Brown 1972). All tributary reaches in the project area have been given a 55-foot primary shade zone distance based on the hill slope of the area, following the Northwest Forest Plan Temperature TMDL Implementation Strategy (2005). Trees located within this primary shade zone would not be harvested thus helping to maintain the existing thermal regime of the tributary by maintaining greater than 80 percent effective stream shade.

Other Water Quality Parameters

Additional water quality parameters (e.g. nutrients, dissolved oxygen, pesticide and herbicide residues, etc.) are unlikely to be affected by this proposal and were not reviewed for this analysis (U.S.E.P.A. 1991).

Oregon Department of Environmental Quality (DEQ) Standards

The Oregon Department of Environmental Quality's (DEQ) 2004-2006 303d List of Water Quality Limited Streams (http://www.deq.state.or.us/wq/assessment/rpt0406/results.asp) is a compilation of streams which do not meet the state's water quality standards. A review of the listed streams for the Siletz-Yaquina 4th field HUC was completed for this report. The Salmon River is listed for numerous parameters ranging from nutrients to metals. Slick Rock Creek was delisted in 2002 and is no longer on the official 303(d) list for Oregon.

The DEQ also published an assessment, the 319 Report, which identifies streams with potential non-point source water pollution problems (1988 Oregon Statewide Assessment of Nonpoint Sources of Water Pollution). Salmon River and Slick Rock Creek are not included on this list.

Beneficial Uses

There are no known domestic or municipal water rights in the project area. The closest proximity for existing water rights to the project include: domestic irrigation (lawn and garden), approximately five miles downstream of the BLM-managed lands in Section 8 (WRIS 2004).

Additional recognized beneficial uses of the stream-flow in the project area include anadromous fish, resident fish, recreation, and esthetic value. Best management practices, as described below under

environmental effects would be implemented to help eliminate and/or minimize any potential impacts to beneficial uses of the project watersheds.

Project BMP's, as described previously would be implemented to eliminate and/or minimize sediment generation and delivery to stream channels from the proposed project activities. Because there is no measurable increase to streamflow expected from this activity, there is no expected increase in sediment generation or delivery to streams and no expected effect to existing beneficial uses of the project watershed including the existing water rights users.

Environmental Effects

3.1.4.1 Alternative 1 (No Action)

Mid-Seral Habitat Enhancement (Project 1) and Late-Seral Habitat and Deciduous Swamp Enhancement (Project 2)

The no action alternative would result in a continuation of the condition and trends as described in the Salmon-Neskowin Watershed Analysis (BLM/USDA Forest Service) and the Affected Environment section of this report. There would be no improvements to the Lindsey Ridge and lower Bear Creek roads.

During field review of stream channels in the project area, the channels were observed to be mostly stable (not experiencing channel changes outside the expected range of natural variability) and functional (the size of stream substrate and woody debris amounts are similar to reference streams in the Coast Range provence). Sediment supplies are in the range expected for its stream type (Rosgen , 1994). Channel substrates are typically sand, with some pebbles and gravels. Some channel reaches contain large amounts of CWD. The remaining channels all contained sections of discontinuous flow where water went subsurface. No reduction of forest canopy would take place. No additional disturbance to flow paths resulting from timber harvest and road work/use would occur. Streams disturbed from past management would continue to display the above referenced stable conditions.

3.1.4.2 Alternative 2 (Proposed Action)

Mid-Seral Habitat Enhancement (Project 1)

Stream Flows

Measurable effects to hydrologic processes, channel conditions, and water quality due to the proposed action are unlikely. Alterations in the capture, infiltration and routing (both surface and subsurface) of precipitation may occur as a consequence of the mechanical removal of trees and reductions in stand density. This effect from the proposed action would be difficult to measure and unlikely to substantially alter stream flow or water quality.

Numerous studies have documented increases in mean annual water yield and increases in summer base flow following the removal of watershed vegetation; vegetation intercepts and evapotranspires precipitation that might otherwise become runoff (Bosch et al. 1982). Thus, it can be assumed that this project would likely result in some small increase in water yield which correlates with the removal of conifers, the death of larger conifers by girdling, and a short-term reduction in vegetation cover through pile burning. However, other than increased peak flows, an increase in fall and winter discharge from forest activities is likely to have little biological or physical significance (U.S.E.P.A. 1991).

In almost all cases, removal of more than 20 percent of the vegetative cover over an entire watershed (5^{th}-field) would result in increases in mean annual water yield. Removal of less than 20 percent of vegetative cover has resulted in negligible changes, where it was not possible to detect any effect (i.e. the error in

measurements was greater than the change) (Bosch 1982). In addition, alterations in the timing and/or quantity of peak flow events as a result of forest harvest and road construction have been studied for several decades (Jones and Grant 1996). The proposed project sites would affect approximately 1.7 percent of the forest cover in the Slick Rock Creek Subwatershed and 0.3 percent in the larger Salmon River Watershed. Because of the small percentage of forest cover being affected by this project, increases to stream flow (mean annual yield and summer base flow) caused by this action alone are unlikely to be measurable. There is a low risk of increased peak flows due to ROS winter storms. This effect is presumed to be small because the vegetation treatment planned is only a thinning and should not alter the vegetation structure of the landscape such as clear cutting would.

Stream Temperatures

Increases in stream temperature as a result of this action are unlikely. All tributary reaches in the project area would have a 55-foot primary shade zone distance based on the hill slope of the area. Trees located within this primary shade zone would not be harvested thus helping to maintain the existing thermal regime of the tributary by maintaining greater than 80 percent effective stream shade. At stream heads, where groundwater and surface water interfaces, stream temperatures are relatively insensitive to change and are likely consistently below ODEQ temperature standards.

No stream temperature data was available for this analysis. The channels are generally shaded by alder, conifer, ferns and brush. Stream shading varies between dense canopy (greater than 80 percent angular canopy density)cover by conifers to open canopy (50 to 60 percent angular canopy density) at flatter reaches (Brazier and Brown 1972). The flatter stream reaches were those that had discontinuous flow where there was no surface flow. Streams in the Trout Creek project area are classified by the Salmon Neskowin Watershed Analysis as having fisheries values one half mile below the project area (Map Plate 11, USDI 1999). The watershed analysis also showed critical fisheries habitat as being more than 5 miles below the project areas (Map Plate 10). Based on field observations, aerial photo reviews of streams completed for the analysis of this EA between 2006 and 2009 , and modeling runs for the project area, current streamside vegetation and valley topography appears adequate to shade surface waters during summer base flow and it is likely that stream temperatures consistently meet the Oregon state standard (18 degrees Celsius) for these waters.

Project Area Water Quality

Sediment Supply, Transport and Turbidity

It is unlikely that the proposed projects would lead to measurable increases in sediment delivery to streams, stream turbidity, the alteration of stream substrate composition, or sediment transport regime. Stream protection zones would eliminate disturbance of streamside vegetation; no trees would be cut from the stream bank or where roots are stabilizing the stream bank. Tree girdling and piling of slash would have minimal to no ground disturbance and no activities would take place directly in or adjacent to stream channels.

Skyline and ground-based skid trails, if sufficiently compacted, could route surface water and sediment into streams. However, several factors would limit the potential for this to occur. Even if compacted, high levels of residual slash left on yarding corridors (both machine and skyline), would reduce runoff by deflecting and redistributing overland flow laterally to areas where it would infiltrate into the soil. Existing skid trails would be used for ground-based equipment as much as possible to reduce additional soil compaction and the total surface area of landings would be kept to a minimum. In addition SPZs in riparian areas have high surface roughness, which function to trap any overland flow and sediment before reaching streams. Ground-based skidding would occur during periods of low soil moisture with little or no rainfall, in order to minimize soil compaction and erosion.

Sediment supplies are in the range expected for their stream type (Rosgen , 1994). Channel substrates are typically sand, with some pebbles and gravels. Some channel reaches contain large amounts of CWD. The remaining channels all contained sections of discontinuous flow where water went subsurface.

Burning hand piles could produce patches of soil with altered surface properties that restrict infiltration. However, these surfaces would be surrounded by larger areas that could absorb runoff or sediment that reach them. In addition, piles would be burned outside of SPZs and away from standing or running surface water. No burning would occur within SPZs to protect water resources and the remaining vegetated buffer would filter out any potential sediment delivered from upslope areas. Based on previous burning projects, it is not expected that any erosion would occur from these areas due to burning and thus there would be no impact to sediment generation or nutrient levels available to the remaining vegetation which would maintain the productivity of the stand.

Since the proposed action is unlikely to result in any measurable increase in stream temperature or sedimentation and would not place large amounts of fine organic material in the streams or alter stream reaeration, it is unlikely that it would have any measurable effect on dissolved oxygen or nutrient levels.

Road Construction and Maintenance:
The proposed action includes construction of 5,370 feet of new spur roads and the renovation of eight miles of existing roads that would be used for timber haul. Road construction and renovation effects would be limited by restricting work to periods of low rainfall and runoff. The new road construction would occur along contours, near the ridgetop. All road construction would be outside of the Riparian Reserve, except for a short section near Unit 8E (less than 300 feet). These new roads would minimize the interception/disruption of subsurface flow. Construction would employ techniques to reduce the concentration of runoff and keep sedimentation to a minimum and since no additional stream crossings would be constructed, there would be little opportunity for sediment from these surfaces to directly enter streams. To minimize the potential for runoff accumulating on the road surface, following the proposed action, the new roads would be decommissioned.

During road renovation, impacts to water quality would be expected while drainage structures are being improved or replaced. Impacts would be greatest if equipment is operating in and/or adjacent to the stream channels.

Impacts of skid trail construction would be the same as those for yarding corridors described above. Following project completion; water-barring, grass-seeding and blocking the trails would help to minimize surface runoff on and erosion of these trails; this would thereby reduce any sedimentation potential from these roads.

Late-Seral Habitat and Deciduous Swamp Enhancement (Project 2)

There would be no significant impacts to water resources from girdling or overtopping trees to create snags or falling trees for CWD. Trees would be selected from outside SPZs and would not likely impact stream shade, bank stability, or channel structure.

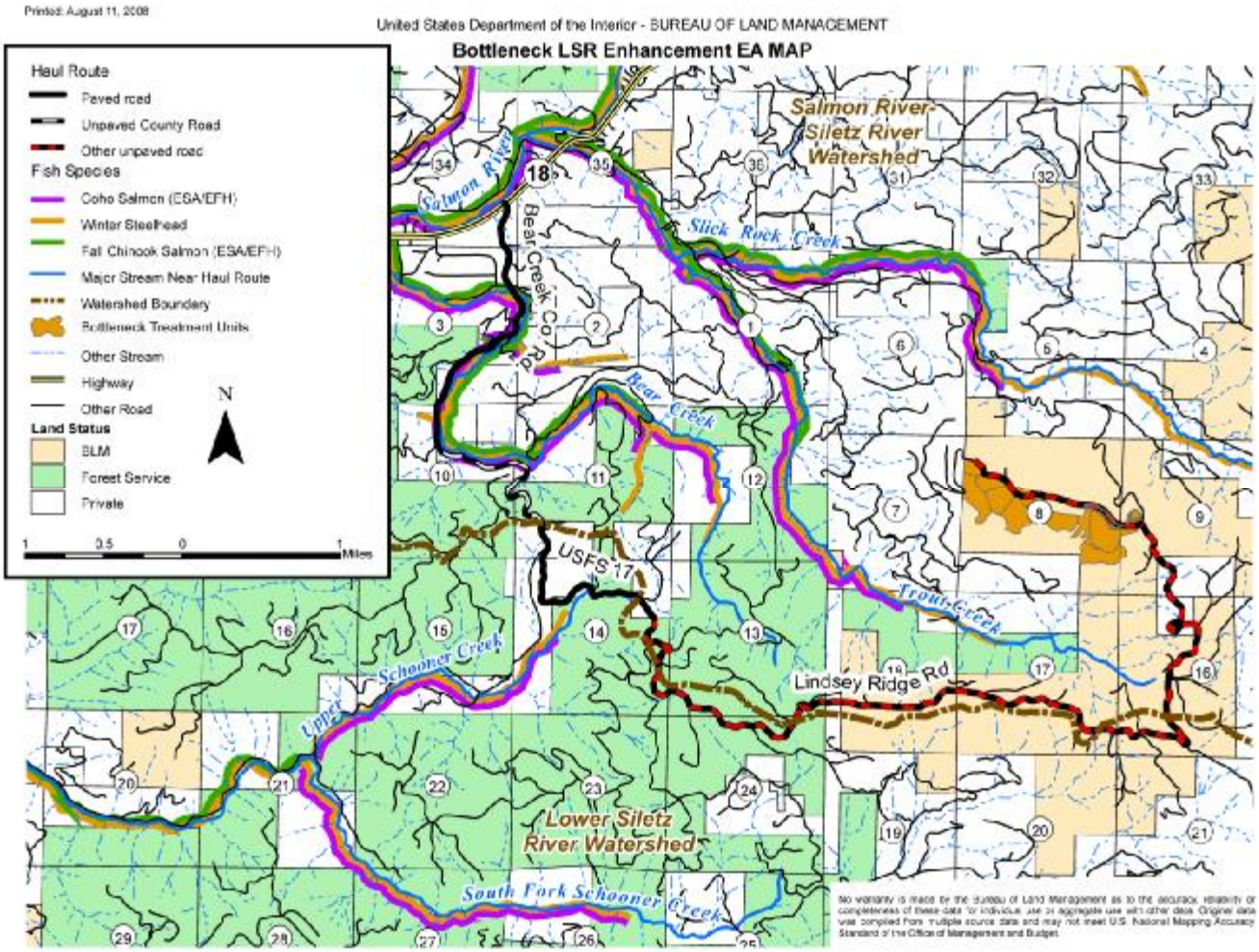
3.1.5 Fisheries/Aquatic Habitat

Affected Environment

Mid-Seral Habitat Enhancement (Project 1) and Late-Seral Habitats and Deciduous Swamp Enhancements (Project 2)

The proposed action is contained within two 5th field watersheds; Salmon River Watershed and the Lower Siletz River Watershed. The relevant fish bearing streams affected by the action are Slick Rock Creek and Trout Creek draining to the Salmon River. Project 1 would treat 161 acres limited to two drainages; Trout Creek and Slick Rock Creek all within the Salmon River Watershed. The proposed timber haul route for Project 1 would cross both of the 5th field watersheds (see Map #3).

