Upper Siletz River Watershed Enhancement Environmental Assessment and Finding of No Significant Impact

Environmental Assessment Number DOI-BLM-OR-S050-2009-0002

August 9, 2010

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

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

Abstract: This EA (environmental assessment) discloses the predicted environmental effects of one project on BLM-managed lands within the Upper Siletz River fifth-field watershed. The action areas are located in sections 14 and 15 of Township 7 South, Range 8 West, and sections 15, 23, and 25 of Township 8 South, Range 8 West, Willamette Meridian. The project is a proposal to perform density management thinning for mid-seral habitat enhancement on approximately 654 acres of 40 to 78 year-old stands within LSR (Late- Successional Reserve), AMA (Adaptive Management Area), and RR (Riparian Reserve) LUAs (land use allocations).

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.

BLM/OR/WA/PT-09/077+1792

FINDING OF NO SIGNIFICANT IMPACT

Introduction

The Bureau of Land Management (BLM) has conducted an environmental analysis (Environmental Assessment Number DOI-BLM-OR-S050-2009-0002) for a proposal to implement one project as follows:

- Perform density management thinning for mid-seral habitat enhancement (by accelerating the development of late-seral/old-growth habitat components) on approximately 654 acres of 40 to 78 year-old stands within LSR (Late- Successional Reserve), AMA (Adaptive Management Area), and RR (Riparian Reserve) LUAs (land use allocations).

The action areas are on BLM-managed lands in Township 7 South, Range 8 West, Sections 14 and 15 and Township 8 South, Range 8 West, Sections 15, 23 and 25.

The analysis in this EA is site-specific and supplements analyses found in the *Salem District Proposed Resource Management Plan/Final Environmental Impact Statement*, September 1994 (RMP/FEIS). The proposed thinning activities have been designed to conform to the *Salem District Record of Decision and Resource Management Plan*, May 1995 (RMP) as amended and related documents which direct and provide the legal framework for management of BLM lands within the Salem District (*EA Section 1.4*). Consultation with U.S. Fish and Wildlife Service and National Marine Fisheries Service is described in Section 7.0 of the EA.

The EA and FONSI will be made available for public review August 5, 2010 to September 7, 2010. The notice for public comment will be published in a legal notice by the *Polk County Itemizer Observer* newspaper. Comments received by the Marys Peak Resource Area of the Salem District Office, 1717 Fabry Road SE, Salem, Oregon 97306, on or before September 6, 2010 will be considered in making the decision for this project.

Finding of No Significant Impact

Based upon review of the Upper Siletz River Watershed Enhancement EA and supporting documents, I have determined that the proposed action is not a major federal action and would not significantly affect the quality of the human environment, individually or cumulatively with other actions in the general areas. 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 action has been analyzed within the context of the Upper Siletz River 5th-field Watershed and the action areas' boundaries. The proposed action would occur on approximately 654 acres of BLM-managed LSR, AMA and RR LUA land, encompassing less than 1.5 percent of the forest cover within the Upper Siletz River 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 (except ESA listed species/habitat), invasive, non-native plant species, migratory birds, other special status species / habitat – wildlife, soils, water quality, and wildlife habitat components. The effects of mid-seral enhancement is unlikely to have significant adverse impacts on these resources [40 CFR 1508.27(b) (1)] for the following reasons:

The effects of density management by thinning for mid-seral enhancement are unlikely to have significant adverse impacts on these resources [40 CFR 1508.27(b) (1)] for the following reasons:

- Vegetation and Forest Stand Characteristics *(EA section 3.1.1):* 1/ No special status 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*) at 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. 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, 2008, FEIS, Appendix I.
  Stands proposed for harvest activities are not presently functioning as late-successional old growth habitat.

- Soils, Hydrology, and Fisheries *(EA sections 3.1.3 to 3.1.5)*: The estimated distance of new road construction is 3.5 miles and the majority of new road construction (except 0.6 miles) would be located outside Riparian Reserves and generally be located on ridge top locations. Gentle to moderate slope gradients in project areas provide little opportunity for surface water to flow. The stream protection zones [SPZs (minimum 55 feet on perennial and intermittent streams)] would prevent any overland flow and sediment generated by logging from reaching streams. The SPZs would maintain the current vegetation in the primary shade zone and treatments would retain most of the current levels of shading in the secondary shade zone. Soil compaction is limited to no more than 10 percent of each unit's acreage. Road work (including culvert installations) would take place during the dry season.

- Wildlife (*EA section 3.1.2*): 1/ Existing snags and coarse woody debris (CWD) would be retained. The few large (greater than 20 inches diameter and greater than 15 feet tall) snags that could be felled for safety or knocked over by falling and yarding operations would be retained as CWD. 2/ No suitable habitat for any BLM special status species known to be present would be lost or downgraded. Therefore, the project would not contribute to the need to list any BLM special status species. 3/ Thinning would not significantly change species diversity (a combination of species richness and relative abundance) of the migratory and resident bird community. No species would be become

extirpated in the watershed as a result of thinning, though some species would be likely to leave or enter thinned stands as a short-term response to reduced canopy closure and tree density.

- Air Quality and Fire Hazard/Risk (*EA section 3.1.6*): The thinning would create an increased fire hazard risk from the slash but this would be mitigated by treating slash along open roads where the opportunities for ignition are greatest. After 3 to 5 years, the fine fuels would be decayed in most of the units and the risk of surface fire would decrease to near current levels. The thinning would decrease the risk of a canopy fire. Piling and burning slash at landings and in some fuel treatment areas would have a very short duration impact on air quality; but strict adherence to smoke management regulations would result in little or no impact to the public.

- Carbon Sequestration (Storage) and Climate Change-*(EA section 3.1.7):* The Upper Siletz River Restoration Project EA (DOI-BLM-OR-S050-2009-0002) is tiered to the PRMP FEIS (1994) which concluded that all alternatives analyzed in the FEIS, in their entirety including all timber harvest, would have only slight (context indicates that the effect would be too small to calculate) effect on carbon dioxide levels.

The following show quantities of carbon in forest ecosystem vegetation[1] in the Coast Range, and in the Upper Siletz 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, Upper Siletz River Project stands = 104,000 tonnes or 0.0001676 Gt. This represents .001 percent 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 percent of the current U.S. accumulation. (WOPR, p. 4-537).

Carbon emissions resulting from the proposed action would total 5,800 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 .0000002 percent of current global emissions and .000009 percent of current U.S. emissions.

Tree growth following harvest would offset greenhouse gases and result in net storage of 21,000 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.

With the implementation of the project design features described in EA section 2.5.1, potential effects to the affected elements of the environment are anticipated to be site-specific and/or not measurable (i.e. undetectable over the watershed, downstream, and/or outside of the project areas). The project is designed to meet RMP standard and guidelines, modified by subsequent direction (EA section 1.3); and the effects of these project would not exceed those effects described in the RMP/FEIS [40 CFR 1508.27(b) (1), EA sections 3.1].

2. *The Project would not affect*:
   - ü Public health or safety [40 CFR 1508.27(b)(2)];

[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.

- Unique characteristics of the geographic areas [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 areas (EA section 3.1);
- Districts, sites, highways, structures, or other objects listed in or eligible for listing in the National Register of Historic Places, nor would the proposed action cause loss or destruction of significant scientific, cultural, or historical resources [40 CFR 1508.27(b)(8)] (EA section 3.1).

3. The *Project* is 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. The *Project* does not set a precedent for future actions that may have significant effects, nor does it represent a decision in principle about a future consideration [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 the *Project* 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 project's scope (effects are likely to be too small to be measurable), scale (action areas of 654 acres, encompassing 1.5 percent of the forest cover within the Upper Siletz River Watershed and duration [direct effects would occur over a maximum period of four to six years (EA section 3.1)].

6. The *Project* is not expected to adversely affect endangered or threatened species or 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 (NMFS)

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 Siletz River system. Upper Willamette River (UWR) Winter Steelhead and UWR Spring Chinook are listed as threatened under the ESA, as amended, and are known to occur within the Luckiamute River and South Yamhill River systems.

Based on project location and project activities the proposed Potter Elk, Fanno Lookout, and Upper Warnicke timber sales are considered 'no effect' to OC coho salmon. This determination is primarily due to distance of project activities (more than 9.5 miles) from listed fish habitat. Consultation with NMFS is not required for OC coho salmon for this project.

The propose actions would have 'no effect' to UWR Spring Chinook salmon and Oregon chub. Generally, the 'no effect' determination is based on the distance upstream of project activities (approximately 25 miles) from ESA listed Chinook salmon critical habitat and historic habitat for Oregon chub. Consultation with NMFS is not required for UWR Spring Chinook salmon, or with USFWS for Oregon chub for this project.

Based on project location and project activities, the proposed Potter Elk and Fanno Lookout Timber sales are considered 'no effect' to UWR winter steelhead. The proposed activities (except hauling), occur within the Siletz watershed and are unconnected to UWR winter steelhead habitat. Proposed hauling occurs within the Luckiamute River watershed where listed steelhead reside. The no effect determination is primarily due to distance of project activities from listed fish habitat (at least 1/3 mile) and proposed design features (dry season use of Blackrock Mainline Road) which would prevent impacts to listed fish from occurring. Consultation with NMFS is not required for UWR winter steelhead for these timber sales.

A determination has been made that the proposed Upper Warnicke Timber sale 'may affect' Upper UWR winter steelhead. The 'may affect' determination is primarily due to the proximity of listed fish and critical habitat adjacent to proposed haul routes in the Agency Creek-South Yamhill River watershed. Due to the Proposed Actions' 'may affect' determination consultation with NMFS would be required on ESA listed UWR winter steelhead.

Actions which 'may affect' listed species and are not addressed under existing consultations, including *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.

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 Upper Siletz River Watershed Enhancement EA Projects are not expected to adversely affect EFH due to distance of all activities associated with the project from occupied habitat. Consultation with NMFS on EFH is not required for this project.

7. *The Project* does 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: _____ _____

John Huston, Date

Acting Marys Peak Resource Area Field Manager

Glossary: Abbreviations, Acronyms, and Terms

Airshed	A geographic area that shares the same air mass due to topography, meteorology, and climate.
Alternative	Proposed project (plan, option, choice)
Anadromous Fish	Species that migrate to oceans and return to freshwater to reproduce.
Basal Area (BA)	The cross section area of a tree measured in square feet.
BLM	Bureau of Land Management. Federal agency within the Department of Interior responsible for the management of 275 million acres.
BMP	Best Management Practice(s). Design features and mitigation measures to minimize environmental effects.
BO	Biological Opinion. The document resulting from formal consultation that states the opinion of the Fish and Wildlife Service or National Marine Fisheries Service as to whether or not a federal action is likely to jeopardize the continued existence of listed species or results in destruction or adverse modification of critical habitat.
CEQ	Council of Environmental Quality, established by the National Environmental Policy Act of 1969
CEQ Regulations	Regulations that tell how to implement NEPA
Crown	The 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.
DBHOB	Diameter at breast height outside bark and all.
EA	Environmental Assessment. A systematic analysis of site-specific activities used to determine whether such activities have a significant effect on the quality of the human environment.
EFH	Essential Fish Habitat. Anywhere Chinook or coho salmon could naturally occur.
EIS	Final Supplemental Environmental Impact Statement to Remove or Modify the Survey and Manage Mitigation Measure Standards and Guidelines, January 2004.
Ephemeral Streams	Streams that contain running water only sporadically, such as during and following storm events.
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
FSEIS	Final Supplemental Environmental Impact Statement
Fish and Wildlife Service	FWS. A division within the U.S. Department of the Interior
Fish-Bearing Stream	Any stream containing any species of fish for any period of time.
FONSI	Finding of No Significant Impact
Fuel Loading	The amount of combustible material present per unit of area, usually expressed in tons per acre (dry weight of burnable fuel)
Girdle	Removal of the inner bark from the entire circumference of a tree. This typically results in the death of the tree within 3 to 5 years.
Ground Base Yarding	Utilizing equipment operating on the surface of the ground to move trees or logs 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, strip the tree of limbs, 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.
Interdisciplinary Team	IDT. A group of individuals assembled to solve a problem or perform a task.
Intermittent Stream	Any nonpermanent flowing drainage feature having a definable channel and evidence of scour or deposition. Includes ephemeral streams if they meet these two criteria.
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 hauling
Late-Successional	Forest conditions consisting of larger trees and multiple canopy layers that support numerous plant and animal species.
LSR	Late-Successional Reserve (a NWFP designated land use allocation) Lands to be managed or maintained for older forest characteristics.
LSRA	Late Successional Reserve Assessment for Oregon's Northern Coast Range Adaptive Management Area (LSRA, see USDA
LUA	Land Use Allocation. NWFP designated lands to be managed for specific objectives
LWD	Large Woody Debris. Woody 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)
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. Federal agency within NOAA which is responsible for the regulation of anadromous fisheries in the U. S.
Non-Native Plant	Any plant species that historically does not occur in a particular ecosystem
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).
NWFP/FSEIS	Final Supplemental Environmental Impact Statement on Management of Habitat for Late-Successional and Old-Growth Forest Related Species within the Range of the Northern Spotted Owl, February 1994
ODEQ	Oregon Department of Environmental Quality
ODFW	Oregon Department of Fish and Wildlife. Oregon State Agency responsible for the management and protection 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.
ORGANON	A computer based program used to model projected tree growth, stand density and crown ratio using existing stand tree species and size.
Perennial Stream	A stream that typically has running water on a year-round basis.
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 water barred. May include removal of culverts, ripping and seeding of roadbed. Road prism remains

	intact for future use.
Road Reconstruction	Work done to restore a damaged or deteriorated road to a usable condition and possibly a new design standard. May include road realignment, slide and fill failure repair and/or structure upgrades. Reconstruction generally involves a higher degree of engineering than basic road improvement/renovation work. These roads are un-drivable prior to reconstruction work.
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. Document that approves decisions to the analyses presented in the FEIS.
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.
Seral	One stage of a series of plant communities that succeed one another.
Silviculture	The manipulation of forest stands to achieve desired structure.
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 dead, partially dead, or defective tree at least 10 inches DBHOB and 6 feet tall.
Soil Compaction	An increase in bulk density and a decrease in soil porosity resulting from applied loads, vibration, or pressure.
Soil Productivity	Capacity or suitability of a soil, for establishment and growth of a specified crop or plant species, primarily through nutrient availability.
SPZ	Stream Protection Zone is a buffer along streams and identified wet areas where no material would be removed and heavy machinery would not be allowed. The SPZ is measured to the slope break, change in vegetation, or 50 feet from the channel edge which ever is greater.
Standards and Guidelines	S and G. The primary instructions for land

	manager. Standards address mandatory actions, while guidelines are recommended actions necessary to a land management decision.
Succession	The stages a forest stand makes over time as vegetation competes and natural disturbances occur. The different stages in succession are often referred to as seral stages.
Topped	Completely severing the upper portion of a standing live tree. The typical purpose for this action is to enhance wildlife habitat by creating snags from standing live trees.
Turbidity	Multiple environmental sources that causes water to change conditions.
USDI	United States Department of the Interior
USEPA	United States Environmental Protection Agency
VRM	Visual Resource Management, all lands are classified from 1 to 4 based on visual quality ratings and the amount of modification allowed in the landscape.
Waterbars	A ridge of compacted soil or loose rock or gravel constructed across disturbed rights-of-way and similar sloping areas.
Watershed	The drainage basin contributing water, organic matter, dissolved nutrients, and sediments to a stream or lake.
Weed	A plant considered undesirable and that interferes with management objectives for a given area at a given point in time.
Windthrow	Trees uprooted or blown over by natural events.
Yarding Corridors	Corridors cut through a stand of trees to facilitate Skyline yarding. Cables are strung in these corridors to transport logs from the woods to the landing.

UPPER SILETZ RIVER WATERSHED ENHANCEMENT
ENVIRONMENTAL ASSESSMENT

Table of Contents

List of Tables

1.0 INTRODUCTION

This EA (Environmental Assessment) will analyze the impacts of proposed mid-seral enhancement and connected actions on the human environment in the Upper Siletz 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 Significant Impact is appropriate.

Section 1 of this EA for the proposed project provides a context for what will be analyzed in the EA, describes the kinds of action we will be considering, defines the project areas, describes what the proposed action needs to accomplish, and identifies the criteria that we will use for choosing the alternative that will best meet the purpose and need for this proposal.

1.1 Project Covered in this EA

Mid-Seral Habitat Enhancement is a proposal to cut and remove a portion of the trees through three timber sales on approximately 654 acres of managed mid-seral forest stands. One of the timber sales, Upper Warnicke, would thin approximately 260 acres of 43 to 55 year old stands within LSR (Late-Successional Reserve) and RR (Riparian Reserve) LUAs (Land Use Allocations). The remaining two timber sales, Potter Elk and Fanno Lookout, would thin approximately 394 acres of 40 to 78 year old stands within AMA (Adaptive Management Area) and RR LUAs, and create eight early-seral openings for big game and migratory bird use.

1.2 Project Area Locations

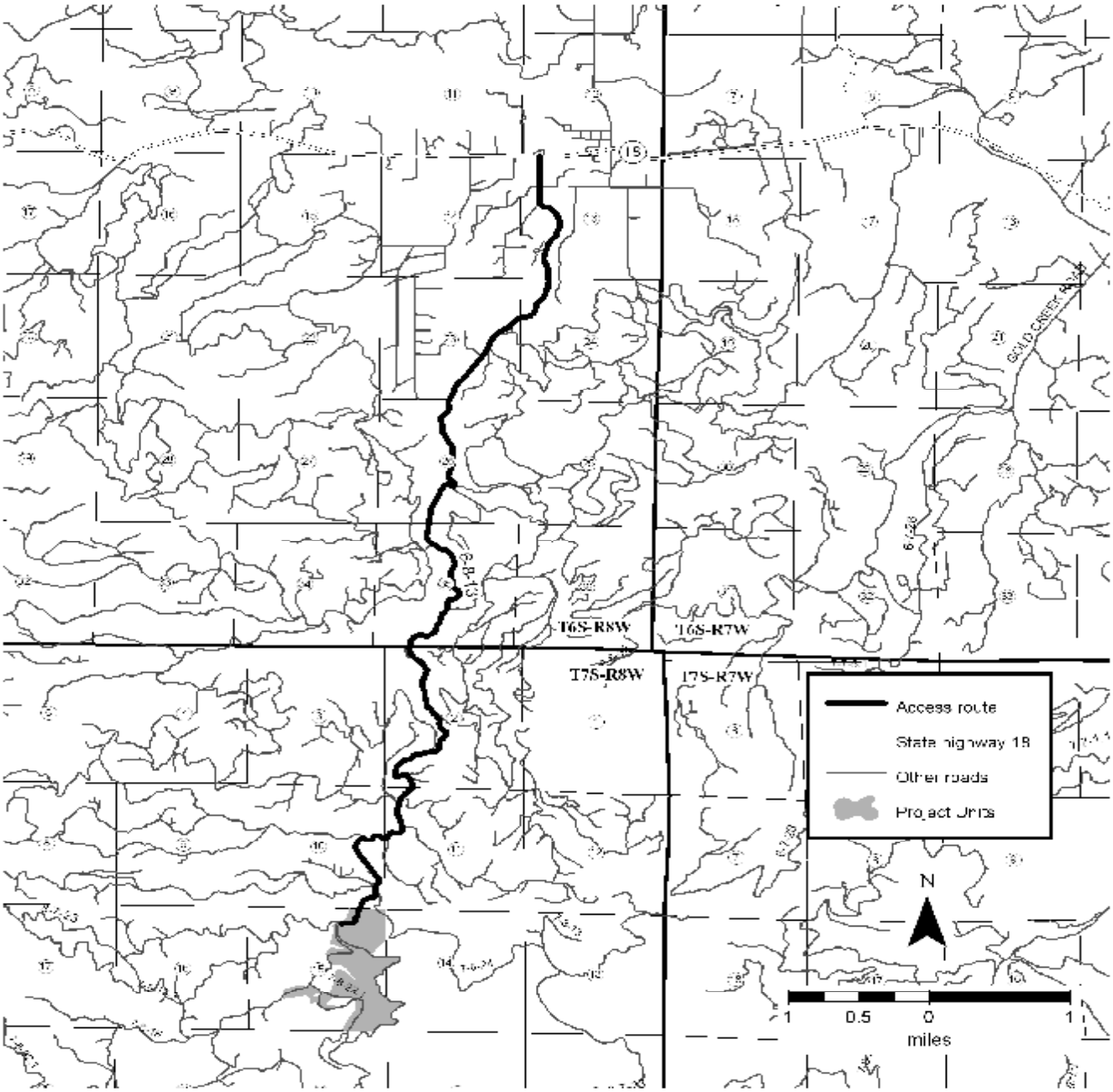
The project areas are located approximately 15 air miles southwest of Dallas, Oregon, in Polk County on forested land managed by the Marys Peak Resource Area, Salem District of the BLM (Bureau of Land Management). The project areas are within Township 7 South, Range 8 West, Sections 14 and 15 and Township 8 South, Range 8 West, Sections 15, 23, and 25 Willamette Meridian (Map 1).

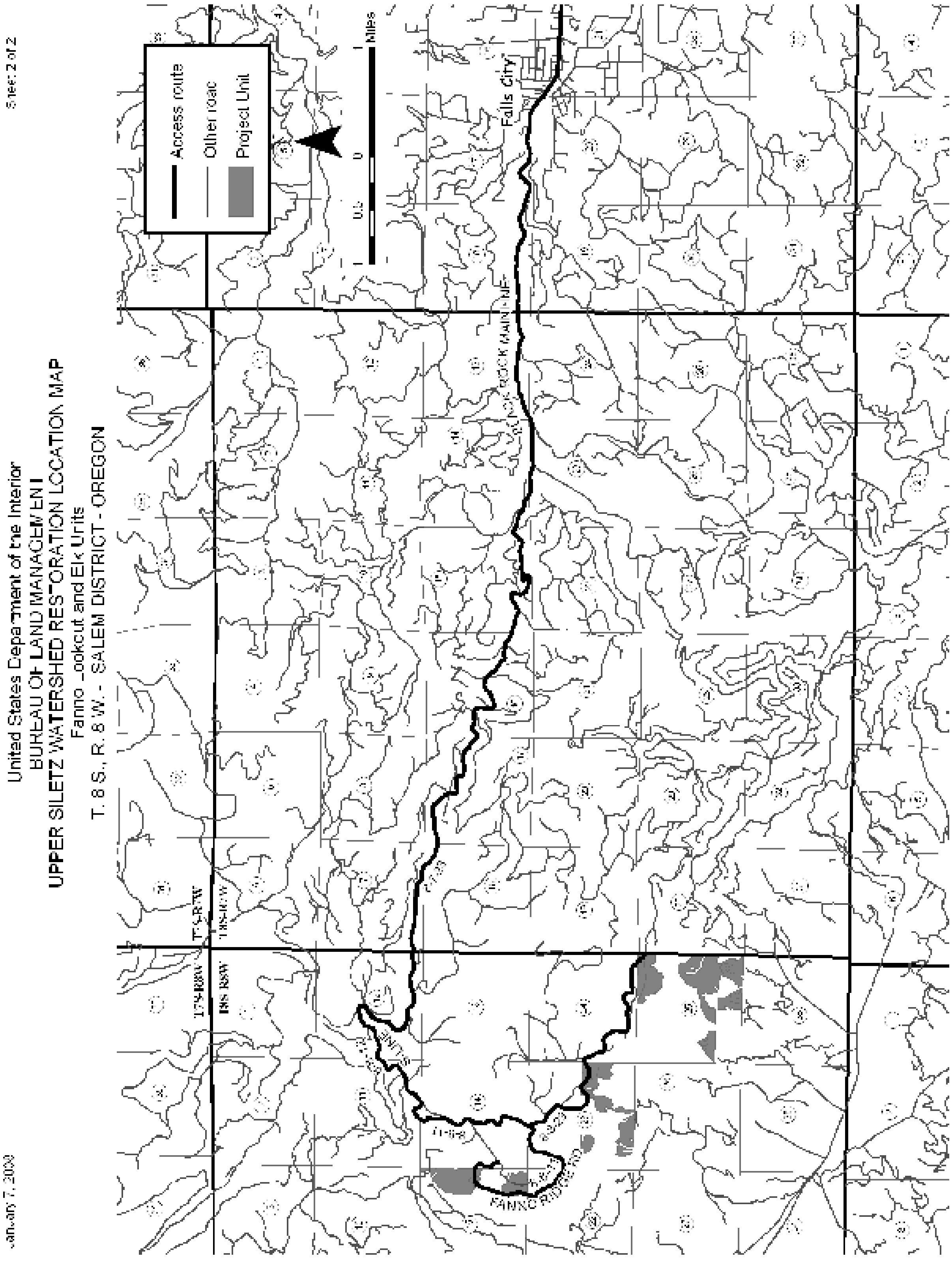
Map 1: Location Map

January 7, 2009

United States Department of the Interior
BUREAU OF LAND MANAGEMENT
UPPER SILETZ WATERSHED RESTORATION LOCATION MAP
Upper Warnicke Units
T. 7 S., R. 8 W. - SALEM DISTRICT - OREGON

Sheet 1 of 2




United States Department of the Interior
BUREAU OF LAND MANAGEMENT
UPPER SILETZ WATERSHED RESTORATION LOCATION MAP
Fanno Lookout and Elk Units
T. 8 S., R. 8 W. - SALEM DISTRICT - OREGON
January 7, 2009
Sheet 2 of 2
Access route
Other road
Project Unit
0
0.5
1
Miles
Falls City
FANNO RIDGE RD

1.3 Conformance with Land Use Plans, Policies, and Programs

The Upper Siletz River Watershed Enhancement project has been designed to conform to the following documents, which direct and provide the legal framework for management of BLM lands within the Salem District:

- *Salem District Record of Decision and Resource Management Plan,* May 1995 (RMP) as amended: The RMP has been reviewed and it has been determined that the proposed thinning activities conform to the land use plan terms and conditions (e.g. complies with management goals, objectives, direction, standards and guidelines) as required by 43 CFR 1610.5 (BLM Handbook H1790-1). Implementing the RMP is the reason for doing these activities (RMP p.1-3);
- *Record of Decision for Amendments to Forest Service and Bureau of Land Management Planning Documents within the Range of the Northern Spotted Owl and Standards and Guidelines for Management of Habitat for Late-Successional and Old-Growth Forest Related Species within the Range of the Northern Spotted Owl*, April 1994 (the Northwest Forest Plan, or NWFP);
- *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 Upper Siletz River Watershed Enhancement EA is site-specific, and supplements and tiers to analyses found in the *Salem District Proposed Resource Management Plan/Final Environmental Impact Statement*, September 1994 (RMP/FEIS). The RMP/FEIS includes the analysis from the *Final Supplemental Environmental Impact Statement on Management of Habitat for Late-Successional and Old-Growth Forest Related Species within the Range of the Northern Spotted Owl*, February 1994 (NWFP/FSEIS). 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 action is 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.

All of the above documents, along with the Upper Siletz River Watershed Enhancement interdisciplinary team (IDT) reports (EA section 8.1.1), are hereby incorporated by reference in the Upper Siletz River Watershed Enhancement EA and available for review in the Salem District Office. Additional information about the proposed project are available in the Upper Siletz River Watershed Enhancement EA Analysis File (NEPA file), also available at the Salem District Office.

1.3.1 Survey and Manage Review

The Upper Siletz River Watershed Enhancement project is consistent with court orders relating to the Survey and Manage mitigation measure of the Northwest Forest Plan, as incorporated into the Salem District Resource Management Plan.

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

exempting certain categories of activities from the Survey and Manage standard (hereinafter "Pechman exemptions").

Judge Pechman's Order from October 11, 2006 directs: "Defendants shall not authorize, allow, or permit to continue any logging or other ground-disturbing activities on projects to which the 2004 ROD applied unless such activities are in compliance with the 2001 ROD (as the 2001 ROD was amended or modified as of March 21, 2004), except that this order will not apply to:

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

Following the Court's December 17, 2009 ruling, the Pechman exemptions are still in place. Judge Coughenour deferred issuing a remedy in his December 17, 2009 order until further proceedings, and did not enjoin the BLM from proceeding with projects (including timber sales). Nevertheless, I have reviewed the Upper Siletz River Watershed Enhancement Project in consideration of both the December 17, 2009 and October 11, 2006 order. Because the Upper Siletz River Watershed Enhancement project entail 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 April 24, 2011.

1.3.2 **Northern Spotted Owl (NSO) Status Review**

"The following information was considered in the analysis of the Upper Siletz River Watershed 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 U. S. Fish and Wildlife Service (USFWS), (NMFS) 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 5.0 shows how the Upper Siletz River Watershed Enhancement project meets the Aquatic Conservation Strategy in the context of the PCFFA cases. In addition, project design features (p. 15) would provide protection measures to meet ACS objectives.

1.4 **Decision Criteria/Project Objectives for the Project**

The Marys Peak RA 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 project (EA section 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 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 September 23, 2009, was sent to 22 potentially affected or interested individuals, groups, and agencies. Three responses were received during the scoping period.

1.5.1 **Relevant Issues**

Based on input from the public and the Interdisciplinary Team, plus information contained in the ROD/RMP, the following issues were identified. These issues provide a basis for comparing the environmental effects of the alternatives and aid in the decision-making process. The major issues brought forward were used to formulate alternatives, identify appropriate design features, or analyze environmental effects. The following major issues were identified:

Issue 1: What would be the effects of road construction on soil productivity and water quality?

Issue 2: What would be the effects of mechanical harvesting equipment when used on slopes between 35 and 45 percent?

Issue 3: What effects would the removal of green trees (direct loss of live structure and indirect loss o f dead wood structure related to density-dependent suppression mortality) have on mid-seral wildlife habitat and the species that depend upon this habitat type? How would listed wildlife species be affected?

Issue 4: What would be the effects from road work and thinning activities on the spread of invasive species?

Issue 5: What effect would thinning have on Carbon Sequestration (Storage) and Climate Change?

Issue 6: What effect would thinning, road work and timber hauling have on resident and anadromous fish and aquatic habitat?

Issue 7: What effects would thinning and road work have on fuel loading, fire risk and air quality?

Issue 8: What effects would the thinning have on native and Special Status botanical and fungal species?

Issue 9: What effects would density management have on mid-seral forest stand health, and composition? Would the effects contribute to Adaptive Management Area, Late Successional Reserve and Riparian Reserve LUA objectives?

Issue 10: What effects would road construction have within the North Fork Siletz River/Warnicke Creek Key Watershed?

1.6 Purpose of and Need for Action

Purpose

The purpose for the action is threefold: 1) to accelerate the development of LSOG (late-seral/old-growth) forest conditions in mid seral habitat; 2) create early-seral patch habitat for big game and migratory birds; 3) help local economies by providing a stable timber supply. The proposed action areas were chosen for mid-seral enhancement of forest stands to meet the future needs of northern spotted owl, marbled murrelet, and other species dependent upon LSOG forest habitats; and for improvement to the watershed and road system.

The action is intended to implement a subset of specific management opportunities in a manner consistent with standards and guidelines described below. The BLM proposes forest management activities on approximately 654 acres. These activities would include: timber harvest, road construction/reconstruction/renovation, big game/bird patch creation, and snag/CWD creation.

The following describe the purpose for the action:

Late-Successional Reserve Area LUA: Manage forest stands and wildlife habitat in the LSR LUA to:

- Develop, accelerate, and enhance late-successional forest conditions, which serve as habitat for late-successional forest species (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).
- If needed to create and maintain late-successional forest conditions, conduct thinning operations in forest stands up to 80 years of age. This will be accomplished by precommercial or commercial thinning of stands regardless of origin (e.g., planted after logging or naturally regenerated after fire or blowdown) (RMP p. 16).

Adaptive Management Area LUA: Implement a subset of the specific management opportunities that were identified to be consistent with AMA objectives (RMP p. 19):

- Restore and maintain late-successional forest conditions which serve as habitat for late-successional forest species and which are be consistent with marbled murrelet guidelines.
- Provide a stable timber supply.

Manage mid-seral stands in RR LUA (RMP pp.9-15) to:

- Apply silvicultural practices for Riparian Reserves to control stocking, reestablish and manage stands, and acquire desired vegetation characteristics needed to attain Aquatic Conservation Strategy objectives (RMP p. 11).
- Accelerate the growth of trees to restore large conifers to Riparian Reserves (RMP p.7).
- Enhance or restore habitat (e.g. CWD, snag habitat, in-stream large wood) for populations of native riparian-dependent plants, invertebrates, and vertebrate species (RMP p.7).

Maintain and develop a safe, efficient and environmentally sound road system (RMP p. 62) to:

- Provide appropriate access for timber harvest and silvicultural practices used to meet the objectives above;
- Reduce environmental effects associated with identified existing roads within the project area.

The project would be implemented by offering a total of three timber sales (Fanno Lookout and Potter Elk) which would be completed within a four year time period that would commence in May 2011, while the final timber sale (Upper Warnicke) would be completed within a four year time period that would commence in November 2011.

Need For Action

Only five percent of the Upper Siletz River watershed (44,490 acres) currently provides LSOG habitat for fish and wildlife. There is a need to accelerate the development of LSOG forest conditions by applying density management to existing mid-seral stands. This is expected to improve conditions for long-term increases in fish and late-successional wildlife species, especially northern spotted owl and marbled murrelet populations.

Current forest stand exam data indicates the managed mid-seral forests in the project areas have declining growth rates and limited structural diversity. These second-growth stands are characterized by a single-layered, dense, overstory canopy with little to no large wood, live or dead, remaining from primary-growth stands. Large wood is an important component of aquatic habitat in forested ecosystems and its accumulation within stream channels is necessary for many functions. Large wood provides cover for fish, sediment storage for food supply and spawning grounds, nutrient retention, pool formation, and formation of off-channel habitat. The proposed action would remove some trees so that the retained trees would reach larger diameters sooner, when compared to the no treatment option.

Variable-density thinning prescriptions hold promise for acceleration of the development of spotted owl habitat and dense prey populations (Carey 1995, 2001) especially when appropriate attention is paid to decadence (snags, cavity trees, and coarse woody debris) (Bunnell et al. 1999; Carey et al. 2002). Variable-density thinning treatments emphasize multi-species management and are likely the most favorable prescriptions for providing key habitat structural components for spotted owl prey species.

The Upper Siletz Watershed Analysis (pp. 133-134) directs the management of BLM-administered lands in the South Fork Siletz subwatershed to provide elk habitat generally unavailable on private lands. Currently, the mature forest stands on BLM provide good to excellent escape, hiding, and thermal-cover, but poor foraging opportunities. Foraging opportunities in clearcuts are good but are relatively short-term; and if the opening is too large and not adjacent to escape and hiding-cover it would not be fully utilized by deer and elk. There is a need to provide long-term (20+ years) quality forage immediately adjacent to escape and hiding-cover which is in short supply due to decades of intensive timber management. The openings would also serve as excellent habitat for migratory birds that nest and/or feed in permanent forest openings in the Coast Range.

The following road work is needed in order to perform the timber harvest and silvicultural treatments:

- Renovate approximately 9.5 miles of existing road.
- Reconstruct approximately 0.8 miles of existing road.
- Construct approximately 3.8 miles of new road. New roads to be constructed with year-round hauling allowed would be surfaced with rock. New roads to be constructed with seasonal-hauling restrictions would either be natural surfaced or would have a thin lift of rock as a traction coat. Cross drain culverts would be installed as needed.

2.0 ALTERNATIVES

2.1 Alternative Development

Pursuant to Section 102 (2) (E) of the National Environmental Policy Act (NEPA) of 1969, as amended, federal agencies shall "Study, develop, and describe appropriate alternatives to recommended courses of action in any proposal which involves unresolved conflicts concerning alternative uses of available resources."

An unresolved conflict concerning the impacts of road construction on water quality and long-term soil productivity was used to generate an alternative (Alternative 3). An alternative proposing to limit new road construction/reconstruction would partially meet the purpose and need of the project and address these conflicts.

Therefore, this EA will analyze the effects of Alternative 1 (No Action), Alternative 2 (Proposed Action), and Alternative 3 (Limited Road Construction).

2.2 Alternative 1 (No Action)

The No Action Alternative describes the environmental baseline, against which the effects of the action alternatives can be compared, i.e. the existing conditions in the project areas and the continuing trends in those conditions if the BLM does not implement any of the proposed actions. 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 areas at this time:

- Silviculture treatments to enhance fish and wildlife habitats
- Timber harvest
- Road construction, reconstruction, renovation, or decommissioning
- Fuel reduction treatments
- Big game and migratory bird habitat improvement

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 action areas. On private lands adjacent to the action areas, 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.

2.3 Alternative 2 (Proposed Action)

Mid-seral Habitat Enhancement

The proposed project consists of density management treatments involving the following three timber sales: Upper Warnicke, Fanno Lookout and Potter Elk.

The Upper Warnicke treatment would occur within LSR and RR LUAs on approximately 260 acres of 43 to 55 year old stands which would be thinned to a variable density (basal area ranging from 80 to 160 square feet/acre). Trees would be skyline yarded on approximately 68 acres and ground based yarded on approximately 192 acres.

The Potter Elk and Fanno Lookout treatments would occur within AMA and RR on approximately 394 acres of 40 to 78 year old stands which would be thinned to a variable density (basal area ranging from 110 to 140 square feet/acre). Trees would be skyline yarded on approximately 175 acres, ground-based yarded on approximately 156 acres, and helicopter yarded on approximately 63 acres. In addition, a total of eight wildlife patch areas would be created for big game and migratory bird use and would consist of the following:

- Each patch would be approximately 5 acres in size
- Within each patch, a 1-acre patch center would be created by cutting and removing all trees (except for four standing trees for immediate snag creation), The 4 snags (at least 15+ inches in diameter) to be created by base girdling would be clumped along the northern edge of the 1-acre patch centers
- Each one acre patch center would be surrounded by 4 acres of heavy thinning

Potter Elk timber sale includes 173 acres of treatment areas to be analyzed in this EA and 170 acres (Potter Creek) that was previously analyzed within the McFall/Potter Creek EA, # OR080-06-12, and will not be analyzed further.

Table 1 Alternative 2 Activities

Activity	Alternative 2 (Proposed Action)
Mid-Seral enhancement (acres)	654
Ground based yarding (acres)	348
Skyline yarding (acres)	243
Helicopter yarding (acres)	63
New road construction (miles)	3.8
Roadside reconstruction (miles)	0.8
Road renovation (miles)	9.5

2.3.1 Connected Actions

Road Construction: Approximately 3.8 miles of new road would be constructed with road locations being primarily ridge-top.

The following new roads to be constructed would be surfaced with rock and would be decommissioned (waterbars installed, grass seed applied to exposed soil on cut/fill slopes and entrances blocked) upon completion of operations: Potter Elk P to P3, Fanno Lookout P to P4 and Upper Warnicke P to P2.

The Potter Elk P4 road to be constructed would consist of either natural surface or would have a thin lift of surface rock placed as a traction coat: Cross drain culverts would be installed as needed and the road would be decommissioned (waterbars installed, grass seed applied to exposed soil on cut/fill slopes and entrances blocked) upon completion of operations.

The Fanno Lookout P road to be constructed would be constructed and timber would be hauled within one season (generally May 1 to October 31). The road would be surfaced with rock and would be decommissioned (waterbars installed, grass seed applied to exposed soil on cut/fill slopes, culverts removed and entrances blocked) upon completion of operations.

Road Reconstruction: Approximately 0.8 miles of existing road to be reconstructed would be located primarily on ridge-top. The roads to be reconstructed would be surfaced with rock and would be decommissioned (culverts removed, waterbars installed, grass seed applied to exposed soil on cut/fill slopes and entrances blocked) upon completion of operations: The portion (approximately 0.2 miles) of the Fanno Lookout P Line road that would be reconstructed across Weyerhauser Company lands would require four spring crossing culverts to be installed.

Road Renovation: Approximately 9.5 miles of existing road would be renovated (roadside brushing, spot rock applied, culvert catch basin cleaning, blading etc.).

2.4 Alternative 3 (Limited new road construction)

Mid-seral Habitat Enhancement

With the following exceptions, Alternative 3 is the same as Alternative 2.

The Upper Warnicke treatment would occur on approximately 214 acres. Trees would be skyline yarded on approximately 31 acres and ground based yarded on approximately 183 acres.

The Potter Elk and Fanno Lookout treatments would occur on approximately 295 acres. Trees would be skyline yarded on approximately 44 acres, ground-based yarded on approximately 126 acres, and helicopter yarded on approximately 125 acres.

Table 2 Alternative 3 Activities

Activity	Alternative 3 (Proposed Action)
Mid-Seral enhancement (acres)	509
Ground based yarding (acres)	309
Skyline yarding (acres)	75
Helicopter yarding (acres)	125
New road construction (miles)	0.4
Road renovation (miles)	9.5

2.4.1 Connected Actions

Road Construction: Approximately 0.4 miles of new road would be constructed with road locations being primarily ridge-top. The P line road to be constructed would be surfaced with rock and would be decommissioned (waterbars installed, grass seed applied to exposed soil on cut/fill slopes and entrances blocked) following operations. The P1 road to be constructed would either be natural surfacing or would have a thin lift of surface rock placed as a traction coat.

Road Renovation: Approximately 9.5 miles of existing road would be renovated.

Table 3: Summary Comparison of Project Activities for Alternatives 1, 2, and 3

Activity	Alternative 1 (No Action)	Alternative 2 (Proposed Action)	Alternative 3 (Limited Road Construction)
Mid-Seral enhancement (acres)	0	654	509
Ground based yarding (acres)	0	348	309
Skyline yarding (acres)	0	243	75
Helicopter yarding (acres)	0	63	125
New road construction (miles)	0	3.8	0.4
Roadside reconstruction (miles)	0	0.8	0
Road renovation (miles)	0	9.5	9.5

2.5 **Common to Alternatives 2 and 3**

2.5.1 **Design Features**

The following is a summary of the design features that reduce the risk to the affected elements of the environment described in EA Section 3.1.

Table 4: Season of Operation/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 (skyline)	Protect the bark and cambium of residual trees
During periods of low precipitation, generally May 1 to October 31	Road construction/reconstruction/renovation/decommissioning	Minimize soil erosion
During periods of low soil moisture, generally July 15 to October 15	Ground based yarding (Tractor)	Minimize soil erosion/compaction
During periods of low soil moisture, generally June 15 to October 31	Ground based yarding (Harvester/Forwarder) and (Hydraulic Loader) and machine chipping and/or piling	Minimize soil erosion/compaction
Generally year round	Timber hauling would be allowed year-round on rock surfaced roads except where the surface is deeply rutted or covered by a layer of mud and where runoff is causing a visible increase in turbidty to adjacent streams and except on roads as noted below.	Minimize soil erosion/stream sedimentation

Season of Operation or Operating Conditions	Applies to Operation	Objective
During periods of dry weather and low soil moisture, generally May 1 to October 31	Timber hauling on the following roads: Road # 6-8-13 and 8-7-23	Minimize soil erosion/ stream sedimentation
July 1 to August 31	In-stream work period (culvert installation)	Minimize soil erosion/stream sedimentation

Project Design Features

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).

- 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 water bodies, 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 waterbar 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 10 percent of the harvest areas.
- 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 yarding equipment to slopes less than 35 percent.
- 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.
- Ground based equipment would be allowed to operate on slopes less than 45 percent within the skyline and aerial yarding areas. The equipment would be allowed to cut, process and deck logs only. No yarding of logs with ground based equipment would be allowed on slopes greater than 35 percent.
- Skid and harvest roads would be blocked where they access main vehicular roads following completion of ground-based yarding.
- Fell harvested trees away from stream channels when possible.
- In the skyline yarding areas, one end suspension of logs would be required over as much of the areas as possible to minimize soil compaction, damage to reserve trees, and disturbance. Lateral yarding using an energized locking carriage would be required.
- 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.
- Repair damaged culvert inlets and downspouts to maintain drainage design capacity.
- Landings should be kept to the minimum size needed to accomplish the job and use existing road surfaces as much as possible.
- During periods of heavy rainfall, the contract administrator may restrict log hauling where the road surface is deeply 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. To minimize water quality impacts, the purchaser may also be required to install silt fences, barkbags, or additional road surface rock.

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

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

- All large areas of exposed mineral soil (roads to be constructed/reconstructed, cat/skid roads, landings), as determined by the contracting administrator would be grass seeded with Oregon Certified (blue tagged) red fescue (*Festuca rubra*), applied at a rate equal to 40 pounds per acre or sown/planted with other native species as approved by the resource area botanist. Prior to applying seed, the contractor would supply the BLM with the seed certification (blue tag) and seed label.

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

- Stream protection zones (SPZs) where no cutting and/or yarding is permitted would be established along all streams and identified wet areas within the harvest areas. These zones would be a minimum of approximately 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.
- From the SPZ to the upper edge of the Riparian Reserve, 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.
- No yarding would be permitted in or through any SPZs within the harvest areas.
- No refueling would be allowed within 100 feet of any standing or running water.
- Woody material removed from stream crossing for culvert maintenance must be retained in the stream network.

To protect and enhance stand diversity:

- Priorities for tree marking would be based on Marking Guidelines. Tree selection would be designed to leave a range of tree diameters, maintain tree species diversity, create variable density of leave trees, and retain legacy and wildlife tree structure while meeting target densities.
- 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 riparian buffers.
- Any plus trees (trees selected for genetic traits) and their reference trees, and bearing trees would be reserved from harvest.
- Understory conifers less than 7 inches diameter breast height outside bark (DBHOB) would be excluded from harvest.
- Any Continuous Vegetation Survey (CVS) plot reference trees would be reserved from harvest to aid in plot relocation for future plot measurements.
- Except in yarding corridors/skid trails and gaps, species diversity would be maintained by thinning to retain tree species composition similar to current levels, or increase the proportion of minor species where they are not abundant.
- In areas infected with *Phellinus weirii*, symptomatic trees and all Douglas-fir trees (the most susceptible species) would be removed within 50 feet of dead or symptomatic trees. If openings greater than approximately 0. 5 acre are created, the need for planting would be evaluated considering elk habitat. If needed, large nursery stock of non-susceptible or immune species would be planted.
- In areas of western hemlock infected with dwarf mistletoe, trees would be assessed according to the severity of infection based on the 6-Class Hawksworth Dwarf Mistletoe Severity Rating. All trees infected with dwarf mistletoe in the mid or upper crown and bole would be removed to reduce the spread of dwarf mistletoe. Douglas-fir and true fir would be retained. If openings greater than approximately 0.5 acre are created, seedlings would be planted of non-susceptible or immune species. Western hemlock would not be planted within 40 feet of a western hemlock infected with dwarf mistletoe.

To protect wildlife special habitat components:

- Any tree found to have a stick or ball nest, regardless of size (tree or nest) would be protected, unless it is a safety hazard.

- Remnant/legacy structure, live or dead, would be protected; live legacy would be released from any live-crown competition; dead legacy would be protected with adjacent leave trees.
- 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 CWD moved for these purposes would remain on site within the project areas. Additional trees would be reserved around snags greater than 20 inches DBHOB and 40 feet in height to protect them from logging operations and to reduce the necessity of falling them for safety reasons.
- All live trees with damage (hollow, cavities, dead or broken tops, etc) would be reserved.
- Additional trees would be cut around the largest diameter trees with the fullest live crowns to maintain their open-grown, wolf- tree structure.
- If natural processes have not provided at least 2 snags per acre and 2 down trees per acre for CWD within ten years of treatment within the thinning treatments (not including the elk forage patches' 1-acre centers), create 4 snags per acre at least 20 inches in diameter by base-girdling leave trees.

To reduce fire hazard risk and protect air quality:

- 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, soil protection, etc.
- 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 treatment strategies would include directional falling (to keep slash away from fuel breaks), followed by a reduction of surface fuels to reduce the intensity and severity of potential wildfires in the long-term. Fuels reduction may be accomplished by burning of slash piles, by machine processing of slash on-site, or by a combination of these techniques.
- 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 or within 30 feet of the edge of landings; constructed, and existing roads would be machine or hand piled. Logs, tops, and debris would be decked or piled as directed by the contract administrator (except for logs sold and removed from the project areas).
- For areas that are to be machine piled or chipped, mechanical equipment would remain on slopes averaging 35 percent or less (unless the equipment is specifically designed to operate on steeper slopes and approved by the contract administrator).
- All piles would be located at least ten feet away from reserve trees and snags. Larger piles would be preferable over small piles. Windrows would be avoided unless approved by the contract administrator.
- During the late summer 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 (RMP pp. 22, 65).
- Fuels treatment of any kind would be prohibited within SPZs.
- Hand piling of fuels intended for burning is prohibited closer than 100 feet from any stream channel.
- Mechanical fuels treatment would be prohibited closer than 200 feet from any stream channel.

To protect Special Status and Special Attention Species:

- Required pre-disturbance surveys and known-site management for any listed botanical, fungal, or animal species would be accomplished in accordance with BLM Manual 6840- *Special Status Species Management*, and *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 resource areas biologist and/or botanist would be notified if any listed botanical, fungal or animal species are found occupying stands proposed for treatment during project activities. If the species is a federal listed ESA or Category A, B or E Survey and Manage 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 or Category A, B or E Survey and Manage species, then appropriate mitigation action would be taken.
- For any listed botanical species 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.
- Protect all known sites of bureau SS botanical and fungal species by including the sites in reserves.

To Protect Cultural Resources:
The project area occurs in the 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 wor*k would be suspended if cultural material is discovered during project work until an archaeologist can assess the significance of the discovery.

Project Design Features specific to Upper Warnicke Timber Sale Areas

- New spur road P1 would have a slash filter windrow constructed from the intersection of Road 7-8-22.1 to 100 feet past the flagged edge of the stream inception point within the unit.
- Understory conifers less than 7 inches diameter breast height outside bark (DBHOB) would be excluded from harvest.
- A portion of western hemlock infested with mistletoe in the mid or upper crown and bole would be retained to provide enhanced tree structural habitat, but some infested trees would be removed as necessary to meet the density target.
- 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.
- Except in yarding corridors/skid trails and gaps, species diversity would be maintained by reserving all trees (merchantable and non merchantable) other than Douglas-fir and western hemlock.

Project Design Features specific to Fanno Lookout and Potter Elk Timber Sale Areas

- Potter Elk project area: A total of four wildlife patch areas would be created and would consist of the following:
    - Each patch would be approximately 5 acres in size;
    - Within each patch, a 1-acre patch center would be created by cutting and removing all trees (except for four standing trees for immediate snag creation). The 4 snags (at least 15+ inches in diameter) to be created by base girdling would be clumped along the northern edge of the 1-acre patch centers;
    - Each one acre patch center would be surrounded by 4 acres of heavy thinning (reserving approximately 22 trees per acre).
- Fanno Lookout Unit 25B project area: wildlife patch area– create 1 patch, approximately 5 acres in size as described above.
- Fanno Lookout Unit 15C project area: wildlife patch area – create 1 patch, approximately 5 acres in size as described above, except the 4 acres of heavy thinning would leave 28 trees per acre.
- Fanno Lookout Units 15A and 23A project areas: wildlife patch areas– create 1 patch in each unit, approximately 5 acres in size as described above, except the 4 acres of heavy thinning would leave 37 trees per acre.
- Wildlife patches would occur on slopes less than 35 percent, and would not be placed within the RR LUA. Debris accumulations within the one-acre patch-centers would be machine and/or hand piled and

burned. Patches would be monitored by ODFW (Oregon State Department of Fish and Wildlife); those patches receiving significant elk use would be maintained by ODFW.

Photo of Klickitat Tie LSR Enhancement (Post Harvest 2003)

Photo of Upper Warnicke (Pre Harvest 2009)

2.6 **Comparison of Alternatives With Regard To Purpose and Need**

Table 5: Comparison of Alternatives by Purpose and Need (Upper Warnicke treatment only)

Purpose and Need (EA Section 1.6)	Alternative 1 (No Action)	Alternative 2 (Proposed Action)	Alternative 3 (Limited Road Construction)
If needed to create and maintain late-successional forest conditions, conduct thinning operations in forest stands up to 80 years of age. This would be accomplished by precommercial or commercial thinning of stands regardless of origin (e.g., planted after logging or naturally regenerated after fire or blowdown) (RMP p. 16).	Understory regeneration, shrubs etc. would be lacking. The current pattern of habitat use by wildlife species within these project areas would be expected to continue unchanged. Dispersal habitat conditions for spotted owls would remain unchanged. No timber harvest would occur, consequently no spatial and structural diversity would occur.	In the short-term, increases horizontal spatial variability within treated stands (gaps and clumps); minor reduction and disturbance to existing CWD material (snags and down logs) resulting from felling, yarding, and road construction. Reduced recruitment rate of small sized CWD would be partially offset by immediate creation of larger CWD of desirable size, and augmentation of decadence processes; retention of hardwood tree and shrub diversity. In the long-term, the gradual transition in structural characteristics of the treated stands would more closely resemble late-seral forest (larger diameter trees and limbs, sub-canopy development, greater tree species diversity, greater volume and size of hard CWD, canopy gaps); and extends persistence of hardwood tree and shrub cover diversity. The harvest input would likely result in a gain of 200 cubic feet per acre of CWD in skyline yarding areas and about 100 cubic feet per acre in ground-based yarding areas. Spatial and structural diversity would be increased.	Same as in Alternative 2 except approximately 46 less acres would receive treatment to create late-successional forest conditions.

Purpose and Need (EA Section 1.6)	Alternative 1 (No Action)	Alternative 2 (Proposed Action)	Alternative 3 (Limited Road Construction)
Plan and implement silvicultural treatments inside Late-Successional Reserves that are beneficial to the creation of late-successional habitat (RMP p. 16).	Maintains a highly dense, uniform, small diameter stand of trees with receding crown ratios, loss of limbs and loss of growth.	Treatment includes variable density thinning, creation of small gaps around "open grown" trees, and retention of small clumps. This would increase spatial and structural diversity of the stand.	Same as in Alternative 2 except approximately 47 less acres of habitat would be created through mid-seral enhancement.
Develop, accelerate, and enhance late-successional forest conditions, which serve as habitat for late-successional forest species (LSRA, p. 2).	Does not meet this purpose and need. Creates high level of small size CWD for the next decade or two in all stands within the project area.	Reduces stand densities to allow target conifers to increase diameter and height growth. Accelerate changes in some stand components to develop certain elements of diversity sooner by releasing understory conifers, increasing large down wood and snags by density management.	Same as in Alternative 2 except approximately 46 less acres would be enhanced to serve as habitat for late successional created through mid-seral enhancement.
Accelerate the growth of trees to restore large conifers to Riparian Reserves (RMP p.7)	This alternative does not meet the objectives for speeding development of late-successional forest habitat.	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.	Same as in Alternative 2 except approximately 27 less acres would incur conifer tree growth acceleration within Riparian Reserves.
Apply silvicultural practices for Riparian Reserves to control stocking, reestablish and manage stands, and acquire desired vegetation characteristics needed to attain Aquatic Conservation Strategy objectives (RMP p. 11).	Without treatment, stand structure would remain relatively uniform, except for gaps created by disturbance. Relatively large, open-grown trees would continue to lose lower crown due to competition from surrounding trees that established subsequent to them.	Treatment includes variable density thinning, creation of small gaps around "open grown" trees, and retention of small clumps. This would increase spatial and structural diversity of the stand.	Same as in Alternative 2 except approximately 27 less acres would acquire desired vegetation characteristics.
Enhance or restore habitat (e.g. CWD, snag habitat, in-stream large wood) for populations of native riparian-dependent plants, invertebrates, and vertebrate species (RMP p.7).	The main input of CWD would come from density mortality, disturbance events and endemic levels of insects and disease and would result in more snags and downed logs than with treatment. In general, the quantity of mortality would be much greater than if the stands were thinned, but dead trees would be smaller in size.	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 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 thinning, larger trees would be available for recruitment for CWD.	Same as in Alternative 2 except approximately 46 less acres would acquire desired vegetation characteristics.

Purpose and Need (EA Section 1.6)	Alternative 1 (No Action)	Alternative 2 (Proposed Action)	Alternative 3 (Limited Road Construction)
Provide appropriate access for timber harvest and silvicultural practices used to meet the objectives above. Reduce environmental effects associated with identified existing roads within the project areas.	Maintain existing road densities. Maintain existing drainage and road surface conditions. Delay maintenance on feeder roads, main routes would be maintained.	Constructs 0.7 miles of new roads. Following harvest, the new construction would be decommissioned. Renovates 6.9 miles of existing roads. These renovations would improve drainage and road surface conditions, resulting in less road surface erosion into streams.	No road construction would occur. Renovates 0.2 miles of existing road. These renovations would improve drainage and road surface conditions, resulting in less road surface erosion into streams.

Table 6: Comparison of Alternatives by Purpose and Need (Fanno Lookout and Potter Elk treatments only)

Purpose and Need (EA Section 1.6)	Alternative 1 (No Action)	Alternative 2 (Proposed Action)	Alternative 3 (Limited Road Construction)
Restore and maintain late-successional forest conditions which serve as habitat for late-successional forest species, which can be consistent with marbled murrelet guidelines (RMP p. 19).	Understory regeneration, shrubs etc. would be lacking. The current pattern of habitat use by wildlife species within these project areas would be expected to continue unchanged. Dispersal habitat conditions for spotted owls would remain unchanged. No timber harvest would occur consequently no spatial and structural diversity would occur.	In the short-term, increases horizontal spatial variability within treated stands (gaps and clumps); minor reduction and disturbance to existing CWD material (snags and down logs) resulting from felling, yarding, and road construction. Reduced recruitment rate of small sized CWD would be partially offset by immediate creation of larger CWD of desirable size, and augmentation of decadence processes; retention of hardwood tree and shrub diversity. In the long-term, the gradual transition in structural characteristics of the treated stands would more closely resemble late-seral forest (larger diameter trees and limbs, sub-canopy development, greater tree species diversity, greater volume and size of hard CWD, canopy gaps); and extends persistence of hardwood tree and shrub cover diversity. The harvest input would likely result in a gain of 200 cubic feet per acre of CWD in skyline yarding areas and about 100 cubic feet per acre in ground-based yarding areas. Spatial and structural diversity would be increased.	Same as in Alternative 2 except approximately 99 less acres would receive treatment through mid-seral enhancement

Provide a stable timber supply (RMP p. 9).	Would not offer timber for sale.	Offers approximately 394 acres of timber for sale.	Offers approximately 295 acres of timber for sale.
Accelerate growth of trees to restore large conifers to RR (RMP p. 7).	Without treatment, stand structure would remain relatively uniform, except for gaps created by disturbance.	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.	Same as in Alternative 2 except approximately 38 less acres would incur conifer tree growth acceleration within Riparian Reserves.
Enhance or restore habitat (e.g. CWD, snag habitat, instream large wood) for populations of native riparian-dependent plants, invertebrates, and vertebrate species can be (RMP p. 7).	Does not meet purpose and need. Maintains existing forest conditions which are lacking CWD and snags, particularly in decay class 1 and 2.	Increases snags and CWD; providing habitat for amphibians, small mammals, invertebrates, bryophytes and fungi.	Same as in Alternative 2 except approximately 38 less acres would acquire desired vegetation characteristics.
Provide appropriate access for timber harvest and silvicultural practices used to meet the objectives above.	No change. Maintain existing road densities.	Constructs 3.1 miles of new roads and reconstructs 0.8 miles of existing roads. Following harvest, the new construction would be decommissioned. Renovates 4.4 miles of existing roads. These renovations would improve drainage and road surface conditions, resulting in less road surface erosion into streams.	Constructs 0.3 miles of new road. Renovates 4.4 miles of existing road. These renovations would improve drainage and road surface conditions, resulting in less road surface erosion into streams.