Map 3: Proposed Timber Haul Route and Anadromous Salmonid Fish Distribution of Bottleneck LSR Enhancement Project



Oregon Department of Fish and Wildlife (ODFW) habitat surveys have been conducted on Trout Creek approximately 2½ miles downstream from the project areas. Impaired habitat conditions were noted for pools, shade, fine sediment, key wood, and width to depth ratio in the ODFW habitat surveys; conditions are based on ODFW Aquatic Inventory Habitat Benchmarks (Foster et al 2001). Gravel percentages were between desirable and undesirable benchmark conditions in the project affected reach. The low abundance of key wood is likely impairing the quality and abundance of pool habitat through-out the surveyed reaches. The undesirable amount of silt/sand documented in the surveys likely impairs functionality of the gravels as spawning/incubation habitat.

No fish species were documented in the treatment area of either Slick Rock Creek or Trout Creek (Calver and Snedaker 2006). The precise upper limit of fish distribution is unknown for most of the affected streams associated with the project area. Distribution of fish species can be estimated based on accessibility to suitable habitat determined by stream slopes, sufficient drainage area to create minimal suitable habitat, and known long standing barriers (Bjorn and Reiser 1991). The upper limit of fish species in proximity to the project area (not field identified) was derived using two methods.

1. Streamnet (2007) maps identify salmon and steelhead distribution near the project area and passage barriers in proximity to the project area which may limit fish migration.

2. Comparisons with fish presence-absence surveys conducted nearby indicate drainage areas of approximately 50 acres are necessary to provide suitable habitat for native trout and sculpin species. Current literature indicates salmon, steelhead, and cutthroat trout may use stream channels with contiguous slopes up to 20 percent (Bryant etal 2004). Local field experience confirms the literature estimates. BLM Geographic Information System (GIS) Digital Elevation Models (DEM) of hillside contours was used to estimate stream slopes and drainage areas for streams near the project area (BLM 2008). The slope and drainage area conditions indicate fish distribution ends approximately 2/3 mile downstream of the project area in the Trout Creek and 3/4 mile downstream in Slick Rock Creek.

Fish Distribution (Salmon River Watershed)
Chinook and coho salmon, and steelhead trout are present in Trout Creek and Slick Rock Creek (Streamnet 2007). Chinook salmon are located in the lower reaches of Trout Creek and Slick Rock Creek, more than two miles downstream from the project area. Nearest steelhead populations are approximately 0.7 miles from the project area in Trout Creek and one mile from the project area in Slick Rock. The nearest coho salmon populations are more than one mile downstream from the project area in both Trout Creek and Slick Rock Creek. Chinook, coho, and steelhead are adjacent to portions of the unpaved timber haul route in the Bear Creek drainage, and are at least 0.7 miles from all other portions of unpaved timber haul route.

One falls barrier was identified downstream of the project area in the affected watershed; however, the barrier was not considered a barrier to adult salmon migration (Streamnet 2007). Several barrier culverts have been identified along the timber haul route on unpaved county road, these culverts likely block salmon and steelhead migration. Based on field review, Streamnet GIS data, and BLM GIS data there is one paved and one unpaved stream crossing over anadromous fish bearing streams and two unpaved crossings over resident fish habitat associated with the proposed timber haul route within the Salmon River Watershed.

Fish Distribution (Lower Siletz River Watershed)
The proposed treatments do not directly affect lands within the Lower Siletz River Watershed. The proposed action in this system is only timber hauling and road renovation activities. There are no known fish bearing crossings on the timber haul route within the Lower Siletz River watershed. Estimated distance of resident and anadromous species from proposed road renovation is approximately 0.4 miles downstream. Estimated distance of resident and anadromous species from the timber haul route is between 0.4 and 2 miles downstream (BLM 2008).

Special Status Species or Habitat
The Oregon Coast (OC) coho salmon is listed as threatened under the Endangered Species Act. The species is known to occupy habitat approximately one mile downstream from the project areas in both Trout Creek and Slick Rock Creek. There is no known unpaved stream crossing over OC Coho habitat associated with the timber haul route; however, there is one paved crossing over OC coho salmon habitat. Oregon Coast coho salmon salmon occur downstream from road renovation and timber hauling at least one mile in Slick Rock and ¾ miles in Trout Creek. Oregon Coastal coho salmon habitat is over two miles from unpaved timber haul roads in South Fork Schooner Creek and more than one mile in Upper Schooner Creek. There is an unpaved county road associated with the timber haul route, approximately 100 feet from OC Coho salmon habitat in Bear Creek.

The proposed action for Project 2 is limited to girdling, felling or topping trees over a 32 acre area north of and downslope from Project 1. The proposed action is located near the ridge top between the Slick Rock and Trout Creek drainages. No stream channels are within the project area.

Environmental Effects

3.1.5.1 Alternative 1 (No Action)

Mid-Seral Habitat Enhancement (Project 1) and Late-Seral Habitat and Deciduous Swamp Enhancements (Project 2)

Current timber stand conditions would be maintained. Expected benefits of thinning riparian stands would not be realized. The existing road network would remain unchanged, with no new road construction. Impacts to aquatic habitat would be unlikely with the implementation of the no-action alternative. Short-term snag and CWD recruitment rates would be unchanged and stand conditions would also remain unchanged. Larger CWD would take longer to develop under the no action alternative.

3.1.5.2 Alternative 2 (Proposed Action)

Mid-Seral Habitat Enhancement (Project 1)

Yarding/Falling

Reductions in canopy closure, and vegetative cover, can result in changes in peak or base flows which in turn impair the availability or quality of aquatic habitat. The proposed project would affect less than 4.3 percent of the forest cover in the Trout Creek 7th field watershed (161 acres treated divided by 3,523 acres in drainage), and 0.1 percent of the forest cover in the Slick Rock Creek 7th field watershed (7 acres treated divided by 5,634 acres in drainage). Due to the small percentage of forest cover being affected, the proposed action was considered unlikely to detectably alter stream flows (Wegner 2008). No discernable changes in peak and base flows within the treatment area are anticipated, hence effects to fish habitat downstream are not anticipated.

Temperature Effects

Site level project designs for treatment units included a standard design feature SPZ of at least 55 feet or more. Within the thinning treatment units, the SPZ widths averages 60 feet wide and none less than 55 feet (Snook 2008). According to the stream shading sufficiency analysis done for the proposed treatments units the proposed no-entry SPZs of 55 feet was sufficient to protect critical shade in the primary shade zone, based on topography and average tree height (Snook 2008).

The proposed vegetation treatment in the secondary shade zone (approximately one tree height from the stream) would not result in canopy reduction of more than 45 percent. While the post treatment closure is less than the Northwest Forest Plan TMDL (turbidity maximum daily load) Strategy target of 50 percent post treatment canopy closure there are no known perennial streams in the project area. Channels in the project area that are intermittent / ephemeral are not subject to summer solar warming. Retention of the SPZ buffer and the location of the thinning treatments adjacent to intermittent channels would be expected to maintain the existing stream temperature regimes and the proposed action is unlikely to increases in stream temperatures at the site (Wegner 2008). Based on the shade sufficiency analysis, the hydrology report water quality analysis, and the project design features, the proposed actions are unlikely to affect fish habitat both at the treatment site and downstream.

Large Woody Debris Effects

Loss of CWD and LWD due to harvest can affect the stability and quality of aquatic habitat (Chamberlin et al 1991, Beechie et al 2000). Based on the riparian stand analysis, the proposed action would retain trees which would reach larger diameters earlier compared to the no treatment option, creating natural opportunities for higher quality LWD recruitment in the long-term (Snook 2008). In the short-term, the smaller woody debris would continue to fall from within the untreated SPZs. Wood recruitment studies conducted in the Pacific Northwest have shown the majority of woody debris recruitment occurs within

59 to 65 feet of the stream edge (McDade et al 1990, Van Sickle and Gregory 1990, Meleason et al 2002). The proposed SPZ width, which accounts for 85 percent of this woody debris recruitment zone, is anticipated to maintain wood recruitment rates. Therefore, the proposed actions are not expected to cause any short-term effects to aquatic habitat at the site or downstream.

Proposed thinning in the riparian treatment areas is anticipated to increase the average growth of the remaining trees 37 percent over 30 years compared to not treating the stands (Snook 2008). Larger wood would begin to be recruited from farther up the slopes as the treated stands reach greater heights. Thus, wood with a larger range of sizes would potentially be recruited into streams over the long-term in treated stands. As short-term recruitment of the existing CWD is expected to be maintained, the proposed actions are not expected to cause short-term effects to fish habitat at the site or downstream. In the long-term the increase in the size of trees in riparians could beneficially affect LWD recruitment to the stream channel, thus potentially improving the quality/complexity of aquatic habitat adjacent to the treatment areas in the future.

Fish habitat is at least 2,500 feet downstream from the riparian treatment areas and beneficial effects to fish habitat from wood growth could be realized in the event of mass movement. The project treatments were generally located on slopes considered low-risk for mass movement. Soil stability tends to decrease on slopes greater than 70 percent, increasing risk of mass movement (Swanston 1991, Sidle & Terry 1992). Treatments proposed on lands considered at low risk for mass movement are unlikely to result in subsequent transport of large wood downstream and would be considered highly unlikely to effects fish habitat downstream.

Sediment Effects

The proposed project actions are unlikely to result in any measurable changes in sediment delivery to the surrounding stream network which could affect the turbidity, substrate composition, or the sediment transport regimes (Wegner 2010). The dominant use of skyline yarding, buffers, residual slash, and use of existing skid trails should keep sediment movement to a minimum. Vegetated buffer widths ranging from 40 to100 feet are sufficient to prevent sediment from reaching streams (Burroughs and King 1989, Corbett and Lynch 1985, Swift 1985). Project design features include at least 55 feet buffers adjacent to treatment units. The proposed 55 foot buffers would be expected to capture sediment prior to reaching stream channels. These buffers combined with residual slash remaining following treatment should obstruct flow paths and keep sediment movement to a minimum. Slash, limbs and non-merchantable material left following harvest activities, within treatment areas can substantially reduce the magnitude of sediment movement (Burough and King 1989, Swift 1985). As the proposed actions are not likely to measurably alter water quality characteristics at the treatment sites, they would be unlikely to alter aquatic habitat downstream from the project area.

Timber Hauling

The potential for timber hauling to generate road sediment is minimized by project PDF's. The majority of the sale area and haul roads are located near the ridge lines and are graveled (Map 3). Winter haul would occur on rocked road surfaces only. Any native surface roads would be restricted to dry season use only. Buffer distances of at least 200 feet would be expected to capture the majority of sediment generated from hauling on road surfaces before reaching fish habitat (Burroughs and King 1989, Corbett and Lynch 1985, Swift 1985, Belt et al 1992). Spot rocking and minor road grading may occur to maintain road surface conditions. Hauling operations would be suspended if weather or environmental conditions pose an imminent risk of road sediment flowing in road ditches. Roads the located more than 200 feet from fish habitat would be unlikely to transport sediment which would reach fish habitat (Table 5).

Table 12. Project haul routes and proximity to ESA listed fish habitat (LFH) and essential fish habitat (EFH) and resident fish.

Haul Road	Season of Use	Miles of Haul	Road Surface	Number of Crossings Over				Distance LFH/EFH (ft)	Distance Resident Fish (ft)
				LFH/EFH		Resident Fish Only			
				Bridge	Culverts	Culverts	LWC		
7-9-8	Year	0.5	A					6,100	3,600
7-9-18.4	Year	1.8	A					10,100	4,500
7-10-24	Year	5.5	A					3,600	700
7-10-14	Year	1.3	P					2,000	350
Bear Cr Cty Rd	Year	1.1	A					50	50
Bear Cr Cty Rd	Year	2.0	P	1		1		5	5

Based on field review of the haul roads 7-9-8, 7-10-18.4, 7-10-24, 7-10-14 and most of Bear Creek Road are not directly connected to fish habitat (Table 5). Wet season hauling on these road segments may result in site level increase in sediment transport to several non-fish bearing streams (see Map 3). Research has demonstrated that relatively short segments of small ephemeral/intermittent streams (300 to 400 feet) can effectively store coarse sediment washed from roads which would in turn contribute to protection of water quality in fish bearing habitat downstream (Duncan et al, 1987). Sediment entering these small non-fish bearing intermittent tributaries in the project area would likely be retained in the channel bedload prior to reaching fish habitat and delivered only during high flow events when background sediment levels would also be elevated. Turbidity generated from hauling over non-fish bearing crossings may occur during winter freshet events when background turbidity is also elevated. The small increase in turbidity which may be generated by hauling on this road would be undetectable against background turbidity where fish reside; thus unlikely to impact fish and aquatic habitat.

An old slide area, with an unpaved portion of Bear Creek road crossing thru, is less than 50 feet from Bear Creek. The slide area appears to be stable with new vegetation covering previously exposed soils on the fillslope. There are road barriers on the outside running surface of the road to keep traffic away from the edge, and a small rock berm to redirect surface water flow away from the fillslope. The County repaired the slide by moving the road into the hillside sometime around 1996 (Buisman 2008). No subsequent problems have been noted by the county to date. No impacts to aquatic habitat or listed fish habitat are anticipated from hauling thru the old slide area with implementation of proposed mitigation (placement of silt fence or bark bag) in the affected ditchline leading to Callow Creek. The remainder of the unpaved Bear Creek Road is more than 200 feet from fish habitat.

Most of the Bear Creek County road is paved, or chip sealed (Map 3). Two fish bearing crossings occur on this portion of the haul route. However, due to the hardened road surfaces, the vegetated ditchlines, and limited hydrologic connectivity of the road, sediment transport would be considered unlikely on this segment.

Road Construction/Renovation

The proposed action include the construction of approximately 5,370 feet of new road. All new construction would be seasonally restricted to occur during the dry season, typically May thru October then winterized or decommissioned following harvest.

Flow Effects- Construction of 350 feet of new road associated with the Density Management treatments in Project 1 may occur within one site potential tree height of stream channels, none within 140 feet of any streams. The proposed road construction is unlikely to increase the drainage network in the watershed as the majority of new road is located on ridge tops, generally outside riparian reserves, and no new construction would cross any existing stream channels. Thus, impacts to aquatic habitat downstream would not be anticipated.

Temperature Effects - The channels nearest these new road construction are intermittent, thus not subject to elevation of stream temperatures during summer months. In addition, the existing buffer distance of 140 feet or more between the road and the stream would further limit any increase in solar radiation reaching the stream channel. According to the stream shading sufficiency analysis done for the project area treatment units, the proposed SPZ of 55 feet was sufficient to protect critical shade in the primary shade zone, based on topography and average tree height (Snook 2008). Thus, new road construction would be highly unlikely to have any effect on stream temperatures at the site and highly unlikely to impact aquatic habitat or fish downstream.

LWD Effects - Only road construction has the potential to alter LWD recruitment to streams at the site level. The new construction would be no closer than 140 feet from the nearest stream inception point. The distance between the road construction is greater than average tree height in the unit (84 feet); therefore no impacts to LWD would be expected in the short-term. The proposed road construction is located on a gentle topography near the ridgetop and mass movement would be highly unlikely; therefore transport of present and future large wood would be considered highly unlikely.

Sediment Effects - Approximately 300 feet of new road construction may be located within the RR. This short segment of road would be constructed at least 140 feet upslope of the nearest stream inception point. Vegetated buffers ranging in width between 40 and 100 feet appear to prevent sediment from reaching streams (Buroughs and King 1989, Corbett and Lynch 1985, Swift 1985). Based on location of new roads and seasonal restrictions, road construction is unlikely to increase sediment or stream flows which may affect stream channels and fish habitat.

No short-term impacts to fish or aquatic habitat are anticipated from the proposed five miles of road renovation associated with the proposed action. Renovation is not proposed in proximity to any fish bearing crossings, the closest stream crossing is 1/3 miles from fish habitat. All road renovation work would be seasonally restricted to occur during the dry season, typically May thru October. The proposed road renovation treatments (rocking, grading, ditchline reconstruction, and cross drain replacements) associated with these crossing would be expected to result in a minor short-term increase in erosion in the winter following work, until reestablishment of vegetation in the subsequent growing seasons (Wegner 2010).

No culvert replacements or installations are proposed as part of the project and no effects to fish habitat would occur.

Rock Quarry Utilization- *LWD and Sediment Effects*
The proposed utilization of the Lindsey Ridge Quarry is not anticipated to result in any effects to aquatic habitat or fish. The existing quarry is located on the ridge top and there are no known connections from the quarry to the stream network. Transport of rock to new construction and renovation are anticipated to be similar to potential impacts associated with timber hauling (see Timber hauling).

Machine and Hand Pile Burning- *LWD and Sediment Effects*
Burning piles could produce small areas susceptible to erosion and restricted infiltration (Wegner 2008). However burn area would be surrounded by SPZs and no burning would occur in SPZs. Pile burning with the use of these mitigating features is not anticipated to negatively affect the aquatic environment.

Late-Seral Habitat and Deciduous Swamp Enhancements (Project 2)

No stream channels are within the project area. No changes to the road network or drainage network would occur. In addition, the small scale of project area affected within the Slick Rock Drainage, 0.3 percent, and Trout Creek Drainage, 0.2 percent, indicates the proposed action is unlikely to alter flows. Treatments are anticipated to result in negligible ground disturbance, hence risk of sediment movement occurring at the site level is highly unlikely. Treatments are located away from stream channels and distances are sufficient that no effects to stream temperatures would be anticipated. The low levels of

ground disturbance and the distance of treatments from stream channels are not expected to affect LWD recruitment to stream channels. As flow, sediment, temperature, and LWD recruitment are not anticipated to be affected at the site level, these effects would not affect aquatic habitat or fish downstream.

3.1.6 Fuels/Air Quality

Affected Environment

Mid-Seral Habitat Enhancement (Project 1) and Late-seral Habitat and Deciduous Swamp Enhancement (Project 2)

Fuels

Project 1 estimated total dead fuel loading ranges from less than 10 up to 20 tons per acre. Much of the existing down material is rotten or only partially sound. There is a light accumulation of small and medium diameter dead woody material and leaf litter on the ground. Larger (greater than 20 inches DBHOB) downed logs are scarce as are large snags. Small snags less than 10 inches DBHOB are common. Aspect of the proposed treatment unit area is generally: southwest and south. A small portion (less than 10 percent) of the unit is flat.

Project 2 estimated total dead fuel loading ranges from less than 10 up to about 40 tons per acre depending on the amount and size of the down logs present. Large down wood is absent over most of the stand so fuel loadings tend toward the lower end of the range. Much of the existing down material is rotten or only partially sound. On the ground there is a light accumulation of leaf litter along with medium to larger diameter down logs. Only a few large snags are present while medium and small diameter snags are more common but not plentiful. Aspect of Project 2 is north on about 60 percent of the area and southwest to flat on the remaining area.

Air Quality

Air quality in the vicinity of this proposed action is generally very high due to the mid to high elevation Oregon Coast Range location of the project areas. Transport winds affecting the area generally come in off the ocean and keep the air shed scoured out preventing a build up of particulate matter. Occasional stagnant air conditions do develop and may result in accumulation of particulate matter but generally these are short lived lasting less than one week.

Environmental Effects

3.1.6.1 Alternative 1 (No Action)

Mid-Seral Habitat Enhancement (Project 1) and Late-seral Habitat and Deciduous Swamp Enhancements (Project 2)

This alternative would result in no change to the affected environment. Short-term impacts to fuels and air quality would be avoided.

3.1.6.2 Alternative 2 (Proposed Action)

Mid-Seral Habitat Enhancement (Project 1)

Fuels

Fuel loading, risk of a fire start and the resistance to control a fire, would all increase at the sites as a result of the proposed action. Slash created from timber harvest would add an estimated 7 to 15 tons per acre of dead fuel to the thinned areas. The fuel arrangement would be discontinuous.

Risk of a fire start in the untreated slash would be greatest during the first season following cutting. Fire risk would diminish as the area "greens up" with under story vegetation, and as the fine twigs and branches in the slash begin to break off and collect on the soil surface. Past experience, in the geographic area of this proposed action, has shown that, in approximately 15 years, untreated slash would generally decompose to the point where it no longer contributes significantly to increased fire risk. Depending on the amount of large, down wood left on site from logging, the resistance to control would also decrease over time but more slowly. The resulting total residual dead fuel loading would vary throughout the thinned areas ranging from 5 to 30 tons per acre. It is expected that about half of the dead fuel tonnage to be left on site following treatment would be in the form of down logs and pieces in the 10 inch and larger size class.

Increasing the spacing between the tree crowns would have the beneficial result of decreasing the potential for crown fire occurrence in the treated stands once the slash breaks down. In the first few years following harvest however, if a fire started under dry, summer or early fall conditions, the increased slash loading in the thinned stands would likely result in high stand mortality from scorch and tree torching.

If a market for the slash material develops to the point where it would be economical and energy efficient to remove and transport the fuel to a co-generate power facility, the fire risk could be substantially reduced. If 60 to 80 percent of the slash material was removed from the site following logging and a fire occurred, the level of stand mortality expected would be very low due to the substantial decrease in expected fire intensity. It is expected that at least 10 to 20 percent of the total fuel loading would have to remain on site in the form of larger size logs and pieces in order to meet the CWD requirements.

Air Quality

The total amount of slash debris expected to be piled for burning is estimated to be approximately 365 tons from the thinned areas. Burning approximately 365 tons of dry, cured, piled fuels under favorable atmospheric conditions in the Oregon Coast Range is not expected to result in any long-term negative effects to air quality in the air shed. Locally within ¼ to ½ mile of the piles there may be some very short-term smoke impacts after piles are ignited resulting from drift smoke. Depending on size, arrangement, type and moisture content of the fuel, the smoke would diminish over several hours or days as the piles cool and burn out (sooner if rain develops). Generally this smoke only affects the immediate area (¼- ½ mile or less) around the pile. Due to the location of this project (over 2000 feet elevation), it is unlikely that inversions would present a problem impacting the local air quality. Burning of slash would always be coordinated with the Oregon Department of Forestry (ODF) and conducted in accordance with the Oregon State Smoke Management Plan. This serves to coordinate all forest burning activities on a regional scale to prevent negative impacts to local and regional air sheds.

Late-seral Habitat and Deciduous Swamp Enhancements (Project 2)

Fuels

Fuel loading, risk of a fire start and the resistance to control a fire, would all increase slightly at the site as a result of the proposed action. Slash created from the selected CWD trees would be created over a period of years since only some of the selected trees would be felled or topped. The remaining selected

CWD trees that are girdled would shed dead foliage and branches over a period of years and would eventually fall down. Due to the planned scattered location of the selected trees, the effect on overall fuel loading would be minimal and is not likely to add significantly to the risk of a fire start.

If a fire were to burn on the site, the scattered CWD trees would pose some additional resistance to controlling the fire. The scattered nature of the CWD trees limits this increase to acceptable, manageable levels. Based on the likely size range of the CWD trees, an estimated 5 to 15 tons per acre of scattered (mostly large diameter) dead fuel would be added to the treatment area. The fuel arrangement would be discontinuous.

The slight increase in risk of a fire start in the untreated slash would be greatest during the first season following cutting. Because this fuel would be scattered and discontinuous, it is expected that the increase in fire risk would return to previous levels within 3 years following Project 2 treatment. The increase in resistance to controlling a fire would also decrease over time but more slowly.

The decision to create and leave the CWD untreated under this proposed action is based on our estimate that the risk is manageable based on a long history of observations of fuels in the geographic area. Treating these fuels would negate the benefits of creating them in the first place.

3.1.7 Recreation/Visual Resources

Affected Environment

Mid-Seral Habitat Enhancement (Project 1) and Late-Seral Habitat and Deciduous Swamp Enhancements (Project 2)

Recreation
The proposed project area is characterized by a forest setting and accessed by gravel forest roads. Evidence of human-made modifications (roads, timber harvest) is common on both private and public lands surrounding the project area. Timber management operations are likely to continue on both private and public forest lands in the vicinity of the project areas. There are no developed recreational facilities in the vicinity of the projects. Activities that occur in the area include OHV (Off-Highway Vehicle) use, hunting, target shooting, driving for pleasure, special forest product harvest, and dispersed camping. The project area lands are open to OHV use.

Visual Resource
The intermixed land ownership pattern between public and private forest land greatly limits the BLM's ability to manage these areas as a contiguous viewshed. Timber management operations near or adjacent to the units are observable from private and public lands and forest roads. The view from major roads and highways of the surrounding terrain is one of timber management as various age classes of trees are visible.

The project occurs in VRM 4 which states the following objective: "Manage visual resource management class 4 lands for moderate levels of change to the characteristic landscape. Management activities may dominate the view and be the major focus of viewer attention. However, every attempt should be made to minimize the effect of these activities through careful location, minimal disturbance, and repeating the basic elements of form, line, color, and texture" (RMP p. 37).

Environmental Effects

3.1.7.1 Alternative 1 (No Action)

Mid-Seral Habitat Enhancement (Project 1) and Late-seral Habitat and Deciduous Swamp Enhancements (Project 2)

With the exception of unexpected changes (i.e. wildfire or disease), the project area would continue to provide a forest setting for dispersed recreational activities. A short-term increase in log truck traffic, noise and other inconveniences related to the thinning operations would not occur. However, these inconveniences from other landowners' timber management operations in the vicinity would still occur. No modifications to the landscape character of the project areas would be expected to occur. Modifications to the landscape character in the vicinity of the project area would still be expected, as a result of timber management operations on other lands.

3.1.7.2 Alternative 2 (Proposed Action)

Mid-Seral Habitat Enhancement (Project 1) and Late-seral Habitat and Deciduous Swamp Enhancements (Project 2)

Recreation

A forest setting would be maintained, and vegetation disturbed by operations would be expected to return within five years. This project would have minimal to no impact on recreational uses due to the fact there are other opportunities available. Current recreation access and use of the project areas would be restricted approximately three to five years during thinning operations and enhancement activities. These activities generally occur during the summer months coinciding with archery season starting in late August. Hauling during winter months would interfere with rifle hunting seasons. Other BLM lands nearby would remain available for recreational opportunities. Recreational users in the vicinity would hear the noises of the timber sale operations and experience traffic delays of minutes to hours. Use of the project area is expected to return to prior usage and not hinder any future dispersed recreation opportunities.