2.7 **Alternative Considered but not Analyzed in Detail**

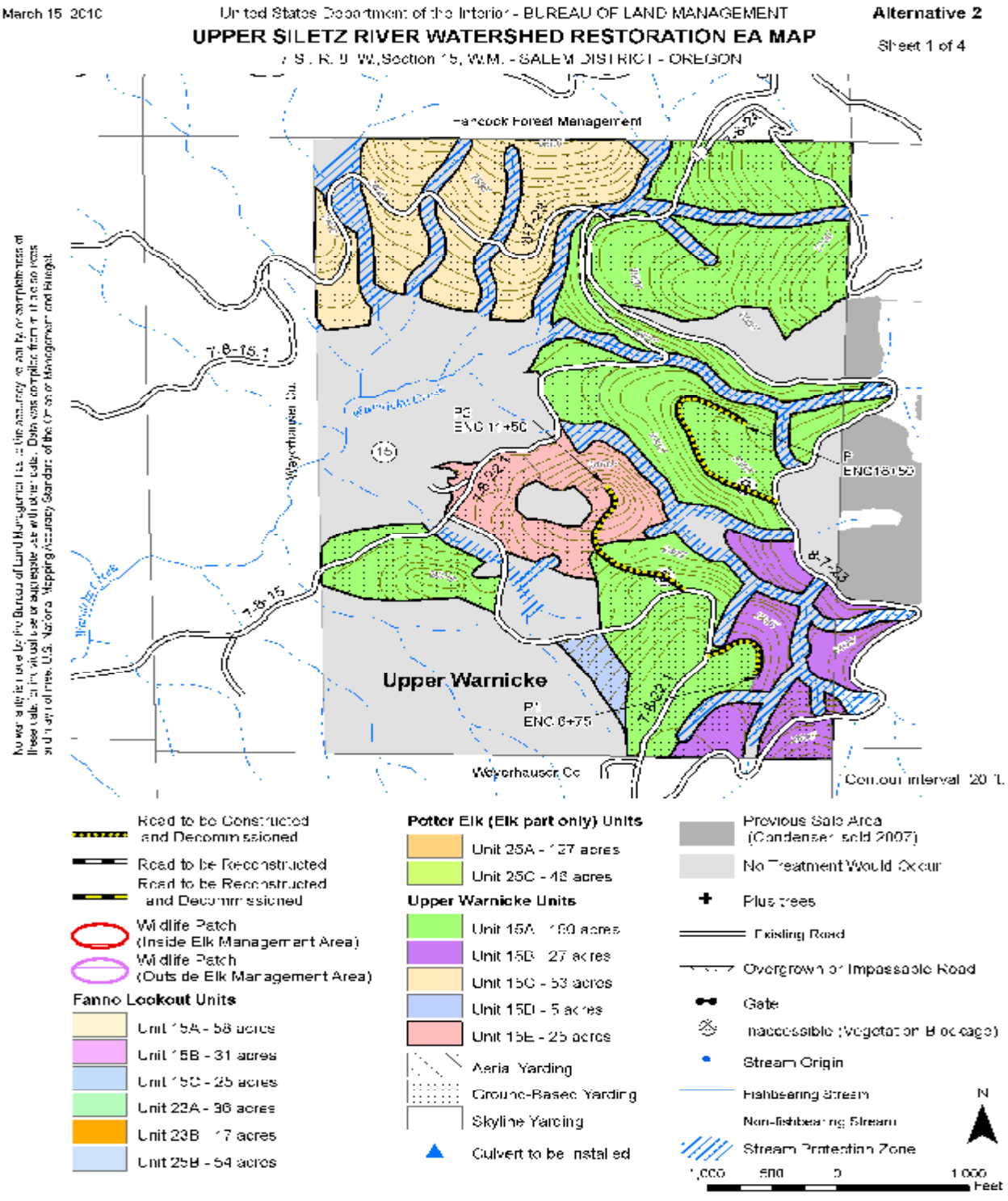
A no-new-road construction alternative was considered but not fully analyzed for the following reasons:

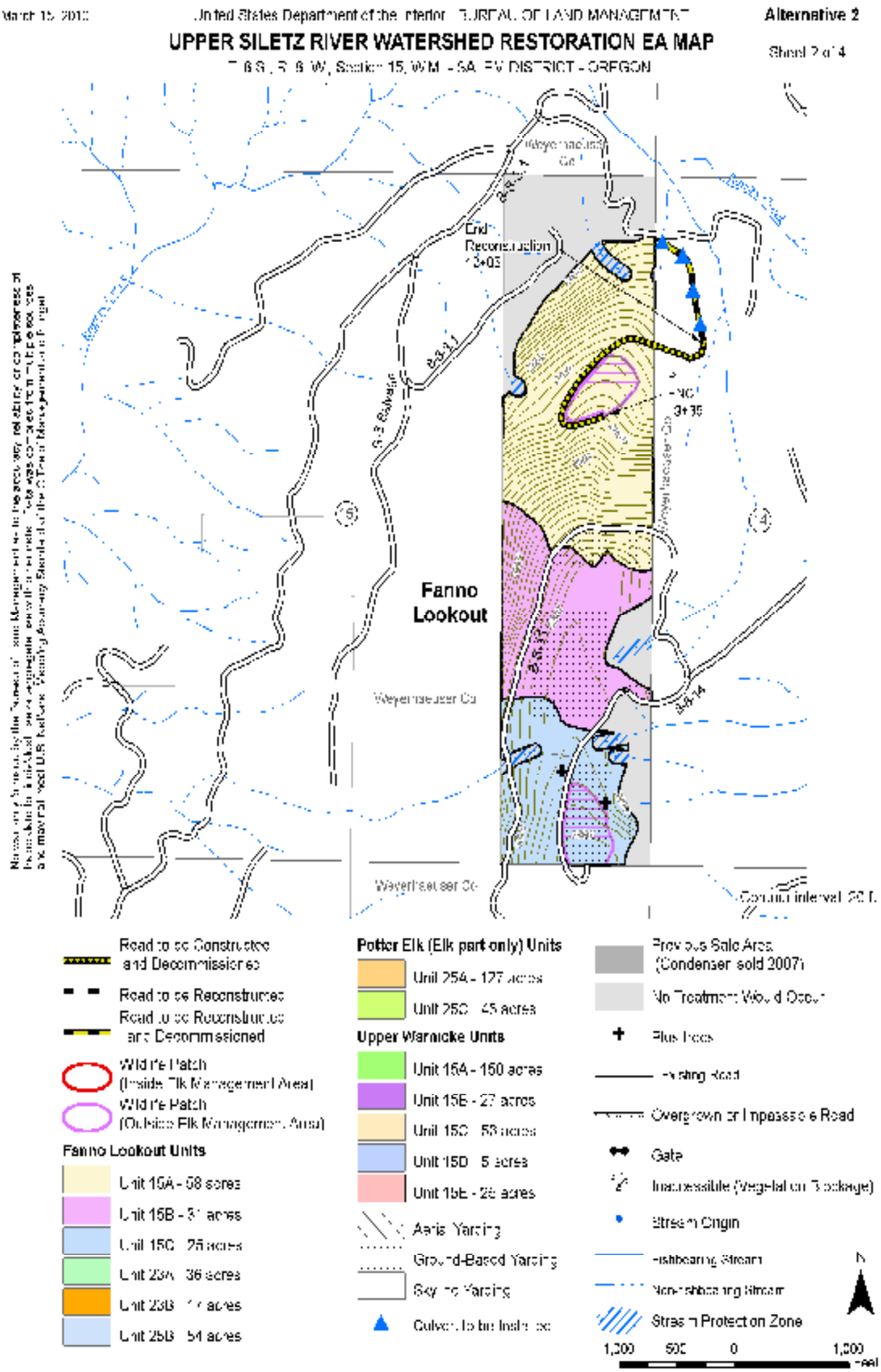
This potential alternative would have no new roads constructed to access T.8 S., R. 8 W., sections 15, 23, and 25 and T. 7 S., R. 8 W., section 15 of the Upper Siletz watershed. Without new road construction, Fanno Lookout (T.8 S., R. 8 W., sections 15 and 23) and Upper Warnicke (T. 7 S., R. 8 W., section 15) would be conventionally (skyline and ground based) logged. However, Potter Elk (T.8 S., R. 8 W., section 25) would require 100 percent helicopter logging with long flight distances to nearby landing locations. This would result in an economically unviable timber sale

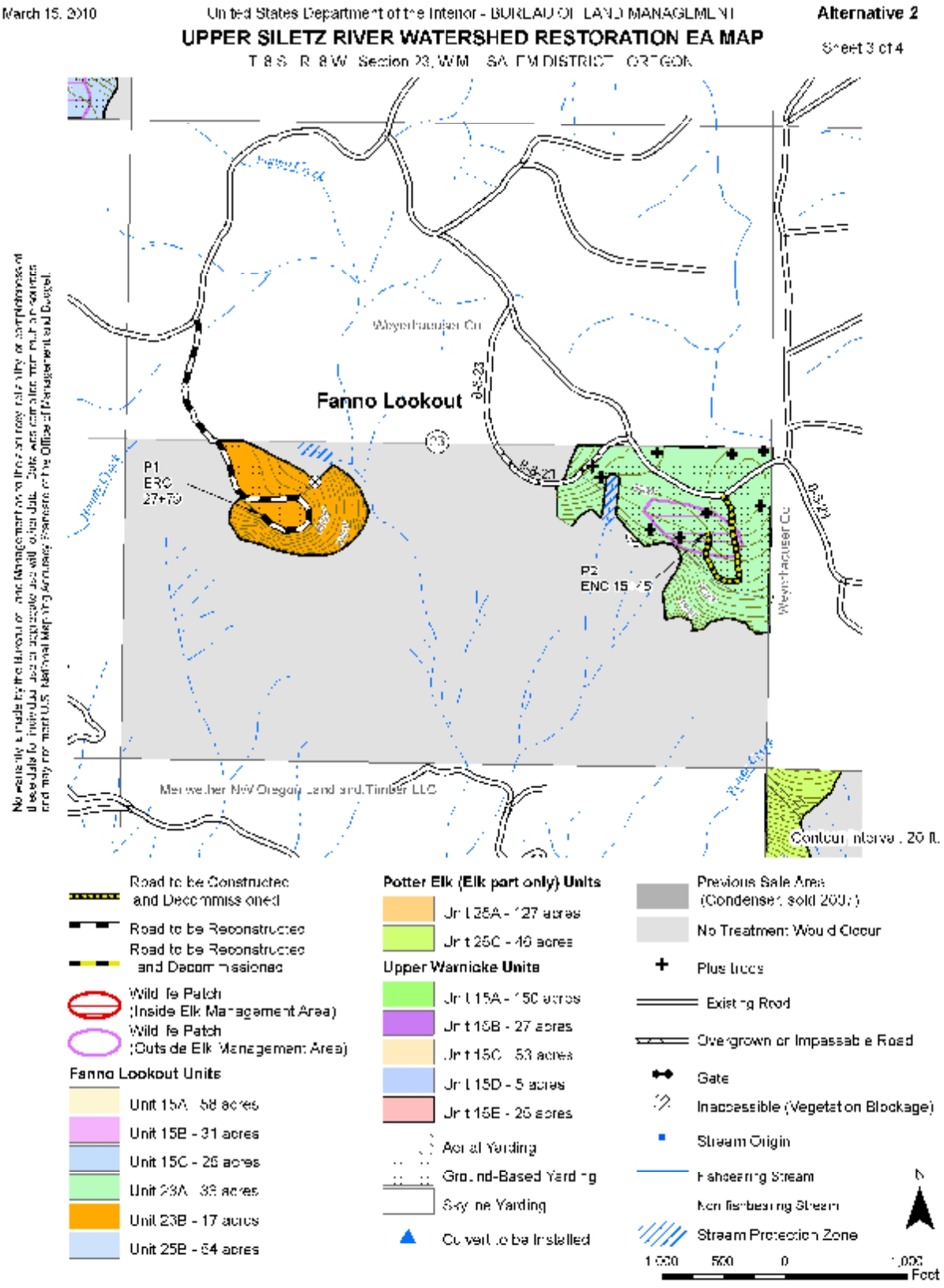
The nearby Potter Creek Timber Sale (T.8 S., R.8 W., section 35), which was analyzed in the FY 2007 McFall/Potter Creek Density Management Environmental Assessment was originally designed to be conventionally logged and included new road construction. When the nearby Potter Elk Timber Sale was planned, and it was determined that helicopter logging would be needed, the majority of new road construction and conventional yarding in Potter Creek (section 35) was dropped in lieu of helicopter logging.

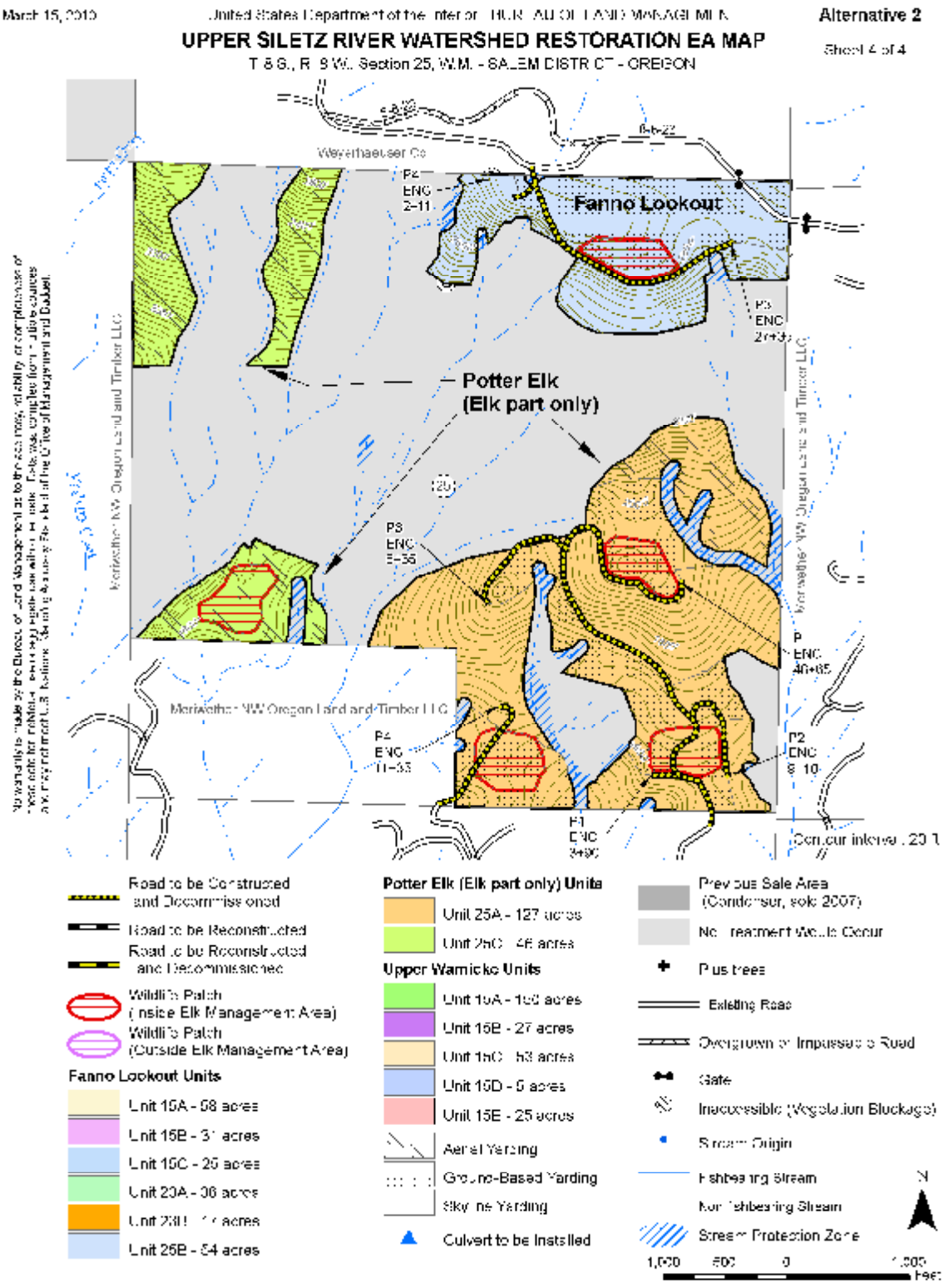
Potter Creek is not economically designed to be a stand-alone timber sale. As stated above, without some limited road construction, Potter Elk would be an economically unviable timber sale, resulting in Potter Creek also becoming an uneconomical timber sale Due to their close proximity, Potter Creek and Potter Elk timber sales are planned to be sold together as Potter Elk in Fiscal Year 2011.

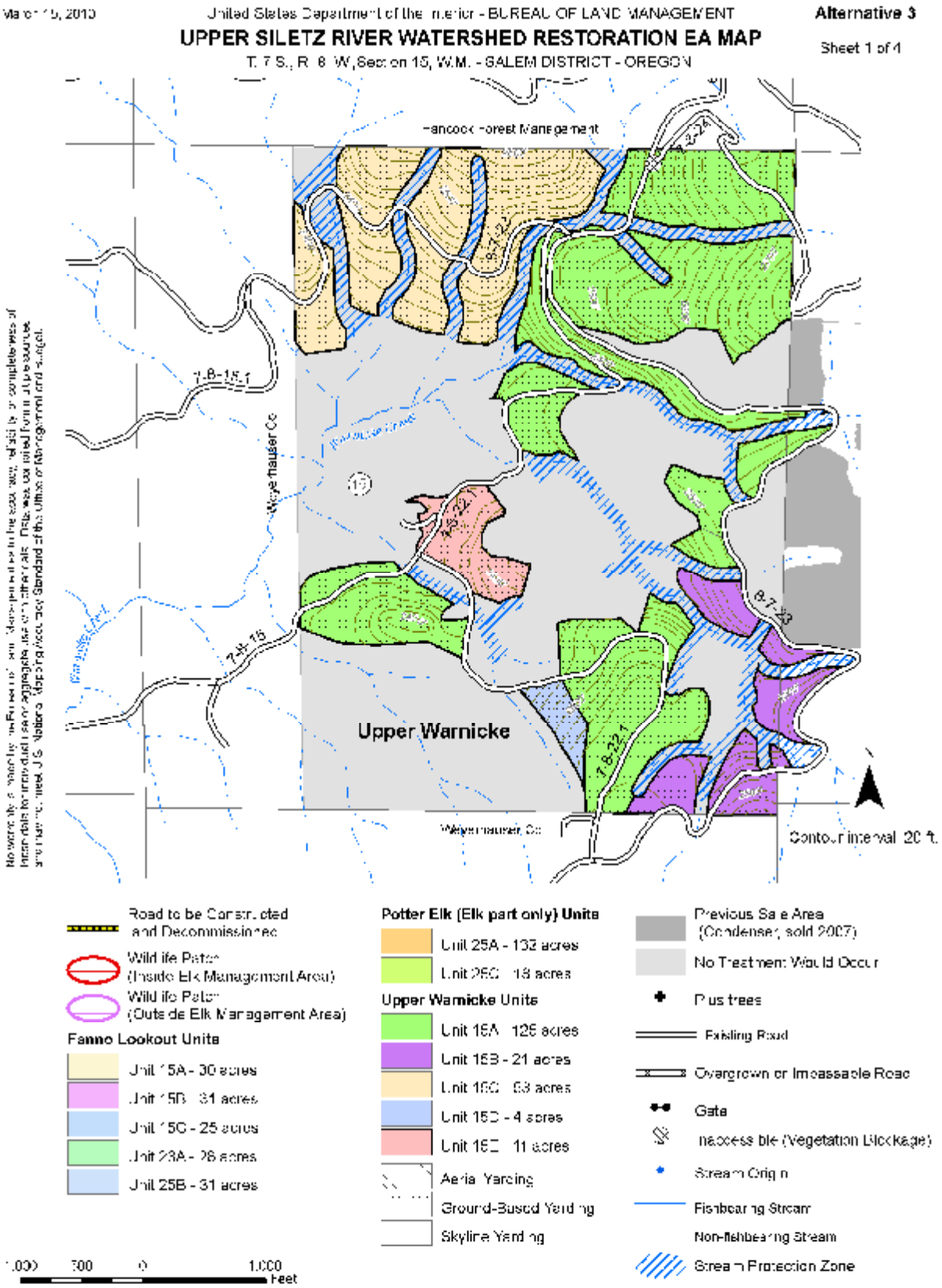
Map 2: Map of the Action Alternative

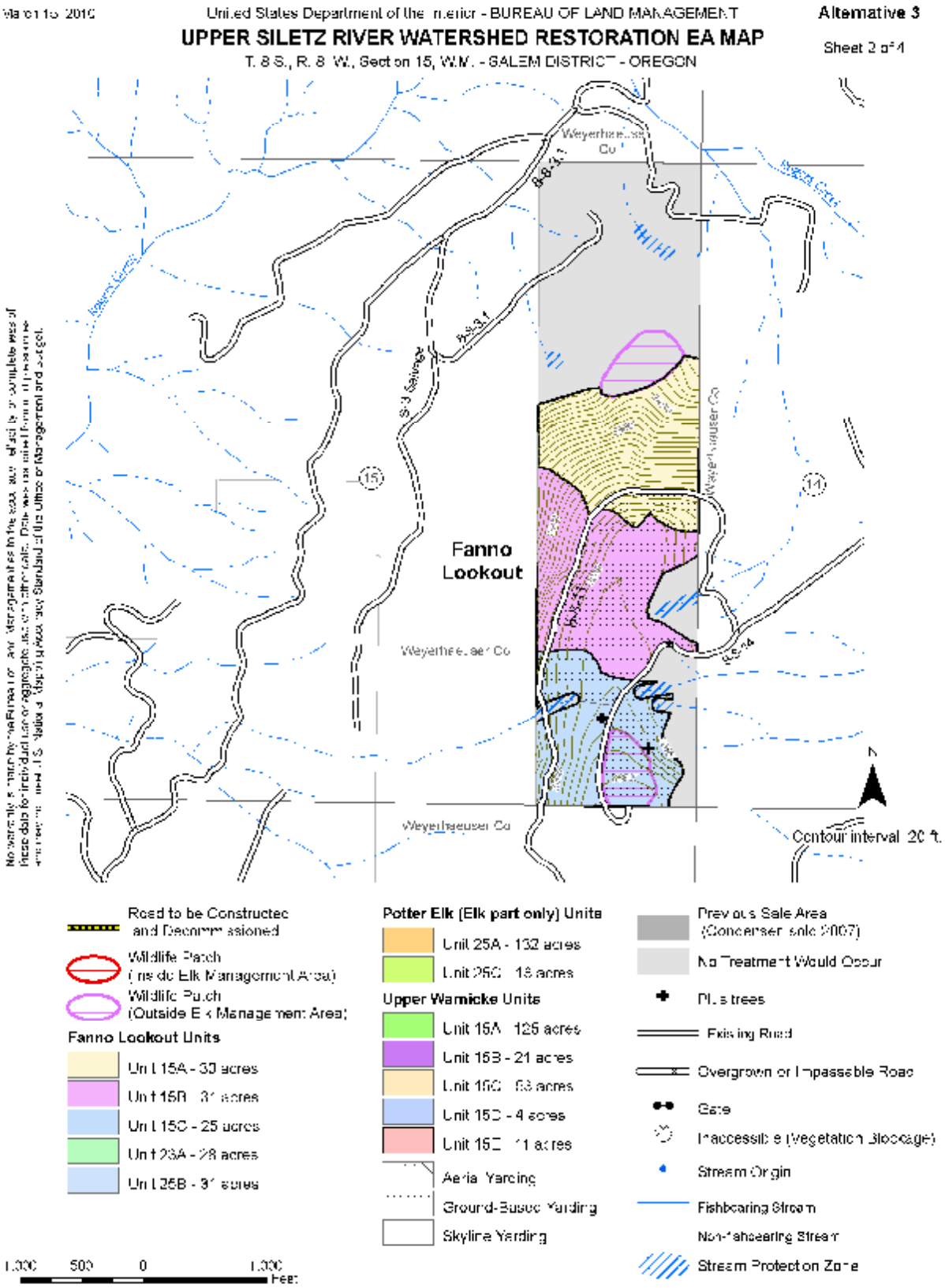


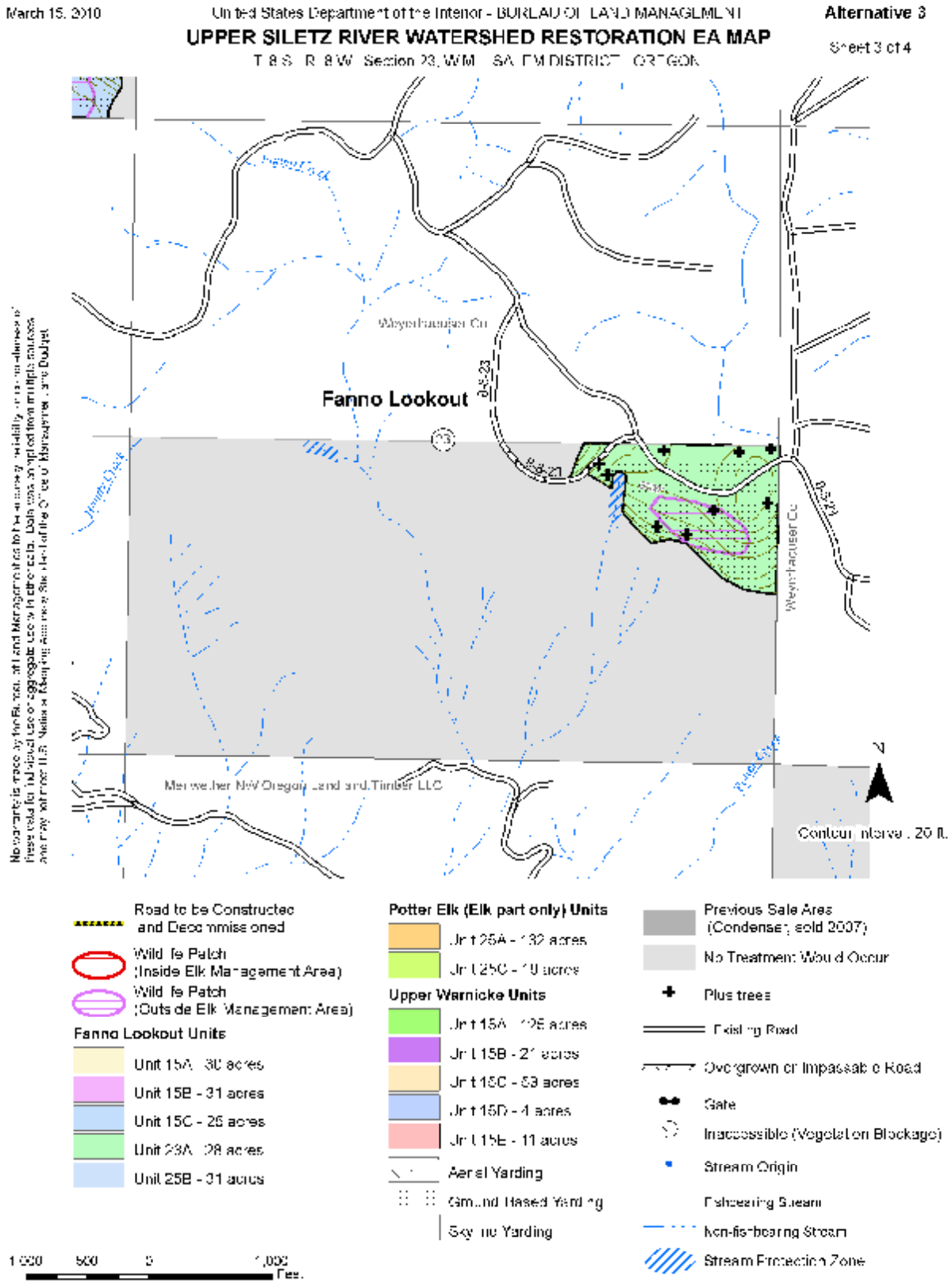

Alternative 2
UPPER SILETZ RIVER WATERSHED RESTORATION EA MAP
Sheet 2 of 4
Fanno Lookout
Weyerhaeuser Co
Road to be Constructed and Decommissioned
Road to be Reconstructed
Road to be Reconstructed and Decommissioned
Wildlife Patch (Inside Elk Management Area)
Wildlife Patch (Outside Elk Management Area)
Fanno Lookout Units
Unit 15A - 58 acres
Unit 15B - 31 acres
Unit 15C - 25 acres
Unit 23A - 36 acres
Unit 23B - 7 acres
Unit 25B - 54 acres
Potter Elk (Elk part only) Units
Unit 25A - 127 acres
Unit 25C - 45 acres
Upper Warnicke Units
Unit 15A - 150 acres
Unit 15B - 27 acres
Unit 15C - 53 acres
Unit 15D - 5 acres
Unit 15E - 28 acres
Aerial Yarding
Ground-Based Yarding
Skyline Yarding
Culvert to be Installed
Previous Sale Area (Condenser sold 2007)
No Treatment Wooded Ocver
Plus Trees
Existing Road
Overgrown or Impassable Road
Gate
Inaccessible (Vegetation Blockage)
Stream Origin
Fishbearing Stream
Nonfishbearing Stream
Stream Protection Zone
1,200 600 0 1,200
Feet

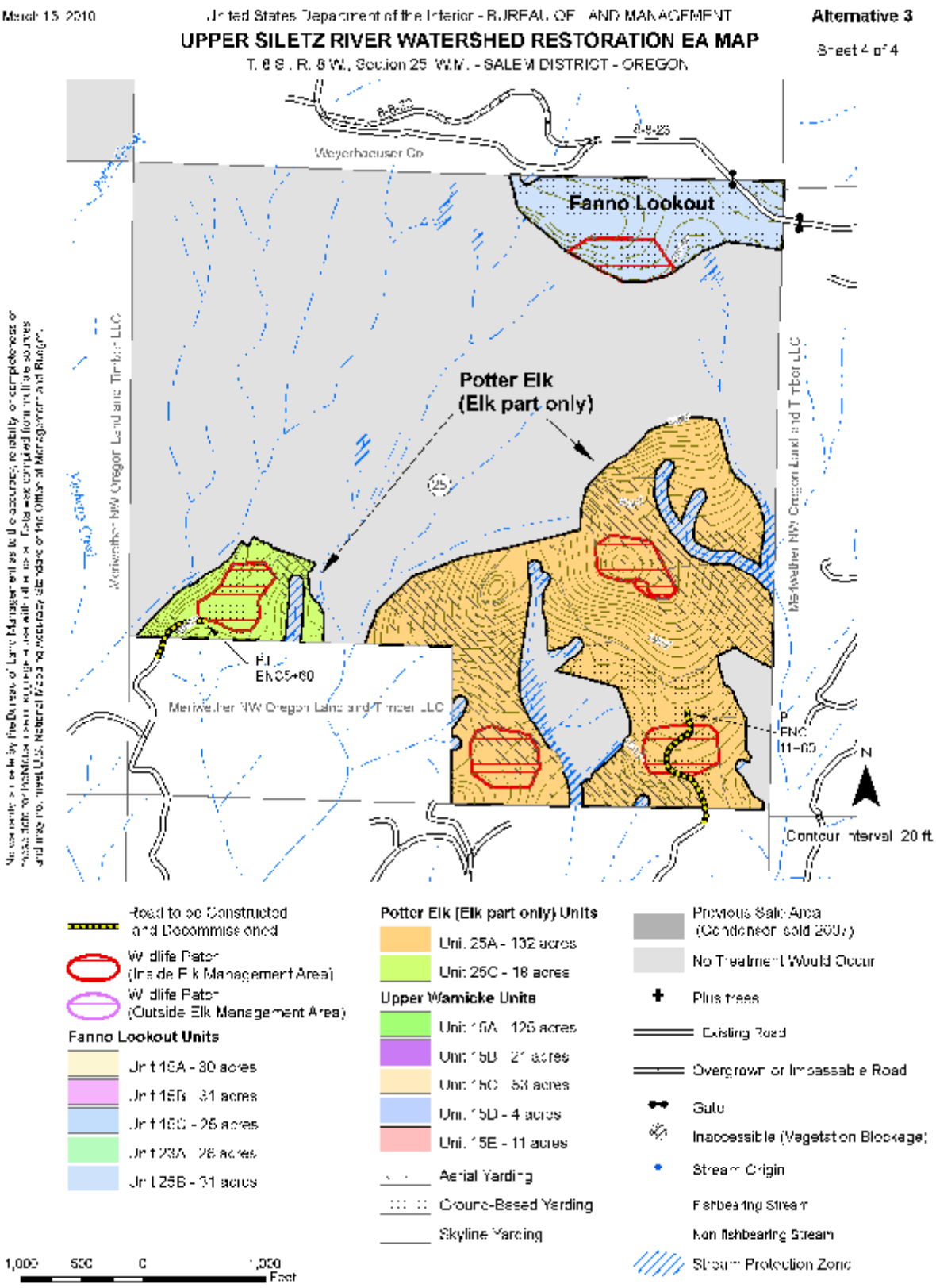

March 15, 2010
United States Department of the Interior - BUREAU OF LAND MANAGEMENT
Alternative 2
UPPER SILETZ RIVER WATERSHED RESTORATION EA MAP
Sheet 3 of 4
T 8 S., R. 8 W., Section 23, WM., SALEM DISTRICT - OREGON
Fanno Lookout
P1
ERC
27+79
P2
ENC 15+75
Weyerhaeuser Co
Contour Interval 20 ft.
Road to be Constructed and Decommissioned
Road to be Reconstructed
Road to be Reconstructed and Decommissioned
Wildlife Patch (Inside Elk Management Area)
Wildlife Patch (Outside Elk Management Area)
Fanno Lookout Units
Unit 15A - 58 acres
Unit 15B - 31 acres
Unit 15C - 26 acres
Unit 23A - 38 acres
Unit 23B - 17 acres
Unit 25B - 64 acres
Potter Elk (Elk part only) Units
Unit 25A - 127 acres
Unit 25C - 46 acres
Upper Warnicke Units
Unit 15A - 150 acres
Unit 15B - 27 acres
Unit 15C - 53 acres
Unit 15D - 5 acres
Unit 15E - 26 acres
Aerial Yarding
Ground-Based Yarding
Skyline Yarding
Culvert to be Installed
Previous Sale Area (Condensed, sold 2007)
No Treatment Would Occur
Plus trees
Existing Road
Overgrown or Impassable Road
Gate
Inaccessible (Vegetation Blockage)
Stream Origin
Fishbearing Stream
Non fishbearing Stream
Stream Protection Zone
1,000 500 0 1,000
Feet