Ground based yarding increases the opportunity for additional open OHV riding on skid trails and throughout the harvest unit due to the removing of trees and other vegetation that act as barriers to off road travel. Passing vehicles and OHVs could create a fire ignition source for stumps and logging debris from vehicle sparks (from lack of proper spark arrestor or catalytic converter in the muffler system), heating grasses (fine fuels) from idle vehicles, or tossing out burning materials such as cigarettes.

Visual Resources

The removal of some trees in the stands would have a minimal impact to the quality of the viewshed. The projects would contribute to the amount of timber cut or removed in the watershed, but the amount is minimal compared to timber harvest practices on private lands where clear cutting is a frequently used harvest method. Large scale clear cutting practices from multiple private landowners affect visual resources substantially more than thinning a stand of timber. Timber harvest activities near or adjacent to the project are observable from private and public lands and roads. There are private clearcuts adjacent to the project area.

The proposed project would comply with VRM 4 management objectives. Visual disturbance of the project area would be associated with modifications to vegetation and other ground disturbing activities from timber sale operations and enhancement activities. The proposed action would maintain some canopy cover. The areas are expected to return to a more natural appearance within five years as disturbed understory vegetation returns to more natural appearance and the remaining stand continues to

mature. There would also be a few days where there is a decline in visual quality as a result of the smoke created when piles are burned.

The project would have no visual impacts due to the fact that the project is not visible from major public travel routes, recreation areas, residences, or other key observation points. This landscape has and would continually be altered by the BLM, through strategic planning, and private company clearcuts.

3.1.8 Carbon Sequestration (Storage) and Climate Change

On July 16, 2009, the U.S. Department of the Interior withdrew the Records of Decision (2008 ROD) for the Western Oregon Plan Revision. The information contained in the Final Environmental Impact Statement for the Revision of the Resource Management Plans of the Western Oregon Bureau of Land Management (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

Context –Greenhouse Gases, Climate Change and the Spatial Scale for Analysis

Greenhouse Gases, Climate Change and the Spatial Scale for Analysis

Uncertainty about the nature, effects and magnitude of the greenhouse gases and global climate change interrelationship is evident in a wide range of conclusions and recommendations in the literature reviewed. However, 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, summarized the latest science on greenhouse gases and 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. Based on the BLM's review of statutes, regulations, policy, plans and literature, the BLM accepts the conclusions above as appropriate context for a reasoned choice among alternatives.

Context – Temporal Scale for Analysis

The BLM has selected fifty 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 fifty years, stands in the project area will have nearly returned to current carbon storage levels, and carbon storage will have offset carbon emissions resulting from harvest.

Context – Calculations of Carbon Storage, 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. 8.2, 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.

Affected Environment

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, p. 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, p. 3-224).

The proposed action (Project 1) is to conduct density management harvest on approximately 157 acres of trees aged 50-70 years old.

Carbon Storage

The following show quantities of carbon in forest ecosystem vegetation[2] in the Coast Range, and in the Bottleneck 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, Bottleneck Projects 1 and 2 stands = 36,000 tonnes or 0.0001676 Gt. This represents .001% 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, p. 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 Bottleneck 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.

[2] 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.

Environmental Effects

3.1.8.1 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 50 years of growth, live tree carbon would increase to 42,400 tonnes, an increase of 13,000 tonnes from the current level of 29,400 tonnes.

The no action alternative would result in greater net carbon storage over the 50 year analysis period than the proposed action by approximately 11,700 tonnes.

3.1.8.2 Alternative 2 (Proposed Action)

Total carbon in forest ecosystem vegetation can be divided into three pools: 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. The proposed action would cause direct effects on greenhouse gas levels by emitting greenhouse gases (specifically, carbon dioxide) from harvest operations and fuel treatment.

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

Harvest Operations
Equipment use necessary to harvest and transport the timber to the nearest mill (Willamina, Oregon) would consume an estimated 10,401 gallons of fuel, or total emissions of 35 tonnes of carbon.

Live Trees
Live trees would be removed, decreasing live tree carbon from 29,400 to 13,900 tonnes, and transferring 15,500 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 35 tonnes of carbon emitted.

Harvested wood
Harvested saw log gross volume of 4,000 mbf would contain 5,400 tonnes of carbon. Much of the emissions from harvested wood occur shortly after harvest. In the first 10 years after harvest, approximately 1,190 tonnes would be emitted.

Long-term Impacts (11-80 years after timber harvest):

Live Trees
Following harvest and coarse wood and snag creation, an average of 40 trees per acre (Bummer and North Fork Overlook areas) or 59 trees per acre (Buck Roberts area) would remain on site, and would store carbon as they grow. Additionally, new tree seedlings are likely to establish and grow, increasing carbon storage considerably. 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 55 years of growth. After 50 years of growth, carbon stored in live trees would be 28,900 tonnes, still 500 less than the current (pre-harvest) level of 29,400 tonnes.

Harvested wood
Harvested wood in the Bottleneck LSR Enhancement Watershed Restoration projects would contain 5,400 tonnes of carbon. From 11-50 years after harvest approximately 450 tonnes of carbon would be emitted from harvested wood, totaling 1,640 tonnes (31 percent) emitted without energy capture in the full 50 year analysis period. The balance, approximately 20,335 tonnes (69 percent) 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 1,700 tonnes, while storage would equal 3,015 (net storage of 1,300 tonnes) and include the following:

Short-term emissions (0-10 years post-harvest)
- Harvest operations emissions totaling about 28 tonnes
- Fuel treatment (burning) emissions totaling 35 tonnes
- Emissions from harvested wood 0-10 years after harvest of 1,190 tonnes

Long-term emissions(11-50 years post-harvest)
- Emissions from harvested wood, 11 to 50 years after harvest of 450 tonnes.

Long-term Storage (50 year analysis period)
- 3,560 tonnes of storage in harvested wood
- -550 tonnes net storage in live trees after 50 years of growth

Greenhouse gas emissions and carbon storage over the 50 year analysis period resulting from the proposed action are displayed in Table 13, below.

Comparison of Alternatives

Table 13. Carbon Emissions and Storage, Comparison of Action and No Action Alternatives

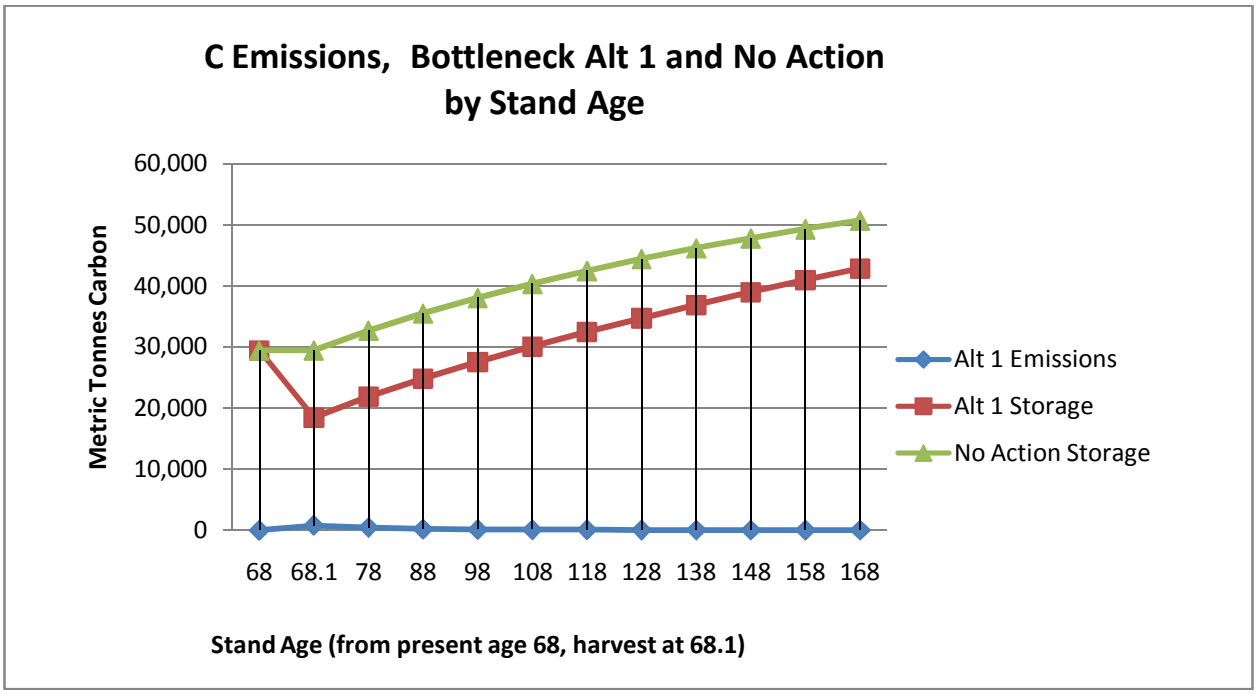
Source	Proposed Action (Tonnes)	No Action Alternative (Tonnes)	Notes
Emissions, 2010-2060	1,700	0	Logging, fuel treatments (burning), and emissions from harvested wood.
Live tree storage, 2059	28,900	42,400	50 years of stand growth
Live tree storage, 2009 (current condtions)	29,400	29,400	68 year old stand, 2009
Net change, live trees	-550	+ 13,000	Live tree carbon from growth 2009 - 2059
Harvested wood storage, 2059	3,565	0	69% of harvested wood carbon, 50 years
Total storage increase	**3,015**	**13,000**	Storage: live trees and harvested wood
Net Carbon Storage, Proposed Action	**1,300**	**13,000**	**Storage minus emissions, 2009-2059**

Under the No Action alternative, 32% more carbon would remain stored in live trees than under the Proposed Action during the 50 year analysis period. Under the Proposed Action, carbon would be

released through logging, fuel treatments and emissions resulting from harvested wood, the majority (74%) within ten years after harvest. Stand growth subsequent to harvest would store carbon equivalent to those emissions within five years. Therefore, the period where emissions are greater than storage is less than five 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 1,700 tonnes, equivalent to 6% of the current live tree storage in the project area, and approximately .0000016% 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.



4.0 CUMULATIVE EFFECTS

4.1 Vegetation

Age Class:
Due to ecological succession and forest management (mostly private land harvests), the amount of acreage in each age class within this watershed is in constant transition. Ecological succession would advance early seral forest plantations toward mid seral conditions, just as current and expected future harvests of mid seral stands would return these patches to early seral conditions.

Fire history and intensive forest management on both private and public lands over the past several decades has greatly reduced the amount of late seral forests and the quality and quantity of coarse woody debris in western Oregon forests (Moeur, et al. 2005, Hagar 2007). The prevailing management regime on private lands would likely involve alternating between mid seral and early seral habitat conditions over time without retaining any late seral forests patches for the foreseeable future. The proposed action

would affect mid-seral stands aged 68 years but would not change the age class composition on BLM-managed lands in the watershed.

Native vegetation:
Project 1 consists of commercially thinning 161 acres located on the western slopes of the Oregon Coast Range Mountains and within the Salmon-Neskowin Watershed Analysis area. The Salmon River Watershed encompasses approximately 64,000 acres. Approximately 4.7 percent of the Salmon River Watershed is under the jurisdiction of the Bureau of Land Management and this project occurs on less than 5.3 percent of the BLM-managed land. This proposed project occurs on 0.25 percent of the Salmon River Watershed. Effects of the proposed action on native vegetation are expected to be localized within the project area. Project 2 cumulative effects on native vegetation are expected to be minimal and localized within the project area.
Bureau Special Status Botanical and Fungal Species:
Density management of dense stands could provide habitat for uncommon botanical and fungal species (known from forests with larger diameter trees) since thinning dense stands can allow for increased secondary conifer growth and for the development of understory and shrub species. There are no known Bureau SS species within or adjacent to the project area.

Invasive/Non-native Plant Species (including Noxious Weeds):
Examples of forest management activities and natural events within the Salmon River Watershed that would create soil disturbance, increase available light, and increase soil temperatures, all of which would influence the spread of NNPs are:

- commercial and pre-commercial timber density management projects;
- young stand maintenance;
- road construction, maintenance, renovation, decommissioning and culvert replacements;
- landslide, high flow sedimentation deposits; and off highway vehicle (OHV) activities.

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 movement, water movement, natural dispersal and wind. Many past and present management and non-management activities tend to open dense forest settings and disturb soils, therefore providing opportunities for widespread NNP infestations to occur. Most NNPs are not shade tolerant and would not persist in a forest setting as they become out-competed for light as tree and/or shrub canopies close and light to the understory is reduced. The implementation of these projects would likely increase the number of common and widespread non-native plant species that are known to occur within the Salmon River Watershed. However, as discussed abov,e the risk rating for any adverse cumulative effects to the Salmon River Watershed or any adjacent watersheds would remain low.

Many past and present management and non-management activities tend to open dense forest settings and disturb soils therefore providing opportunities for widespread NNP infestations to occur. Most NNPs are not shade tolerant and would not persist in a forest setting as they become out-competed for light as tree and/or shrub canopies close and light to the understory is reduced. In addition many NNPs are early successional species and are replaced by more dense growing shrubs and forbs that are common in western Oregon. The implementation of this project would likely increase the number of common and widespread non-native plant species that are known to occur within the Upper Alsea River and Marys River Watersheds. However, as discussed above the risk rating for any adverse cumulative effects to the Upper Alsea River and Marys River Watersheds or any adjacent watersheds would remain low.

Bureau Special Status Botanical and Fungal Species:
There would be no overall effect to bureau sensitive species, but the project would provide for additional habitat at a quicker rate when compared to the no action alternative.

4.2 **Soils**

(IDT Reports incorporated by reference: Rickard Creek Timber Sale Soils Report, pp. 1 to 8)

The total area of residual soil compaction from yarding, skid trails, landings, and area removed from production by existing roads on this projects site would not exceed 7 percent. This meets BLM standards for residual compaction within the unit. In the disturbed areas (including permanent roads), soil structure, bulk density and surface condition would be restored to pre-study harvest levels over a period of several decades as a result of normal soil biological processes as well as the mechanical effects of weathering, wetting, and drying.

In order to avoid damage to existing tree roots, we would not plan on ripping skid roads to mitigate compaction. Mitigation would only be in the form of limiting soil disturbance and compaction by skiding on top of slash as much as possible and doing ground based skiding during periods of low soil moisture (less than 25 percent) with a minimum of skid trails (less than 10 percent of the unit area) (Timber harvest BMP's , Appendix C-2).

Placement of water bars in skid trails and blocking off motorized access to skid trails would promote out-slope drainage and prevent water from accumulating and running down the skid trail surfaces in large enough volumes to cause erosion that could reach streams. A small amount of localized erosion can be expected on some of the tractor skid trails the first year or two following skidding. Eroded soil is not expected to move very far from its source (less than 100 feet) and would be diverted by the water bars or out sloping to spread out in the vegetated areas adjacent to the trails and infiltrate into the ground. After several seasons, the accumulated litter fall on the skid trails would reduce the impact of rain droplets on the soil surface further reducing the potential erosion of the skid trails. Existing OHV use in the area would be reduced by the decommissioning of one road and the skid trail blocking work described above.

The analysis indicates that the proposed projects are considered unlikely to have detectable affects on soil erosion, or soil productivity. There would be no measurable cumulative impact to the soils resource outside the project area.

4.3 **Water**

The proposed action, when combined with other proposed actions in the Slick Rock Creek Subwatershed, and the larger Salmon River Watershed is unlikely to have detrimental cumulative effects on the hydrologic regime. A level 1 analysis was performed to determine the risk of increasing peak flows in the Slick Rock Creek Subwatershed, and the larger Salmon River Watershed through density management.

The watersheds were initially analyzed for land ownership, vegetation type, age class, and extent of TSZ. Using these parameters and the methodology of the ***Salem District Watershed Cumulative Effects Analysis Procedure 1994,*** a risk factor ("rfactor") was calculated to determine the relative risk or sensitivity of areas to increases in runoff and consequently peak stream flows. Currently, the average rfactor value in these watersheds is "1", which is considered low (on a scale of 0-3, with 3 = high risk of increases to peak flows).

The assessment indicates a low risk of peak flow enhancement for watersheds that are in the ROS zone based on the proposed harvest treatment type (thinning). All of the project area activities are located in the ROS zone. Based on the assessment for this project, the risks of peak-flow enhancement in these watersheds are "low".

Using information based on a recent report by Grant (2008), an analysis was completed that totaled up the existing amount of harvested lands in the 6th field watersheds in the project areas. This includes the Trout Creek Watershed and Slick Rock Creek Watershed for all land ownerships. That analysis found that approximately 20 percent of the Trout Creek Watershed and 25 percent of the Slick Rock Creek

watershed was in a "open" condition, meaning that the lands were either harvested and currently had less than 30 percent crown cover or were naturally open (meadows, rock slopes, etc).

The Grant paper set the peakflow detection level at 10 percent based on measurement error in natural stream systems and natural variability in stream systems. Adding in the proposed harvest acres in the Trout Creek watershed; 154 acres, the projected percent of the watersheds in an open condition increases to 24.3 percent in the Trout Creek Watershed which would roughly relate to a mean predicted increase of 11 percent in peak flows. The range does extend up to 13 percent based on the regression line data shown in the envelope curve developed by Grant. For the Slick Rock Creek Watershed (3 acres of proposed harvest) the percent of the watershed in an open condition remains at 25 percent which roughly relates to a mean predicted increase of 13 percent in peakflows. The range does extend up to 14 percent based on the regression line data shown in the envelope curve developed by Grant.

The analysis assumes no recovery of past harvest stands, and that the current level of harvest activity on private lands remains the same and that all the acres in the sale are resulting in less than 30 percent crown cover when completed. Based on these side boards, it is still expected that the addition of these proposed harvest activities in both watersheds would be unmeasurable from the existing peakflow increases based on the Grant envelope curve and the peakflow detection level. Because the majority of the project area is so close to and below the rain-dominated elevation, the Grant curve for that zone was also reviewed. In both watersheds with the proposed harvest activities, the percent change in peak flows is less than 5 percent which is well below the peak flow increase detection level.

Due to the small amount of federal land in these watersheds, cumulative impacts to the Slick Rock Creek Subwatershed and Salmon River Watershed are likely to continue to be dominated by actions on private lands. Current and likely future management actions on public lands in the watershed include: stand density management through timber sales, road maintenance (drainage improvements, renovations, decommissioning), and riparian treatments. Likely future private actions include: timber management and associated road construction in the highlands and continued settlement and agricultural development in the lowlands.

Because of the small amount of land affected by the proposed action and because the anticipated effects of the proposed action on hydrology would be short-term and localized, the proposed action is not likely to contribute to cumulative effects in the Slick Rock Creek Subwatershed or downstream in the larger Salmon River Watershed.

Water Quality - Cumulative Effects

Temperature

The no-harvest SPZ widths along all streams in both projects follow the guidelines established in the 1995 RMP and by the Oregon DEQ that would maintain a minimum of 80 percent shade for the streams. Because stream shading would be maintained there are no anticipated changes to stream temperature from the implementation of these projects.

Sediment

These 157 acres are all located in the Upper Salmon watershed and equate to less than 0.3 percent of the lands. The creation of temporary roads, yarding corridors and the mechanical removal of trees are unlikely to measurably increase sedimentation into project area streams.

An analysis of sediment and temperature cumulative effects on BLM lands was completed in the *Final Environmental Impact Statement for the Revision of the Management Plans of the Western Oregon Bureau of Land Management* (FEIS 2008). This analysis is located on pages 759-775 of Volume II. BMP's used to limit sediment introduction to water sources are listed in Appendix I (Pages 268-316) in Volume III of the FEIS. The appropriate BMP's needed to maintain the existing sediment regime in the stream systems are listed in Chapters 2 of this document. The FEIS analysis combined with this more site

specific analysis results in no anticipated effects to stream sediment or temperature from existing conditions.

4.4 Fisheries/Aquatic Habitat

The proposed stand treatments are not expected to alter LWD recruitment, stream bank stability, and sediment supply to channels at the 5th field watershed scale in the short-term or long-term. Cumulative impacts to fishery resources could occur if proposed actions result in alterations in runoff contributing to changes in flows where fish reside. Based on the Hydrology reports analysis of alterations to peak flows in the project area (Wegner 2008) and the Hydrology Cumulative Effects Analysis (Wegner 2008) changes in flows were considered un-measurable at the site level and are unlikely to contribute to cumulative effects, subsequently, no cumulative effects are anticipated on aquatic resources.

The Hydrology report indicated that the proposed treatments were considered unlikely to have detectable effects on stream temperatures and not expected to result in any cumulative effects to temperature (Wegner 2008). No cumulative effects are anticipated for peak flows, streambanks, and instream structure which could also affect temperature. Since no cumulative effects were anticipated for these project activities on temperature, streambank conditions, and peak flows these treatments would not result in cumulative effects for fisheries resources.

The proposed stand treatments are not expected to alter LWD recruitment, stream bank stability, and sediment supply to channels at the 5th field watershed scale in the short-term or long-term. As short-term LWD recruitment is protected and long-term LWD recruitment is enhanced only slightly, positive cumulative effects are anticipated for instream structure from the proposed actions. Approximately 36 percent of the land base within the Salmon River Watershed is federally administered, by the BLM and Forest Service. The trend in LWD recruitment on federal lands is increasing as the stands mature within the Northwest Forest Plan designated Riparian Reserves (Reeves et al 2006). Analysis conducted under the FEIS Revision of the Resource Management Plans of Western Oregon indicated trends of LWD recruitment on all Western Oregon and Washington BLM administered Riparian Management Areas. Overall, LWD recruitment was considered likely to continue to improve over the next 100 years under the preferred alternative (BLM 2008b). Private lands account for roughly 46 percent of the land base in the Upper Alsea Watershed. An assessment of Oregon Forest Practices indicated on non-federally administered forest lands roughly 94 percent of the riparian network would be considered inadequately stocked for future recruitment of LWD (IMST 1999). However, based on the various policies currently being applied to coastal Oregon forest lands, the amount of riparian area with large and very large conifer trees, which would contribute towards large wood recruitment, is projected to increase significantly (Spies et al 2007).

Proposed road renovation activities associated with the Density Management are unlikely to reach fish habitat and would not be expected to contribute to any cumulative effects. Extensive road work has occurred on BLM, FS and adjacent industrial forest over the last decade in the Salmon River Watershed. In addition to timbersale road construction substantial restoration work has occurred to improve road stability, reduce road generated sedimentation, and remove barriers to aquatic habitat movement at stream crossings. Site level road work, both private and public, have had negative and positive impacts on aquatic habitat. However, these projects are unlikely to detectably alter fish productivity at 5th field scale due to the small scale of project work and lack of connectivity between treatment areas.

Timber hauling may contribute a minor amount of sediment to the stream network during the wet season hauling and follow cessation of timber hauling. Most timber haul routes are located near ridgetops with a limited number of stream crossings. Timber hauling within the Bear Creek drainage is within 200 feet of fish habitat for 1/4 mile; however, site level impacts were expected to be unmeasurable due to the mild road gradients. As site level impacts are not anticipated to be measurable, cumulative effects to aquatic resources would be unmeasurable.

Late seral and deciduous swamp enhancement were not anticipated to result in any site level effects to fish or aquatic habitat therefore the actions associated with Project 2 are not anticipated to contribute to any cumulative effects.

4.5 **Wildlife**

The parameters for this cumulative impact analysis are as follows:

- Proposed Actions; variable-density thinning approximately 161 acres of 69 year old conifer forest. In addition, release of wolf trees (about one per acre) to protect their full live crowns while creating snags and CWD on approximately 32 acres of 105 year old conifer forest
- Resource of concern; mid-seral conifer forest wildlife habitat
- Spatial scale for past, present and reasonably foreseeable future actions; Slick Rock Creek sixth-field watershed (9,151 acres)
- Temporal scale for past and reasonably foreseeable future actions; 20 years (10 years pre-treatment and 10 years post-treatment)
- Current conditions; see section 3.0 Affected Environment
- Trend without Proposed Action; see section 4.2 No-Action Alternative

Federal lands in the watershed (BLM 26%, USFS 9%) have been managed as LSR since 1995 and are expected to be managed as (or very similar to) LSR into the future. This means that all actions on federal lands during this temporal scale are planned to benefit wildlife, especially LSOG dependent species. Therefore the cumulative impact to wildlife has been, is, and would be positive on federal timber lands since mid-seral thinnings are designed to enhance the conditions of the existing habitat by increasing structural diversity, accelerating the development of late-seral habitat, and creating new snags and CWD.

Private timberlands in the watershed (65%) have provided, are providing, and will continue to provide simple structured early and mid-seral forest habitat. These private lands are not expected to contribute to LSOG conditions at the landscape level.

4.6 **Fuels/Air Quality**

Although there would be an increase in fuel loading and resultant fire hazard in the short-term, there would be positive net benefits in the long-term due to the proposed thinning treatment. When looked at from a watershed scale, the thinning of approximately 161 acres of forest habitat would reduce the long-term (5 or more years) potential of the stand to carry a crown fire. The localized increase in fire risk would diminish back to background levels within 15 years. If fuels are removed from the site for co-generate power production, fire risk would diminish by a substantial margin immediately.

Project 2 effects would be a slight increase in fuel loading and resultant fire hazard in the short-term but probably not enough to be measurable with any statistical significance especially considering the discontinuous arrangement of the fuels. The localized increase in fire risk would diminish down to historical back round levels within 3 years or less.

There would be few cumulative effects to these resources, as the effects from Project 1 would be local and/or short lived, and there would be no other uses affecting this resource. Based on past experience with pile burning in this and other similar areas, there are no expected cumulative effects on air quality from the planned fuels treatment under this proposal.

4.7 Carbon Sequestration (Storage) and Climate Change

Alternative 1 (No Action)

Incremental Effects of Project Related Greenhouse Gases and Carbon Storage:

This increase of 13,000 tonnes of live tree carbon would contribute to an annual average of 260 tonnes, or .00009 percent 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, Marys Peak Resource Area) would result in a total carbon storage of approximately 603 million tonnes, 5 percent higher than average historic conditions (576 million tonnes, WOPR, 3-224).

Greenhouse gas emissions and carbon storage over the 50 year analysis period resulting from the No Action are displayed in Table 13.

4.7.1.1 Alternative 2 (Proposed Action)

***Incremental Effects of Project Related Greenhouse Gases and Carbon Storage*:**
Carbon emissions resulting from the proposed action would total 1,700 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, p 2-3). Therefore, the emissions from the proposed action would constitute .0000004 percent of current global emissions and .0000016 percent of current U.S. emissions.