March 15, 2010
United States Department of the Interior - BUREAU OF LAND MANAGEMENT
Alternative 2
UPPER SILETZ RIVER WATERSHED RESTORATION EA MAP
Sheet 4 of 4
T 8 S., R 9 W., Section 25, W.M. - SALEM DISTRICT - OREGON
Weyerhaeuser Co
Fanno Lookout
Potter Elk
(Elk part only)
Merriweather NW Oregon Land and Timber LLC
Contour interval 20 ft
Road to be Constructed and Decommissioned
Road to be Reconstructed
Road to be Reconstructed and Decommissioned
Wildlife Patch (Inside Elk Management Area)
Wildlife Patch (Outside Elk Management Area)
Fanno Lookout Units
Unit 15A - 58 acres
Unit 15B - 31 acres
Unit 15C - 25 acres
Unit 23A - 36 acres
Unit 23B - 14 acres
Unit 25B - 54 acres
Potter Elk (Elk part only) Units
Unit 25A - 127 acres
Unit 25C - 46 acres
Upper Warnicke Units
Unit 15A - 158 acres
Unit 15B - 27 acres
Unit 15C - 53 acres
Unit 15D - 9 acres
Unit 15E - 25 acres
Aerial Yarding
Ground-Based Yarding
Skyline Yarding
Culvert to be Installed
Previous Sale Area (Condenser, sale 2007)
No Treatment Would Occur
Push trees
Existing Road
Overgrown or Impassable Road
Gate
Inaccessible (Vegetation Blockage)
Stream Origin
Fishbearing Stream
Non-Fishbearing Stream
Stream Protection Zone
N
1,000 500 0 1,000 Feet


United States Department of the Interior - BUREAU OF LAND MANAGEMENT
Alternative 3
UPPER SILETZ RIVER WATERSHED RESTORATION EA MAP
Sheet 1 of 1
T. 7 S., R. 8 W., Section 15, W.M. - SALEM DISTRICT - OREGON
Hancock Forest Management
Weyerhaeuser Co
Upper Warnicke
Weyerhaeuser Co
Contour Interval 20 ft.
Road to be Constructed and Decommissioned
Wildlife Patch (Inside Elk Management Area)
Wildlife Patch (Outside Elk Management Area)
Fanno Lookout Units
Unit 15A - 30 acres
Unit 15B - 31 acres
Unit 15C - 25 acres
Unit 23A - 26 acres
Unit 25B - 31 acres
Potter Elk (Elk part only) Units
Unit 25A - 132 acres
Unit 25C - 18 acres
Upper Warnicke Units
Unit 16A - 125 acres
Unit 16B - 21 acres
Unit 16C - 63 acres
Unit 16D - 4 acres
Unit 16E - 11 acres
Aerial Yarding
Ground-Based Yarding
Skyline Yarding
Previous Sale Area (Condensed, sold 2007)
No Treatment Would Occur
Plus trees
Existing Road
Overgrown or Impassable Road
Gate
Inaccessible (Vegetation Blockage)
Stream Origin
Fishbearing Stream
Non-fishbearing Stream
Stream Protection Zone
1,000 500 0 1,000
Feet


March 15, 2010
United States Department of the Interior - BUREAU OF LAND MANAGEMENT
Alternative 3
UPPER SILETZ RIVER WATERSHED RESTORATION EA MAP
Sheet 2 of 4
T. 8 S., R. 8 W., Section 15, W.M. - SALEM DISTRICT - OREGON
Fanno Lookout
Weyerhaeuser Co
Contour interval 20 ft.
Road to be Constructed and Decommissioned
Wildlife Patch (Inside Elk Management Area)
Wildlife Patch (Outside Elk Management Area)
Fanno Lookout Units
Unit 15A - 30 acres
Unit 15B - 31 acres
Unit 15C - 25 acres
Unit 23A - 28 acres
Unit 23B - 31 acres
Potter Elk (Elk part only) Units
Unit 25A - 132 acres
Unit 25C - 18 acres
Upper Warnicke Units
Unit 15A - 126 acres
Unit 15B - 21 acres
Unit 15C - 53 acres
Unit 15D - 4 acres
Unit 15E - 11 acres
Aerial Yarding
Ground-Based Yarding
Skyline Yarding
Previous Sale Area (Conducted since 2007)
No Treatment Would Occur
Pile trees
Existing Road
Overgrown or Impassable Road
Gate
Inaccessible (Vegetation Blockage)
Stream Origin
Fishbearing Stream
Non-fishbearing Stream
Stream Protection Zone
1,000 500 0 1,000 Feet


March 15, 2010
United States Department of the Interior - BUREAU OF LAND MANAGEMENT
Alternative 3
UPPER SILETZ RIVER WATERSHED RESTORATION EA MAP
Sheet 3 of 4
T 8 S., R. 8 W., Section 23, WM., SALEM DISTRICT - OREGON
Fanno Lookout
Weyerhaeuser Co
Contour Interval 20 ft.
Road to be Constructed and Decommissioned
Wildlife Patch (Inside Elk Management Area)
Wildlife Patch (Outside Elk Management Area)
Fanno Lookout Units
Unit 15A - 30 acres
Unit 15B - 31 acres
Unit 15C - 26 acres
Unit 25A - 28 acres
Unit 25B - 31 acres
Potter Elk (Elk part only) Units
Upper Warnicke Units
Unit 15A - 25 acres
Unit 15B - 21 acres
Unit 15C - 53 acres
Unit 15D - 4 acres
Unit 15E - 11 acres
Aerial Yarding
Ground Based Yarding
Skyline Yarding
Previous Sale Area (Condensed, sold 2007)
No Treatment Would Occur
Plus trees
Existing Road
Overgrown or Impassable Road
Gate
Inaccessible (Vegetation Blockage)
Stream Origin
Fishbearing Stream
Non-fishbearing Stream
Stream Protection Zone
1,000
500
0
1,000
Feet


March 15, 2010
United States Department of the Interior - BUREAU OF LAND MANAGEMENT
Alternative 3
UPPER SILETZ RIVER WATERSHED RESTORATION EA MAP
Sheet 4 of 4
T. 6 S., R. 6 W., Section 25 W.M. - SALEM DISTRICT - OREGON
Weyerhaeuser Co
Fanno Lookout
Potter Elk
(Elk part only)
Weyerhaeuser NW Oregon Land and Timber LLC
Merrill Weyerhaeuser NW Oregon Land and Timber LLC
Contour Interval 20 ft.
N
Road to be Constructed and Decommissioned
Wildlife Patch (Inside Elk Management Area)
Wildlife Patch (Outside Elk Management Area)
Fanno Lookout Units
Unit 19A - 30 acres
Unit 19B - 31 acres
Unit 19C - 25 acres
Unit 23A - 26 acres
Unit 23B - 31 acres
Potter Elk (Elk part only) Units
Unit 25A - 132 acres
Unit 25C - 18 acres
Upper Wamicke Units
Unit 15A - 125 acres
Unit 15B - 27 acres
Unit 15C - 53 acres
Unit 15D - 4 acres
Unit 15E - 11 acres
Aerial Yarding
Ground-Based Yarding
Skyline Yarding
Previous Sale Area (Conducted/sold 2007)
No Treatment Would Occur
Plus trees
Existing Road
Overgrown or Impassable Road
Gate
Inaccessible (Vegetation Blockage)
Stream Origin
Fishbearing Stream
Non fishbearing Stream
Stream Protection Zone
1,000
500
0
1,000
Feet

3.0 AFFECTED ENVIRONMENT AND ENVIRONMENTAL EFFECTS

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

Table 7: 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. This project also complies with the PCFFA II (265 F.3d 1028 (9th Cir. 2001)) by analyzing the site scale effects on the Aquatic Conservation Strategy. EA section 5.0 shows how the Upper Siletz River Watershed Enhancement project meets the Aquatic Conservation Strategy in the context of the PCFFA cases.
Air Quality (Clean Air Act as amended (42 USC 7401 et seq.)	This project is in compliance with this direction because air quality impacts would be of short duration (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)]	This project is 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)]	This project would have no effect on this element because there are no ecologically critical areas present within the project areas.
Energy Policy (Executive Order 13212)	This project is in compliance with this direction because this project would not interfere with the Energy Policy (Executive Order 13212).
Environmental Justice (E.O. 12898, "Environmental Justice" February 11, 1994)	This project is in compliance with this direction because the project 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)	Effects to this element are addressed in text (EA Section 3.1.5).
Farm Lands, Prime [40 CFR 1508.27(b)(3)]	The project would have no effect on this element because no prime farm lands are present on BLM land within the Marys Peak RA.
Floodplains (E.O. 11988, as amended, Floodplain Management, 5/24/77)	This project is in compliance with this direction because the proposed treatments would not change or affect floodplain functions.

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)	This project would have no effect on this element because no Hazardous or Solid Waste would be stored or disposed of on BLM lands as a result of this project.
Healthy Forests Restoration Act (Healthy Forests Restoration Act of 2003 (P.L. 108-148)	This project is in compliance with this direction because treatments would decrease the risk of fire and help restore forests to healthy functioning condition (EA Section 3.1.6).
Migratory Birds (Migratory Bird Act of 1918, as amended (16 USC 703 et seq)	This project is in compliance with this direction because treatments would 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)	This project is 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)	This project is in compliance with this direction because Project Design Features would prevent establishment of new populations of invasive plant species and because vegetation development would result in decline in both number and vigor of invasive plant populations in the project areas. 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 areas.
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 areas during operations and the project would not create hazards lasting beyond project operations.
Threatened or Endangered Species (Endangered Species Act of 1983, as amended (16 USC 1531)	This project is in compliance with this direction because there would be no adverse effects on Threatened or Endangered Species (EA Section 3.1.2 and 3.1.5).
Water Quality –Drinking, Ground (Safe Drinking Water Act, as amended (43 USC 300f et seq.) Clean Water Act of 1977 (33 USC 1251 et seq.)	This project is in compliance with this direction because Oregon State water quality standards would be adhered to and the areas hydrology would not be changed measurably. Addressed in text (EA Section 3.1.4)
Wetlands (E.O. 11990 Protection of Wetlands 5/24/77) [40 CFR 1508.27(b)(3)]	This project is in compliance with this direction because wetlands within the project areas would be protected by buffers. (EA Section 3.1.4)
Wild and Scenic Rivers (Wild and Scenic Rivers Act, as amended (16 USC 1271) [40 CFR 1508.27(b)(3)]	This project is in compliance with this direction because there are no Wild and Scenic Rivers within or adjacent to the project areas.
Wilderness (Federal Land Policy and Management Act of 1976 (43 USC 1701 et seq.); Wilderness Act of 1964 (16 USC 1131 et seq.)	This project is in compliance with this direction because there are no Wilderness Areas or areas being considered for Wilderness Area status in or adjacent to the project areas.

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 carbon storage/climate change*. This section describes the current condition and trend of those affected elements, and the environmental effects of the alternatives on those elements.

3.1.1 Vegetation

The following silvicultural and botanical issues will be addressed in the environmental effects section below:

- What effects would the thinning and road work have on native and Special Status botanical and fungal species?
- What effects would density management have on mid-seral forest stand health and composition? Would the effects contribute to Adaptive Management Area, Late Successional Reserve and Riparian Reserve LUA objectives?
- What would be the effects from road work and thinning activities on the spread of invasive species?
- What effects would the removal of green trees (direct loss of live structure and indirect loss of dead wood structure related to density-dependent suppression mortality) have on mid-seral habitat?

Affected Environment

Present Stand Condition and History

The proposed treatment areas consists of thirteen forest stands totaling approximately 654 acres dominated by fully stocked Douglas-fir, small sawtimber (11 to 20 inches DBHOB). The trees originated with natural regeneration in the late 1930's to 1960's after timber harvest. In Fanno Lookout units 15A, 15B, 15C, and 23A, there are a scattering of noble fir, western hemlock and Douglas-fir trees that originated before the majority, as they are relatively large, full-crowned and open-grown. In Potter Elk units 25A and 25C, there is a large component of red alder found in groups. Western hemlock is found in all the stands, and noble fir in all but the Potter Elk stands, and Pacific silver is found in the Upper Warnicke stands. A small component of western redcedar occurs in most units.

There are very few understory trees (less than7.0 inches DBHOB) in these stands, however some co-dominant and suppressed trees remain less than 7.0 inches DBHOB due to relatively young age and slow growth. In Upper Warnicke, harvest in the 1950's and 1960's is evidenced by stumps, skid roads and hummocks throughout the units. In 1972, pre-commercial thinning (12 feet x 12 feet spacing) was completed in Upper Warnicke units 15A and 15B.

Inter-tree competition can be described by the concept of relative density index (RDI). Below a relative density index of 0.25, trees are experiencing little inter-tree competition, and at 0.35 are considered to be 'fully stocked'. Above relative density index of about 0.55, competition is strong and tree growth and vigor declines, and mortality of suppressed trees begins. Currently the stands in the Upper Siletz Project are at a weighted (by acres) average relative density of 0.81.

Coarse Woody Debris
There is a weighted average (by acres) of 1308 cubic feet per acre of downed wood in the proposed treatment areas, and snag volume of 262 cubic feet per acre, for a total of 1570 cubic feet per acre. There is an average of 11.3 conifer snags per acre in the project areas, with average DBHOB of 14.0 inches.

Forest Health
Douglas-fir bark beetles are endemic in the project areas. Recently downed Douglas-fir trees encourage the build-up of beetle populations, which subsequently attack and kill standing Douglas-fir trees. Douglas-fir trees weakened by root disease infection are more likely to be attacked by the beetle (Hadfield 1986). In stands under 100 years old, the risk of mortality to healthy green trees is low, even when beetle populations may be quite high.

Hemlock dwarf mistletoe, *Arceuthobium tsugense*, is a destructive parasite of living western hemlock and several other tree species along the Pacific coast Severe infections of trees can cause growth loss, top-kill and tree death. Severe infections are found in western hemlock in Upper Warnicke Unit 15A, Fanno Unit 23A, and moderate infections are found in units Potter Elk 25A and 25C. Scattered infections are present in much of the Upper Warnicke areas.

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. Weather damage is common particularly in Fanno Lookout Units 15B and 15C, as the sites are high elevation and exposed to prevailing winds. Many of the dominant trees in these stands have broken or multiple tops.

Special Status Botanical and Fungal Species
Inventory of the project areas for bureau special status vascular plant, lichen, bryophyte and fungal species were accomplished through intuitive controlled surveys, in accordance with survey protocols for the specific groups of species.

Surveys in Upper Warnicke Creek led to the discovery of two sensitive moss species known sites, (*Tetraplodon mnioides, Tayloria serrata*) and one strategic moss species known site, (*Codriophorus ryzardii*). In addition two sensitive fungal species known sites were discovered in the Fanno Lookout project areas, *Gomphus kauffmanii* and *Phaeocollybia spadicea*. No known sites were located in the Potter Elk project areas. Three of these species, *Codriophorus ryzardii* (=*Racomitirum aquaticum*), *Gomphus kauffmanii* and *Phaeocollybia spadicea* are also included in the bureau's survey and manage program as either category B or E species.

The two moss species, (*Tetraplodon mnioides, Tayloria serrata*) occur outside the treatment areas only on animal dung and known as "dung mosses". The dung mosses appear to persist in open, moss covered right-of-ways within the project areas and may not compete well in areas of dense vegetation. In addition, they have generally been located above 2,000 feet in elevation.

Invasive (Noxious Weeds, Invasive Non-native Species):
The following noxious weeds are known from within or adjacent the project areas;
Armenian blackberry (*Rubus armeniaca*), Canadian thistles and bull thistles (*Cirsium arvense* and *C. vulgare*), Scot's broom (*Cytisus scoparius*) St. John's wort (*Hypericum perforatum*), and Tansy ragwort (*Senecio jacobaea*).

Environmental Effects

3.1.1.1 *Alternative 1 (No Action Alternative)*

Stand Development

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 desired characteristics of diversity and structure would take considerably longer to develop than if the proposed treatment were implemented.

Stand structural conditions would remain on the current trajectory of increasing density and decreasing individual tree growth rates. Without treatment, stand structure would remain relatively uniform, except for gaps created by disturbance. The main input of CWD (coarse woody debris) would come from density mortality, wind and snow events, insects and diseases and resulting in more snags and downed logs than with treatment. In general, the quantity of mortality would be much greater than if the stands were thinned, but dead trees would be smaller in size. In the project areas, density mortality in trees of all sizes is predicted to average 44 trees per acre of about 12 inches DBHOB in the next 30 years without treatment, and only 1 tree per acre of 16 inches DBHOB with density management in that same time period.

The modeling provides a basis for comparison but does not include mortality from disturbance and stochastic events. One study of stands aged 14 to 38 years, over 22 years showed total annual stem mortality of 1 to 5 percent. Since the stands in the project areas are older than the researched stands and have fewer trees per acre, 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 trees lost from wind are relatively larger than trees lost to density mortality (Lutz and Halpern, 2006).

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.

Crown ratio is directly related to the health and vigor of the tree. As the canopy closes and lower limbs are lost to shading, crown ratios would decrease from the current average of 36 percent to an estimated 29 percent in 30 years. Wind firmness and individual tree stability would also decrease.

Relatively large, open-grown trees would continue to lose lower crown due to competition from surrounding trees that established subsequent to them.

This alternative does not meet the objectives for speeding development of late-successional forest habitat.

Characteristics for the project area stands for 30 years from present with and without treatment as projected by ORGANON are compared in Table 8.

Table 8. Weighted Average (by acres) Stand Characteristics with Treatment vs. No Treatment 30 years in the future (year 2038)[1]

Unit	Alt.	Age[1] (yrs)	TPA[2]	% DF (TPA)	BA[3] (Sq.Ft.)	QMD (in.)[4]	RDI[5]	Density Mortality		
								TPA	BA	QMD
Weighted Average	**Alt. 2 or 3**	**85**	**51**	**51%**	**196**	**28.6**	**0.45**	**0.9**	**2**	**16**
	No Tmt.	**85**	**165**	**60%**	**360**	**20.8**	**0.93**	**44.0**	**28**	**12**

[1] Modeled from stand age in 2008 to 2038.
[2] Trees per acre greater than 7" DBHOB.
[3] Basal areas in square feet: cross-sectional areas occupied by tree boles on each acre, a measure of density
[4] QMD=quadratic mean diameter, the DBHOB of tree of mean basal areas.

[5] Relative Density Index, the density of trees per acre relative to the maximum density possible (Reineke, 1933).

Forest Health
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.

Special Status Botanical and Fungal Species
All known sites would persist in the short term without human intervention. Natural selection and succession would continue to shape the environment.

Some dung moss sites may be lost due to current levels of right-of-way use and road maintenance activities on existing drivable roadways. Other known sites located on older, overgrown roadways may be lost due to succession and/or competing native vegetation. No road construction would occur, therefore no future habitat for the dung mosses would be created under this alternative.

Invasive (Noxious Weeds, Invasive Non-native Species)
Without any new human caused disturbances in the proposed project areas, (other than existing road maintenance activities), the established noxious weed populations would remain at about the present level. The Upper Warnicke Creek project areas noxious weed population(s) would decline because it has been the target of physical control (pulling, grubbing) and is scheduled to be treated with herbicides in the summer of 2010.

3.1.1.2 *Alternative 2 (Proposed Action)*

Stand Development

Restored structural complexity of the stands
Alternative 2 treatments include variable density thinning, creation of small gaps around "wolf" trees, one-acre patch cuts with heavy thinning adjacent, 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. Patch cuts and heavy thinning areas and gaps would allow development of a younger cohort of trees, likely including a high proportion of shade-tolerant species.

Accelerated development of desired tree characteristics
Residual trees would increase in diameter and crown size. With thinning, the QMD would increase from the current of 17.1 inches to 22.2 inches from the removal of smaller trees, raising the mean QMD. With 30 years of growth, QMD would then increase from 22.2 inches to 28.6 inches, an increase of 6.4 inches). Density management would result in an additional 2.7 inch of diameter growth in 30 years, an 73 percent increase from no treatment. Without thinning, the average increase in QMD is predicted to be 3.7 inches

Species Composition
Species diversity in the project areas is high, as most stands have a large component of western hemlock and noble fir in addition to Douglas-fir. Thinning prescriptions would decrease Douglas-fir where it is proportionally high, and increase it where it is proportionately low. Overall, the weighted average percentage of Douglas-fir trees per acre would drop from current 60 percent to 51 percent over the Upper Siletz Project areas with treatment.

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. With treatment, the current stand average height to diameter ratio of 69 would decline to an average of 59 after 30 years of growth, indicating an improvement of

tree stability over time.

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 (1 tree per acre) is expected to occur for 30 years after treatment. However, inputs resulting from harvest consisting of limbs and tops, breakage and cull and incidentally felled or topped trees 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 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. Thirty years after treatment, the proposed action would result in an increase of more than 8 inches in tree DBHOB over the no action alternative.

Measures to protect existing large snags are likely to be effective, but many of the smaller snags would likely be felled for safety reasons. Future treatments to create downed logs and snags (see PDFs in Section 2.5) would increase the number of snags and downed log volumes. Inputs would be of large diameter, created from at least 20 inches in diameter breast height outside bark (DBHOB) or larger, and of decay class 1 material.

Attainment of Aquatic Conservation Strategy Objectives from density management within the Riparian Reserves

Approximately 234 acres (36 percent) of the Upper Siletz Project are within Riparian Reserves boundaries. From the SPZ to the upper edge of the Riparian Reserve, stand density would be reduced using the same prescription used on the upland forest. Habitat for aquatic and riparian dependent species would be maintained or enhanced in Riparian Reserves in the following ways:

Maintenance of stream temperature through shading

Stream shading would not be affected by the proposed treatments. According to the Stream Shading Sufficiency Analysis (USDA, USFS et. al., 2004) done for the proposed treatment, SPZs need to be 55 to 60 feet wide to provide critical shade in the primary shade zone, based on topography and average tree height. Additionally, canopy cover would remain above 50 percent in the secondary shade zone (from the primary shade zone to approximately one tree height from the stream). Understory 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

From research on the BLM Western Oregon Density Management Study, (Ares, et al, 2009 and Olson and Rugger, 2007) thinning affects vegetation structure by increasing cover of grasses and forbs and increasing species richness, a measure of diversity. Richness increases because forest floor herb species typically found under forest canopies remain and flourish, and are joined by open-site herbs and grasses not typically found under forest canopies. Greater species richness was found when prescriptions include gaps and leave islands as part of a variable thinning treatment. Increased overstory variability encouraged development of multiple layers of understory vegetation. However, species composition and abundance following thinning is more dependent on composition and abundance prior to treatment than on treatment effects. 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. 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.

Davis and Puettman (2009) analyzed data from the Young Stand Thinning and Diversity Study on the Willamette National Forest. They found that thinning resulted in initial declines of bryophytes, tall shrubs, and low shrubs, but they recovered within 5 years. Herbs displayed little initial response, but a release of early-seral species was evident in the thinned stands by 5 to 7 years post treatment.

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

Research (Ares, et al, 2009 and Olson and Rugger, 2007, Norvell and Exeter, 2004, Progar and Moldenke, 2002) has found that thinning treatments generally maintained habitat for native plant, invertebrate and invertebrate riparian-dependant species. 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 including salamanders. Native plants were found to persist and increase in coverage after density management. Patch openings and wide 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.

Risk assessment

There would be an elevated risk of a bark beetle infestation for one to three years after harvest from the increased in fresh downed wood, resulting from both the logging operation and creation of additional snags and down wood. Bark beetle risk guidelines would be followed to minimize this risk. The incidence of root disease and heartrot would be unaffected or reduced as a result of treatment. Laminated root rot (***Phellinus weirii)*** would be reduced by removing susceptible trees from around current infection centers, halting the spread of disease.

The potential for windthrow would be higher for the first decade following density management. The risk would be reduced by selecting leave trees with deep, healthy crowns. Risk is greater near created openings (patch cuts in the project areas and 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 areas (Busby, Adler, Warren and Swanson, 2006). A two-year study of wind damage following variable density thinning (Roberts, et al., 2007), showed a loss of 1.3 percent of stems concentrated in topographically vulnerable conditions.

Western hemlock dwarf mistletoe would continue to infect a portion of western hemlock trees in the project areas. To reduce the risk, trees with the most severe infections and infections in the upper two-thirds of the crown would be removed with harvest, and trees with latent infections that worsen after harvest could be selected for downed wood or snag creation. Furthermore, host continuity could be reduced by retention of western hemlock in clumped rather than even distribution.

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. Prescribed burning of slash piles along roads and on landings could result in damage to the crowns of a few adjacent residual trees.

In patch cuts, there is a risk that the sites would become dominated by shrubs, forbs and grasses and natural regeneration would occur very slowly. Since no stocking target exists for the patch cuts, and the objective of creating them is to provide early seral habitat, this outcome would meet current objectives.

Long-term increase in quality instream large woody debris (LWD) recruitment

With treatment, trees would reach large diameters earlier compared to the no treatment option, creating opportunities for high quality LWD recruitment. Large amounts of smaller wood could 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.

Bureau Special Status Botanical and Fungal Species:
This project would not negatively affect any bureau special status vascular plant, lichen, bryophyte or fungi species because all of these known sites have been excluded from within the treatment areas.

However, because the dung moss sites known to occur near the project area occur on overgrown or existing roadways, the implementation of the Upper Warnicke project would create future habitat through new road construction for these species. It is estimated the creation of this habitat and microclimate would take up to 40 years before it is considered as 'suitable habitat'. However, blocking these roads post harvest would protect the habitat from future damage created by vehicular traffic and would allow for the development of 'suitable habitat' at a faster rate than if vehicles were not restricted on these roads.

Road renovation would remove existing habitat for the dung mosses, but as mentioned above would create 'suitable habitat' for the future. However, there are no known sites on any roads to be renovated within the project areas.

This project could affect any species that are not practical to survey for and known sites were not located during subsequent surveys. These species would mainly include special status hypogeous fungi species. However, the majority of these species have no known sites within the Marys Peak Resource Area 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 and cable yarding corridors 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 areas on exposed mineral soil post treatment. These populations generally persist until the native vegetation out competes them in approximately 1 to 10 years.

All of the known noxious weed species that occur in or 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.

Any adverse effects from the establishment of Armenian blackberry, Canadian and bull thistles, Scot's broom, St. John's wort and tansy ragwort within or near the project areas are not anticipated and the risk rating for the long-term establishment of these species and consequences of adverse effects on the project areas 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 areas 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,
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 and
5) the project areas and haul routes would be included into the Marys Peak herbicide treatments in 2010 and 2011.
6) all road construction and road maintenance areas would be monitored for new infestations of ODA listed noxious weed infestations and treated with appropriate methods. Monitoring newly constructed roads would provide for early detection and allow for a rapid response to remove any non-native species of concern.

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.

3.1.1.1 *Alternative 3 (Limited new road construction)*

Mid-Seral Habitat Enhancement

Stand Development

Under this alternative, 15 acres of forest would not be cut for road right-of-way, thus remaining as productive forestland.

Density management would occur on 145 fewer acres (22 percent less) than Alternative 2. Alternative 3 would not include treatment of Fanno Lookout 23B (17 acres), and several stands would have fewer acres treated. The greatest reductions in size would be Fanno Lookout 15A, Fanno Lookout 25B, Potter Elk 25C, and Upper Warnicke 15A, all reduced by about 25 acres (23 to 28 acres). These stands are aged 51 to 66 years old, with the exception of Potter Elk 25C, aged 75 years. Because trees in Potter Elk 25C are older and height growth would be slowing, there would be less opportunity to improve crown ratio as high stand density continues.

Without treatment, crown ratios would continue to drop, tree stability would decrease, individual tree growth would continue to slow, and the opportunity to improve stand structure through treatment diminishes over time. Without treatment, these stands would have been at a current relative density of 0.81 increasing to 0.93 in thirty years, meaning that they would have been well above the threshold of density mortality.

Attainment of Aquatic Conservation Strategy Objectives from density management within the Riparian Reserves
Approximately 196 acres (38 percent) of the Upper Siletz Project is within Riparian Reserves boundaries in Alternative 3. In Alternative 3, 42 fewer acres (18 percent less) would be treated within Riparian Reserves. In general, the untreated areas in Alternative 3 are one side of a stream or small reaches of streams. One exception is in Upper Warnicke Unit 15A, where approximately 900 feet of stream would be untreated on both sides in Alternative 3 that would have density management on both sides in Alternative 2. In the long-term (30+ years) the recruitment potential for larger diameter coarse wood would be less than in Alternative 2. Elsewhere, in the 196 acres treated in Riparian Reserves, habitat for aquatic and riparian dependent species would be maintained or enhanced as described for Alternative 2.

Risk assessment
There would be no opportunity to reduce severity of laminated root rot and dwarf mistletoe infections in western hemlock in the 142 acres that would be untreated in Alternative 3. However, the areas of greatest severity of these are included in the treatment areas.

Bureau Special Status Botanical and Fungal Species:
The implementation of Alternative 3 would reduce future habitat for the dung moss species because less new road construction (roads to be blocked) would occur. However, this alternative would also reduce the amount of future suitable habitat for rare and uncommon botanical and fungal species created at a faster rate through thinning.

This project would not negatively affect any bureau special status vascular plant, lichen, bryophyte or fungi species because all of these known sites would be excluded from within the project areas.

Invasive (Noxious Weeds, Invasive Non-native Species):
The implementation of Alternative 3 would have fewer impacts than those described in Alternative 2 because there would be fewer roads to be constructed and less acres to thin. The reduction in the amount of exposed mineral soil would further reduce the likelihood of any adverse affects from the establishment of noxious weeds which are already considered low.

3.1.2 Wildlife

The following wildlife issues will be addressed in the environmental effects section below:

- What effects would the removal of green trees (loss of live structure and future dead wood structure) have on mid-seral wildlife habitat and the species that depend upon this habitat type?
- What effects would the creation of patch cuts and heavy thinning areas have on elk critical habitat and grass-forb-shrub and deciduous tree patches?