Tree growth following harvest would offset greenhouse gases and result in net storage of 1,300 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 percent higher than average historic conditions (576 million tonnes, WOPR, 3-224, as reanalyzed in November 6, 2009 memo, on file, Marys Peak Resource Area). The incremental effect of the proposed action, over time, would be net storage of carbon.

5.0 COMPLIANCE WITH THE AQUATIC CONSERVATION

Existing Watershed Condition

The Bottleneck LSR Enhancement Project areas are in the Salmon River 5th field Watershed which drains into the Salmon River.

Six percent of the watershed is managed by BLM and 94 percent is managed by other landowners. Late seral and/or old-growth forests comprise 32 percent of the BLM-managed lands in the watershed. We can infer then, that commercial harvest or stand replacement fire has occurred on 68 percent of the BLM-managed lands in the watershed. The earliest harvests on BLM-managed lands have been regenerated and are progressing towards providing mature forest structure. Most of the private industrial lands have been and will continue to be moved from mid seral to the early seral class.

Review of Aquatic Conservation Strategy Compliance:

The projects meet the Aquatic Conservation Strategy in the context of PCFFA IV and PCFFA II [complies with the ACS on the project (site) scale]. The following is an update of how these projects comply with the four components of the Aquatic Conservation Strategy. The projects would comply with:

Component 1 – Riparian Reserves: by maintaining canopy cover along all streams and wetlands would protect stream bank stability and water temperature. Riparian Reserve boundaries would be established consistent with direction from the *Salem District Resource Management Plan*. No new road construction would occur within RMP Riparian Reserves;

Component 2 – Key Watershed: by establishing that the Bottleneck LSR Enhancement Projects are not within a key watershed;

Component 3 –Watershed Analysis: The Salmon Neskowin Watershed Analysis (1995) describes the events that contributed to the current condition such as early hunting/gathering by aboriginal inhabitants, road building, agriculture, wildfire, and timber harvest. The following are watershed analysis findings that apply to or are components of this project:

Projects 1 and 2:

- Early commercial thinnings may be viable treatment options in stands whose ages range from 30 to 79 years. Multiple commercial thinnings may be appropriate for some stands, especially those that are currently near the young end of this range. Dense and/or uniform stands are candidates. Stand condition and other resource management concerns may limit the number of desirable entries. The objectives of early commercial thinnings are to promote the growth of large diameter trees, to encourage the development of some late-successional stand characteristics, and to increase wind-firmness (p. 64).

- Early commercial thinnings will encourage stand variability and spacing variability. This in turn will favor the development of large limbs on some trees and will hasten the development of desirable characteristics within the stand (p. 64).

- Late commercial thinnings may help move densely stocked stands from the competitive exclusion stage into the understory reinitiation phase. Doing so will help to expand existing blocks of late-seral forest and will create linkages between existing late-seral blocks (p. 64).

- Additionally, late commercial thinnings will hasten the development of multiple canopy layers and will promote wind-firmness, especially in stands with prior thinning entries. In many stands, some trees will be large enough to provide for down logs, woody debris, and snags (p. 64).

- Create snags and CWD in areas (not associated with silvicultural treatments) that are currently deficient in these habitat components. Meet or exceed snag and CWD levels following the recommendations of the LSRA (p. 65).

- Conduct treatments in LSRs to accelerate the development of late-successional habitat only in areas that currently lack species and/or structural diversity (p. 67).

- Potential early commercial thin treatment areas were identified by evaluating GIS data for stands in the conifer pole, conifer mix pole, young conifer, and young conifer mix seral classes. These seral classes include stands up to 80 years old. Potential treatment areas on BLM-managed lands occur in the Bald Mountain area (pp 67-68).

- Manage riparian vegetation to protect existing late-successional stands and to maximize growth of earlier successional stands with the objective to provide LWD recruitment and stream shading (p. 70).

Component 4 – Watershed Restoration:
Projects 1 and 2 would restore watershed conditions by providing a gradual transition in structural characteristics of the treated stands that would more closely resemble late-seral forest. These projects would also promote stand diversity, provide more light to accelerate growth of selected conifers and promote species diversity.

These projects have been reviewed 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 Actions do not retard or prevent the attainment of any of the nine ACS objectives for the following reasons.

Table 14: Project' Consistency with the Nine Aquatic Conservation Strategy Objectives

Aquatic Conservation Strategy Objectives (ACSOs)	**Projects 1 and 2 – Mid-Seral Enhancment and Late Seral and Decidious Swamp Enhancement Actions**
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..	Does not prevent the attainment of ***ACSO 1***. Addressed in Text (*EA section 3.2.1*). 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. Faster restoration of distribution, diversity, and complexity of watershed and landscape features would not occur. **Proposed Action Alternative:** Species diversity will be increased, as thinning will target Douglas-fir, increasing the relative proportion of the other tree species. Furthermore, treatment will promote the establishment of seedlings, which are likely to include hardwood, western hemlock and western red cedar (EA.p. 23). Treatment includes variable density thinning, creation of small gaps around "wolf" trees, and retention of small clumps. This would increase spatial and structural diversity of the stand. Some trees would experience no competition and grow very full crowns. Some trees would remain at close spacing and retain closed canopy conditions. Thinning around "wolf" or legacy trees in Projects 1 and 2 would increase growth and vigor of the remaining trees and prevent loss of lower crown due to competition. (EA p. 23).

Aquatic Conservation Strategy Objectives (ACSOs)	Projects 1 and 2 – Mid-Seral Enhancment and Late Seral and Decidious Swamp Enhancement Actions
2. Maintain and restore spatial and temporal connectivity within and between watersheds.	Does not prevent the attainment of ***ACSO 2***. Addressed in Text (*EA sections 3.2.1 and 3.2.3*). In summary: **No Action Alternative:** The No Action alternative would have little effect on connectivity except in the long term within the affected watershed. **Proposed Action Alternative:** 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.. No stream crossing culverts would be used that would potentially hinder movement of aquatic species; therefore no aquatic barriers would be created. Both terrestrial and aquatic connectivity would be maintained, and over the long-term, as Riparian Reserves develop late successional characteristics, lateral, longitudinal and drainage connectivity would be restored. Renovation of the transportation system would not affect spatial connectivity.
3. Maintain and restore the physical integrity of the aquatic system, including shorelines, banks, and bottom configurations.	Does not prevent the attainment of ***ACSO 3***. Addressed in Text (*EA sections 3.2.4*). In summary: **No Action Alternative:** It is assumed that the current condition of physical integrity would be maintained. **Proposed Action Alternative:;** Projects 1 and 2 are unlikely to affect stream channel stability and function as all field identified streams and wet areas would be protected with a minimum 55-foot SPZ. No yarding would occur across streams. No bank stabilizing vegetation would be removed.

Aquatic Conservation Strategy Objectives (ACSOs)	Projects 1 and 2 – Mid-Seral Enhancment and Late Seral and Decidious Swamp Enhancement Actions
4. Maintain and restore water quality necessary to support healthy riparian, aquatic, and wetland ecosystems.	Does not prevent the attainment of ***ACSO 4***. Addressed in Text (*EA section 3.2.4*). In summary **No Action Alternative:** It is assumed that the current condition of the water quality would be maintained. **Proposed Action Alternative** Increases in stream temperature as a result of this action are unlikely. All tributary reaches in the project area would have a 55-foot primary shade zone distance based on the hill slope of the area. Trees located within this primary shade zone would not be harvested thus helping to maintain the existing thermal regime of the tributary by maintaining greater than 80 percent effective stream shade. At stream heads, where groundwater and surface water interfaces, stream temperatures are relatively insensitive to change and are likely consistently below ODEQ temperature standards. The channels are generally shaded by alder, conifer, ferns and brush. Stream shading varies between dense canopy (greater than 80 percent angular canopy density)cover by conifers to open canopy (50 to 60 percent angular canopy density) at flatter reaches (Brazier and Brown 1972). The flatter stream reaches were those that had discontinuous flow where there was no surface flow. Based on field observations, aerial photo reviews of streams completed for the analysis of this EA between 2006 and 2009 , and modeling runs for the project area , current streamside vegetation and valley topography appears adequate to shade surface waters during summer base flow and it is likely that stream temperatures consistently meet the Oregon state standard (18 degrees Celsius) for these waters (EA p. 43) Sedimentation and stream turbidity: see No. 5 below Road renovation practices are intended to reduce the likely deposition of road fill material into adjacent streams.

Aquatic Conservation Strategy Objectives (ACSOs)	Projects 1 and 2 – Mid-Seral Enhancment and Late Seral and Decidious Swamp Enhancement Actions
5. Maintain and restore the sediment regime under which aquatic ecosystems evolved.	Does not prevent the attainment of ***ACSO 5***. Addressed in Text (*EA section 3.2.4*). In summary **No Action Alternative:** It is assumed that the current levels of sediment into streams would be maintained. **Proposed Action Alternative** It is unlikely that the proposed projects would lead to measurable increases in sediment delivery to streams, stream turbidity, the alteration of stream substrate composition, or sediment transport regime. Stream protection zones would eliminate disturbance of streamside vegetation; no trees would be cut from the stream bank or where roots are stabilizing the stream bank. Tree girdling and piling of slash would have minimal to no ground disturbance and no activities would take place directly in or adjacent to stream channels. Skyline and ground-based skid trails, if sufficiently compacted, could route surface water and sediment into streams. However, several factors would limit the potential for this to occur. Even if compacted, high levels of residual slash left on yarding corridors (both machine and skyline), would reduce runoff by deflecting and redistributing overland flow laterally to areas where it would infiltrate into the soil. Existing skid trails would be used for ground-based equipment as much as possible to reduce additional soil compaction and the total surface area of landings would be kept to a minimum. In addition SPZs in riparian areas have high surface roughness, which function to trap any overland flow and sediment before reaching streams. Ground-based skidding would occur during periods of low soil moisture with little or no rainfall, in order to minimize soil compaction and erosion. Sediment supplies are in the range expected for their stream type (Rosgen , 1994). Channel substrates are typically sand, with some pebbles and gravels. Some channel reaches contain large amounts of CWD. The remaining channels all contained sections of discontinuous flow where water went subsurface. Burning hand piles could produce patches of soil with altered surface properties that restrict infiltration. However, these surfaces would be surrounded by larger areas that could absorb runoff or sediment that reach them. In addition, piles would be burned outside of SPZs and away from standing or running surface water. No burning would occur within SPZs to protect water resources and the remaining vegetated buffer would filter out any potential sediment delivered from upslope areas. Based on previous burning projects, it is not expected that any erosion would occur from these areas due to the burning and thus there would be no impact to sediment generation or nutrient levels available to the remaining vegetation which would maintain the productivity of the stand. Since the proposed action is unlikely to result in any measurable increase in stream temperature or sedimentation and would not place large amounts of fine organic material in the streams or alter stream reaeration, it is unlikely that it would have any measurable effect on dissolved oxygen or nutrient levels (EA pp. 68 and 69). .

Aquatic Conservation Strategy Objectives (ACSOs)	Projects 1 and 2 – Mid-Seral Enhancment and Late Seral and Decidious Swamp Enhancement Actions
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.	Does not prevent the attainment of ***ACSO 6***. Addressed in Text (*EA section 3.2.4*). In summary **No Action Alternative:** No change in in-streams flows would be anticipated. **Proposed Action Alternative** Measurable effects to hydrologic processes, channel conditions, and water quality due to the proposed action are unlikely. Alterations in the capture, infiltration and routing (both surface and subsurface) of precipitation may occur as a consequence of the mechanical removal of trees and reductions in stand density. This effect from the proposed action would be difficult to measure and unlikely to substantially alter stream flow or water quality. Numerous studies have documented increases in mean annual water yield and increases in summer base flow following the removal of watershed vegetation; vegetation intercepts and evapotranspires precipitation that might otherwise become runoff (Bosch et al. 1982). Thus, it can be assumed that this project would likely result in some small increase in water yield which correlates with the removal of conifers, the death of larger conifers by girdling, and a short-term reduction in vegetation cover through pile burning. However, other than increased peak flows, an increase in fall and winter discharge from forest activities is likely to have little biological or physical significance (U.S.E.P.A. 1991). In almost all cases, removal of more than 20 percent of the vegetative cover over an entire watershed (5^{th}-field) would result in increases in mean annual water yield. Removal of less than 20 percent of vegetative cover has resulted in negligible changes, where it was not possible to detect any effect (i.e. the error in measurements was greater than the change) (Bosch 1982). In addition, alterations in the timing and/or quantity of peak flow events as a result of forest harvest and road construction have been studied for several decades (Jones and Grant 1996). The proposed project sites would affect approximately 1.7 percent of the forest cover in the Slick Rock Creek Subwatershed and 0.3 percent in the larger Salmon River Watershed. Because of the small percentage of forest cover being affected by this project, increases to stream flow (mean annual yield and summer base flow) caused by this action alone are unlikely to be measurable. There is a low risk of increased peak flows due to ROS winter storms. This effect is presumed to be small because the vegetation treatment planned is only a thinning and should not alter the vegetation structure of the landscape such as clear cutting would (EA pp. 42 to 43).

Aquatic Conservation Strategy Objectives (ACSOs)	Projects 1 and 2 – Mid-Seral Enhancment and Late Seral and Decidious Swamp Enhancement Actions
7. Maintain and restore the timing, variability, and duration of floodplain inundation and water table elevation in meadows and wetlands.	Does not prevent the attainment of ***ACSO 7***. Addressed in Text (*EA section 3.2.4*). In summary **No Action Alternative:** No change in in-streams flows would be anticipated. **Proposed Action Alternative** Design features for the project, such as SPZs, coupled with the relatively small percent of vegetation proposed to be removed, would maintain groundwater levels and floodplain inundation rates. Detectable direct or indirect effects to stream flow as a result of this action are unlikely. The proposed action would not alter existing patterns of floodplain inundation or water table elevation as it would have no effects on existing flow patterns and stream channel conditions. Proper drainage of roads would maintain water tables and flood plain functions.
8. Maintain and restore the species composition and structural diversity of plant communities in riparian areas and wetlands.	Does not prevent the attainment of ***ACSO 8***. Addressed in Text (*EA section 3.2.1*). 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 Alternative:** The actual riparian areas along streams in Project 1 would be excluded from treatment during the project by designating SPZs. There would be no change to riparian vegetation on banks or within the riparian zones along streams resulting from the proposed projects. Large amounts of smaller wood would continue to fall from within the untreated SPZs, and larger wood would begin to be recruited from farther up the slopes as the treated stands reach heights of 200 feet. In the long-term, trees would reach large diameters earlier compared to the no treatment option, creating natural opportunities for high quality LWD recruitment (EA pg. 25). Project 2 would maintain open wet meadow habitat, a rare component of the landscape that provides a specialized habitat niche for many species, rather than allowing succession to the more common closed forest habitat (EA pg. 27).

Aquatic Conservation Strategy Objectives (ACSOs)	Projects 1 and 2 – Mid-Seral Enhancment and Late Seral and Decidious Swamp Enhancement Actions
9. Maintain and restore habitat to support well-distributed populations of native plant, invertebrate and vertebrate riparian-dependent species.	Does not prevent the attainment of ***ACSO 9***. Addressed in Text (*EA section 3.2.3*). 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 Alternative** Research at the DMS sites found that the treatments generally maintained habitat for native plant, invertebrate and invertebrate riparian-dependant species. Similar effects are expected in the proposed action as the previous treatment measured in the research. However, no additional patch cuts are included in the proposed action. Specifically, thinning was found to increase species richness of arthropods, and forest riparian buffers thirty meters wide serve as refuge for both forest-upland and forest-riparian arthropod species. Thinning was found to have minimal effects on most species of aquatic vertebrates (salamanders). Native plants were found to persist and increase in coverage after density management. Patch openings and low (retention) thinning drastically reduced the diversity of epigeous ectomycorrhizal fungal species, but medium and high retention thinning showed little change in fungal diversity. Buffers of widths defined by the transition from riparian to upland vegetation or topographic slope breaks appear sufficient to mitigate the impacts of upslope thinning on the microclimate above headwater streams. Because the microclimate, as well as the structure and composition of the forest stand and understory vegetation are protected within the untreated buffer, habitat elements seem to be protected (EA pp. 25 and 26).

6.0 LIST OF PREPARERS

Table 15: List of Preparers

Resource	Name	Initial	Date
Botany TES and SS Plant Species	Ron Exeter		
Cultural Resources	Heather Ulrich		
Fisheries/Aquatic Habitat	Scott Snedaker		6/25/10
Fuels/Air Quality	Terri Brown		
Water/Soils	Steve Wegner	SJW	6/25/10
NEPA	Gary Humbard	GLH	6/25/10
Recreation/Visual Resources	Traci Meredith	TMM	6/28/2010
Silviculture/Riparian Ecology	Hugh Snook	HWS	6/28/2010
Wildlife TES and SS Animal Species	Gary Licata		6/25/10
Road Work	Russ Buswell		6/29/10
Harvest Plan	Cory Geisler		6/28/10

7.0 CONTACTS AND CONSULTATION

7.1 Agencies, Organizations, and Persons Consulted (ESA Section 7 Consultation)

U. S. Fish and Wildlife Service
To address concerns for potential effects to listed wildlife species and potential modification of critical habitats, the proposed action was consulted upon with the USFWS, as required under Section 7 of the Endangered Species Act. Consultation for this proposed action was facilitated by its inclusion within a programmatic Biological Assessment (BA) that analyzed all projects that may modify the habitat of listed wildlife species on federal lands within the Northern Oregon Coast Range during fiscal years 2009 and 2010. The proposed action has been designed to incorporate all appropriate design standards set forth in the BA. This action would be considered a "may affect, not likely to adversely affect" northern spotted owl dispersal habitat and northern spotted owl and marbled murrelet critical habitats. In the resulting Letter of Concurrence (FWS Reference Number 13420-2008-I-0125), after reviewing the effects of the proposed action on the spotted owl and its critical habitat, and the marbled murrelet and its critical habitat, the Service concurred with BLM that the activities, as proposed, are not likely to adversely affect spotted owls or marbled murrelets and are not likely to adversely affect critical habitat for either species.

National Marine Fisheries Service
Consultation with NMFS is required for all actions which 'may affect' ESA listed fish species and critical habitat. Oregon Coast (OC) Coho Salmon are listed as threatened under the ESA, as amended, and are known to occur in the area where the proposed actions are located (Salmon River and Siletz River).

The proposed thinning actions associated with the Bottleneck LSR Thinning Project are within 0.5 miles to the listed fish or listed critical habitat in the Slick Rock Creek Sub-Watershed. Proposed hauling associated with the project occurs adjacent to listed fish . A determination has been made that this proposed project would be a 'May Affect' on OC coho salmon. The 'May Affect' determination is based on the proximity of the density management treatments to the Trout Creek and Slick Rock Creek in the Slick Rock Creek Sub-Watershed where listed fish reside. Due to the "May Affect" determination this project would need to have consultation completed with the NMFS prior to implementation.

Project 1 – Concurrence from NMFS on consistency of this project with guidance described in *Endangered Species Act Section 7 Informal Consultation for the 2008-2009 North Coast Province Thinning Timber Sales Programmatic on Portions of the Siuslaw National Forest and Eugene and Salem Districts of the Bureau of Land Management, Seven Watersheds within the Oregon Coast Recovery Domain* (NMFS 2008) would provide consultation coverage for the May Affect actions of the Bottleneck LSR Thinning project. Concurrence from NMFS was received on March 24, 2010 concluding informal consultation for this project. Actions which do not comply with design criteria of the Thinning Timber sale Programmatic or *Aquatic Restoration Biological Opinion (ESA Section 7 Formal Programmatic Consultation and Magnuson-Stevens Fishery Conservation and Management Act-Essential Fish Habitat Consultation for Fish Habitat Restoration Activities in Oregon and Washington, CY2007-2012)* would require additional ESA consultation coverage.

Project 2 activities have no connections to listed fish habitat; therefore no effects to listed fish or listed fish habitat would occur.

Protection of Essential Fish Habitat (EFH) as described by the Magnuson/Stevens Fisheries Conservation and Management Act and consultation with NMFS is required for all projects which may adversely affect EFH of Chinook and coho salmon. The proposed Bottleneck LSR Enhancement Projects 1 and 2 are not expected to adversely affect EFH due to distance of all activities associated

with the projects from ESA listed fish or critical habitat. Consultation with NMFS on EFH is not required for these projects.

7.2 Cultural Resources - Section 106 Consultation and Consultation with State Historical Preservation Office

The project area occurs in the Oregon Coast Range. Survey techniques are based on those described in Appendix D of the *Protocol for Managing Cultural Resource on Lands Administered by the Bureau of Land Management in Oregon*. Post-project survey would be conducted according to standards based on slope defined in the Protocol appendix. Ground disturbing work would be suspended if cultural material is discovered during project work until an archaeologist can assess the significance of the discovery.

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

For information on project scoping and the original EA comment period, see EA section 1.5.

The revised EA and FONASI will be made available for public review from June 30, 2010 to July 14, 2010 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 *News-Guard* and *News-Times* newspaper. Written comments should be addressed to Trish Wilson, Field Manager, Marys Peak Resource Area, 1717 Fabry Road S., Salem, Oregon 97306. Emailed comments may be sent to OR_Salem_Mail@blm.gov

8.0 MAJOR SOURCES

8.1 Major Sources

8.1.1 Interdisciplinary Team Reports

Exeter, R. 2008. Botanical Report. Marys Peak Resource Area, Salem District, Bureau of Land Management. Salem, OR. Prepared for Bottleneck NEPA File.

Snook, H. 2008. Specialist Report Abstract, Bottleneck LSR Enhancement Project, Forest Vegetation and Silviculture. Marys Peak Resource Area, Salem District, Bureau of Land Management. Salem, OR. Prepared for Bottleneck NEPA File.

Wegner, S. 2008. Bottleneck Environmental Assessment Soils/Hydro Report. Marys Peak Resource Area, Salem District, Bureau of Land Management. Salem, OR. Prepared for Bottleneck NEPA File.

Licata, G. 2008 Biological Evaluation for Terrestrial Wildlife. Marys Peak Resource Area, Salem District, Bureau of Land Management. Salem, OR. Prepared for Bottleneck NEPA File.

Meredith, T. 2008. Visual, Recreation and Rural Interface Report. Marys Peak Resource Area, Salem District, Bureau of Land Management. Salem, OR. Prepared for Bottleneck NEPA File.

Snedaker, S. 2008. Bottleneck Fisheries Report. Marys Peak Resource Area, Salem District, Bureau of Land Management. Salem, OR. Prepared for Bottleneck NEPA File.

Tomczyk, T. 2008. Project Proposal Fuels Report. Marys Peak Resource Area, Salem District, Bureau of Land Management. Salem, OR. Prepared for Bottleneck NEPA File.

Exeter, R. 2010. Revised Botanical Report. Marys Peak Resource Area, Salem District, Bureau of Land Management. Salem, OR. Prepared for Bottleneck NEPA File.

Snook, H. 2010. Revised Specialist Report Abstract, Bottleneck LSR Enhancement Project, Forest Vegetation and Silviculture. Marys Peak Resource Area, Salem District, Bureau of Land Management. Salem, OR. Prepared for Bottleneck NEPA File.

Wegner, S. 2010. Revised Bottleneck Environmental Assessment Soils/Hydro Report. Marys Peak Resource Area, Salem District, Bureau of Land Management. Salem, OR. Prepared for Bottleneck NEPA File.

Licata, G. 2010 Revised Biological Evaluation for Terrestrial Wildlife. Marys Peak Resource Area, Salem District, Bureau of Land Management. Salem, OR. Prepared for Bottleneck NEPA File.

Meredith, T. 2010. Revised Visual, Recreation and Rural Interface Report. Marys Peak Resource Area, Salem District, Bureau of Land Management. Salem, OR. Prepared for Bottleneck NEPA File.

Snedaker, S. 2010. Revised Bottleneck Fisheries Report. Marys Peak Resource Area, Salem District, Bureau of Land Management. Salem, OR. Prepared for Bottleneck NEPA File.

Tomczyk, T. 2010. Revised Project Proposal Fuels Report. Marys Peak Resource Area, Salem District, Bureau of Land Management. Salem, OR. Prepared for Bottleneck NEPA File.

8.1.2 Additional References

USDA Forest Service, USDI. Bureau of Land Management. 1994. Final Supplemental Environmental Impact Statement Management of Habitat for Late Successional and Old-Growth Forest Related Species Within the Range of the Northern Spotted Owl. Portland, OR.

USDA Forest Service, USDI. Bureau of Land Management. 1994. 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. Portland, OR. Note: The ROD and S and G are collectively referred to herein as the Northwest Forest Plan (NFP).

USDA Forest Service and USDI Bureau of Land Management. 2008. Biological Assessment, Fiscal year 2009/2010 habitat modification activities in the North Coast Province which might affect bald eagles, northern spotted owls or marbled murrelets.

Letter of Concurrence on the Effects of Habitat Modification Activities on the Northern Spotted Owl (*Strix occidentalis caurina*), Marbled Murrelet (*Brachyramphus marmoratus*), and Critical Habitat in the North Coast Planning Province, FY 2009 – 2010, proposed by the Eugene District, Bureau of Land Management; Salem District, Bureau of Land Management; and the Siuslaw National Forest (FWS Reference Number 13420-2008-I-0125)

Endangered Species Act Section 7 Informal Consultation for the 2008-2009 North Coast Province Thinning Timber Sales Programmatic on Portions of the Siuslaw National Forest and Eugene and Salem Districts of the Bureau of Land Management, Seven Watersheds within the Oregon Coast Recovery Domain (NMFS 2008)

USDI Bureau of Land Management. 1994. Salem District Proposed Resource Management Plan/Final Environmental Impact Statement. Salem, OR.

USDI Bureau of Land Management. 1994. Salem District Watershed Cumulative Effects Analysis Procedure. Salem District BLM, Salem, Oregon. Internal document.

USDI Bureau of Land Management. 1995. Salem District Record of Decision and Resource Management Plan (RMP). Salem District BLM, Salem, OR. 81 pp. + Appendices.

USDA-FS and USDI-BLM, 1999 Record of Decision and Standards and Guidelines for Amendment to the Survey & Manage, Protection Buffer, and other Mitigation Measures Standards and Guidelines (S&M ROD, January 2001

USDA-FS and USDI-BLM, 1999. Salmon-Neskowin Watershed Analysis. Marys Peak Resource Area, Salem District, Bureau of Land Management. Salem, OR. 107 pp.