Affected Environment

Fifth-Field Watershed Conditions

BLM and Private Lands

Forest management practices, associated with different land ownerships (industrial timber production on private lands and multiple-use management on public), can be responsible for a fragmented and checkerboard landscape pattern. Table 9 summarizes habitat types at the landscape-level by acres and land management/ownership.

Table 9 Current acres of terrestrial wildlife habitat types at the landscape-level (Upper Siletz River 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 (%)	767 (6)	7,049 (58)	1,245 (10)	1,080 (9)	188 (2)	1,886 (15)	12,215 (27)
Private[2] (%)	22,586 (70)	9,679 (30)	0	0	0	0	32,265 (73)
Total (%)	23,353 (53)	16,728 (38)	1,245 (3)	1,080 (2)	188	1,886 (4)	44,480

[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

Habitat conditions at the landscape-level are greatly influenced by management practices on private lands (73 percent ownership). The early-seral (53 percent) and large mid-seral patches (38 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 (remnant or legacy structure).

BLM managed Lands

Current habitat conditions on BLM-managed lands (12,215 acres) are defined by a mid-seral arrangement (58 percent) with the following patch element of managed and unmanaged forest stands: early-seral (6 percent); late-seral (10 percent); old-growth (9 percent); and hardwoods/nonforest (2 percent). The corridor element (15

percent), in the form of an SPZ, provides connectivity for dispersal throughout the landscape. The desired future condition for the public forests in LSR, AMA, and RR is LSOG habitat (currently at 19 percent).

The quantity and quality of LSOG interior-forest habitat (habitat not influenced by edge-effect) may be substantially reduced due to the checkerboard mosaic of the landscape. However, a relatively uncommon habitat condition exists in the north half of the Upper Siletz River watershed where contiguous sections of BLM managed land creates a forest approximately 5,800 acres in size which has a significant component of LSOG habitat (approximately 1,400 acres). Thus, this block of forest will be referred to as the NFS (North Fork Siletz) forest.

Sixth-Field Watershed Conditions

Upper Warnicke

The Upper Warnicke project area is located in the Upper North Fork Siletz River sixth-field watershed. Table 10 summarizes habitat types in the Upper North Fork Siletz River by acres and land management/ownership.

Table-10 Current acres of terrestrial wildlife habitat types in the Upper North Fork Siletz River (stand-level)

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 (%)	680 (16)	1,683 (40)	310 (7)	877 (21)	32 (1)	654 (15)	4,236 (37)
Private[2] (%)	5,142 (70)	2203 (30)	0	0	0	0	7,345 (63)
Total (%)	5,822 (50)	3,886 (34)	310 (3)	877 (7)	32	654 (6)	11,581

[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

BLM Managed and Private Lands

Habitat conditions at the stand-level in the Upper North Fork Siletz River watershed are also greatly influenced by management practices on private lands (63 percent ownership). The current arrangement in the watershed is managed early-seral habitat (50 percent). The early-seral and large mid-seral patches (34 percent) are dominated by Douglas-fir with some other scattered and clumped conifers and various hardwoods. Approximately 10 percent of the stands in the Upper North Fork Siletz River watershed currently provide LSOG habitat and 6 percent provide corridor habitat.

BLM Managed Lands

The corridor element (15 percent), in the form of SPZs, provide connectivity for dispersal throughout the watershed. The desired future condition for the public forests in LSR, AMA, and RR is LSOG habitat (currently at 28 percent). The quantity and quality of LSOG interior-forest habitat is substantially higher in this watershed due to the presence of the NFS forest block; approximately 79 percent of the BLM-managed lands in the Upper North Fork Siletz River watershed are part of this forest.

Potter Elk and Fanno Lookout

The Potter Elk and Fanno Lookout project areas are located in the South Fork Siletz River sixth-field watershed. Table 11 below summarizes habitat types in the South Fork Siletz River watershed by acres and land management/ownership.

Table 11 Current acres of terrestrial wildlife habitat types in the South Fork Siletz River (stand-level)

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 (%)	**25 (1)**	**993 (52)**	**471 (25)**	**0**	**126 (6)**	**300 (16)**	**1,915 (11)**
Private[2] (%)	**10,731 (70)**	**4,599 (30)**	**0**	**0**	**0**	**0**	**15,330 (89)**
Total (%)	**10,756 (62)**	**5592 (32)**	**471 (3)**	**0**	**126 (1)**	**300 (2)**	**17,245**

[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

BLM managed and Private Lands

Habitat conditions at the stand-level in the South Fork Siletz River watershed are controlled by management practices on private lands (89 percent ownership). The current arrangement in the watershed is managed early-seral habitat (62 percent). The early-seral and large mid-seral patches (32 percent) are dominated by Douglas-fir with some other scattered and clumped conifers and various hardwoods. These second and third-growth forests are typical of those at the landscape-level. Approximately 3 percent of the stands in the South Fork Siletz River watershed currently provide LSOG habitat and 2 percent provide corridor habitat.

BLM managed Lands

Functional LSOG interior-forest habitat on federal land is probably not attainable in this watershed due to the small sizes and scattered locations of the parcels. Habitat conditions on BLM-managed lands (1,915 acres) in the South Fork Siletz River watershed is defined by an arrangement of managed mid-seral stands (52 percent), with patches of unmanaged late-seral (25 percent) and small amounts of early-seral and hardwoods/nonforest patches. The corridor arrangement (16 percent), in the form of an SPZ, provides connectivity for dispersal throughout the watershed. The desired future condition for the public forests in LSR, AMA, and RR is LSOG habitat (currently at 3 percent).

Special Habitats

Special habitats in managed and unmanaged conifer forests of the Oregon Coast Range are usually associated with the following patch types; oak woodlands, cliffs, caves, talus, wet/dry meadows, ponds/lakes, and other lentic wetland types. Additional special habitats in managed forests include; long-term and permanent grass-forb-shrub patches, deciduous tree patches, and LSOG forest patches.

The Upper Warnicke project areas include a large wetland patch, and the Fanno Lookout project areas include a dry meadow patch on the top of Fanno Peak in section 15.

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). 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.

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 fir wood created by density-dependent suppression mortality (regardless of stand age). While suppression mortality tends to create more homogeneity at the stand and landscape 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.

The Upper Warnicke, Potter Elk, and Fanno Lookout project areas are lacking in remnant large live and dead wood components when compared to unmanaged mid-seral stands.

Elk

Results from recent studies in elk habitat selection in western Oregon and Washington (Wisdom et al. 2010, not yet published) revealed four key factors elk seem to use in selecting habitat that maximizes their survivability. Habitat selection was related to vegetation nutrition, structure (the distance to the nearest forage-cover edge), the mean percent slope, and the distance to the nearest road open to public motorized use. Therefore, elk would most likely be found in areas with the best forage that is adjacent to cover and on flat to mild slopes, and far from roads open to public motorized use. The quality of forage available to elk in the Oregon Coast Range has always been marginal, ranging from low to moderate, at best, in vegetation nutrition. When overall forage quality is low, then quantity becomes even more important to survival. The best elk forage is found in the early-seral grass-forb-shrub stage; wherever forests have been managed exclusively for wood products this habitat type has been significantly reduced in size and shortened in its duration on the landscape.

The southern portion of the South Fork Siletz River watershed falls within the LCTMA (Luckiamute Cooperative Travel Management Area; administered by Oregon Dept. of Fish and Wildlife, with BLM and private landowners as partners). This elk management area is gated and closed year-round to all public motorized use to minimize elk disturbance on summer range and on critical winter range, where resident elk are joined by herds from adjacent basins in an attempt to survive the winter. Eight 5-acre patches, five within the

LCTMA (Potter Elk project area) and three within close proximity to it (Fanno Lookout project area), are proposed to improve forage quantity and increase the amount of forage-cover edge.

Special Status Species

Northern Spotted Owl
There are no known owl nests/sites in or adjacent to the project areas. The Upper Warnicke project area is in designated northern spotted owl critical habitat. The area is also located within OMOCA-41 (Oregon Managed Owl Conservation Area). The mid-seral stands function as owl dispersal habitat and may also function as foraging and roosting habitat. The closest known active owl site is approximately three miles to the northeast of the Upper Warnicke proposed project area.

The Potter Elk and Fanno Lookout project areas fall outside of designated owl critical habitat and OMOCAs. The mid-seral stands function as owl dispersal habitat and may also function as foraging and roosting habitat, especially the 70+ year old stands. The project areas may function as low quality connectivity habitat between LSR and OMOCAs to the north and south. The closest known active owl site is over six miles to the southeast of the Potter Elk and Fanno Lookout proposed project areas.

Marbled Murrelet
There are no known murrelet nests/sites, or suitable habitat, in or adjacent to the proposed project areas. The Upper Warnicke project area is 18 miles from the Pacific Ocean and is designated marbled murrelet critical habitat. The mid-seral stands currently do not provide suitable nesting structure for the murrelet. The closest known murrelet occupied site is over two miles to the west of the project area.

The Potter Elk and Fanno Lookout project areas fall outside of designated murrelet critical habitat. The mid-seral stands currently do not function as nesting habitat. The closest known murrelet site is approximately four miles to the northwest of the Potter Elk and Fanno Lookout proposed project areas.

Other Special Status Wildlife Species

Mollusks (Pacific Walker Snail, Salamander Slug, Spotted Tail-dropper Slug)

Fall surveys were completed in 2009 and spring surveys will be completed in 2010. One spotted tail-dropper was found during fall surveys in the Potter Elk project area immediately adjacent to a SPZ and associated large riparian area.

Survey and Manage Species

Mollusks (Oregon Megomphix Snail, Evening Fieldslug)

Surveys are not required in thinned stands less than 80 years old for S&M species, but SSS mollusk surveys were conducted in the fall of 2009 and will be completed in spring of 2010. These two S&M species were not found during the fall survey. 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 areas are very low; the Oregon Megomphix has many known sites in the resource area.

Red Tree Vole
There are no known S&M tree vole nests/sites in or adjacent to the proposed project areas. The mid-seral stands are not yet suitable habitat for the red tree vole and surveys are not required in thinned stands less than 80 years old.

Bird Species of Conservation Concern
Bird Species of Conservation Concern are migratory birds which have been exhibiting downward population trends for several years. There are approximately 88 bird species that can occur in the MPRA (Marys Peak Resource Area); 33 have a high likelihood of breeding in the mid-seral stands of the proposed project areas, 24 have a moderate likelihood, 27 have a low likelihood, and 4 are not expected to breed within the project areas. There are 34 Bird Species of Conservation Concern that can occur in the MPRA; 14 have a high likelihood of breeding in the treatment areas, 9 have a moderate likelihood, 8 have a low likelihood, and 3 are not expected to breed in the project areas.

Environmental Effects

3.1.2.1 ***Alternative 1 (No Action)***

At the landscape-level scale (Upper Siletz River watershed) forests on private lands (73 percent) would continue to provide early and mid-seral habitat; as mid-seral stands reach approximately 50 years they would be harvested. On BLM-managed lands under the No-Action Alternative mid-seral stands would continue to grow and develop into mature structure at a much slower rate than if released through thinning. A new impulse of snags and CWD would take longer to occur through density-dependent suppression mortality without some natural disturbance. Species dependent on larger and more complex structure, both live and dead, would be expected to avoid these stands for a longer period of time.

3.1.2.2 ***Alternative 2 (Proposed Action)***

Fifth-field watershed Level Conditions
The proposed wildlife habitat enhancement treatments (654 acres) represent less than 2 percent of the lands in the watershed and approximately 4 percent of the existing mid-seral habitat at this level scale. Any short-term negative impacts from these actions would be so small at this scale that no measurable change in wildlife population conditions is expected. Long-term impacts on public lands, under current management plans would trend towards increasing LSOG habitat quality and quantity.

Stand Level Conditions

Upper Warnicke
The variable-density thinning prescription would remove the suppressed, intermediate, and smaller co-dominant trees, leave the most dominant conifers and all hardwoods, and increase the diversity of tree spacing in the impacted stands. Although the stands' overstory tree species diversity would remain the same, its composition would better reflect late-seral conditions, with a decrease of Douglas-fir and increased proportions of other conifers. 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. The proposed Upper Warnicke enhancement treatments (260 acres) represent 2 percent of the lands in the Upper North Fork Siletz River watershed and approximately 7 percent of the existing mid-seral habitat at this stand-level scale

Potter Elk and Fanno Lookout
The effects of the variable-density thinning prescription would be similar to that described for the Upper Warnicke sale above. The eight elk forage patches would occur within the thinning treatments and would consist of a polygon with a 1-acre treeless center surrounded by four acres of heavy thinning. The elk patches are not expected to add any additional negative impacts to the overall mid-seral impacts described below. The proposed Potter Elk and Fanno Lookout enhancement treatments (394 acres) represent 2 percent of the lands in the South Fork Siletz River watershed and approximately 7 percent of the existing mid-seral habitat at this stand-level scale.

The most apparent impacts, lasting about ten years (approximate time till overstory canopy closure), would be a simplification of the stands' live overstory structure, due to the removal, and felling (CWD) of green trees.

This would be 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. Species dependent on a more closed or dense overstory conifer canopy and/or shaded understory may move into the adjacent mid-seral stands in the short-term. Species that prefer a more open overstory canopy and/or a more complex grass-forb-shrub understory may increase on the treated sites in the short-term. In general, the short-term negative impacts to species using mid-seral habitat would be insignificant due to the small size of the actions and the large amount of untreated mid-seral habitat in the watershed.

Long-term positive impacts from the proposed treatments would accrue to species dependent on LSOG forest habitat in the South Fork Siletz River watershed by accelerating the development of large tree structure, by creating snags and CWD, and by protecting all existing special habitat components.

Special Habitat Components

The proposed treatments of variable-density thinning and elk forage patch creation, by felling and removing live trees, would bypass the natural 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 smaller 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 the project areas (654 total acres dispersed over 4 sections and two townships), which represents less than 2 percent of the Upper Siletz River watershed (landscape-level)
- Design feature to create snags and CWD (2 each, per acre within 10 years of treatment)
- Future snags would be 3 to 4 inches in diameter larger with treatment than without treatment after 30 years (ORGANON model)
- Existing snags resulting from density-dependent suppression mortality in the early and mid-seral stands in the Upper Siletz River watershed (16,348 acres)
- Existing LSOG large dead wood (highest quality due to its 30+ inch diameter size) in the Upper Siletz River watershed (2,325 acres)
- Existing dead wood in the no-entry SPZs in the Upper Siletz River watershed (1,886 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 stands and all the forested lands in the Upper Siletz River watershed are susceptible to the ongoing abiotic/biotic processes of damage and mortality

All existing special habitat components in the project areas 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.

Wildlife Patches

Due to the increases in forage quantity and cover-forage edge, the creation of eight wildlife patches would have short to mid-term positive impacts on elk, deer, migratory birds, and other wildlife that use grass-forb-shrub habitat patches within a mature forest arrangement, especially in the South Fork Siletz watershed.

Special Status Wildlife Species

Northern Spotted Owl

The proposed action is a may affect, not likely to adversely affect 654 acres of northern spotted owl dispersal habitat because there would be a short-term modification of the structure and composition of owl dispersal habitat at the stand-level. The project areas, which represent only 10 percent of the dispersal habitat in the

Upper North Fork Siletz River watershed, and 6 percent in the South Fork Siletz River watershed, would maintain the functionality of the stands as dispersal habitat.

The proposed action is a may affect, not likely to adversely affect 260 acres of northern spotted owl designated critical habitat because the treatments would modify the structure and composition of owl designated critical habitat at the stand-level but would maintain the functionality of current primary constituent elements, thereby preserving the conservation value of the habitat.

The proposed action is a may affect, not likely to adversely northern spotted owl because the long-term impact of all treatments would be positive since the treated stands would develop into suitable nesting habitat sooner than if left untreated, and would also have immediate and long-term positive impacts for foraging owls by improving prey habitat due to the creation of small openings and new snags and CWD in the stands.

Marbled Murrelet

The proposed action is a may affect, not likely to adversely affect marbled murrelet because treatment of the mid-seral stands would have long-term positive affects by accelerating the time it would take for these stands to develop into suitable nesting habitat.

The proposed action is a may affect, not likely to adversely affect 260 acres of marbled murrelet designated critical habitat because the treatments would modify the structure and composition of murrelet critical habitat at the stand-level but would maintain the functionality of current primary constituent elements, thereby preserving the conservation value of the habitat. In addition, treatment of the mid-seral stands would have long-term positive affects by accelerating the time it would take for these stands to develop into suitable nesting habitat.

Birds 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 individual bird nesting success if it occurs during the breeding season. There is a high likelihood that some level of disturbance to nesting would occur if the proposed treatments are conducted during the February-August breeding season, but the disturbance is expected to be insignificant at the landscape and stand population levels.

The variable-density thinning and elk forage patch treatments are not expected to modify bird nesting and foraging habitats to the point that some species are no longer able to occupy the project area. 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 and 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 to10 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. The proposed actions include the creation grass-forb-shrub patches, snags, and CWD which would improve habitat conditions in the selected stands for those species which nest and/or forage in early-seral patches and on dead wood.

3.1.2.1 *Alternative 3 (Limited new road construction)*

This alternative is anticipated to have essentially identical effects to wildlife species and their habitat as the proposed action (Alternative 2), but at the scale of the project area, Alternative 3 offers a noticeably smaller benefit for enhancement to wildlife habitat conditions with the reduced benefit of providing 145 less acres of habitat enhancement. Conversely, Alternative 3 would avoid the short-term impacts of 3.4 miles of additional temporary new road construction required under Alternative 2.

Mid-Seral Habitat Enhancement

3.1.3 Soils

The following soils issues will be addressed in the environmental effects section below:

- What would be the effects of mechanical harvesting equipment when used on slopes between 35 and 45 percent?
- What would be the effects of road construction on soil productivity?

Affected Environment

Slopes on the skyline yarding areas vary from 35 percent to 70 percent. Slopes on the ground based yarding areas vary from 0 to 35 percent. Moderately compacted soils have persisted in scattered existing skid trails and old haul roads that date back to the original tractor and high lead logging that was done in portions of the site in the late 1930's to 1950's. The skid trails and old haul roads are generally under 12 feet in width so the stands are generally fully occupied by tree canopies.

In general, the soils on the units are 15 to 30 inches thick where they contact fractured bedrock. The shallow depth of soil, low water holding capacity and low permeability rate results in a soil profile that may become saturated during extended periods of heavy rainfall exceeding ¾ inch per hour. The area lies within the (TSZ) transient snow zone and annually receives several rain or rain-on-snow (ROS) events resulting in saturated soil conditions. The large amount of coarse fragments (stones) armoring the surface moderates the erosion potential, but it is still advisable to maintain some debris and litter on the soil surface to minimize erosion risk. Shallow landslides are also a risk on steep slopes during saturated soil conditions. Maintaining vegetation with substantial root structure would reduce the risk of shallow landslides on these soils.

The shallow soil may result in a higher risk of wind throw if the stands are opened up to wide spacing distances. There are two management concerns with these soils: 1) the potential for surface erosion and dry ravel, 2) the potential for compaction and surface soil displacement.

Due to the substantial amount of clay and silt size particles in these soils, they are prone to becoming compacted when subjected to pressure from heavy equipment, dragging logs etc. Once compacted, fine textured soils are very slow to recover. (There is scattered, existing evidence of compaction in the old skid trails, dating to the logging in the 1930's to 1950's). Compaction of the soil can reduce site productivity by limiting/restricting root growth in the compacted soil as well as limiting movement of oxygen, carbon dioxide and water into, out of and within the soil. On sloping sites, compaction can result in increased rates of surface water accumulation and run off. On bare soil with slopes exceeding 35 percent, the hazard of erosion can be high.

Environmental Effects

3.1.3.1 *Alternative 1 (No Action)*

No activities would occur under this alternative and there would be no change to the existing soil resource. Soils would continue to function in their existing capacities.

3.1.3.2 *Alternative 2 (Proposed Action)*

Direct and Indirect Effects

Compaction and disturbance/displacement of soil:

Skyline yarding:
Skyline yarding trails usually result in light compaction of a narrow strip less than 4 feet in width. Measurable long term effects on site productivity from this type of disturbance are minimal to none because the extent of the disturbance is so small and surrounded by the remaining thinned vegetation.

Ground based yarding:
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. Approximately 19.1 acres in landings and 20.3 acres in skid trails would be utilized. Because the existing skid trails would be reused, this would result in a cumulative detrimental disturbance level of 6.0 percent in the sale area units. The aerial extent and degree of disturbance would remain within RMP guidelines of less than 10 percent disturbance. (2008 FEIS timber harvest BMP's, Appendix I).

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. 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.

Ground based yarding impacts would vary depending on: whether a harvester / forwarder system or crawler tractors are used, how dry the soils are when heavy equipment operates on them and how deeply covered with slash, the soils in the skid trails are. Impact analysis also included the additional areas used for landings.

In crawler tractor ground-based skid trails, expect a moderate amount of top soil displacement approximately 10 feet wide and moderate to heavy soil compaction to occur depending on the amount of use. 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.

In harvester/forwarder skid trails soil displacement is generally light because the equipment travels on top of slash and does not dig into the soil, and soil compaction is light to moderate which would result in an ummeasurable level of growth reduction from natural variability.

This project would also allow the use of ground-based equipment on those skyline and/or aerial units with slopes between 35 and 45 percent. The activity allowed is the felling and bunching of trees on these slopes. There would be no removal of trees with ground based equipment on these slopes. The trees would be bunched for ease of removal with the skyline and/or aerial system. As noted above, harvester / forwarder skid trail soil displacement is generally light because the equipment travels on top of slash and does not dig into the soil, therefore, soil compaction is light to moderate.

Landings:
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 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.

Approximately 191 landings would be needed to harvest the proposed areas. One hundred twenty-five landings would be used for skyline yarding, (24 would be used for both skyline and ground based yarding). Forty-two landings would be used for ground based yarding. About half of the surface areas used for landings would be the existing road surface.

Road Work (road construction, reconstruction, renovation, skid trail construction and blocking):
Constructing 3.8 miles of new spur roads would result in loss of top soil and compaction of sub-soil on approximately 15.2 acres (about 2.3 percent of the total project areas). The areas currently are forested land that would be converted to non-forested. The roads to be constructed are on gentle topography so the total width of the clearing would be around 14 feet. This narrow clearing would have a very minimal effect of the overall tree spacing and stocking. There are no stream crossings on the new road locations. All of the new construction would be decommissioned and blocked to vehicle traffic following harvest. Recovery back to a forested condition would occur in these areas over time.

Based on previous project work, the spot road renovation of 9.5 miles of existing roads would not change the existing amount of current non-forest land. Some encroaching vegetation along these roads would be removed for safety concerns and surface rock would be added where needed. The renovations would provide better drainage and road surface conditions resulting in less road surface erosion into the surrounding areas or streams.

The renovation work is expected to result in some minor short term roadside erosion where established vegetation in the ditch and culvert catchment areas are removed during the cleaning and reshaping or culvert installment operations. Litter fall accumulations and growth of vegetation generally re-establishes within two seasons and erosion rates return to near natural levels thereafter. The addition of extra cross drain culverts and the road surface reshaping would reduce the volume of water flowing on the road surfaces and should result in less future erosion. This is especially true for the existing portion of private road in the Fanno Lookout sale areas in conjunction with road "P". The new cross drains to be installed would help by keeping spring-fed ditch water off the road surface.

There are no known OHV trails in the project areas and access is restricted for the majority of the time by locked gates. The placement of large debris in the decommissioned roads would effectively close them off to future OHV use.

Site Productivity
One end log suspension wherever practical, and soil impacts in skid trails are expected to result in light compaction in narrow strips less than 4 feet in width. The effect on overall site productivity from light compaction is expected to be low (less than 10 percent) and result in no measurable reduction in overall yield for the project areas because of the design features.

For harvester/forwarder systems, soil impacts in skid trails are expected to result in light to moderate compaction due to slash covering the trails. The trees in the project areas have ample crowns, so there should be adequate slash on the ground to protect soils during skidding activities. The harvester/forwarder system is expected to result in light to moderate compaction (10 to 15 percent) with no expected measurable reduction in overall yield for the project areas because of the design features.

For tractor skidding, soil impacts are expected to result in moderate to heavy, fairly continuous compaction within the landing areas and the main skid trails. Impacts would be light to moderate and less continuous on less traveled portions of skid trails. Worst case expected reduction in productivity for the acres of landings and

skid trails is a 20 percent reduction in yield based on previous timber sale monitoring. The overall sale areas detrimental productivity effect resulting from the impacted acres is expected to be less than 6 percent in disturbed areas for the timber sale units which is below the 10 percent level allowed in the RMP (Timber harvest BMP's, Appendix I).

Soil erosion from fuels and harvest treatments:
Observations over 3 decades of burning piled slash in these areas of the Oregon Coast Range has resulted in no evidence of surface erosion from areas where piled slash has been burned. It is not expected that any additional erosion would occur from these units and thus there should be no impact to sediment generation or nutrient levels available to the remaining vegetation which would maintain the productivity of the stand. With slash and existing undergrowth being left on nearly all of the areas, no measurable amounts of surface erosion are expected from the forested lands treated under this proposed action.

3.1.3.3 *Alternative 3 (Limited new road construction)*

Direct and Indirect Effects

Compaction and disturbance/displacement of soil:

Logging
Approximately 15.3 acres in landings and 6.1 acres in skid trails would be utilized. Because the existing skid trails would be reused, this would result in a cumulative detrimental disturbance level of 4.1 percent in the sale area units. The aerial extent and degree of disturbance would remain within RMP guidelines of less than 10 percent disturbance. (Timber harvest BMP's, Appendix I).

Approximately 153 landings would be needed to harvest the proposed areas. Forty-one landings would be used for skyline yarding, and 112 landings would be used for ground based yarding. About half of the surface areas used for landings would be the existing road surface.

This alternative would also allow the use of ground-based equipment to fell and bunch trees on slopes between 35 and 45 percent on skyline and/or aerial yarding units.

Road Work (road construction, reconstruction, renovation, skid trail construction and blocking):
Constructing 0.4 miles of new spur roads would result in loss of top soil and compaction of sub-soil on approximately 1.6 acres (about 0.3 percent of the total project areas). The areas are currently forested land that would be converted to non-forested. These two short spurs are needed to extend existing roads on private lands to allow access to BLM lands to complete the harvest activity. These roads would also be decommissioned after use. They are located on dry ridge tops and would have minimal road drainage work.

Based on previous project work, the spot road renovation of 9.5 miles 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 would provide better drainage and road surface conditions resulting in less road surface erosion into the surrounding areas or streams.

3.1.4 **Water**

The following water issue will be addressed in the environmental effects section below:

- Issue 1: What would be the effects of road construction on water quality?

Affected Environment

Project area streams

The project areas include 1st to 3rd order, intermittent and perennial streams. The majority of 1st order channels are Rosgen type "A" intermittent source channels: less than 10 feet wide, 4 to 10 percent gradient, entrenched, low width/depth ratio, and low sinuosity. Channels are typically "step-pool" in form, which transition to cascade at valley constrictions. Most of the stream channels in the project areas are filled with colluvium due to raveling hillsides and periodic debris torrents, which may strip the channels to bedrock. Some streams are completely buried by colluvium, causing subterranean flow. Channel substrates are typically cobble and gravel, with steeper reaches dominated by boulder and bedrock.

The central 2nd order stream in Upper Warnicke Creek includes reaches of Rosgen type "B" channel types, (2 to 4 percent gradient, with low, moderately-confined banks, low width/depth ratio, and moderate sinuosity), at the mouths of steep tributary valleys where they enter broader flat areas. Channel morphology is riffle/pool with gravel and cobble dominated banks and bed.

In these upper watershed streams there is little evidence of beaver activity. Depending on the water year some streams may flow subsurface before they resurface downhill on these valley flats. These are depositional reaches for sediment and wood moved from upstream reaches and isolated debris flows. Sediment is stored on bars and behind debris jams, providing potential fish spawning habitat.

All of these channel types viewed in the project areas are vegetatively stabalized (i.e. the vegetation in channel and on the banks is the predominate stabalizing element) and currently in proper functioning condition (U.S.D.I. 1998). None of the channels in the project areas are currently functioning at risk or nonfunctional; none of the channels exhibit indications of instability (i.e. high rates of bank erosion and sediment transport, nick points, etc).

Project area water quality and beneficial uses

Fine sediment and turbidity

During field review of stream channels in the project areas, channels were observed to be stable and functional with sediment supplies in the range expected for these stream types. However, no turbidity data was located or collected for this analysis.

Stream Temperature

No stream temperature data was collected for this analysis for any of the streams in the project areas. The streams are very high in the watersheds and are fully vegetated. Stream temperature monitoring during the summer of 1996 in the South Fork Siletz River, 1 mile downstream from the project area just below the confluence with McFall Creek, showed temperatures exceeding the State of Oregon's Department of Environmental Quality's standard of 17.8° C for 10 days.

Streams in the project areas are classified as having a "low" risk of detrimental changes in water temperature (USDI 1996). The headwaters of most channels in the project areas are ephemeral and do not flow on the surface during most summers. Consequently, these channels have little potential to be heated by direct solar radiation. Based on field observations and aerial photo reviews of the perennial streams in the project areas,

current streamside vegetation and colluvial fill is adequate to shade surface waters during summer base flow and it is likely that stream temperatures consistently meet the Oregon state standard.

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).

Project area stream flow

The project areas have one of the highest precipitation rates in the Oregon Mid Coast Range, receiving approximately 155 inches of rain annually and having a mean 2-year precipitation event of 6.5 inches in a 24-hour period (N.O.A.A. Precipitation-Frequency Atlas for Oregon, Volume X). Most runoff is associated with winter storm events 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. Stream flow in the summer is typically a fraction of winter levels as a result of little or no snowpack accumulation and infrequent rainfall. Many headwater channels retreat to subsurface flow or become intermittent.

Peak Flow

Terrain in the project area watersheds is generally mountainous with elevations ranging from approximately 1,500 to 3,200 feet. While snowpack accumulation in the Oregon Coast Range is unusual, these elevations are within a transient snow zone. In most years, at elevations above 1,500 feet, snow remains for short periods and may be subject to ROS (U.S.D.I. 1995). Overlapping areas between high intensity rainfall and high ROS events are particularly vulnerable to extreme storm events and may lead to large flood events (USDI 1996).

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://waterquality.deq.state.or/wq/303dpage.htm) is a compilation of streams which do not meet the state's water quality standards. A review of the listed streams for the Upper Siletz River watershed was completed for this report. None of the streams draining the project areas, the South Fork of the Siletz nor the North Fork of the Siletz and their tributaries are listed on the current 303d report. Over 25 miles downstream of the project areas, the mainstem Siletz River is listed from its mouth to Rock Creek for exceeding summer temperature standards.

The DEQ published an assessment, the 319 Report, which identifies streams with potential non-point water pollution problems (2006 Oregon Statewide Assessment of Nonpoint Sources of Water Pollution). No water quality issues were identified for streams in the project areas. The Siletz River located over 6 miles downstream of the project areas was identified as having "moderate water quality by observation" for fish, aquatic habitat, and general water quality conditions. Sources of information (watershed analysis, ODFW habitat surveys) give more up to date information, supported by data, on fish and aquatic habitat conditions for these streams (see the Fisheries report in this assessment).

Beneficial Uses

Beneficial uses of surface water from the project areas are displayed in Table 12. There are no known existing municipal or domestic water users in the project areas. There are no water rights listed for any of the streams in the project areas. In-stream water rights occur along the Siletz River approximately 7 to 8 miles downstream of the project areas. Additional recognized beneficial uses of the stream-flow in the project areas include anadromous fish, resident fish, recreation, and esthetic value.

Table 12. Beneficial Uses Associated with Streams in the Project Areas

Stream (Catchments-7th field)	Proposed Activity	Beneficial Use of Water	Approximate Distance from Project	Information Source
Upper Warnicke Creek Upper North Fork Siletz River	Stand density management Road construction/ reconstruction	Anadromous fish	greater than 1.5 miles downstream from project areas	U.S.D.I. 1996
		Resident fish	Within project areas	U.S.D.I. 1996
		Domestic use	greater than 7 miles	WRIS[1]
		Irrigation/live stock watering	greater than 7 miles	WRIS
Rogers Creek, McSherry Creek, Sand Creek, Fanno Creek South Fork Siletz River	Stand density management Road construction/ reconstruction	Anadromous fish	greater than 1 mile downstream of project areas	U.S.D.I. 1996
		Resident fish	Within project areas	U.S.D.I. 1996
		Domestic use	greater than 8 miles	WRIS
		Irrigation/live stock watering	greater than 8 miles	WRIS

1. WRIS = *Water Rights Information System* on the Oregon Department of Water Resources website.

Environmental Effects

3.1.4.1 *Alternative 1 (No Action)*

No action would result in the continuation of current conditions and trends at these sites as described in the Affected Environment section of this report.

3.1.4.2 *Alternative 2 (Proposed Action)*

Watershed Hydrology: Direct and Indirect Effects

Streamflow:

Increases in mean annual water yield following the removal of watershed vegetation have been documented in numerous studies around the world (Bosch et al., 1982). Measurable increases (greater than 10 percent) in water yield would be expected to last approximately 20 to 30 years based on the above cited studies. Vegetation would intercept and evapotranspire precipitation that would otherwise become runoff. Thus, it can be assumed that the action considered under this proposal would likely result in some small increase in water yield (including a small increase in summer base flow) which correlates with the removal of a portion of the conifer overstory in the watershed. Based on the amount of harvest in this proposal, the level of water yield increase would be well below 10 percent and would not be able to be detected from the natural range in variability in flow levels on a year to year basis.

The risk of increases to peak flows based on the proposed management activity falls well below the potential risk of peak flow enhancement from the Oregon Watershed Assessment Manual Analysis., and below the level determined by Grant (2008) to be measurable beyond the range of natural variability in peak flows on a year to year basis.

Water Quality: Direct and Indirect Effects

Fine sediment and Temperature

The creation of temporary roads, skidding corridors and the mechanical removal of trees are unlikely to significantly increase sedimentation into project area streams because harvest generated slash would be maintained in the skidding corridors, minimizing the need for machines to travel on bare soil.

Included in this proposal is the use of ground based equipment to fell and bunch logs on slopes between 35 and 45 percent in the skyline and/or aerial harvest units. The use of ground based equipment machinery would take place on harvest generated slash and no skidding of the trees would be allowed by ground based machinery in these areas. Tree removal is not proposed on steep, unstable slopes where the potential for mass wasting adjacent to streams is high. Therefore, increases in sediment delivery to streams due to harvest activities and mass wasting are unlikely to result from this action.

In addition, SPZs in riparian areas have high surface roughness, which can function to trap any potential overland flow and sediment before reaching streams. In order to minimize soil compaction and erosion, ground-based skidding would occur during periods of low soil moisture (less than 25 percent) with little or no rainfall. This is especially of concern in the south half of section 15 in the Upper Warnicke sale area; as the soils in that area are classified as fragile for timber production.

For the protection of stream channels and aquatic resources, SPZs were applied to all stream channels and "high water table areas" (small wet areas, ponds, marshes, etc.) in the project areas. These zones were determined in the field following the protocol outlined in the *Northwest Forest Plan Temperature Implementation Strategies* (2005). Stream buffers extend a minimum of 55 feet from stream channels and to the extent of the riparian vegetation around "wet areas". This zone would be extended upslope during field surveys as far as deemed necessary to protect aquatic resources (the average width of the stream buffer is between 60 and 70 feet). These determinations were based on site features such as floodplains, slope breaks, slope stability, water tables, vegetation heights, etc. Stream shading would exceed the widths recommended to maintain a minimum of 80 percent effective shade resulting in no change to water temperature from the activities proposed in this project.

Logging:

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.

Fuels Treatments:

The majority of slash associated with this project in the tractor yarding areas would be left on site. Where large amounts of slash are found along roads and landings, it would be piled and burned. Burning piles could produce small areas without soil cover that are more susceptible to erosion. Burning could also produce patches of bare soil with altered properties that restrict infiltration. Burn piles would occupy very small areas surrounded by larger areas that would absorb runoff and trap any sediment that moved from the burn sites.

Road Work
Approximately 3.8 miles of new road construction is proposed, on or near ridgetop locations. The proposed new construction would occur on moderate to low gradient slopes, with no stream crossings. Although the majority of the road construction is located outside the riparian reserve, Alternative 2 includes approximately 5,210 feet of new road construction located within the RR LUA, while Alternative 3 includes approximately 50 feet of road work within the riparian reserve area. In Alternative 2, the portions of new road would be located approximately 100 feet away from the stream edge. In Alternative 3, the short section of new road in the Potter Elk sale area would be approximately 55 feet away from the stream head located on private land.

All these road segments in both alternatives would have no physical connection to the streams. The risk of impacts to water quality due to road construction would be limited by restricting work to periods of low rainfall and runoff. Construction would employ techniques to reduce concentration of runoff and sediment, such as outsloping, ditch lines, and water-bars on steeper sections of road. These new roads would be decommissioned after their use.

Road "P" in the Fanno Lookout sale area would be reconstructed/constructed, used for haul and decommissioned in one season (May to October). The road would be surfaced with rock for the haul period. There are four spring/seeps that drain out of the existing cutslope of the road prism on private land that would have culverts installed to allow the water to pass under the road. All these new roads would be decommissioned after use and blocked to prevent vehicle traffic following harvest.

The proposed final road system is located in a stable geologic landform and there is no risk of road related landslides. The placement of roads on the landscape is an average of more than 300 feet from existing streams and the road locations are on topographic divides where any road generated water or sediment would have no impact on drainages in the project area. Road construction, use, and decommissioning would result in no expected additions of sediment to stream channels in the project area.

Drainage on existing roads would be improved through renovation including adding 4 to 10 inches of spot rock surfacing on 9.5 miles of project haul roads. Road maintenance activities (brushing, blading, spot rocking) are unlikely to measurably impact channel morphology over the long term because the activities all take place on established roads that are elevated above stream channels. Drainage improvements would likely improve water quality over existing conditions by reducing road generated sediment.

Timber Hauling
Timber hauling during periods when water is flowing on roads and into ditches could potentially increase stream turbidity if water from ditches flowed long enough to enter streams. During periods of heavy rainfall, the contract administrator may restrict log hauling where the road surface is deeply 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. Based on the road locations and the project design features there is no expected impacts on water quality from the project proposal.

See Section 3.1.5.2 for detailed analysis concerning timber hauling impacts to water quality.

Channel Morphology
This project is unlikely to affect stream channel stability and function as all field identified streams and wet areas would be protected with at least a 55-foot SPZ. No yarding would occur across streams. No bank stabilizing vegetation would be removed. Under both alternatives this project would thin trees adjacent to the approximately 2,000 feet SPZ of Upper Warnicke Creek which is a fish bearing stream. No other tree removal is proposed along fish bearing streams in either alternative. However, thinning is proposed to produce larger trees over time that would fall into the streams adding additional structure and complexity to the channel and a minimum of 55 feet of unharvested stream buffer would remain along the streams.

3.1.4.3 *Alternative 3 (Limited new road construction)*

Water Quality: Direct and Indirect Effects

Logging:

Road Work and Timber Hauling:
Constructing 0.4 miles of new spur roads would result in loss of top soil and compaction of sub-soil on approximately 1.6 acres (about 0.3 percent of the total project area). The area currently is forested land that would be converted to non-forested. These two short spurs are needed to extend existing roads on private lands to allow access to BLM lands to complete the harvest activity. These roads would also be decommissioned after use. They are located on dry ridge tops and would require minimal road drainage work. There would be no impact to water quality or quantity from these two road segments.

Based on previous project work, the spot road renovation and improvement of 9.5 miles 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 would provide better drainage and road surface conditions resulting in less road surface erosion into the surrounding area or streams. As discussed in Alternative 2, the road densities would remain at the existing level in the North Fork Siletz River watershed.

3.1.5 Fisheries/ Aquatic Habitat

The following fish and aquatic habitat issues will be addressed in the environmental effects section below:

- What effect would thinning and road work have on resident and anadromous fish and their aquatic habitat?

Affected Environment

Upper Siletz River Watershed

Fish Passage and Access
Major tributaries associated with the project area include North Fork Siletz River, Warnicke Creek, Little Boulder Creek, South Fork Siletz River, Rogers Creek, Mcfall Creek, McSherry Creek, Sand Creek, Fanno Creek, and Potter Creek. Siletz Falls, located at least 9½ miles downstream from project activities in the Upper Siletz watershed, historically blocked access for all but summer steelhead to the Upper Siletz River, including the North Fork Siletz or South Fork Siletz River drainages. Warnicke Creek Falls, 1½ miles downstream of the project area in Upper Warnicke Creek drainage, is the upper limit of anadromous fish distribution. Valsetz dam located on the South Fork Siletz River is approximately 3¾ miles downstream from project activities. The dam was partially removed in the 1990s, and passage was largely restored.

Aquatic Habitat
In general, habitat conditions are mixed in the project area streams with a tendency for fine sediment and large woody debris being in less than desirable conditions. Shade was at desirable levels for all streams except in South Fork Siletz River and Warnicke Creek. Both these surveyed reaches were associated with open meadow areas with little overstory conifer, open meadow habitat is not present in project area streams.

Fish Distribution
Coastal cutthroat trout have been documented within the South Fork Siletz River, McSherry Creek, Sand Creek, Potter Creek, Rogers Creek, North Fork Siletz River, Warnicke Creek, and Little Boulder Creek. Cutthroat trout are documented as present in the stream on the eastern edge of section 25 (Potter Elk) and within the main tributary in section 15 (Upper Warnicke) (see Maps 1&2). The precise upper limit of resident fish distribution is unknown for many of the remaining affected streams associated with the project areas.

Summer steelhead are present in South Fork Siletz River, Sand Creek, McSherry Creek, Rogers Creek, Potter Creek, and Fanno Creek. Spring chinook distribution in the North Fork Siletz River is approximately 5½ miles downstream from project areas and within the South Fork Siletz River are approximately two miles downstream from the project areas. Siletz Falls, at least 9½ miles downstream from project activities blocks coho salmon from further movement upstream to either the North Fork Siletz River or South Fork Siletz River drainages.

Agency Creek-South Yamhill River Watershed

Fish Passage and Access
The South Fork of the Yamhill River is the major river system for the tributaries draining from the project area haul route (Firehaul Road) to the north. Anadromous fish distribution in the affected drainage (Upper Rock Creek) is predominately affected by natural barriers to migration. Resident and anadromous salmonids are not present in the project area, except some portions of occupied habitat along the proposed Firehall Road haul route (Map 2) in Rock Creek and Cow Creek (Upper Rock Creek, South Yamhill River). A 15 foot waterfall on Rock Creek blocks coho and winter steelhead over four miles downstream from the project area.

Aquatic Habitat
Approximately 3¼ miles of the unnamed Rock Creek tributary draining the project area was surveyed near the confluence with Rock Creek to approximately ¼ of a mile downstream from the project area (ODFW 1993). Reach one is in proximity to the proposed haul route. The reach is characterized as desirable for shade, sediment composition is mixed with low levels of fine sediment but lacking in gravels.

Fish Distribution
No fish presence surveys were conducted in the streams associated with the project haul route. Upper Rock Creek resident fish distribution was estimated based on visual conditions from the road. Two fish bearing unpaved crossings were assumed to occur midway along the haul route. The first crossing was slightly over two miles downstream, over resident fish habitat only. The second was 4½ miles downstream from the project area, over resident and anadromous fish habitat.

Spring Chinook salmon are not believed to be present in the South Yamhill River basin. Spring Chinook salmon migratory habitat in the Willamette River would be over 65 miles downstream from the project area. Other native species are present within the watershed but occur between 4 miles to 65 miles downstream from the project area.

Luckiamute River Watershed

Fish Passage and Access
Major tributaries associated with the project area (haul routes to the east) in the Luckiamute River watershed include the upper Luckiamute River, the Little Luckiamute River, Teal Creek, and Camp Creek. Little Luckiamute Falls, is located at least 0.3 miles downstream from the nearest unpaved stream crossing over the main haul route. The Little Luckiamute Falls historically blocked access for all anadromous species to much of the Upper Little Luckiamute River and Camp Creek. A series of 15 to 40 foot waterfalls in Township 8 south, Range 6 west, Section 31 blocks access to anadromous fish from the upper reaches of Teal Creek. The upper limits of anadromy on Teal Creek, the first large falls, is over 1½ miles downstream from the nearest stream

crossing over unpaved haul route (Valsetz Mainline Road). The North Fork Teal Creek falls, approximately 90 feet high, is located approximately 1/4 mile downstream from the Valsetz Mainline Road haul route.

Aquatic Habitat

In general, habitat conditions are mixed in the project area streams with a tendency for large woody debris being in less than desirable conditions in all but two upper reaches, one in Camp Creek and the other in Little Luckiamute R. Shade was at desirably high levels for all streams except for reaches one and three in Camp Creek.

Fish Distribution

No fish presence surveys were conducted in the streams associated with the project haul route. Upper Camp Creek and Little Luckiamute River resident fish distribution was estimated based on visual conditions from the road. Two fish bearing unpaved crossings occur midway along the haul route (Blackrock) over the Little Luckiamute River. The first crossing was slightly over 1/3 miles up Blackrock Road from start of pavement in Fall City, the second was 3 1/3 miles from pavement, both over resident fish habitat only. Fish presence upstream of North Fork Teal Creek Falls is unknown.

Currently no known populations of Oregon chub are believed to be present in the watershed. Other native species are present within the watershed, but occur between 4 miles to 25 miles downstream from the project area.

Rare, Threatened, and Endangered Species

The OC (Oregon Coast) coho salmon Evolutionary Significant Unit (ESU) is listed as threatened under the Endangered Species Act (ESA). Oregon Coast coho salmon are present in Upper Siletz River, approximately 9½ miles downstream from the nearest project area activity.

Upper Willamette River ESU Winter steelhead are listed as threatened or endangered under the ESA, as amended, in the Willamette River basin. Within the Luckiamute River this species occurs approximately 1/3 mile downstream from the nearest unpaved stream crossing (Streamnet 2007). Within the Agency Creek-South Yamhill River this species occurs adjacent to portions of the haul route on Firehaul road.

Upper Willamette River (UWR) Spring Chinook, and Oregon chub are listed as threatened or endangered under the ESA, as amended, in the Willamette River basin. Upper Willamette River Spring Chinook are located 25 miles downstream from any project activities (Streamnet 2007). Chub habitat is no longer known to occur within the South Yamhill River or Luckiamute Rivers. No effects to these species would occur and would not be discussed further.

Environmental Effects

3.1.5.1 *Alternative 1 (No Action)*

Current timber stand conditions would be maintained. Expected benefits of thinning riparian stands, accelerating the growth rates of retained timber, subsequently increasing the average diameters of trees available for future LWD recruitment, 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.

3.1.5.2 ***Alternative 2 (Proposed Action)***

Yarding/Falling

Flow effects
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 change forest cover between 0.5 and 12 percent in any of the affected 7th field drainages and between 0.3 and 2.4 percent of any affected 6th field sub-watershed. Based on the Hydrology Cumulative Effects Analysis the risk of peak flow enhancement based on the proposed management activity was determined to be low (Wegner 2009). As no discernable changes in peak and base flows within the treatment area are anticipated, no alterations to fish habitat would be anticipated.

LWD effects
Loss of CWD and LWD due to harvest can alter the stability and quality of aquatic habitat (Beechie et al 2000, Chamberlin et al 1991). Based on the stand analysis, including riparian areas, 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 2010, Roux 2010). In the short-term the small diameter woody debris most likely to reach stream channels would continue to fall from within the untreated 55 to 60 foot SPZs. Wood recruitment studies conducted in the Pacific Northwest have shown the majority of woody debris recruitment occurs within 18 to 20 meters (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 between 52 to 85 percent over 30 years compared to not treating the stands (Snook 2010, Roux 2010). Larger diameter 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 by SPZs, the proposed actions are not expected to cause short-term changes to fish habitat at the site or downstream. In the long-term, the increase in the size of trees in the RR LUA could benefit LWD recruitment to the stream channel, thus potentially improving the quality/complexity of aquatic habitat adjacent to the treatment areas in the future.

Temperature effects
According to the stream shading sufficiency analysis done for the proposed treatment units, the proposed SPZs of 55 to 60 feet was sufficient to protect critical shade in the primary shade zone, based on topography and average tree height (Snook 2010, Roux 2010). 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 50 percent. Stream shading would be maintained and no change to water temperature from the activities proposed in this project would be anticipated (Wegner 2010). Based on the shade sufficiency analysis, the hydrology report water quality analysis, and the project design features, the proposed actions are unlikely to impact fish habitat both at the treatment site and downstream.

Sediment effects
Proposed yarding is unlikely to result in any measurable changes in sediment delivery to the surrounding stream network (Wegner 2010). The use of aerial and skyline yarding, SPZ buffers, residual slash, and use of existing skid trails should keep sediment movement to a minimum. Vegetated buffer widths ranging from 40 to 100 feet are sufficient to prevent sediment from reaching streams (Burroughs and King 1989, Corbett and Lynch 1985,

Swift 1985). 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.

Road Work:

Flows Effects

Construction of 4,300 feet of new road may occur within one site potential tree height of stream channels, none within 70 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 the new road construction are intermittent, thus not subject to elevation of stream temperatures during summer months. In addition, the existing buffer distance of 70 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 SPZs of 55 feet was sufficient to protect critical shade in the primary shade zone, based on topography and average tree height (Snook 2010, Roux 2010). Thus, new road construction would be highly unlikely to have any affect on stream temperatures at the site and highly unlikely to impact aquatic habitat or fish downstream.

LWD Effects

Road construction has the potential to alter LWD recruitment to streams at the site level. Stand exam data shows the tallest 40 trees adjacent to all road segments are generally shorter than the distance separating most new roads to the nearby streams (Table 13). Except for two segments in Potter Elk (25A-P and 25A-P3) road construction would not be anticipated to impact LWD recruitment in the short-term at these sites.

Table 13. Length of new road construction within one Site Potential Tree (SPT) height of stream channels in proximity to stream channels, ESA listed fish habitat and essential fish habitat (EFH), and resident fish.

Unit-Rd #	Length of New Construction within 1 SPT (ft)	Tallest 40 Trees/Unit (Ft)[1]	Shortest Distance to Streams (Ft)	Distance LFH/EFH (Ft)	Distance Resident Fish (Ft)
Fanno Lookout					
25B-P3	710	104	120	80,900/48,700	3,600
25B-P4	50	104	170	81,800/49,600	4,500
15A-P	260	98	100	47,700/15,500	2,500
Potter Elk					
25A-P	880	138	100	76,000/43,800	2,450
25A-P3	1,310	138	110	75,600/43,400	2,000
25A-P4	490	138	140	74,700/42,500	1,100
U. Warnicke					
15A-P	417	87	150	75,300/28,200	150
15B-P1	370	87	100	79,800/32,800	2,900

1- See Appendix 3 Upper Warnicke and Appendix 3 Potter-Elk and Fanno Lookout Silviculture Prescription. Largest 40 tree heights from stand exam data.

Removal of trees within one site potential tree height of streams from new construction of 25A-P and 25A-P3 may cause a reduction in potential recruitable CWD and LWD. Removal of riparian timber may alter the

stability and quality of aquatic habitat (Beechie et al 2000, Chamberlin et al 1991). All new construction would be spatially separated by at least 100 feet from stream channels. Over the short-term, the small diameter woody debris most likely to reach stream channels would be protected by a combination of the untreated 55 to 60 foot SPZs in project units and the minimum 100 foot buffer between road construction and streams.

The total area of road within the riparian impacted within one site potential height of streams is very small, less than 2.3 acres. Proposed roads are located on or near ridge tops, all of which are located on low gradient slopes. New construction is located in areas considered low-risk in susceptibility to mass movement (BLM 1998). As only a small fraction of the recruitable wood source near the stream may be affected, the effected soils are considered stable, the impacts to large wood is anticipated to be undetectable in the adjacent streams over the long-term. Undetectable changes to wood and wood recruitment in stream channels is not expected to measurably affect aquatic habitat at the site or downstream where fish reside. Thus the long-term impacts of road construction would be undetectable to fish and aquatic habitat downstream. The proposed road work may also have modest benefit to the stands creating openings in the adjoining canopy and locally stimulating growth, thus potentially enhancing the quality of LWD recruitment from stands adjacent to the roads.

Sediment Effects

Proposed road construction would occur at least 70 feet from streams. Vegetated buffer widths ranging from 40 to 100 feet are sufficient to prevent sediment from reaching streams (Burroughs and King 1989, Corbett and Lynch 1985, Swift 1985). Based on the modest gradients associated with the proposed road locations, and the incorporation of buffers of 70 feet or more, transport of sediment to stream channels would not be expected. Based on location of new roads and seasonal restrictions, road construction is unlikely to increase sediment which may alter stream channels and fish habitat.

Timber Hauling:

The potential for timber hauling to generate road sediment is minimized by PDF's. The majority of the sale area, and haul roads are located near the ridge lines and are graveled. 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. Road located more than 200 feet from fish habitat would be unlikely to transport sediment which would reach fish habitat (Table 13).

Upper Warnicke

The majority of the haul route to the north (Firehaul Road) is located in the Agency Creek-South Yamhill River Watershed on rock surface roads which drain towards or are adjacent to Rock Creek and Cow Creek, both of which are fish bearing and contain winter steelhead (Map 4). The road parallels a portion of Rock Creek, perched 50 feet upslope from the stream near vertical cliffs for approximately 1/4 mile. Six stream crossings are within two site potential tree heights of occupied habitat for salmonids, four of which are near listed steelhead habitat.

Hauling can increase the risk of sediment reaching these stream channels and negatively affect aquatic habitat. Seasonally restricting hauling on Firehaul Road such that no surface runoff from roads would occur and implementation of sediment reduction design features would minimize the quantity of sediment expected to reach fish habitat in the South Yamhill River watershed. In addition, recent improvements in Firehaul road, intended to reduce the overall quantity of sediment transported to aquatic habitat in Rock Creek and Cow Creek, should result in improved conditions over the long-term. However, minor short-term pulses in sediment may reach the streams associated with the haul route during the onset of initial winter storm events.

Sediment and turbidity which may be generated from hauling during winter freshet events would most likely occur when background turbidity in streams is also elevated. The small increase in turbidity which may be

generated by hauling on this road would likely be undetectable against background turbidity where fish reside; thus impacts to fish and aquatic habitat would likely be unmeasurable.

Fanno Lookout

The proposed hauling from Fanno Lookout varies in proximity to resident fish, the haul route is primarily in the Little Luckiamute River with a small portion in Rogers Creek and Little Boulder Creek. The majority of the haul route is located near the ridge top of the Luckiamute River watershed, with few stream crossings (Table 13). Cutthroat trout occupy habitat along the Little Luckiamute River which parallels a portion of the haul route. Approximately thirteen perennial stream crossings along Little Luckiamute River are associated with the haul route, seven crossings within 400 feet of the Little Luckiamute River. The falls at Falls City is the limit for steelhead in the Little Luckiamute River. The nearest graveled stream crossing associated with the haul route to steelhead occupied habitat, (a tributary to the Little Luckiamute River), is approximately 1/3 of a mile upstream from the falls in Falls City (Map 3).

Proposed dry season hauling is not expected to result in detectable quantities of sedimentation reaching fish bearing streams. Minor short-term pulses in sediment may reach the streams associated with the haul route crossings during the onset of initial winter storm events. There are two large stream crossings located on the 8-7-23 road, over the Little Luckiamute River. These low gradient road crossings have heavily vegetated ditchlines and would have limited potential to transport sediment (Luce and Black 1999). The remaining stream crossings on the 8-7-23 road may connect ditchlines to small intermittent channels. 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.

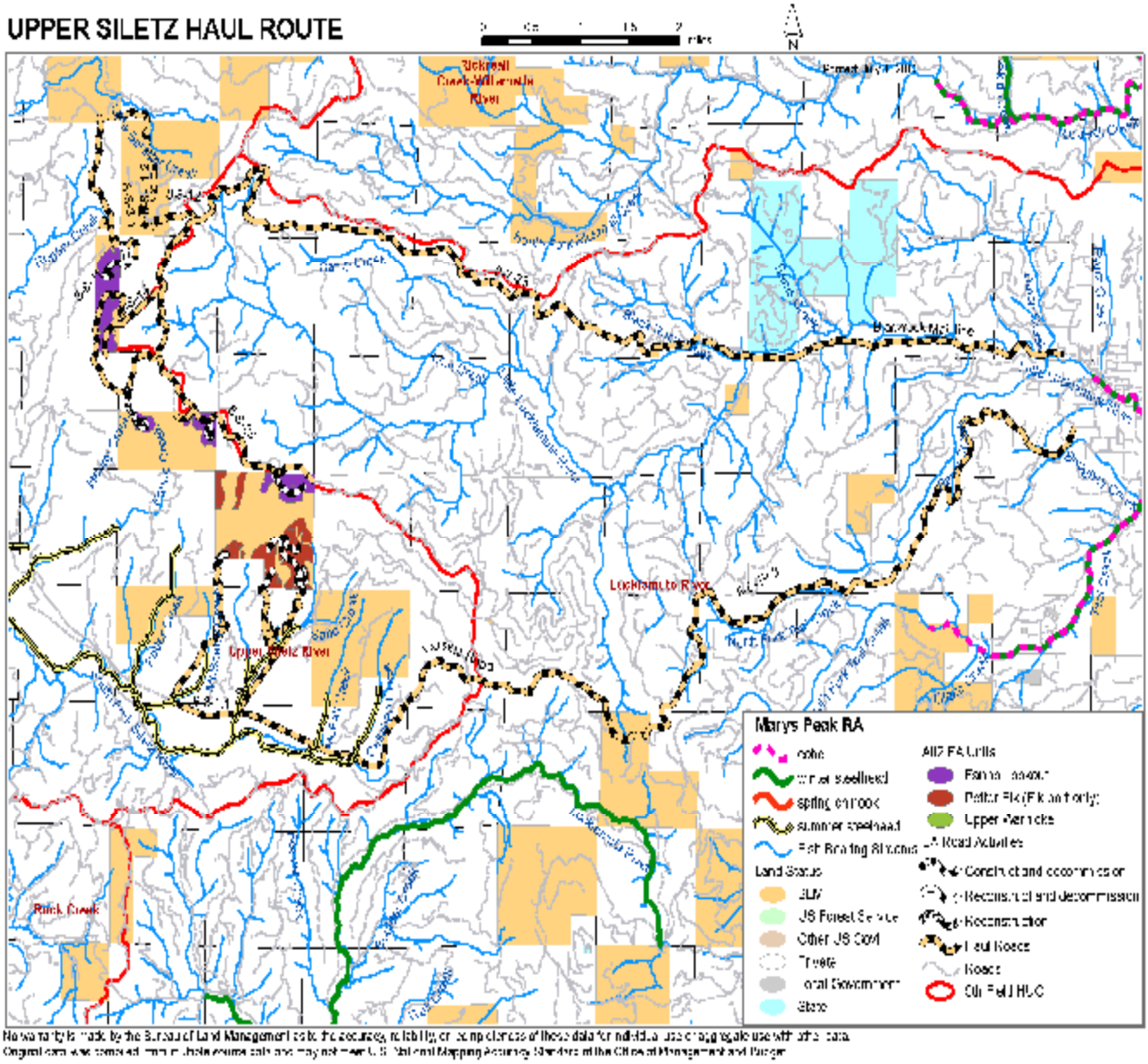
Potter Elk

Five stream crossings over resident fish habitat in the Upper Siletz River are located on flat road surfaces with heavily vegetated ditchlines. However, short segment of road in close proximity to these fish bearing crossings may have direct short-term connections of road surface runoff with stream channels during heavy rainfall events. Cessation of hauling during these heavy rainfall periods, when road surface flows are most likely to be connected to stream channels, would minimize the extent of sediment being disturbed and subsequently available for transport to the stream channel. Impact to fish and aquatic habitat would be limited to minor short-term site specific effects to short reaches of fish habitat downstream of these stream crossings due to sediment generated from hauling. Fish may experience short-term direct negative effects as a result of proposed wet season hauling due to localized increase in turbidity in the stream channel. Generally fish would be expected to move away from high turbidity to areas of low turbidity or reducing activity during periods of elevated turbidity (Bjornn and Reiser 1991). Application of sediment control PDFs (silt fences, hay bales etc) and cessation of haul during heavy rainfall, would minimize the magnitude of sediment reaching streams. The duration of sediment reaching streams would be short-term, occurring during the wet seasons during and immediately following hauling activities.