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(was IPCC 2007) Denman, K.L., et al. 2007: Couplings Between Changes in the Climate System and Biogeochemistry. In: Climate Change 2007: The Physical Science Basis. Contribution of Working Group I to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change [Solomon, S., D. Qin, M. Manning, Z. Chen, M. Marquis, K.B. Averyt, M.Tignor and H.L. Miller (eds.)]. Cambridge University Press, Cambridge, United Kingdom and New York, NY, USA. http://www.ipcc.ch/pdf/assessment-report/ar4/wg1/ar4-wg1-chapter7.pdf

Forster, P, et al. 2007. Climate Change 2007: The Physical Science Basis. Contribution of Working Group 1 to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change. Solomon, S. D., Qin, M. Manning, Z. Chen, M. Marquis, K.B. Averyt, M. Tignor and H.L. Miller, Eds. Cambridge University Press, U.K. and New York, N.Y. *(pp. 129-234).* http://www.ipcc.ch/pdf/assessment-report/ar4/wg1/ar4-wg1-chapter2.pdf

Hudiburg, T. Law, B. Turner, D. Campbel, J. Danato, D. and Duane, M. 2009. Carbon dynamics of Oregon and Northern California forests and potential land-based carbon storage. Ecological Applications, 2009: 163-180.

Smith, J.E. Heath L.S. Skog, K.E., and Birdsey, R.A. 2006. Methods for calculating forest ecosystem and harvested carbon with standard estimates for forest types in the United States. Gen. Tech. Rep. NE-343. Newtown Square, PA: U.S. Department of Agriculture, Forest Service, Northeastern Research Station. 216 p. http://www.treesearch.fs.fed.us/pubs/22954

(was U.S. EPA 2007) U.S. EPA Environmental Protection Agency. 2009. Inventory of U.S. Greenhouse Gas Emissions and Sinks: 1990 – 2007. U.S. EPA, Washington, D.C. http://www.epa.gov/climatechange/emissions/usinventoryreport.html

9.0 Response to Scoping Comments

A scoping letter, dated October 11, 2007, was sent to 16 potentially affected or interested individuals, groups, and agencies. Two responses were received during the scoping period.

9.1 **Summary of comments and BLM responses**

The following addresses comments raised in one letter from the public received as a result of scoping (40 CFR Part 1501.7). Additional supporting information can be found in Specialists' Reports in the NEPA file. The comments, (in italics type), may have been paraphrased for clarity or conciseness, but

the complete text of the comment was available to the Interdisciplinary Team (IDT) making the response. The full text of the comment letter is available in the Bottleneck NEPA/ EA file.

9.1.1 Oregon Wild (October 26, 2007)

1. **Comment:** *Oregon Wild generally does not support new road construction in reserves. Conduct thinning without extensive construction of new roads; provide a stand by stand description of the road spur lengths and the acres each spur accesses for thinning..*

   Response: Some new road construction is necessary for operability due to topography present in the project area. The majority of new road construction (except 300 feet) would be located outside Riparian Reserves (generally on ridgetop locations) and would be blocked to vehicular traffic following harvest. In addition BMPs would be followed during road construction to reduce the risk of adverse effects to aquatic resources.

   The following table includes the length of each new road to be constructed and the number of acres accessed by each road and then computed the cost:benefit ratio of the number of acres treated per mile of road construction.

Road #	Primary Road Work	Miles	Associated Unit Acres	Acres of Unit/Mile of Road
P1	New	0.47	65	138
P2	New	0.22	45	205
P3	New	0.29	32	110
P4	New	0.05	18	360

2. **Comment:** *Oregon Wild would be disappointed to see large trees cut in late-seral habitat in order to "release" other large trees.*

   Response: Trees to be cut or girdled within Project 2 would not be greater than 36 inches DBHOB, with the majority of trees less than 30 inches DBHOB.

9.1.2 American Forest Resources Council (October 31, 2007)

1. **Comment:** *"The AFRC would like to see all timber sales be economically viable."*

Response: Economic feasibility is one of the many factors taken into account when offering a timber sale. Road work costs, yarding costs and other incidental costs versus the acreage and volume taken are calculated and an Interdisciplinary Team of specialists including those in EA Section 5.0, Table 11, come to a consensus on what alternative to pursue for analysis.

2. Comment: *Seasonal restrictions have a cost to the Purchaser and result in a lower bid cost. AFRC would encourage the BLM to allow winter hauling since this would provide wood for the mills and work for the loggers during the winter months.*

Response: Winter hauling would be allowed to occur in Project 1 of this action (section 3.2.3.2 p. 39).

3. Comment: *The AFRC would like to see flexibility for fuels treatments. Rather than specifying a method of accomplishing resource objectives, BLM should identify objectives and any limitations to resource disturbance. The purchaser could then identify the method they could implement given their particular employee skills and equipment mix.*

Response: The purpose of the fuels treatment recommended in the EA is to reduce or mitigate slash hazard and risk along roads and landings. Besides the option of hand or machine piling of slash concentrations, the EA (p. 11) specifies: "When ever possible alternative waste recycling of slash material should be encouraged. This may be: providing firewood to the public, chipping for co-gen power production, chipping for soil amendments, soil protection, etc." This is an attempt to provide some flexibility that will still meet the objective of reducing fire hazard and risk. However, leaving slash concentrations along roads and landings would not be an option.

4. Comment: *The AFRC would like to see thinning treatments with smaller (25-60 feet) no cut buffers to achieve management objectives of moving the RR into Late-Successional forest faster. We encourage the BLM to maximize opportunities in the RR LUA.*

Response: The minimum width of the SPZs for this project is 55 feet which falls into the desired range that you indicated you would like to see thinning occur. The primary shade zone (USDI 2005) width is determined by the existing height of the riparian trees and the slope of the ground in the unit. This distance ranges from 50 to 60 feet slope distance. As mentioned above the minimum no cut width for this project is 55 feet which falls into your desired widths.

9.2 Appendix B: Response to Public Comments Received on the Bottleneck EA

Four e-mail messages was received commenting on the Bottleneck LSR Enhancement Environmental Assessment. Although the letters communicated a number of issues and opinions on forest management in general, the response to comments below only discusses those specifically directed to the Environmental Analysis which was made available for public review from March 4, 2009 to April 2, 2009. Comments are in *italics*. The BLM response follows each comment.

Oregon Wild, Doug Heiken
Received March 24, 2009

The majority of comments included in the Coast Range Association letter dated April 2, 2009 were stated in Oregon Wilds letter dated March 24, 2009. The following comment numbers were also included in the Coast Range Association letter: One thru twenty.

1. **Comment:** *The EA says that there is a shortage of "key wood" in nearby streams, yet the plan is to thin in riparian reserves within less than a site-tree distance of streams which will "capture mortality" (69.9 tpa worth!) that would otherwise be recruited to riparian reserves and streams. The EA makes no attempt to evaluate the trade-off between quality/size and quantity of riparian and instream wood.*

Response: EA analyzed the affects of wood recruitment to streams from adjoining stands on pages 46 (3.2.5 Fisheries/Aquatic Habitat). The analysis indicated that within SPZ (minimum of 55 feet, average of 60 feet) the remaining trees would be unaffected by proposed treatment. These untreated areas would provide source areas for wood debris recruitment to stream channels. Based on studies conducted in the Pacific Northwest the majority of the stream side wood recruitment would be expected to occur within 20 meters (65 feet) to stream channels and lower rates of recruitment would occur as distance increases from the stream (McDade et al. 1990, Van Sickle and Gregory 1990, Benda et al. 2002). Results indicate a relationship between size of the debris (age/diameter) recruited and the distance to the stream. Smaller diameter pieces of CWD are more likely to be recruited closer in proximity to the stream channel. Thus,

project design is intended to protect the majority of potential wood recruitment areas, covering both functional LWD and CWD inputs. The silviculture analysis of the proposed treatments areas indicated a beneficial growth response of the stands due to treatment (EA page 23). The EA indicated that increased growth rates would increase diameter of the residual stand over time, compared to the no action alternative. Larger diameter trees would be expected to be retained longer, and have greater effects, in the stream channel (Scherer 2004, Rosenfeld and Huato 2003). As the trees growth increases, in treatment areas, the residual stand tree height would be expected to reach stream channels at a greater distance from the stream, when mortality eventually does occur, thus providing long term benefits to the recruitment of LWD.

2. **Comment:** *Avoid road construction. Where road building is necessary, ensure that the realized restoration benefits far outweigh the adverse impacts of the road. Rank new road segments according to their relative costs (e.g. length, slope position, soil type, ease of rehabilitation, weed risk, native vegetation impacts, etc.) and benefits (e.g. acres of restoration facilitated), then use that ranking to consider dropping the roads with the lowest ratio of benefits to costs. Do not allow log hauling during the wet season.*

Response: The majority of the new construction consists of relatively short spur roads and they will provide the ability to treat an appropriate amount of area. The following table includes the length of each new road to be constructed and the number of acres accessed by each road and then computed the cost:benefit ratio of the number of acres treated per mile of road construction.

The following table includes the length of each new road to be constructed and the number of acres accessed by each road and then computed the cost:benefit ratio of the number of acres treated per mile of road construction.

Road #	Primary Road Work	Miles	Associated Unit Acres	Acres of Unit/Mile of Road
P1	New	0.47	65	138
P2	New	0.22	45	205
P3	New	0.29	32	110
P4	New	0.05	18	360

3. **Comment:** *Develop an alternative that addresses carbon and climate by (a) deferring harvest of older forests to store carbon and provide biodiversity and connectivity and (b) thin younger stands to increase forest resilience and diversity and connectivity.*

Response: An alternative to defer harvest of older forest to store carbon and thin younger stands to increase diversity would not meet the purpose and need of Project 1. The proposed action area was chosen for density management of forest stands to meet the future needs of marbled murrelet, northern spotted owl, and other species dependent upon late-seral/old-growth forest habitats; and for improvement to the watershed and road system.

Coast Range Association, Chuck Willer
Received April 2, 2009

The majority of comments included in the Coast Range Association letter were previously stated in Oregon Wilds letter dated March 24, 2009. The following comments were exclusive to Coast Range Association letter.

1. **Comment:** *We urge you to not engage in forest harvest treatments on stands over 80 years of age in conformance to the Record of Decision for the Northwest Forest Plan. The Salmon River Watershed is an important coastal watershed for salmon conservation. We believe the project's related road construction may pose a threat to endangered coastal coho salmon.*

   Response: The stands proposed for harvest in Project 1 are approximately 68 years old. Harvest activities would not occur in the stands proposed for treatment in Project 2. The Fisheries/Aquatic Habitat analysis (EA pages 45 – 48) indicated that the site level impacts from proposed project work (falling, yarding, hauling, road work, and pile burning), with the incorporation of design features, were not anticipated to measurably affect aquatic habitat. The project proposal is for stand thinning, leaving significant numbers of residual trees in the treatment units and leaving 55 foot protection zones adjacent to stream channels. Road renovation is intended to protect infrastructure, reduce impacts, and correct problem areas along the haul route. The proposed project, with design features, should result in improved conditions while mitigating risk of short term impacts.

2. **Comment:** *Why do so called "wolf trees" need 1/4 acre gaps created around them? Forest stands, particularly west of the coastal crest, exhibit a wide historic range of densities. Native stands of trees do not need to be thinned. Native stands have a built in range of tree densities that reflect soil biology and complex legacy conditions. The agencies singular focus on promoting dominant tree growth fails to acknowledge future ecologically diverse distributions of large wood recruitment to the forest floor and stream channels.*

   Response: As stated in the EA (p.23) Thinning around "wolf" or legacy trees in Projects 1 and 2 would increase growth and vigor of the remaining trees and prevent loss of lower crown due to competition.

Mr. Paul C. Katen
Received April 2, 2009

1. **Comment:** *The project will have significant impact on 1) water quality and 2) coho spawning habitat.*

   Response: The EA identified that increases in stream temperature as a result of this action are unlikely. All tributary reaches in the project area have been given a 55-foot primary shade zone distance based on the hill slope of the area, following the Northwest Forest Plan Temperature TMDL Implementation Strategy (2005). Trees located within this primary shade zone will not be harvested thus helping to maintain the existing thermal regime of the tributary by maintaining greater than 80 percent effective stream shade. At stream heads, where groundwater and surface water interfaces, stream temperatures are relatively insensitive to change and are likely consistently below ODEQ temperature standards.

   It is also unlikely that the proposed projects would lead to measurable increases in sediment delivery to streams, stream turbidity, the alteration of stream substrate composition, or sediment transport regime. Stream buffers would eliminate disturbance of streamside vegetation; no trees would be cut from the stream bank or where roots are stabilizing the stream bank. Tree girdling and piling of slash would have minimal to no ground disturbance and no activities would take

place directly in or adjacent to stream channels. For these reasons there is very little chance of any significant impacts to water quality for streams within the project area and for streams below the project area.

The EA identified both Slick Rock Creek and Trout Creek as habitat for Oregon Coast (OC) coho salmon (EA page 45). OC coho salmon is an ESA listed species. Affects which may affect critical habitat or listed fish would be consulted on with National Marine Fisheries Service prior to signing the Decision Record for the project (see FONSI page v and EA pages 59). Consultation documents, the thinning timber sale programmatic and habitat restoration programmatic, were incorrectly referenced in both the FONSI and EA. These errors would be corrected in the DR statement.

The Fisheries/Aquatic Habitat analysis (EA pages 45 – 48) indicated that the site level impacts from proposed project work (falling, yarding, hauling, road work, and pile burning), with the incorporation of design features, were not anticipated to measurably affect aquatic habitat. The project proposal is for stand thinning, leaving significant numbers of residual trees in the treatment units and leaving 55 foot protection zones adjacent to stream channels. Road renovation is intended to protect infrastructure, reduce impacts, and correct problem areas along the haul route. The proposed project, with design features, should result in improved conditions while mitigating risk of short term impacts.