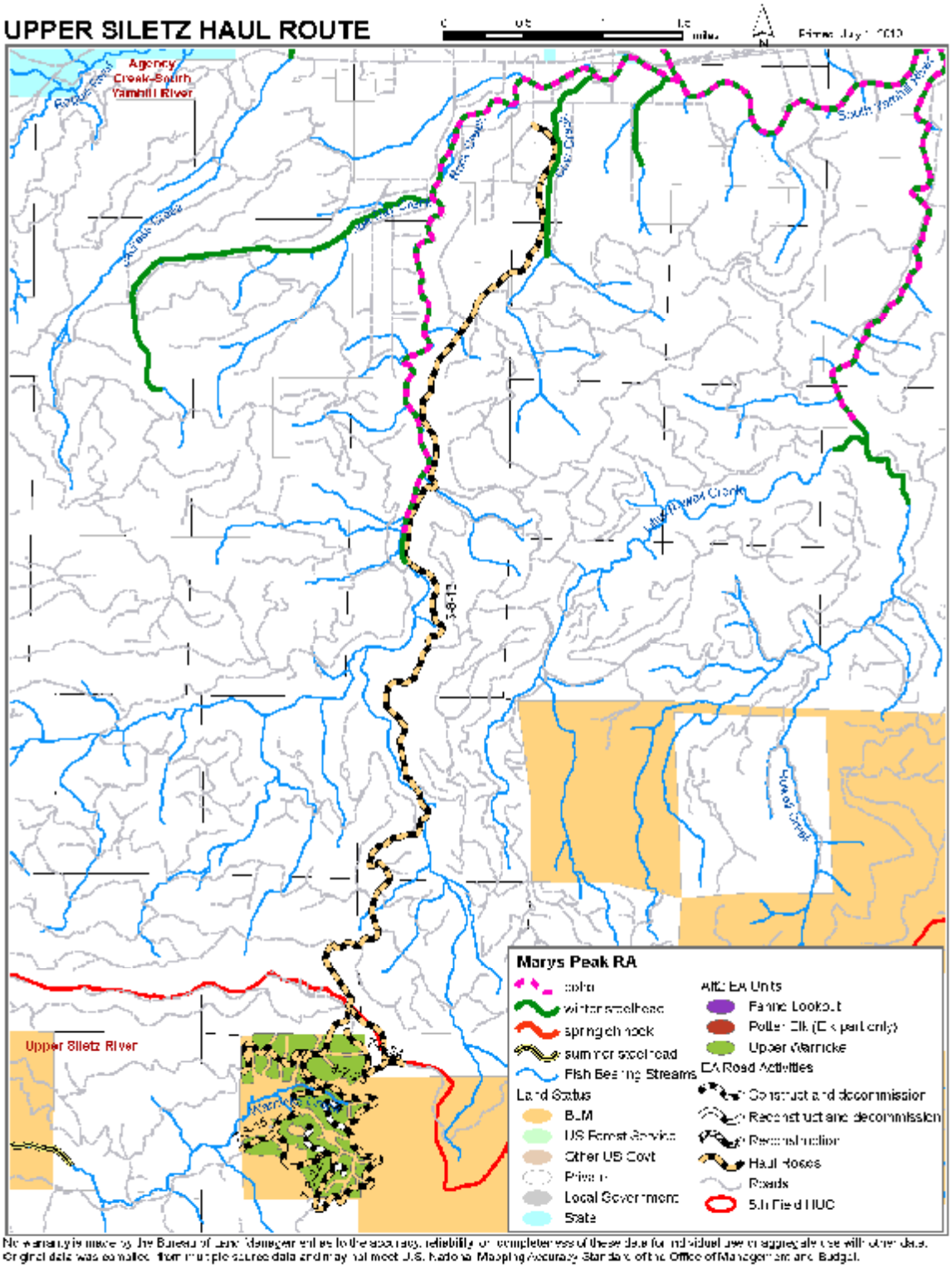
The hauls roads associated with Potter Elk have limited connectivity to resident fish habitat, though several crossings are in close proximity. There are no known fish bearing stream crossing associated with the haul route in the Luckiamute River Watershed. Wet season hauling on road segments associated with Potter Elk in the Teal Creek and Little Luckiamute River drainages may result in site level increase if sediment transport to several non fish bearing streams (Map 1). 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.

Map 3



Map 4


UPPER SILETZ HAUL ROUTE
Agency Creek-South Yamhill River
Upper Siletz River
Marys Peak RA
coho
winter steelhead
spring ch nook
summer steelhead
Fish Bearing Streams
Land Status
BLM
US Forest Service
Other US Govt
Private
Local Government
State
Alt. EA Units
Fanno Lookout
Potter Elk (Exempt only)
Upper Warnicke
EA Road Activities
Construct and decommission
Reconstruct and decommission
Reconstruction
Haul Routes
Roads
5th Field HUC

Machine and Hand Pile Burning
Burning piles could produce small areas susceptible to erosion and restricted infiltration (Wegner 2010). However burn areas would be surrounded by buffers and no burning would occur in SPZs. Vegetated buffer areas ranging in width from 40 to 100 feet appear to prevent sediment from reaching streams (Burroughs and King 1989, Corbett and Lynch 1985, Swift 1985). The SPZ's associated with the project would be expected to provide sufficient distance from the streams to capture any surface erosion from pile burning treatments.

3.1.5.3 *Alternative 3 (Limited new road construction)*

Yarding/Falling

Flow, Temperature, LWD, and Sediment Effects
Alternative 3 would change forest cover between 0.5 and 10.5 percent in any of the affected 7th field drainages and between 0.3 and 2.0 percent of any affected 6th field sub-watershed. This alternative would affect a slightly smaller area within each of the affected drainages/sub-watersheds compared to Alternative 2. Other than a 22 percent reduction in the total number of acres treated (654 acres in Alternative 2 versus 509 acres in alternative 3) the proposed thinning prescription of Alternative 3 would be the same as proposed under Alternative 2. Flow, temperature, LWD, and sediment effects would be similar in scope and nature as described under Alternative 2, except for unit 15A in Fanno Lookout. Unit 15A boundary changed, increasing the distance of proposed actions from stream channels and fish habitat in Alternative 3 compared to Alternative 2. Alternative 3 would treat seven riparian acres approximately 2,900 feet upstream from resident fish compared to less than one tenth acre treated approximately 1,200 feet from resident fish under Alternative 2. The proposed boundary of unit 15A under Alternative 3 would be less likely to alter aquatic and fish habitat compared to Alternative 2 actions due to smaller area treated and greater distances (eg wider buffers) to aquatic habitats.

Road Work:

Flows, Temperature, and Sediment Effects
Construction of 250 feet of new road may occur within one site potential tree height of stream channels, none within 55 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, 88 percent of the new road is located outside the riparian reserves, and no new construction would cross any existing stream channels. Vegetated buffer widths ranging from 40 to 100 feet are sufficient to prevent sediment from reaching streams (Burroughs and King 1989, Corbett and Lynch 1985, Swift 1985). Based on the modest gradients associated with the proposed road locations, and the incorporation of buffers of 55 feet or more, transport of sediment to stream channels would not be expected. The channels nearest the new road construction are intermittent, thus not subject to elevation of stream temperatures during summer months. Based on location of new roads, the intermittent nature of the stream channel and seasonal restrictions on activities, road construction is unlikely to increase flows, temperature, or sediment which may alter stream channels and fish habitat.

LWD Effects
Alternative 3 would reduce the amount of new road construction within one site potential tree height of project area streams to slightly more than 250 feet, a nearly 4,000 foot reduction compared to Alternative 2. Proposed new construction would occur within 55 feet of stream channel inception point (Table 14). Over the short-term the small diameter woody debris most likely to reach stream channels would be protected by the untreated 55 foot SPZs between road construction and streams. At a minimum, the proposed SPZ width in this circumstance, which accounts for 77 percent of this woody debris recruitment zone, is anticipated to maintain wood recruitment rates. Alternative 3 actions are not expected to cause measurable short-term effects to aquatic habitat at the site or downstream.

Alternative 3 would reduce the amount of drainage and subwatershed area affected. Other than a net reduction in the total number of acres treated, proposed thinning prescription would be the same as proposed under Alternative 2. Flow, temperature, LWD, and sediment effects would be similar in scope and nature as described under Alternative 2, except for unit 15A in Fanno Lookout. Unit 15A boundary changed, increasing the distance of proposed actions from stream channels and fish habitat compared to Alternative 2. The proposed boundary of unit 15A under Alternative 3 would be less likely to alter aquatic and fish habitat compared to Alternative 2 actions due to greater distances (eg wider buffers) to aquatic habitats.

Table 14. Length of new road construction within one Site Potential Tree (SPT) height of stream channels in proximity to stream channels, ESA listed fish habitat and essential fish habitat (EFH), and resident fish.

Unit-Rd #	Length of New Construction within 1 SPT (ft)	Tallest 40 Trees/Unit (Ft)[1]	Shortest Distance to Streams (Ft)	Distance LFH/EFH (Ft)	Distance Resident Fish (Ft)
Potter Elk					
25C-P1	250	138	55	71,000/33,800	2,200

The total area of road within the riparian impacted within one site potential height of streams is very small, less than 0.13 acres. More than two acres of the stand would be unaffected by road construction under Alternative 3 compared to Alternative 2. The proposed road is located on or near ridge tops, all of which are located on low gradient slopes. New construction is located in areas considered low-risk in susceptibility to mass movement (BLM 1998). As only a small fraction of the recruitable wood source near the stream may be affected, the affected soils are considered stable, and the scale of the project treatments is limited to 0.13 acres within one SPT from the stream, the impacts to large wood is anticipated to be undetectable in the adjacent streams over the long-term. Undetectable changes to wood and wood recruitment in stream channel is not expected to measurably effect aquatic habitat at the site or downstream where fish reside. Thus the long-term impacts of road construction would be undetectable to fish and aquatic habitat downstream. The proposed road work may also have modest benefit to the stands creating openings in the adjoining canopy and locally stimulating growth, thus potentially enhancing the quality of LWD recruitment from stands adjacent to the roads.

Machine Pile and Hand Pile Burning

Minor changes to treatment area would occur under this alternative. The nature and magnitude of effects to fisheries and aquatic habitat from machine pile and hand pile burning under Alternative 3 would the same as described under Alternative 2.

Timber Hauling:

Upper Warnicke, Fanno Lookout, Potter Elk

The proposed haul routes would be the same under both alternatives, except minor changes to haul routes in Potter Elk would occur under Alternative 3. Three fish bearing stream crossings would be included and one fish bearing crossing dropped under this alternative; however, the nature and magnitude of effects to fisheries and aquatic habitat would the same as described under Alternative 2.

Rare, Threatened, and Endangered Species

The NMFS (National Marine Fisheries Service) listed the UWR (Upper Willamette River) ESU winter steelhead as a threatened species under the ESA. Critical habitats were designated for UWR steelhead. Upper Willamette River ESU Winter steelhead historically would not reach the project areas due to natural barriers. No effects to listed UWR steelhead are anticipated from the proposed treatments (yarding/falling/pile burning/road construction/road renovation/road decommissioning/girdling) due to the distance of treatment to occupied habitat.

Upper Willamette River winter steelhead are present in Teal Creek up to the first barrier falls in the Northeast ¼ of Township 8 South, Range 6 West Section 31, approximately 1.75 miles downstream from the nearest stream crossing of the Valsetz Mainline Road haul route. The upper limit of UWR winter steelhead in the Little Luckiamute River ends at the falls in Falls City Township 8 South, Range 6 West, Section 21.

The proposed dry season hauling on roads close to the Little Luckiamute River associated with Black Rock Road is not anticipated to affect listed steelhead due to the distance of listed habitat from the proposed hauling and that no surface erosion would be occurring during hauling. With incorporation of project design criteria (dry season use of Black Rock Road and restricting haul to periods when ditchline flows are not connected to stream channels on the Valsetz Mainline Road) the proposed hauling on these roads would have no effects to listed UWR steelhead.

The proposed hauling on Firehaul Road close to Rock Creek and Cow Creek in the Agency Creek-South Yamhill River Watershed 'may affect' listed UWR steelhead due to the proximity of listed habitat adjacent to the proposed haul route and hydrologic connectivity of the road to occupied habitat. Seasonally restricting haul to the dry season would be expected to minimize effects to the listed species.

Upper Willamette River Spring Chinook salmon are known to reside in the lower reaches of the Luckiamute River, 25.5 miles downstream from the haul route. The NMFS has listed spring chinook salmon in the UWR ESU as threatened under the ESA.

Oregon chub historically resided in the lower portions of the Luckiamute River. Oregon chub is listed as endangered under the ESA. Currently there are no known chub populations residing in the Luckiamute River watershed.

The OC coho salmon ESU is listed as threatened under the ESA. Oregon Coast Coho Salmon do not migrate past Siletz Falls, at least 9.5 miles downstream from the project area (ODFW 1997).

The proposed hauling on Firehaul Road may cause short-term effects to the listed fish or listed critical habitat in the Agency Creek-South Yamhill River Watershed. For this reason a May Affect determination was made for UWR steelhead and UWR steelhead critical habitat and formal or informal consultation may be required.

A No Effect determination was made for UWR Chinook salmon, Oregon Coastal coho salmon, and Oregon chub primarily due to the distance of listed habitat from the proposed action. No consultation would be required for UWR spring chinook, OC coho, or Oregon chub species.

Protection of 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 Potter Elk and Fanno Lookout Timber sales addressed in the Upper Siletz River Watershed Enhancement EA are not expected to adversely affect EFH due to distance of all activities associated with the project from occupied habitat in either the Upper Siletz River or Luckiamute River Watersheds. Consultation with NMFS on EFH is not required for the Potter Elk and Fanno Lookout Timber sales. However, proposed hauling on Firehaul Road may require consultation with NFMS to address potential effects from the Upper Warnicke timber sale to EFH.

3.1.6 **Fuels\Air Quality**

The following fuels and air quality issues will be addressed in the environmental effects section below:

- What effects would thinning and road work have on fuel loading, fire risk and air quality?

Affected Environment

Fuels:

Undergrowth in the timber stands is a moderate to heavy growth of: salal, vine maple, sword fern, and red huckleberry. There is a light to moderate accumulation of small and medium diameter dead woody material and leaf litter on the ground in most of the stands. There are scattered areas with heavy accumulations of medium and larger diameter logs where wind throw has occurred. Larger 20 inches+ diameter downed logs are more common in the older stands where wind throw has occurred, otherwise they are scarce as are large snags. Small

snags less than 12 inches DBHOB are fairly common.

The estimated total dead fuel loading for these stands ranges from 10 up to 25 tons per acre on the majority of sites. On sites with substantial amounts of wind throw the fuel loading would range up to 60 tons per acre. Much of the existing down material is rotten or only partially sound.

Air Quality:
Air quality in the area of the proposed project is generally very high due to the location of the project areas in the Oregon Coast Range. Transport winds affecting the areas 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 during the burning season and may result in accumulation of particulate matter but generally these are short lived lasting less than 1 week.

Environmental Effects

3.1.6.1 *Alternative 1 (No Action)*

This alternative would result in no immediate change to the affected environment. Short-term impacts to fuels and air quality would be avoided. Longer term fuel loadings and crown density would increase and there would be no reduction in the risk of a crown fire occurring in the untreated stands.

3.1.6.2 *Alternative 2 (Proposed Action)*

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. Depending on the level of treatment in the various units, slash created from timber harvest would add an estimated 5 to 15 tons per acre of dead fuel to the treatment areas. The fuel arrangement would be discontinuous.

In the stands that would be commercially thinned, risk of a fire start in the untreated slash would be greatest during the first season following cutting, the period when needles dry out but remain attached. Within one year, the risk of a fire start greatly diminishes as the dead needles and fine twigs break off, fall to the surface, absorb moisture and begin to decay. With the increased sunlight to the ground there would be increased sprouting and germination of shrub and forb vegetation. This new vegetation growth would increase the shading and humidity near the ground level raising the moisture level of the surface fuels thus reducing the risk of ignition. If a fire does start, the increase in green vegetation greatly reduces the fire intensity and spread rate due to heat absorption by the moisture contained in the green vegetation. In addition, the stems and leaves of the green vegetation would block or reflect much of the heat generated by the fire and slow down the rate heat transfer and preheating of adjacent fuel which is a critical key component of fire spread. Observations by this author 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 substantially to increased fire risk.

Depending on the amount of large, down wood left on site following logging, resistance to control would also decrease over time but more slowly. This longer time horizon is due to the fact that larger material takes longer to decay and thus stays on the site for a longer time period. Since large size class fuels are a key component in resistance to control (i.e. it takes more effort and water to extinguish these fuels), the resistance to control would decline at a slower rate commensurate with the decay rates of the larger size class material left on site. This is what is expected to occur for the areas considered in this proposed action where the slash created would be left in place, untreated.

The resulting total residual dead fuel loading would vary throughout the sites ranging from 5 to 30 tons per acre in areas with few down logs. Where there are large logs left in place to meet coarse wood requirements, these logs would add an additional 10 to 40 tons per acre to the residual dead fuel loading. 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 8 inch and larger size class. The decision to leave the majority of the slash untreated under this proposed action is based on a number of factors:

- Historically, the number of fires that have occurred in this area has been very low. The risk of a fire occurring in the area as a result of this additional slash is fairly low if mitigation is done to the highest risk areas.
- Very little treatment of slash on commercial thinning areas has been done in the past in NW Oregon and there have only been a few fires resulting from this practice.
- The general area in and around this project is not a high use recreation area (primary recreational use is hunting) so the primary ignition source (people) would not be a high risk factor for a fire start.
- The cost to treat all the slash would be fairly high (greater than $500 per acre) with limited additional benefit.
- Spot treatment of the highest risk slash along roads and on landings has been a fairly cost effective treatment used successfully on similar projects in the past.
- If a fire did occur, most of the timber value would be salvageable.
- The continued existence of a tree canopy to shade the fuels would maintain cooler temperatures and higher humidity on the site which would contribute to reducing the risk of a fire start.

The affect of decommissioning and blocking the new roads in the project areas would be an increase in the response time and the effort needed by ODF (Oregon Department of Forestry) or BLM to control a fire in the area since access is restricted. This negative effect is somewhat offset by the fact that most fires in this area are human caused. By restricting access, the risk of a fire starting in the area should be lower. Fire records for the Salem District over the past 20+ years show that the majority of the non industrial operation human caused fire starts have occurred alongside roads, on landings at the end of roads or along trails. Subsequently, by restricting access, fire starts within the proposed treatment areas would be less than if roads and access were to remain open. The use of gates during the high fire danger season has been used by private and federal land owners in this region for a number of years with good success in preventing fire starts.

Air Quality:

Because there are several proposed units making up this proposed action, it is expected that only a portion of the total would be available for burning at any given time. The total amount of slash debris expected to be piled and available for burning on a given day is estimated to be approximately 100 to 600 tons from the landings and treated areas along the roads. Burning up to 600 tons of dry, cured, piled fuels under favorable atmospheric conditions in the Oregon Coast Range under the guidance of the OSMP (Oregon Smoke Management Plan) administered by the local ODF offices is not expected to result in any long term negative effects to air quality in the air shed. Because the fuel would be located in individual piles, burning on a given day can easily be adjusted to the amount that fits within OSMP guidelines for the day.

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. Generally, once covered dry piles have been ignited, the fire intensity builds rapidly to a point where the fuels burn cleanly and very little smoke is produced. The strong convection column produced carries the smoke and gases well up into the atmosphere where it is diluted and carried away in the air mass. After a few hours, as the piles burn down and the intensity subsides, additional smoke may be produced due to lower temperatures and less efficient combustion. Depending on size, arrangement, type and moisture content of the remaining fuel, the smoke would diminish over several hours or days as the piles cool and burn out (sooner if rain develops). Generally this later smoke only affects the immediate area (¼ to ½ mile or less) around the pile.

If a temperature inversion develops over the area during the night time hours, smoke may be trapped under the inversion and accumulate, resulting in a short term impact to the local air quality (generally the area within 1 mile or less from the burn area). The accumulated smoke generally clears out by mid-morning as the inversion lifts. Due to the location of this project (over 2,000 feet elevation in an area with good exposure and air flow), it is unlikely that inversions would present a problem. Burning of slash would always be coordinated with ODF and conducted in accordance with the OSMP. This serves to coordinate all forest burning activities on a

regional scale to prevent negative impacts to local and regional air sheds. Guidance under the OSMP would always prevent or severely limit burning anytime the weather forecasts indicate there is a likelihood of a stagnant air or persistent inversion situation developing.

3.1.6.3 *Alternative 3 (Limited new road construction)*

Fuels:
With the following exceptions, Alternative 3 is the same as Alternative 2. Alternative 3 proposes less harvested acres, therefore less activity related slash to help support a surface fire following harvest. In addition, less affects on reduced overhead canopy and the associated increase in brush would help maintain the live fuel loadings. Because there are fewer acres proposed for harvest, fewer canopies are opened up, therefore less dead fuels, duff, and surface vegetation would be dried out, and fuel moisture would be less affected and the flammability potential may be lessened.

Air Quality:
With the following exceptions, Alternative 3 is the same as Alternative 2. Alternative 3 proposes less harvested acres therefore less slash would be burned. The burning that would occur would have similar effects as alternative 2, which are limited and short lived.

3.1.7 **Carbon Sequestration (Storage) and Climate Change**

The Upper Siletz River Enhancement Project EA (DOI-BLM-OR-S050-2009-0002) is tiered to the PRMP FEIS (1994) which concluded that all alternatives analyzed in the FEIS, in their entirety including all timber harvest, would have only slight (context indicates that the effect would be too small to calculate) effect on carbon dioxide levels. Responsive to public comment, the BLM considers it prudent to include project level analysis of carbon storage and emissions.

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, concluded that it is currently beyond the scope of existing science to identify a specific source of greenhouse gas emissions or sequestration and designate it as the cause of specific climate impacts at a specific location. This defines the spatial scale for analysis as global, not local, regional or continental. That memorandum is incorporated here by reference.

Temporal Scale for Analysis

The BLM has selected thirty 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 thirty 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.

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 percent of harvest volume is considered as sawlogs and 36.2 percent 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

Climate Change

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

Under average historic conditions (2008 FEIS, p. 3-211), BLM-managed lands in western Oregon stored 576 million tonnes of carbon, 35 percent 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 654 acres of trees aged 40 to 78 years old.

Carbon Storage

The following show quantities of carbon in forest ecosystem vegetation[6] in the Coast Range, and in the Upper Siletz project area.

[6] 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.

- Total carbon, forest ecosystem vegetation, Pacific northwest, Coast Range 1.8-2 Giga-tonnes (Gt) (Hudiburg, et al. 2009).
- Total carbon, forest ecosystem vegetation, Upper Siletz River Project stands = 104,000 tonnes or 0.0001676 Gt. This represents *.001 percent* 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 percent 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 Upper Siletz River project:

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

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

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

Environmental Effects

3.1.7.1 *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 30 years of growth, live tree carbon would increase to 124,000 tonnes, an increase of 46,000 tonnes from the current level of 78,100 tonnes.

The no action alternative would result in greater net carbon storage over the 30 year analysis period than the proposed action by approximately 42,600 tonnes.

3.1.7.2 *Alternative 2 (Proposed Action)*

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

Harvest Operations
Equipment use necessary to harvest and transport the timber to the nearest mill (Dallas, Oregon) would consume an estimated 53,317 gallons of fuel, or total emissions of 160 tonnes of carbon. (This includes 65 acres of helicopter yarding, which requires high fuel consumption, and 589 acres of conventional yarding).

Live Trees
Live trees would be removed, decreasing live tree carbon from 78,100 to 42,300 tonnes, and transferring 35,800 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 147 tonnes of carbon emitted.

Harvested wood
Harvested saw log gross volume of 13,000 mbf would contain 17,300 tonnes of carbon. Much of the emissions from harvested wood occur shortly after harvest. In the first 10 years after harvest, approximately 3,950 tonnes would be emitted.

Long-term Impacts (11-50 years after timber harvest):

Live Trees
Following harvest an average of 43 trees per acre 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 30 years of growth, carbon stored in live trees would be 74,400 tonnes, still 3,700 less than the current (pre-harvest) level of 78,100 tonnes.

Harvested wood
Harvested wood in the Upper Siletz project would contain 17,300 tonnes of carbon. From 11 to 30 years after harvest approximately 1,011 tonnes of carbon would be emitted from harvested wood, totaling 5,000 tonnes (31 percent) emitted without energy capture in the full 30 year analysis period. The balance, approximately 12,400 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 5,270 tonnes, while storage would equal 8,700 (net storage of 3,390 tonnes) and include the following:

Short-term emissions (0-10 years post-harvest)
- Harvest operations emissions totaling about 160 tonnes
- Fuel treatment (burning) emissions totaling 147 tonnes
- Emissions from harvested wood 0 to 10 years after harvest of 4,000 tonnes

Long-term emissions(11-30 years post-harvest)
- Emissions from harvested wood, 11 to 30 years after harvest of 1,011 tonnes.

Long-term Storage (30 year analysis period)
- 12,400 tonnes of storage in harvested wood
- -3,700 tonnes net storage in live trees after 30 years of growth

Greenhouse gas emissions and carbon storage over the 30 year analysis period resulting from the proposed action are displayed in Table 15, below.

3.1.7.1 ***Alternative 3 (Limited new road construction)***

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

Harvest Operations
Equipment use necessary to harvest *and transport the timber to the nearest mill (*Dallas*, Oregon) would consume an* estimated 53,317 *gallons of fuel*, or total emissions of 125 tonnes of carbon. (This includes 125 acres of helicopter yarding, which requires high fuel consumption, and 384 acres of conventional yarding).

Live Trees
Live trees would be removed, decreasing live tree carbon from 60,815 to 33,000 tonnes, and transferring 27,800 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 147 tonnes of carbon emitted.

Harvested wood
Harvested saw log gross volume of 10,000 mbf would contain 13,500 tonnes of carbon. Much of the emissions from harvested wood occur shortly after harvest. In the first 10 years after harvest, approximately 3,080 tonnes would be emitted.

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

Live Trees
Following harvest an average of 43 trees per acre 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 Alternative 3 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 30 years of growth, carbon stored in live trees would be 57,900 tonnes, still 2,900 less than the current (pre-harvest) level of 60,800 tonnes.

Harvested wood
Harvested wood in the Upper Siletz project would contain 13,500 tonnes of carbon. From 11 to 30 years after harvest approximately 787 tonnes of carbon would be emitted from harvested wood, totaling 3,900 tonnes (31%) emitted without energy capture in the full 30 year analysis period. The balance, approximately 9,600 tonnes (69%) 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 4,100 tonnes, while storage would equal 6,700 (net storage of 3,390 tonnes) and include the following:

Short-term emissions (0-10 years post-harvest)

- Harvest operations emissions totaling about 125 tonnes
- Fuel treatment (burning) emissions totaling 115 tonnes
- Emissions from harvested wood 0 to 10 years after harvest of 3,100 tonnes

Long-term emissions(11-30 years post-harvest)

- Emissions from harvested wood, 11 to 30 years after harvest of 787 tonnes.

Long-term Storage (30 year analysis period)

- 9,600 tonnes of storage in harvested wood
- -2,900 tonnes net storage in live trees after 30 years of growth

Greenhouse gas emissions and carbon storage over the 30 year analysis period resulting from Alternative 3 are displayed in Table 15, below.

Comparison of Alternatives

Table 15. Carbon Emissions and Storage, Comparison of Proposed Action and No Action Alternatives

Source	*Proposed Action (Tonnes)*	*No Action Alternative (Tonnes)*	*Notes*
Emissions, 2010-2040	5,270	0	Logging, fuel treatments (burning), and emissions from harvested wood.
Live tree storage, 2059	74,400	124,000	30 years of stand growth
Live tree storage, 2009 (current conditions)	78,100	78,100	68 year old stand, 2009
Net change, live trees	-3,725	+ 46,000	Live tree carbon from growth 2009 - 2039
Harvested wood storage, 2059	12,380	0	69 percent of harvested wood carbon, 30 years
Total storage increase	**8,700**	**46,000**	Storage: live trees and harvested wood
Net Carbon Storage, Proposed Action	**3,400**	**46,000**	**Storage minus emissions, 2009-2039**

Under the No Action alternative, 40 percent more carbon would remain stored in live trees than under the Proposed Action during the 30 year analysis period. Under the Proposed Action, carbon would be released through logging, fuel treatments and emissions resulting from harvested wood, the majority (80 percent) 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 5,270 tonnes, equivalent to 7 percent of the current live tree storage in the project area, and approximately .0000016 percent 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.

Table 16. Carbon Emissions and Storage, Comparison of Alternative 3 and No Action Alternative

Source	***Alternative 3 (Tonnes)***	***No Action Alternative (Tonnes)***	***Notes***
Emissions, 2010-2040	4,100	0	Logging, fuel treatments (burning), and emissions from harvested wood.
Live tree storage, 2059	57,900	96,600	30 years of stand growth
Live tree storage, 2009 (current conditions)	60,800	60,800	68 year old stand, 2009
Net change, live trees	-2,900	+ 35,800	Live tree carbon from growth 2009 - 2059
Harvested wood storage, 2059	9,600	0	69% of harvested wood carbon, 30 years
Total storage increase	**6,700**	**35,800**	Storage: live trees and harvested wood
Net Carbon Storage, Alternative 3	**2,600**	**35,800**	**Storage minus emissions, 2009-2059**

4.0 CUMULATIVE EFFECTS

4.1 Vegetation

Age Class:

Alternative 2

Alternative 2 would not change the age class distribution of the Upper Siletz River Analysis area, as all the density management would be in mid-seral stands, and would change the structure of these stands, but would not change their age class. However, eight acres in one-acre patch cuts would go from mid-seral to early seral age class. Currently, age class distribution in the 12,215 acres of BLM-managed land in the 44,480 acre watershed consists of 767 acres (6 percent of BLM-managed land) early seral (age 0 to 39 years), 7,049 (58 percent) mid-seral (age 40-79 years), 1,245 acres (10 percent) late-seral (80 to 199 years) and 1,080 acres (9 percent) old-growth habitat (age 200+ years). The patch cuts would create a very small change on the landscape, representing 0.06 percent of the BLM-managed land. However, with the McFall Timber Sale (2008), K-Line Timber Sale (2009) and Condenser Peak Timber Sale (2010) where 33 acres in patch cuts were created, a total of only 41 acres of open, very early seral habitat has been created in the last 25 years, comprising 0.3 percent of BLM-managed land in the watershed. The balance of the 767 acres consists of stands aged 25 to 40 years old. Future timber sales that contain patch cuts are likely, but the cumulative effect of these small patch cuts that represent about 1 percent of the total project harvest areas is small.

Alternative 3

Alternative 3 would change the age class distribution of the Upper Siletz River Analysis area similar to Alternative 2 as all the density management would be in mid-seral stands, and would change the structure of these stands, but would not change their age class.

Native vegetation:
In a recent report by Grant (2008), open areas resulting from regeneration harvesting would generally have a higher proportion of early seral species, annual species and non-native species. However, most of the native species are perennials and would persist on the sites. Studies have shown that native understory species associated with forest cover compose at least 50 percent of the ground vegetation in early seral stages and reach pre-harvest levels of species diversity and species abundance before the forest stand matures (Zamora, 1981), and native plant cover increases with time after clearcutting (Lemkuhl, 2002). Approximately 30 percent of lands in the Upper Siletz River watershed for all land ownerships are in an "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).

Bureau Special Status Botanical and Fungal Species:
Commercial thinning/density management of dense conifer stands would provide future habitat for uncommon botanical and fungal species since thinning dense stands allows for increased secondary conifer growth when compared to no thinning. In addition, thinning allows for an increase in diversity and density of shrub and forb species. There are no known Rare, Threatened, Endangered species in the project areas. All Bureau special status species have been protected by excluding the known sites within the treatment areas.

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

- 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 noxious weed infestations to occur. Most noxious weeds are not shade tolerant and would not persist in a forest setting as they become out-competed for light as native tree and/or shrub canopies close and light to the understory is reduced. 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 Siletz River Watershed. However, as discussed above, the risk rating for any adverse cumulative effects to the Upper Siletz River Watershed or any adjacent watersheds would remain low.

4.2 **Wildlife**

The parameters for this cumulative impact analysis are as follows:

- Proposed Action; variable-density thinning approximately 654 acres of 40 to79 year old conifer forest and creation of approximately 40 acres of grass-forb-shrub elk forage patches

- Resource of concern; mid-seral conifer forest wildlife habitat
- Spatial scale for past, present and reasonably foreseeable future actions; Upper Siletz River watershed (44,480 acres)
- Temporal scale for reasonably foreseeable future actions; 5 to10 years
- Current conditions; see Affected Environment
- Trend without Proposed Action; see No-Action Alternative

The Proposed Action Alternative would have a positive cumulative impact in the Upper Siletz River watershed to BLM-managed mid-seral wildlife habitat from this action and reasonably foreseeable future mid-seral thinnings (roughly 2,820 acres across six different sections) due to the following:

- Design feature to create snags and CWD (2 each per acre within 10 years of treatment)
- Future snags would be 3 to 4 inches in diameter larger with treatment than without treatment after 30 years (ORGANON model)
- Existing snags resulting from density-dependent suppression mortality in the early and mid-seral stands in the Upper Siletz River watershed (16,348 acres)
- The small size of the project areas (654 total acres dispersed over 4 sections and two townships), which represents less than 2 percent of the Upper Siletz River watershed

Private timberlands in the watershed would continue to provide simple structured early and mid-seral forest habitat in the reasonably foreseeable future. These private lands are not expected to contribute to LSOG conditions at the landscape level.

In relation to the Proposed Action Alternative there would be a positive cumulative impact in the Upper Siletz River watershed to BLM-managed mid-seral wildlife habitat from this action and reasonably foreseeable future mid-seral thinnings (roughly 2,820 acres across six different sections) since they 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.

4.3 **Soils**

Alternative 2

No measurable amounts of surface erosion are expected from the forested lands treated under this proposed alternative. With timber hauling restricted to the dry season on native surfaced roads, the amount of sediment produced from roads and entering streams would be negligible to none. There would be no measurable cumulative impact to the soils resource outside the project area. The existing soils resource shows that the past direct and indirect effects in the project area have not had a cumulative effect on soil productivity or function. Based on these observations and the existing condition, it is unlikely that the proposed activities and the associated BMP's used for timber harvest would result in any measurable cumulative impact to the soils resource.

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 I), and soil disturbance levels are expected to remain at an insignificant level.

Alternative 3
Based on the lesser amount of road construction and harvest acres in this alternative, it is expected that the North Fork Siletz River River Key Watershed road component would better meet the Aquatic Conservation Strategy (Objectives #s 1, 2, 4, 5, 6 and 7) by not increasing the road density from the existing level. All other components of this alternative would be similar to Alternative 2 in regards to soils impacts.

4.4 **Water**

Stream Flows

Baseline precipitation, snow accumulation, and snowmelt process input and their effects to peak flows are attributes that do not change over short time periods (50 to 100 years). Because of this, the values used in the *2003 Upper Siletz Analysis* (included by reference) were brought forward and updated to include additional harvest that has taken place between 2003 and 2010.

The 2003 analysis included a list of probable actions that would occur in a ten year period. This information was reviewed for correctness and updated to make sure it included enough acres to model this project proposal accurately. The 2003 analysis included over 650 acres of additional BLM harvest and 630 acres of harvest on private lands. This proposal includes a maximum of 394 acres of harvest in the South Fork of the Siletz watershed and 260 acres in the Upper North Fork of the Siletz watershed. Using the previous watershed analysis report (WAR) analysis for the South Fork of the Siletz this action falls under the acres already analyzed. Within the entire Upper Siletz River watershed, the already completed WAR analysis resulted in a potential peakflow increase of 4.4 percent. For the smaller 7th code watersheds, the estimated percent increase in the 2-year flow volume ranges from 1.3 percent to 4 percent.

In a more recent analysis of effects to peak flows from forest management (Grant et al. 2008), the analysis of past study data has shown that watersheds dominated by areas located in the transient snow zone (like those in this proposal) generally begin to show some evidence of peak flow increase when between 15 to 20 percent of the area has been harvested. The paper also includes information from basins with no roads that experienced harvest or loss of vegetation due to fire. The increases from these watersheds can be used as a hypothetical "reference" response that could be expected from more natural landscape response to vegetation removal.

The existing percent of the watersheds that are unvegetated ranges from 37 to 45 percent. The watersheds in this proposal have the following percent of their area in an unvegetated state: McSherry Creek – 45 percent, Sand Creek -43 percent, Fanno Creek – 39 percent, Rogers Creek – 37 percent, and Warnicke Creek – 37 percent. At these levels, using the Grant analysis envelope curves, the expected increase in peakflows in the project watersheds would range from zero to 15 percent. The largest expected "natural" response in peak flow increase from these levels of vegetation removal is 18 percent.

The proposed action, in combination with all existing harvest is estimated to increase peak flows for a two-year event (under normal storm conditions) approximately 4.5 percent. This represents a 1.5 percent increase from current conditions in the entire Upper Siletz River Watershed. The estimated cumulative peak flow increases in the project watersheds are as follows: McSherry Creek – 13 percent, Sand Creek -13.3 percent, Fanno Creek – 11.9 percent, Rogers Creek – 12.1 percent, and Warnicke Creek – 12.4 percent. Considering the precision of the model, these values are well within the range of error for this method. For normal storm events, no increases in peak flow relative to a theoretical full forested condition are expected under the proposal in conjunction with the other activities in the cumulative effects analysis.

The Grant paper also discusses that there is no exact response of stream channels to increases in peak flows. In fact, Grant discusses that for the stream channel types found in the analysis area (step-pool and cascade) there is little potential for changes in stream channel attributes from increases in stream flows below the ten-year flow event which is generally in the area of a 35 to 40 percent increase in the normal two-year peak flow level.

The risk of increases to peak flows based on the proposed management activity falls well below the level indicating a potential risk of stream channel changes. Therefore, based on this update, and previous analyses, the risk of peak flow enhancement based on the proposed management activity in either action alternative is determined to be low and cumulative impacts expressed as changes to stream channel attributes are not expected to be measurable either in the project watersheds or downstream of the project watersheds.

Water Quality

Fine sediment and Temperature:

The existing channel conditions show that the past direct and indirect effects to the watershed and stream channels in the project area have not had a cumulative effect on sediment generation or function in the stream channels. Based on these observations and the existing condition, it is unlikely that the proposed activities and their associated stream buffers would result in any measurable cumulative sediment impact to the aquatic system. Stream shading would exceed the widths recommended to maintain a minimum of 80 percent effective shade resulting in no change to water temperature from the activities proposed in this project.

Burning

Observations over 3 decades of burning piled slash in this area of the coast range has resulted in no evidence of surface erosion from areas where piled slash has been burned. Based on this local experience, no increase in surface erosion is expected from this proposed activity. It is not expected that any additional erosion would occur from these units and thus there should be no impact to sediment generation or nutrient levels available to the remaining vegetation which would maintain the productivity of the stand. With slash and existing undergrowth being left on nearly all of the area, no measurable amounts of surface erosion are expected from the forested lands treated under this proposed action.

Road Work and Hauling

Road densities in the project watersheds are displayed in Table 17. The North Fork Siletz River/Warnicke Creek is classified as a key watershed for fisheries in the Aquatic Conservation Strategy (ACS). One of the criteria in this classification is that there should be a decrease in the existing amount of road construction in the basin to help improve habitat. After previous BLM actions in the planning area, some road decommissioning has occurred, so the existing road densities are lower than they have been in the recent past. The proposed activities in Alternative 2 would increase the road density back towards the previous level, but it would remain below the previous level of 5.7 mi/mi2.

Table 17 Road Densities within the 6th Field Watersheds

Watershed	Basin Square Miles	Total Road Miles	Previous Road Density (mi/mi2) After Decommissioning actions	Existing Road Density (mi/mi2)	Alt. 2 Road Density (mi/mi2)	Alt. 3 Road Density (mi/mi2)
South Fork Siletz River	26.9	127.3	4.7	4.7	4.8	4.7
North Fork Siletz River	18.1	103.3	5.7	5.4	5.5	5.4

4.5 Fisheries/Aquatic Habitat

The cumulative effects of the proposed actions to the vegetation, hydrology, and soil resources were assessed under the Soils and Hydrology Report (Wegner 2010), and the Silvicultural Prescription (Snook 2010, Roux 2010). Combined with the direct and indirect effects analysis presented in the Fisheries Report, these additional cumulative effects analyses form the basis of the fisheries resource cumulative effects analysis.

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 2010) changes in flows were considered unmeasurable 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 2010). No cumulative effects are anticipated for peak flows, streambanks, and instream structure which could also affect temperature. As 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 27 percent of the land base within the Upper Siletz River Watershed is federally administered. 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 2008).

Private lands account for roughly 73 percent of the land base in the Upper Siletz River 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. Hauling may contribute a minor amount of sediment to the stream network in the wet season. Most haul routes are located near ridgetops with a limited number of stream crossings. Portions of the haul route within the effected drainages may occur in close proximity to fish habitat; however, site level impacts were expected to be unmeasurable. As site level impacts are not anticipated to be unmeasurable, cumulative effects to aquatic resources would be unmeasurable.

Extensive road work has occurred on BLM and adjacent industrial forest over the last decade in the Upper Siletz River Watershed. In addition to timber sale 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 nature of project work and lack of connectivity between treatment areas.

Impacts of other hauling activities, from private forests, may contribute to cumulative impacts to fish habitat at the 5th field scale. However, the magnitude and extent of impacts from hauling are impractical to assess, or predict, due to high degree of variability of hauling which may occur within a watershed from one year to the next.

4.6 **Fuels/Air Quality**

There would be no cumulative effects to these resources as the effects from the project would be local and/or short lived, and there would be no other uses affecting this resource. Burning of slash would be guided by the OSMP which serves to coordinate all forest burning activities on a regional scale to prevent excess accumulation of smoke and protect air quality of local and regional air sheds. Based on past experience with pile and broadcast burning in this and other similar areas, it is expected that burning in accordance with the OSMP would result in no cumulative effects on regional air quality from the planned fuels treatment under this proposal.

The estimated 600 tons of fuel planned for disposal under this planned action would be burned over several days in the spring and fall burning seasons when weather conditions are favorable. Under OSMP guidance, generally units would be in the 500 to 750 ton range or less on most burn days and have a 5 to 10 mile spacing between units. This guidance allows for enough volume in the air shed for the smoke to dissipate without accumulating to densities that would produce noticeable negative impacts to visibility or health and safety. The OSMP guidance takes into account other sources of air particulates along with forest smoke in order to keep the combined total of air particulates within acceptable standards. Forest fuel burning at a given site is an infrequent one time event that is spaced and timed to allow for components of the smoke to be washed out of the atmosphere, be chemically broken down, be absorbed by plants, be diluted in the atmosphere, etc. so no long term cumulative effects are expected from this activity.

When looked at from a watershed scale, the thinning/density management of approximately 654 acres of forest habitat would result in a very minor increase in risk of a fire start and resistance to control a fire overall for the watershed during the first 10 years following treatment. Longer term (10 to 50+ years) there would be a reduction in the potential of the treated stand to carry a crown fire.

4.7 **Carbon Sequestration and Climate Change**

Alternative 1 (No Action)

Incremental Effects of Project Related Greenhouse Gases and Carbon Storage:

This increase of 42,600 tonnes of live tree carbon would contribute to an annual average of 1,421 tonnes, or .00007 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 30 year analysis period resulting from the No Action are displayed in Table 16.

Alternative 2 (Proposed Action)

Carbon emissions resulting from the proposed action would total 5,270 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 .0000002 percent of current global emissions and .000009 percent of current U.S. emissions.

Tree growth following harvest would offset greenhouse gases and result in net storage of 3,400 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.

Alternative 3 (Limited Road Alternative)

Carbon emissions resulting from Alternative 3 would total 4,100 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 Alternative 3 would constitute .0000002% of current global emissions and .000009% of current U.S. emissions.

Tree growth following harvest would offset greenhouse gases and result in net storage of 2,600 tonnes of carbon. The WOPR EIS (p. 4-538), which is incorporated here by reference, states that by 2106, the No Action Alternative (management under the 1995 RMP) would result in a total carbon storage of approximately 628 million tonnes, 9% higher than average historic conditions (576 million tonnes, WOPR, 3-224, as reanalyzed in November 6, 2009 memo, on file, Marys Peak Resource Area). The incremental effect of Alternative 3, over time, would be net storage of carbon.

5.0 COMPLIANCE WITH THE AQUATIC CONSERVATION STRATEGY

Existing Watershed Condition

Upper Siletz River Watershed

Twenty-seven percent of the Upper Siletz River watershed is managed by BLM and 73 percent is managed by private. Approximately 27 percent of the total BLM managed lands consist of stands greater than 80 years old and approximately 28 percent of BLM managed lands are located in riparian areas (within 100 feet of a stream).

Review of Aquatic Conservation Strategy Compliance:

The project meets 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 the project would comply with the four components of the Aquatic Conservation Strategy. The project 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*. Construction of 4,300 feet of new road may occur within one site potential tree height of stream channels, none within 70 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;

Component 2 – Key Watershed: by establishing that the Upper Siletz River Watershed Enhancement project is located within the North Fork Siletz River/Warnicke Creek Key Watershed;

Component 3 –Watershed Analysis: The Upper Siletz River Watershed Analysis (1996) 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 analyses findings that apply to or are components of this project:

Upper Siletz River Watershed Analysis

Further evaluate single-story stands lacking structural diversity and identified as potential for density management (USRWA p. 6).

Locate any additional stands with hemlock component for potential density management (USRWA p.6).

In stands proposed for density management with less than two hard snags per acre, create snags at least 50 feet tall by topping live conifers at least 24 inches DBHOB (USRWA p.9).

Component 4 – Watershed Enhancement:

The project has 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:

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Table 18: Project' Consistency with the Nine Aquatic Conservation Strategy Objectives

Aquatic Conservation Strategy Objectives (ACSOs)	Upper Siletz River Watershed Enhancement and Associated 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 sections 3.1.1* and 3.1.5). 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 enhancement of distribution, diversity, and complexity of watershed and landscape features would not occur. **Proposed Action Alternative:** Treatments include variable density thinning, creation of small gaps around "wolf" trees, one-acre patch cuts with heavy thinning adjacent, and retention of small clumps. This would increase spatial and structural diversity of the stand (EA p. 39). Patch cuts and heavy thinning areas and gaps would allow development of a younger cohort of trees, likely including a high proportion of shade-tolerant species (EA p. 39). Residual trees would increase in diameter and crown size. With treatment, trees would reach large diameters earlier compared to the no treatment option, creating opportunities for high quality LWD recruitment. Large amounts of smaller wood could 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 . **Alternative 3 (Limited New Road Construction)** Density management would occur on 145 fewer acres (22 percent less) than Alternative 2. The greatest reductions in size would be Fanno Lookout 15A, Fanno Lookout 25B, Potter Elk 25C, and Upper Warnicke 15A, all reduced by about 25 acres (23 to 28 acres). Because trees in Potter Elk 25C are older and height growth would be slowing, there would be less opportunity to improve crown ratio as high stand density continues. In Alternative 3, 42 fewer acres (18 percent less) would be treated within Riparian Reserves. In the long-term (30+ years) the recruitment potential for larger diameter coarse wood would be less than in Alternative 2.

Aquatic Conservation Strategy Objectives (ACSOs)	Upper Siletz River Watershed Enhancement and Associated 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 3.1.1*). 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 and Alternative 3 (Limited New Road Construction):** 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 section 3.1.5*). In summary: **No Action Alternative:** It is assumed that the current condition of physical integrity would be maintained. **Proposed Action Alternative and Alternative 3 (Limited New Road Construction):** This project is unlikely to affect stream channel stability and function as all field identified streams and wet areas would be protected with at least a 55-foot SPZ. No yarding would occur across streams. No bank stabilizing vegetation would be removed. Under both alternatives this project would remove trees along approximately 2,000 feet of Upper Warnicke Creek which is a fish bearing stream. No other tree removal is proposed along fish bearing streams in either alternative. However, thinning is proposed to produce larger trees over time that would fall into the streams adding additional structure and complexity to the channel and a minimum of 55 feet of unharvested stream buffer would remain along the streams (EA p. 54).
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 3.1.4*). In summary: **No Action Alternative:** It is assumed that the current condition of the water quality would be maintained. **Proposed Action Alternative and Alternative 3 (Limited New Road Construction):** For the protection of stream channels and aquatic resources, riparian buffers or no-treatment zones were applied to all stream channels and "high water table areas" (small wet areas, ponds, marshes, etc.) in the project areas. These zones were determined in the field following the protocol outlined in the *Northwest Forest Plan Temperature Implementation Strategies* (2005). Stream buffers extend a minimum of 55 feet from stream channels and to the extent of the riparian vegetation around "wet areas". This zone would be extended upslope during field surveys as far as deemed necessary to protect aquatic resources (the average width of the stream buffer is between 60 and 70 feet). These determinations were based on site features such as floodplains, slope breaks, slope stability, water tables, vegetation heights, etc. Stream shading would exceed the widths recommended to maintain a minimum of 80 percent effective shade resulting in no change to water temperature from the activities proposed in this project (EA p. 53).

Aquatic Conservation Strategy Objectives (ACSOs)	Upper Siletz River Watershed Enhancement and Associated 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 3.1.3*). In summary: **No Action Alternative:** It is assumed that the current levels of sediment into streams would be maintained. **Proposed Action Alternative and Alternative 3 (Limited New Road Construction):** The creation of temporary roads, skidding corridors and the mechanical removal of trees are unlikely to significantly increase sedimentation into area streams because harvest generated slash would be maintained in the skidding corridors, minimizing the need for machines to travel on bare soil. Included in this proposal is the use of ground based equipment to fell and bunch logs on slopes between 35 and 45 percent in the skyline harvest units. The use of ground based equipment machinery would take place on harvest generated slash and no skidding of the trees would be allowed by ground based machinery in these areas. Tree removal is not proposed on steep, unstable slopes where the potential for mass wasting adjacent to streams is high. Therefore, increases in sediment delivery to streams due to harvest activities and mass wasting are unlikely to result from this action. In addition, SPZs in riparian areas have high surface roughness, which can function to trap any potential overland flow and sediment before reaching streams. Ground-based skdding would occur during periods of low soil moisture (less than 25 percent) with little or no rainfall, in order to minimize soil compaction and erosion. This is especially of concern in the south half of section 15 in the Upper Warnicke sale area, as the soils in that area are classified as fragile for timber production (EA p. 52).
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 3.1.4*). In summary: **No Action Alternative:** No change in in-streams flows would be anticipated. **Proposed Action Alternative and Alternative 3 (Limited New Road Construction):** Vegetation would intercept and evapotranspire precipitation that would otherwise become runoff. Thus, it can be assumed that the action considered under this proposal would likely result in some small increase in water yield (including a small increase in summer base flow) which correlates with the removal of a portion of the conifer overstory in the watershed. Based on the amount of harvest in this proposal, the level of water yield increase would be well below 10 percent and would not be able to be detected from the natural range in variability in flow levels on a year to year basis. The risk of increases to peak flows based on the proposed management activity falls well below the potential risk of peak flow enhancement from the Oregon Watershed Assessment Manual Analysis., and below the level determined by Grant (2008) to be measurable beyond the range of natural variability in peak flows on a year to year basis (EA p. 52).
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 3.1.4*). In summary: **No Action Alternative:** No change in in-streams flows would be anticipated. **Proposed Action Alternative and Alternative 3 (Limited New Road Construction) :** For the protection of stream channels and aquatic resources, riparian buffers or no-treatment zones were applied to all stream channels and "high water table areas" (small wet areas, ponds, marshes, etc.) in the project areas. These zones were determined in the field following the protocol outlined in the *Northwest Forest Plan Temperature Implementation Strategies* (2005). Stream buffers extend a minimum of 55 feet from stream channels and to the extent of the riparian vegetation around "wet areas". This zone would be extended upslope during field surveys as far as deemed necessary to protect aquatic resources (the average width of the stream buffer is between 60 and 70 feet). These determinations were based on site features such as floodplains, slope breaks, slope stability, water tables, vegetation heights, etc (EA p. 53).

Aquatic Conservation Strategy Objectives (ACSOs)	Upper Siletz River Watershed Enhancement and Associated Actions
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 3.1.1*). 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 and Alternative 3 (Limited New Road Construction):** Greater species richness was found when prescriptions include gaps and leave islands as part of a variable thinning treatment. Increased overstory variability encouraged development of multiple layers of understory vegetation. From research on the BLM Western Oregon Density Management Study, (Ares, et al, 2009 and Olson and Rugger, 2007) thinning affects vegetation structure by increasing cover of grasses and forbs and increasing species richness, a measure of diversity (EA p. 41).
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 3.1.1*). 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 and Alternative 3 (Limited New Road Construction):** 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. Native plants were found to persist and increase in coverage after density management. Research (Ares, et al, 2009 and Olson and Rugger, 2007, Norvell and Exeter, 2004, Progar and Moldenke, 2002) has found that thinning treatments generally maintained habitat for native plant, invertebrate and invertebrate riparian-dependant species. 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 (EA p. 41).

Over the long-term, this project should aid in meeting ACS Objectives by speeding the development of older forest characteristics in RR, including increased large wood recruitment for stream channels. In addition, more open stands would allow for the growth of important riparian species in the understory. This project would also promote stand diversity, provide more light to accelerate growth of selected conifers and promote species diversity. The creation of snags and CWD would restore watershed conditions by providing a gradual transition in structural characteristics of the treated stands that would more closely resemble late seral forest.

6.0 LIST OF PREPARERS

Table 19: List of Preparers

Resource	Name	Initial	Date
Cultural Resources	Heather Ulrich		
Hydrology/Water Quality/Soils	Steve Wegner		
Silviculture/Riparian Ecology	Hugh Snook/Arlene Roux		
Botany TES and Special Status Plant Species	Ron Exeter		
Wildlife TES and Special Status Animal Species	Gary Licata		
Fuels/Air Quality	Terri Brown		
Fisheries	Scott Snedaker		
Carbon Storage/Climate Change	Hugh Snook		
NEPA Review	Gary Humbard		
Road Work	Russ Buswell		
Timber Harvest Planning	Andy Frazier/Cory Geisler		

7.0 CONTACTS AND CONSULTATION

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

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 Siletz River system. Upper Willamette River (UWR) Winter Steelhead and UWR Spring Chinook are listed as threatened under the ESA, as amended, and are known to occur within the Luckiamute River and South Yamhill River systems.

Based on project location and project activities the proposed Potter Elk, Fanno Lookout, and Upper Warnicke timber sales are considered 'no effect' to Oregon Coast coho salmon. This determination is primarily due to

distance of project activities (more than 9.5 miles) from listed fish habitat. Consultation with NMFS is not required for OC coho salmon for these timber sales.

The proposed actions would have 'no effect' to UWR Spring Chinook salmon and Oregon chub. Generally, the 'no effect' determination is based on the distance upstream of project activities (approximately 25 miles) from ESA listed Chinook salmon critical habitat and historic habitat for Oregon chub. Consultation with NMFS is not required for UWR Spring Chinook salmon, or with USFWS for Oregon chub, for these timber sales.

Based on project location and project activities the proposed Potter Elk and Fanno Lookout timber sales are considered 'no effect' to UWR winter steelhead. The proposed activities, except hauling, occur within the Siletz watershed unconnected to UWR winter steelhead habitat. Proposed hauling occurs within the Luckiamute River where listed steelhead reside. The no effect determination is primarily due to distance of project activities from listed fish habitat (at least 1/3 mile) and proposed design features (dry season use of Blackrock Mainline Road) which would prevent impacts to listed fish from occurring. Consultation with NMFS is not required for UWR winter steelhead for these timber sales.

A determination has been made that the proposed Upper Warnicke Timber sale 'may affect' Upper UWR winter steelhead. The 'may affect' determination is primarily due to the proximity of listed fish and critical habitat adjacent to proposed haul routes in the South Yamhill River watershed. Due to the Proposed Actions' 'may affect' determination consultation with NMFS would be required on ESA listed UWR winter steelhead.

Actions which 'may affect' listed species and are not addressed under existing consultations, including *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.

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 Upper Siletz River Watershed Enhancement EA Project 1 is not expected to adversely affect EFH due to distance of all activities associated with the project from occupied habitat. Consultation with NMFS on EFH is not required for this project.

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

The project area occurs in the Oregon Coast Range Mountains. 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:

1. A scoping letter, dated September 23, 2009, was sent to 22 potentially affected and/or interested individuals, groups, and agencies. – Three responses were received during the scoping period. Comments received were evaluated and considered during the development of this EA and its alternatives.

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

7.3.1 **30-day public comment period**

The EA and FONSI will be made available for public review August 5, 2010 to September 7, 2010. The notice for public comment will be published in a legal notice by the *Polk County Itemizer Observer* newspaper. Comments received by the Marys Peak Resource Area of the Salem District Office, 1717 Fabry Road SE, Salem, Oregon 97306, on or before September 6, 2010 will be considered in making the final decisions for this project.

8.0 **MAJOR SOURCES AND COMMON ACRONYMS**

8.1 **Major Sources**

8.1.1 **Interdisciplinary Team Reports:**

Exeter, R. 2010. Botanical Report. Marys Peak Resource Area, Salem District, Bure*au of Land Management. Salem,* OR.

Licata, G. 2010. Biological Evaluation **(**Upper Siletz River Watershed Enhancement project) . Marys Peak Resource Area, Salem District, Bureau of Land Management. Salem, OR.

Snedaker, S. 2010. Upper Siletz River Watershed Enhancement Environmental Assessment Fisheries. Marys Peak Resource Area, Salem District, Bureau of Land Management. Salem, OR.

Snook, H. 2010 Specialist Report Abstract, Upper Siletz River Watershed Enhancement project, Forest Vegetation and Silviculture. Marys Peak Resource Area, Salem District, Bureau of Land Management. Salem, OR.

Brown, T. 2010. Upper Siletz Watershed Enhancement Fuels Report. Marys Peak Resource Area, Salem District, Bureau of Land Management. Salem, OR.

Wegner, S. 2010. Upper Siletz River Watershed Restoration Hydrology Environmental Assessment Report. Marys Peak Resource Area, Salem District, Bureau of Land Management. Salem, OR.

Wegner, S. 2010. Upper Siletz River Watershed Restoration Environmental Assessment Soils Report. Marys Peak Resource Area, Salem District, Bureau of Land Management. Salem, OR.

8.1.2 **Additional References:**

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.

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.

USDI. Bureau of Land Management. 1995. Salem District Record of Decision and Resource Management Plan. Salem, OR.

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

USDA Forest Service and USDI Bureau of Land Management. 2010. 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)

USDA. Forest Service, USDI. Bureau of Land Management. 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)

USDC. NMFS. 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)

8.2 Appendix A - Response to Scoping Comments

A scoping letter dated September 23, 2009 was sent to potentially affected and/or interested individuals, groups, and agencies. Three responses were received during the scoping period.

8.2.1 Summary of comments and BLM responses

The following narrative addresses comments raised in two letters 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.

8.2.1.1 *American Forest Resources Council*

1. **Comment**: *We would like to encourage the Salem BLM to take a hard look at allowing mechanical harvesting and pre-bunching of processed logs where possible (slopes less than 45%) on ground based, skyline, and helicopter units. This will make all phases of the logging considerably more economical and can also treat the slash at the same time. New mechanical harvesting equipment has a very light footprint on the ground and thus minimizes detrimental soil effects. It is important on those units where mechanical felling is allowed, that units are identified in the Prospectus so purchasers can bid accordingly.*

Response: The project design features will include a design feature that would allow ground based equipment to operate on slopes less than 45 percent within the skyline and aerial yarding areas. The equipment would be allowed to cut, process and deck logs only. No yarding of logs with ground based equipment would be allowed on slopes greater than 35 percent.

8.2.1.2 *Cascadia Wildlands Project*

1. **Comment:** *The construction of roads creates controversy into an otherwise non-controversial project. Temporary roads are not temporary. They may be closed to motorized use after completion of the project, but their effects on the environment last for decades. Additionally, there is an enormous backlog of old roads that need maintenance. Without the funding or any plan to take care of the roads you already have, we strongly encourage you to focus on those areas where road construction is unnecessary. This is particularly true in LSRs and Riparian Reserves.*

Response: Some new road construction is necessary for operability due to topography present in the project area.

The following tables include 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.

Upper Warnicke Timber Sale

Road #	Primary Road Work	Miles	Associated Unit Acres	Acres of Unit/Mile of Road
P	New	0.35	30	86
P1	New	0.13	11	85
P2	New	0.22	32	146

Fanno Lookout Timber Sale

Road #	Primary Road Work	Miles	Associated Unit Acres	Acres of Unit/Mile of Road
P	New	0.38	34	89
P2	New	0.17	22	129
P3	New	0.42	43	102
P4	New	0.04	10	250

Potter Elk Timber Sale

Road #	Primary Road Work	Miles	Associated Unit Acres	Acres of Unit/Mile of Road
P	New	0.92	74	80
P1	New	0.07	7	100
P2	New	0.07	11	157
P3	New	0.12	24	200
P4	New	0.22	17	77

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 come to a consensus on what alternative to pursue for analysis. The substantially higher cost of helicopter yarding areas that are accessible to road construction and conventional harvest methods would be one factor considered in determining which alternative would be implemented.

An alternative that would entail no new road construction was considered during the development of alternatives. This alternative would entail a substantial increase in the amount of area to be helicopter yarded and also reduce the amount of area to be treated due to logging infeasibility. This alternative was analyzed for economic marketability and the ability to meet the purpose and need. This alternative requiring a substantial amount of helicopter yarding in conjunction with a lack of available nearby helicopter landings would have resulted in an uneconomical timber sale. This alternative would not meet the purpose and need of the project subsequently, this alternative was considered but not analyzed in detail.

An alternative that would include a limited amount (1,800 feet) of new road construction would allow the harvest of the majority of the proposed treatment areas and be economically feasible. Therefore this alternative would be analyzed in the EA (Alternative 3).

In addition, since 1995, approximately 4 miles of existing roads have been decommissioned within the Upper Siletz River Watershed and are no longer in need of maintenance.

2. **Comment:** *If BLM still plans to go forward with the 4.2 miles of road construction, or any amount of road construction for that matter, please fully document the placement of those roads and their environmental*

impacts in the EA. Please also explain how the alternative with road construction is better for watersheds and late-successional habitat than the alternatives without road construction.

Response: The estimated distance of new road construction is 3.8 miles and the majority of new road construction (except 0.6 miles) would be located outside Riparian Reserves and generally on ridgetop locations. The roads 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.

3. **Comment:** *Our other concern is with the 5-acre "patch-cut" openings. Are they clearcuts, or are they heavier thins? BLM and the Forest Service have normally limited openings to 1-3 acres. Why is there a need to increase the size in the Upper Siletz watershed? Are these openings proposed in LSRs, and if so, how do they contribute to the development of late-successional forest habitat conditions? Cascadia Wildlands supports variable density thinning, but these multiple 5-acre openings seem excessive.*

Response: Eight patch-cuts would be created within the mid-seral enhancement areas in the AMA LUA only. Patch cuts would not be created within RR and LSR LUAs. Patch cuts would be approximately 1.0 acre in size and would occur on slopes less than 35 percent. Patches in section 25 would be monitored by Oregon Department of Fish and Wildlife and those patches receiving significant elk use would be maintained as early-seral habitat for elk/deer and nesting/foraging habitat for birds.